

# **Promotion of social stabilization and acceleration of economic recovery in Nineveh Governorate in Iraq (Project Number 180207)**

## **Project Terminal Report<sup>1</sup>**

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CONTENTS	2
ACRONYMS	4
1.3. PROJECT OVERVIEW AND BACKGROUND	5
1.1. Project Details	5
1.2. Project Context	5
1.3. Project Results to be Achieved	6
1.4. Target Beneficiaries	7
1.5. Progress Reports Submitted to JSB	7
1.6. Summary of Project Milestones and Achievements	8
1.7. Project Outreach Summary	11
2. PRODUCTION OF RESULTS OUTPUT 1	12
2.1. Capacity building for micro and small enterprises	12
2.2. Capacity building for household agri-businesses	30
2.3. The Project Beneficiaries and COVID 19	43
3. PRODUCTION OF RESULTS OUTPUT 2	45
3.1. Building the capacity of two Departments of the University of Mosul	45
3.2. Capacity-building of the National Staff – Training of Trainers and Students	63
4. PROJECT CHALLENGES	73
4.1. Output 1 Challenges	73
4.2. Output 2 - Challenges	74
5. IMPACT, SUSTAINABILITY AND RECOMMENDATIONS	74
5.1. Impact	74

5.2. Sustainability	80
5.3. Recommendations	80
ANNEX A: Project Log Frame	83
ANNEX B: Visibility Activities	85
ANNEX C: List of Dairy Processing Equipment, Tools and Supplies given to the Dairy Processing Training Beneficiaries	90
ANNEX D: List of educational training equipment procured and installed at the University of Mosul	92

## Acronyms

BoKU	University of Natural Resource and Life Sciences, Vienna
EDP	Entrepreneurship Development Program
HACCP	Hazard Analysis Critical Control Point
IDP	Internally Displaced Person
IOM	International Office of Migration
ISIL	Islamic State of Iraq and Levant
JCC	Joint Crisis Coordinating Centre
KRI	Kurdistan Region of Iraq
MSE	Micro and Small Enterprise
PMU	Project Management Unit
RFQ	Request for Quotation
SME	Small and Medium Enterprises
UoM	University of Mosul



### 1.3. Project Overview and Background

#### 1.1. Project Details

<b>Project number</b>	180207
<b>Project title</b>	Promotion of social stabilization and acceleration of economic recovery in Nineveh Governorate in Iraq
<b>Thematic area code</b>	HC1 Creating Share Prosperity HC13 Human Security and Post-crisis Rehabilitation
<b>Government Coordinating Agency</b>	Nineveh Governorate with support of related ministries, Ministry of Labor and Social Affairs (KRG and Government of Iraq, Baghdad)
<b>Government Cooperating Agency</b>	Ministry of Planning (KRG and Government of Iraq, Baghdad), Ministry of Agriculture – Research Center Erbil, as well as Nineveh Governorate
<b>Executing Agency</b>	United Nations Industrial Development Organization
<b>Donor</b>	Government of Japan
<b>Donor Funds</b>	US\$ 892,857 (includes 13% Programme Support Costs)
<b>Project Starting Date</b>	March 2019
<b>Duration and original completion date</b>	12 months (March 31, 2020)
<b>Actual duration and completion date</b>	15 months (June 30, 2020) with no-cost project extension

#### 1.2. Project Context

In 2014, the Nineveh Plain territory (lying between the city of Mosul, Iraq's second largest city, and the Kurdistan Region of Iraq) was overtaken by the Islamic State of Iraq and the Levant (ISIL). Close to one million people are estimated to have fled their homes, and at least 20,000 commercial and Government buildings, including schools and training institutions, have been destroyed only in Mosul. The majority of those displaced are from vulnerable ethnic and religious minority groups including Yezidi, Christians and the Shabak people. Many civilians from these communities have been specifically targeted by ISIL because of their religious beliefs.

In the fall of 2016, two years after ISIL claimed the Nineveh territory, Iraqi forces made significant military gains and finally liberated the Nineveh Plains in January 2017. Many scattered families were able to return to their towns with high hopes for the future. The challenges, however, are formidable. There are still 14,000 registered families (approximately 90,000 people) who fled from Mosul and the Nineveh Plains living in Erbil, nearly 13,000 homes to be rebuilt, security concerns in the villages, infrastructure concerns (water, electricity, roads, schools and clinics), all while families try to move to the restored villages.

Out of all Iraqi Governorates, Nineveh hosts the most IDPs (613,000 out of 1,986,000), the most returnees (1,481,000 out of 3,923,000) and the largest host communities (101,000 out of 389,000). Together with 4,000 refugees in Nineveh, this makes it the Governorate with the highest number of people in need (2,168,000 out of 6,650,000)<sup>2</sup>. For returnees, the situation in Nineveh Governorate is especially worrisome, as the lack of livelihoods, services, social cohesion and security is amongst the most pronounced when compared nationally; Nineveh is also one of the Governorates where returnees in need of protection assistance are primarily located. Some of the highest country-wide poverty rates exist in Nineveh (in 2011, 26% of the Governorate's population lived under the poverty line<sup>3</sup>), exacerbating the hardships faced by host communities, IDPs, returnees and refugees together<sup>4</sup>.

Nineveh hosts one of the highest proportions of returnees that are food insecure (162,000) and has observed food consumption gaps, high expenditure on food and negative coping strategies<sup>5</sup>. Across Iraq, 2.4 million people are estimated to be in need of food and livelihood assistance, with Nineveh being one of the Governorates where they are most concentrated. Nationally, almost half of both returnees and IDPs identify employment as their main livelihood need; in fact, Nineveh has the highest rate of unemployed out-of-camp IDPs seeking work (45%), the second-highest rate of unemployed in-camp IDPs seeking work (37%), and together with Anbar and Salah al-Din, the highest rate of unemployed returnees seeking work (41%)<sup>6</sup>.

In conjunction with the material reconstruction of the area, there is a need to revive the local economy and generate local employment, which is necessary to ensure sustainable resettlement, long-term economic development, political reconciliation and the bridging of the humanitarian-development divide. The revitalization of micro- and small enterprises that were operational prior to the conflict and the support of economic/livelihood activities can play a crucial role in this process. Also, it is imperative to provide support to IDPs and returnees for them to gain technical and employable skills to enable them to re-establish their livelihoods and consolidate households. This will require a major reconstruction effort, especially in the vocational and technical training sector.

This project aimed to contribute in reviving the local economy of Nineveh Governorate and to improve employability through the two project outputs. The first output aimed to support the rehabilitation of the small enterprises that were operational before the conflict; and to provide the beneficiaries capacities to establish household income-generating activities for their immediate incomes. The second output is geared at the institutional level, where it built the capacity of the Engineering Department of Mosul University to provide skills training for the youth and finally to contribute to the overall resettlement and stabilization of the local economy.

### 1.3. Project Results to be Achieved

**Development Objective:** To contribute to the social stabilization and economic resilience in Nineveh Governorate in Iraq

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<sup>2</sup> UN OCHA, "2019 Humanitarian Needs Overview", November 2018, p. 17

<sup>3</sup> ALI, Ala, "Security, Religion, and Gender in Nineveh Province, Iraq", Peace Insight, 17 September 2015

<sup>4</sup> UN OCHA, "2019 Humanitarian Needs Overview", November 2018, p. 16

<sup>5</sup> Ibid. (MCNA VI, 2018; CARI Analysis, 2018; Comprehensive Food Security and Vulnerability Assessment, 2016), p. 40

<sup>6</sup> Ibid., p. 51

### **Project Outcomes:**

- Micro and small enterprises restarted for sustainable livelihoods and economic recovery in Nineveh Plains
- Vocational Training Centers (VTCs) and/or National Institutions strengthened to improve conditions allowing for return in conflict-affected areas.

### **Project Outputs:**

Output 1. Micro and small enterprises re-established and income generating activities for returnees supported

Output 2. Accelerated return of communities to areas affected by the conflict over strengthened Vocational Training Centers and supported National Institutions.

### **1.4. Target Beneficiaries**

#### **Output 1: 30% of the direct and indirect beneficiaries will be women.**

- *Direct Beneficiaries: 25 micro- and small entrepreneurs who operated their businesses prior to the conflict; 50 returnee households establishing their agro-based/food processing income-generating activities*
- *Indirect Beneficiaries: 50 returnees employed by the micro- and small enterprises assisted*

#### **Output 2: 30% of the direct and indirect beneficiaries will be women.**

- *Direct Beneficiaries: 1 to 2 VTCs and/or National Institution strengthened with equipment improvements and associated training skills capacities.*
- *Indirect Beneficiaries: 50 to 100 employees and potential employees of the National Institution are trained and operational to provide assistance to the population in the Nineveh region.*

### **1.5. Progress Reports Submitted to JSB**

- First Progress Report Covering the Period April – September 2019
- Second Progress Report covering the period October 2019 to January 31, 2020. This report was submitted in conjunction with the request for a no-cost extension moving the project ending date from March 31, 2020 to June 30, 2020.

## 1.6. Summary of Project Milestones and Achievements

<b>Outcome 1. Micro and small enterprises restarted for sustainable livelihood and economic recovery in the Nineveh Plains</b>	
<b>Output 1. Micro and small enterprises re-established and income generating activities for returnees supported</b>	
<b>Activities</b>	<b>Achievements/Milestones</b>
1. Provide entrepreneurship and technical training to MSEs	<ul style="list-style-type: none"> <li>• Trained 16 SME tahini factory owners (all male) on Food Processing, Food Safety and Hygiene and Introduction to Entrepreneurship</li> <li>• To complement the training of the MSE tahini factory owners, the project trained 47 tahini factory workers (13 females, 34 males) on “Introduction to HACCP and EDP Soft Skills (Team Work)</li> <li>• Trained 15 women engaged in a micro business producing dairy products.</li> </ul>
2. Assist MSEs to rehabilitate their factories/workshops; and provide equipment required and other in-kind inputs that may be required	<ul style="list-style-type: none"> <li>• Provided equipment to the 16 SME tahini factories to improve/increase their production process and packaging. A local SME factory in Iraq fabricated all the processing equipment required by the factories.</li> <li>• Provided dairy processing supplies and tools to the 15 women trained in producing dairy products to help them start/improve their income generating activities.</li> </ul>
3. Provide training to returnee households to establish their agri-based or food processing income generating activities	<ul style="list-style-type: none"> <li>• Conducted training on Household Poultry Operations for 68 female beneficiaries (48 in Bashiqa and 20 in Sheikhan)</li> <li>• As part of the sesame value chain, the project trained 26 sesame farmers supplying tahini factories in Bashiqa sub-district.</li> </ul>

Activities	Achievements/Milestones
4. Provide tools and in-kind support to returnee households to establish their income-generating activities	<ul style="list-style-type: none"> <li>• Distributed the chickens, poultry supplies and feeds to the 68 women beneficiaries who were trained on household poultry operations</li> </ul>
<p><b>OUTCOME 2. Vocational training centers and/or national training institutions strengthened to improve conditions allowing for return in conflict affected areas.</b></p> <p><b>Output 2. Accelerated return of communities affected by the conflict over strengthened VTCs and supported national institutions</b></p>	
2. Identify and develop partnership to establish a programme to address issues of safety	<ul style="list-style-type: none"> <li>• Two main partnerships were identified and developed: One with the BOKU University – Hydraulic Engineering and River Research; and other one with FESTO Didactic in support of the Mechatronic Department at the University of Mosul.</li> </ul>
3. Procurement of identified equipment, installation and commissioning	<ul style="list-style-type: none"> <li>• Procured, installed and commissioned the Hydraulic Equipment and Mechatronic Equipment; low-value procurement also made such as tools required in the industrial workshop, theoretical class room furniture, and video-conference systems.</li> </ul>
4. Planning of TOTs and capacity building activities	<ul style="list-style-type: none"> <li>• In accordance with the UoM, TOT was planned with the Department of Water Resources and Damns Management, the Department of Mechatronics Engineering and the Ministry of Labor and Social Affairs (Erbil).</li> </ul>
5. Implementation of capacity building activities	<ul style="list-style-type: none"> <li>• Provided TOT on flood-risk management and hydromechanics and hydrodynamics fundamentals for 53 beneficiaries from UoM and related institutions.</li> <li>• Provided Smartscreen Training for 4 beneficiaries from the Department of Water Resources and Damns Management, UoM.</li> <li>• Provided TOT of Mechatronics Laboratory for 10 beneficiaries from the Mechatronics Engineering (UoM, Mosul) and the Ministry of Labor and Social Affairs (Erbil).</li> </ul>

6. Supporting VTCs in providing assistance to returnees and ensuring skills development

Teachers of the UoM trained over 500 students with the new equipment and new didactic skills:

- 190 students from Civil Engineering Department
- 130 students from the Mechatronics Department
- 67 students from the Oil Engineering Department
- 60 students from the Dams and Water Resources Department
- 55 students from the Environmental Technical Department
- 36 students from the Environmental Engineering Department

## 1.7. Project Outreach Summary

### OUTPUT 1

*Table 1 Direct Project Beneficiaries disaggregated by Gender (in Total)*

Gender	Number of Direct Beneficiaries	Ratio
Female	96	56%
Male	76	44%
<b>Total</b>	<b>172</b>	<b>100%</b>

*Table 2 - Summary of project beneficiaries per intervention*

Intervention	No. of Beneficiaries	Ratio
Household Dairy Processing	15	9%
Household Poultry	68	40%
Sesame Farmers	26	15%
SME Tahini Factories	16	9%
Tahini Factory worker	47	27%
<b>Total</b>	<b>172</b>	<b>100%</b>

### OUTPUT 2

*Table 3 Direct Project Beneficiaries disaggregated by Gender (in Total)*

Gender	Number of Direct Beneficiaries	Ratio
Female	15	22%
Male	52	88%
<b>Total</b>	<b>67</b>	<b>100%</b>

*Table 4 - Summary of project beneficiaries per intervention*

Intervention	No. of Beneficiaries	Ratio
Training of Trainers on flood-risk management and hydromechanics and hydrodynamics fundamentals	53	79%
SmartScreen Training	4	6%
Training of Trainers- Mechatronics Laboratory	10	15%
<b>Total</b>	<b>67</b>	<b>100%</b>

## 2. Production of Results Output 1

### Output 1. Micro and small enterprises re-established and income generating activities for returnees supported

#### *Indicators and Assessment of Results*

- At least 70% of the micro and small enterprises assisted by the project are fully operational

**Achieved:** Yes. Despite the COVID situation, the project beneficiaries continued with their own income generating activities albeit at a reduced level. At the time of project evaluation, all those assisted in Bashiqa were still operating their business. The Sheikhan beneficiaries during the evaluation did not yet receive their poultry tool kit.

- Minimum of 25 micro and small enterprises directly benefit from the training, technical assistance and material support; 30% of who are female owned enterprises

**Achieved:** Yes. 31 micro and small enterprises assisted - 16 tahini factories and 15 micro/household dairy processing enterprises. 48% of these enterprises assisted are female owned enterprises.

- at least 75% of the returnee families are sustaining the income generating activities they were assisted to establish.

**Achieved:** Yes. (Your question do we know the percentage? Answer: at the time of project evaluation 100% of those who were assisted still had their income generating activities on-going despite of COVID.

- 50 returnee households have been assisted to establish their own agri- or food processing income generating activity (30% of who are female headed households)

**Achieved:** Yes, 89 households or 178% have been assisted to establish their own agri or food processing income generating activities. However only 22 or 25% are female headed households.

#### *Process, Major Activities and Status*

### 2.1. Capacity building for micro and small enterprises

The project worked with 31 micro and small enterprises in Bashiqa. 16 were small and medium scale tahini factories and 15 micro/household enterprises producing dairy products (yoghurt and cheese).

#### **Assistance to the SME Tahini Factories**

The Rapid Market Assessment conducted in the Bashiqa District of Nineveh showed that after liberation from ISIS 16 SME enterprises producing tahini (sesame paste) started rehabilitating their factories. They have infused an average of \$113,687 to rehabilitate their factories by purchasing new equipment and/or purchasing equipment that were taken by ISIS and for the renovation of the factories that were destroyed. All their current operations are about 25% of their pre-ISIS operating capacity.

Based on the training needs identified, these enterprises need technical assistance to upgrade their production process to have better quality products taking into consideration food safety and hygiene as well as equipment to improve their packaging and meet the government's requirements on



labelling. The entrepreneurs also expressed keen interest in learning more how to manage their businesses better.

The tahini processing sector play an important role in the economy of Bashiqa as it is one of the largest employers in the district. Before ISIS each tahini factory was employing a minimum of 20 people.

### **Technical Training of the SME Tahini Factory Owners**

The project provided to the SME tahini factory owners Training on Food Processing, Food Safety and Hygiene and Introduction to Entrepreneurship Development. It is a 34-hour training spread over a period of 10 days; 6 days was allocated for food processing and food safety and 4 days on entrepreneurship development. Training was spread over the period August 17 – 28, 2019. Topics covered were as follows:

#### **Food Processing, Food Safety and Hygiene Module**

#		At the end of the session, the participants will be able to:	Hours
1	Standard Specification and Product, Specification	Give a technical overview of the tahini industry; write suitable specifications for their product; classify, their product into one of the three common food types and explain PH.	1.5
2	Raw Materials	List their raw materials and alternatives to them; list source of supply and alternatives to them; define and practice “grading”; define and prepare “specifications” for their raw materials and discuss 5 ways of maintaining their raw material quality	2
3	Food Spoilage	Explain how microorganisms and other food spoilage mechanisms spoil their raw materials and products	1.5
4	Food Preservation	Discuss 8 food preservation techniques and identify what to use in their business	1.5
5	Production, Process, and Quality Control	Able to discuss how they can process their food product in an improved and more controlled way, in their workshops	2
6	Getting a more productive workforce	Define worker productivity and name ways to make people more productive in the workshop	1.5
7	Workshop layout and design; equipment and technology choice	Assess and improve their workshop layout; discuss building requirements for a good workshop; use the string diagram technique to improve their layout; explain principles of machine, utilization and hygiene hazards in their own workshop	2.5
8	Food Contamination	Describe ways to reduce contamination from foreign objectives, pests, and chemicals; and maintain good personal hygiene	2
9	Food Poisoning	Describe symptoms and cause of food poisoning; name the five keys to preventing food poisoning.	2

10	Food Safety and HACCP	Prepare a simple food safety program for their business based on HACCP principles.	1
11	Packaging and Storage	Discuss principles to improve product packaging and storage	1.5
12	Waste Management and Environment	Describe good practices for eliminating solid, liquid, and gaseous waste; Discuss ways to maintain, healthy air in the workshop	1
<b>Total number of hours</b>			<b>22</b>

**Module: Introduction to EDP**

#	Session title	At the end of the training the participants will be able to	Hours
1	Characteristics of successful entrepreneurs	Explain the different characteristics of successful entrepreneurs	2.5
2	Self -assessment	Assess their entrepreneurial characteristics	1
3	Know your product and promotion your business	Explain significance of knowing their products and non-product values and its importance in promoting their business	3.5
4	Introduction to financial management	Explain importance of financial of management and identify elements of good financial management	1
5	Introduction to financial statements	Explain the different financial statements (profits and loss, balance sheet and cash flow)	2
6	Financial analyses	Demonstrate how to analyze the financial statements of their business and able to compute break – even point	4
<b>Total number of hours</b>			<b>14</b>



**Training session on Food Safety and Hygiene for the tahini factory owners**

### ***Technical Training of the Tahini Factory Workers***

As part of the package to help in the rehabilitation of the SME tahini factories, the project trained 47 workers from the 16 factories. The 15-hour training spread over a period of 5 days covered Food Safety and Hygiene and Soft Skills for Team Building and Work Ethics. The topics covered were upon the request of the SME factory owners.

This training complemented the training of the tahini factory owners. The project conducted the training in two batches; 5 days each training; October 20-24, 2019.

### **The Training Package**

#	Session title	At the end of the session, the participants will be able to:	Hours
<b>Day 1: Food Safety and Hygien Module</b>			
1	Food Spoilage	Explain how microorganisms and other food spoilage mechanisms spoil their raw materials and products	1.5
2	Food Preservation	Discuss 8 food preservation techniques and identify what to use in their business	1.5
<b>Day 2 : Food Safety and Hygiene Module</b>			
3	Production, Process, and Quality Control	Able to discuss how they can process their food product in an improved and more controlled way, in their workshops	1.5
4	Food Contamination, <b>personal hygiene and safe food handler.</b>	Describe ways to reduce contamination from foreign objectives, pests, and chemicals; and maintain good personal hygiene	1.5
<b>Day 3: Food Safety and Hygiene Module</b>			
6	Food Safety and quality assurances HACCP	Prepare a simple food safety program for their business based on HACCP principles.	2
7	Packaging and Storage, Material handling	Discuss principles to improve product packaging and storage	0.5
8	Waste Management and Environment	Describe good practices for eliminating solid, liquid, and gaseous waste; Discuss ways to maintain, healthy air in the workshop	0.5
<b>Day 4: Soft Skills Team Building and Work Ethics</b>			
9	Personal Entrepreneurial Characteristics	Explain the different entrepreneurial characteristics and relate those characteristics to their own personal characteristics	1
10	Self-Awareness	Assess themselves and have new insights into their skills, needs, values and personal entrepreneurial characteristics that will guide them toward planning their career goals.	2
<b>Day 5: Soft Skills Team Building and Work Ethics</b>			
11	Developing a Positive Attitude	Develop positive attitudes that will help them become better persons resulting to greater employability and having better social interactions.	0.5
12	Effective Communication	Experience and explain the importance of effective communication.	0.5
13	Effective Time Management	Explain the importance of time management; state the foundation of efficiency of time management; identify and discuss ways to avoid time wasters; and prepare their "to do list" applying principles of good time management	0.5
14	Managing Conflict Situations	Identify and discuss roots and causes of conflicts and discuss ways to manage conflicts in the work place	1
15	Social Interaction and Cooperation and Top 10 Values Employers Look for in Employees	Discuss ways of learning to work together and how to make agreements	0.5
		<b>Total training hours</b>	<b>15</b>

## Profile of the factory workers who attended the training program

### *Distribution of the trainees per gender*

Gender	No. of Responses	Ratio
Female	13	28%
Male	34	72%
Total	47	100%

### *Distribution per Age Group*

Age Group	No. of Responses	Ratio
18-24	21	45%
25-35	14	30%
36-and Above	12	26%
Total	47	100%

The above show that 75% of the workers trained belong to the youth (18-24 years old) and the young adults (25-35 years old) sector.

### *Distribution by highest level of education reached*

Highest Educational attainment	No. of Responses	Ratio
Did not go to school	8	17%
Primary/Elementary	21	45%
Junior High School (Grade 7, 8, 9)	5	11%
Senior High School (Grade 10, 11, 12)	3	6%
Vocational Diploma	3	6%
Diploma	4	9%
University	2	4%
No Answer	1	2%
<b>Grand Total</b>	<b>47</b>	<b>100%</b>

### *Type of employment with the factory*

Type of employment with the factory	No. of Responses	Ratio
Full-time	46	98%
No answer	1	2%
<b>Total</b>	<b>47</b>	<b>100%</b>

### *Marital status of the trainees*

Marital Status	No. of Responses	Ratio
Single	28	60%
Married	15	32%
Divorced/separated	1	2%
No answer	3	6%
<b>Total</b>	<b>47</b>	<b>100%</b>

### ***Members of their household:***

The data show that on the average 6.833 people live in the household where the factory workers reside.

<b>How many people live with you in your house?</b>	<b>No. of Responses</b>	<b>Ratio</b>
3	5	11%
4	4	9%
5	3	6%
6	7	15%
7	11	23%
8	5	11%
9	3	6%
10	2	4%
13	3	6%
14	2	4%
17	1	2%
21	1	2%
<b>Total</b>	<b>47</b>	<b>100%</b>

### ***Number of youth and young adults in the household***

The responses show weighted average of 2.83 youth and young adults in each household of the factory workers.

<b>With you included, how many are 18 years to 35 years of age?</b>	<b>No. of Responses</b>	<b>Ratio</b>
1	6	13%
2	12	26%
3	10	21%
4	5	11%
5	8	17%
7	1	2%
8	1	2%
None	2	4%
(blank)	2	4%
<b>Total</b>	<b>47</b>	<b>100%</b>

### ***Role in the family support***



72% of the factory workers trained are the sole bread winners of their families. This shows the important contribution the tahini factories to the families in Bashiq.

<b>Are you the sole bread winner of the family</b>	<b>No. of Responses</b>	<b>Ratio</b>
No	13	28%
Yes	34	72%
<b>Total</b>	<b>47</b>	<b>100%</b>

## Equipment Support to the SME tahini factories

Based on the needs of the tahini factories, the project issued the following Requests for Quotations to purchase the equipment they requested as support:

- **RFQ for off-the shelf equipment**

Item No	Specifications	Number of Units Required
1	<p><b>One nozzle paste/liquid filling machine with stainless steel tank 20Liters</b> Condition: New/ stainless steel 304            Warranty: 1 Year            Application: Food, Hardware, Cosmetic            Automatic Grade: Semi-Automatic            Driven Type: Electric&amp; pneumatic            Voltage: 220V/110V-50hz 400W            Dimension (L*W*H): 118*38*43cm            Weight: 26kg. Certification: CE SGS            Pressure: 0.4-0.6mpa            Filling speed: 5-30bottles/min            Filling accuracy: <math>\leq \pm 1\%</math>            Filling volumes range :( 80-1100ml.) From (100grms up to 2000grms) – 100ml-2000ml</p> 	4 units
2	<p>DIRECT DRIVEN AIR COMPRESSOR 220V,            Model Number: V-0.25, 350L            Power Source: AC Power 220v.            Configuration: Portable            Warranty:1 Year            Lubrication Style: Lubricated            Condition: New            Voltage: 220V-50HZ.            Certification: CE            Type: Piston            Motor Power:4 HP            Engine :6.5HP.            Pressure:8-10 bar maximum            flow:840L/min</p> 	4 units

Item No	Specifications	Number of Units Required
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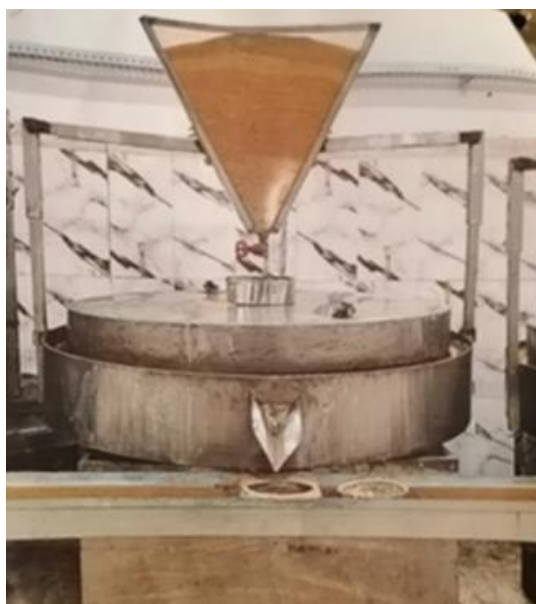


<b>3</b>	<p><b>SEMI-AUTOMATIC CARTON BOX SEALING MACHINE</b></p> <p>Sealing box speed 10-20box/min  Applicable carton size: L600  open×W230-600mm×H130-800mm  Power supply 220/380V 50Hz  Power consumption 0.18kw  Tape width W48-60mm- 75 mm  (Alternative use)  Package size L1020×W850×H1350  mm (Without front and rear roller  frame)  Machine weight 145-165KG</p>	<b>2 units</b>
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- **RFQ for Locally Fabricated Tahini Machines**

Item No	Specifications	Number of Units Required
<b>1</b>	<p><b>TAHINI/SESAME PASTE MAKING MACHINE -STONES MILLS GRINDER. معصرة</b></p> <p>Specifications:  Material: stainless steel 304 all part manufactured  Voltage: 380V 3phase 50HZ.  Power:7.5-10 HP. 1000 r.p.m – 35r.p.m 24 am.  Main part size:  180*135*120cm  Weight :1000-1100 kg.  Capacity: 50-60 kg/hr. paste  Stones Diameters: 120-125 Cm., Turkish 10-20 years guarantee  Thickness: 16 cm for the lower &amp; upper stone.  Motor: 3phase :380v. 7.5 -10 Hp,1000 r.p.m- 35r.p.m .50 Hz 24am.  connect 4 V-belts to 4 Pulleys reduction to 35 r.p.m</p>	<b>3 Units</b>





Item No	Specifications	Number of Units Required
2	<p><b>Roller roasting machine/Sesame burner (قلاية ) 16. Complete -locally Made</b></p> <p>Application: food industry            Heating: Working type: gasoline &amp; electric /high thermo heat efficiency &amp; uniform heating            Capacity: 200KG/Hrs.            Dimensions: (L.H.W) (150*190*120)            Total weight: - 900-1000kg.            Cylinder size inside: 100*75cm. Diameter            All parts inside and outside made of Stainless steel 304 SS308            The frame two layers Isolated from inside            Burner: Electric and Gasoline (220 v and 16 bars pressure)            Gear box with Motor: 220/380 v.50 HZ. 3-4HP- 9A</p>	3 units



- RFQ Expiry Date Printers

Item No	Specifications	Number of Units Required
1	<p><b>Handheld inkjet coding machine/expiry date printer (see picture for sample)</b></p> <p>Expiry date printing Machine: Inkjet coding Machine \ With conveyer and stand :1.3 M 25cm width as shown in photo            Type: Inkjet Printer:            Automatic Grade: Automatic            Voltage: DC16.8V, DC16.8 lithium battery            Dimensions(L*W*H): 130*114*220MM Weight: 1.2KG            Warranty: 1 Year            Print Dimension: 1-12.7mm            Ink Type: solvent and water based            CPU: Quad core 1.4 GHz            Shape Features: ABS+PC case, all black, color touch screen            Spray nozzle: Thermal foaming inkjet 2.5            Printing height: 1.2mm-12.7mm            Printing speed:70m/min            Ink colors: Black, white, red, blue, yellow, green, invisible            Ink volume: 42ml (usually can print 700,000 characters)            Packaging: Metal save box            Printing data: Variable data like expiry date, production date, lot number, operator information and image/ logo / barcode et            Message storage capacity: Store up to 100,000 messages with 4G memory            Languages: English, Arabic            Ink color: Black, white, red, yellow, blue, green            Ink Type: quick-drying ink            Nozzle: TIJ2.5 Thermal foaming nozzle</p>	4 units



Item No	Specifications	Number of Units Required
2	<p><b>Continuous Inkjet Printing Machine for Plastic Coder (see picture for sample)</b>            Similar to CIJ inkjet printer V150            Max. Print Speed 900 characters per second (5*7 dots)            Printable Font Height 1.5 mm-20mm adjustable. Maximum can be widened 9 times; Dot Matrix 24 * 24 dot matrix            Memory Capacity Up to 1000 messages            Printing line within 3 Lines; Printer Content Time, date, lot numbers, serial number            Operate Interface English and Arabic with graphic editing function            Print Material metal, plastic, glass, wood, tube, electrical wire, cable etc.            Print distance 30mm Max from printhead bottom to subtract surface            Ink color Black, blue, red etc            Ink Consumption 70 million character per litter            Power AC220V /380V 50HZ 100AV            Printhead Throat Length 2.7m (customizable)            Warranty: 1 Year; USB and RS232 port No            Environment temperature 5°C-45°C; Humidity Below 90%            Machine Dimension 248 * 338 * 550mm            Package Size 700*500*700mm; Gross Weight 50kgs            Display and Keyboard 8-inch full-color high-definition touch screen, and full-touch virtual keyboard"</p>	6 units



At the time the project was starting, the PMU found out that IOM had also an on-going support program to help the tahini factories in Ninewa. So as not to compete and duplicate assistance, the PMU got in touch with IOM to discuss project synergies.

IOM and the PMU agreed that IOM will furnish the names of the factories that they will support in terms of equipment. UNIDO will provide equipment to those not assisted by IOM. UNIDO will also provide training to the beneficiaries of the IOM intervention.

The RFQs that were issued were for the equipment of the factories not assisted by IOM. The RFQs were initially issued on 29 September 2019 with deadline set on 18 October 2019. When the deadline came, the PMU did not receive any offers; hence was re-issued on November 6, 2020 with deadline set on November 17, 2019. On the second round, the PMU received offers for the RFQs, which then was processed. UNIDO Vienna issued the Purchase Orders based on the technical and financial evaluation of the offers received.

For the RFQ Expiry Date Printers – the PMU recommended splitting the orders. Four of the handheld printers were purchased from Dashti Technical and the six continuous ink printing machines were purchased from Nozhan Bureau. In February 2020, however, Nozhan Bureau informed UNIDO that it is unable to deliver because of the difficulties with importations from China and delivery schedules because of the emerging COVID crisis. The PO was therefore cancelled and a new RFQ issued. At this time, Procurement over \$5,000 were already being handled by the ROTC Procurement Team at the Agribusiness Department, where the project belongs. ROTC Procurement awarded the contract to United Traders for Filling and Packaging, a Baghdad based supplier on May 14, 2020. The company was able to deliver all the items before the project closure on 30 June 2020.

Below are some pictures taken during the fabrication of one of the equipment for the SME Tahini factories.



**Fabrication by a local company of the sesame seed stone grinder equipment ordered**





**Delivery of the equipment to Bashiq**



**Sesame Seed Stone Mill Grinder (locally fabricated) Handed Over to an SME Tahini Factory**

## Assistance to the Micro/Household Dairy Processing Enterprises

The project in coordination with the Local Council identified families that had livestock and if they were processing the dairy produced. Fifteen participants were selected to join the training on Dairy Processing. Criteria for selection was that they have livestock and are engaged or have intentions of processing the milk from the livestock for selling and a female member of the family will be attending the training program.

Profile of the 15 female trainees is as follows

Age Group	No. of Trainees	Ratio
18-25	3	20%
25-35	1	7%
35 years old	11	73%
Total	15	100

Highest educational attainment	No. of Trainees	Ratio
a) Did not go to school	4	27%
b) Primary/Elementary	6	40%
c) Junior High School (Grade 7, 8, 9)	4	27%
d) Senior High School (Grade 10, 11, 12)	1	7%
Total	15	100%

Marital Status	No. of Trainees	Ratio
a. single	4	27%
b. married	11	73%
Grand Total	15	100%

Occupation before Training	No. of Trainees	Ratio
Housewife/Housekeeper	11	73%
No work	2	13%
Student	2	13%
Total	15	100%

Already Produced Milk Before Training	No. of Trainees	Ratio
Yes	14	93%
No but intend to produce	1	7%
Total	15	100%

## Products Being Produced by the trainees

Products being Produced by the Trainees	No. of Trainees	Ratio
Milk, Yogurt, Cheese	5	33%
Yogurt	5	33%
Yogurt, Cheese	2	13%
Milk	1	7%
Milk, Yogurt	1	7%
None yet	1	7%
Total	15	100%

## Technical and EDP Training Provided

The 10-day training on Household Dairy Processing for the 15 returnees was held on February 1-11, 2020. The first eight days were technical in nature covering topics on food safety and hygiene and how to better produce dairy products such as cheese and yoghurt. The training incorporated practical exercises for the trainees to practice and demonstrate the concepts they have learned. Two days of the training was the business side of dairy processing.

Training Course Program for Household Dairy Processing in Bashiqa District February 2020	
Day 1: Feb.1	What should you know about Milk Composition? What is milk like? Constituents of Milk. Why processing? Dairy products as a business - Hygiene in general - the milk ingredients and means of hygiene - the importance of hygiene and its impact on humans, animals and production. Identify microbes and their role in human life (hygiene / diseases / product deteriorations).
Day 2: Feb. 2	Hygiene in dairy household processing in general - the elements and means of hygiene - the importance of cleanliness, Testing for Physical Properties how to handle the milk and processing Detergents and cleaning procedures Types of cleaners and its effects on microbial growths. Identification of microbes and their role in human life (hygiene / diseases / milk, products shelf life ).
Day 3: Feb.3.	Definitions of pasteurization, fermentation, Bacterial Cultures, how to use the thermometer. As per health hygiene the parameters to be available in the household dairy processing. the steps of yogurt, and white soft cheese household processing in a hygiene, economic way.
Day 4: Feb.4	<b>(Practical)</b> /yogurt production with trainees with the control of the health side using the means of hygiene. The way of preparing, using a starter cultures
Day 5: Feb.5	Cheese Definitions, Ingredients, Bacterial Cultures, and General Manufacturing Procedure Small Scale Cheese Making, what is important in cheese making? - Explain the steps to manufacture soft fresh cheese by using rennet in a healthy way; steps in making white cheese using acid.
Day 6: Feb.6	<b>(Practical)</b> the work of soft cheese production (local) by trainees with the application of steps and debate. And How can you make semi-hard cheese? What defects are there in cheese? How do you check of your cheese?
Day 7: Feb.8	<b>(Practical)</b> the process of making white cheese (using Acid) by trainees with the application of steps and discussions

EDP SOFT SKILLS (Marketing and simple financial /record management)	
Day 8: Feb. 9	How to calculate production costs? Income and Expense Record Planning Together as a Family.
Day 9: Feb.10	Dairy animal products as business, how to find the market, develop your business
Dairy processing	
Day 10 Feb. 11	Preserving dairy products (milk, yogurt, cheese), incubator and fermentation / General questions and inquiries. Closure of the session. Distribution of Certificates.

Pictures during the Technical Training



Practical Session



Cheese made during the training





Milking of Cow to make yoghurt or cheese



Some trainees showing products they produced during the training



## Equipment Support

After the training, the project provided equipment/tool support to the 15 graduates to help them improve/start up their dairy processing business. The list of equipment is in Annex B of this report. The items were procured in accordance with UNIDO Procurement Procedures. Total cost of the equipment support for the Dairy Processing Beneficiaries was US\$ 13,326. Below are some pictures of the beneficiaries taken during the handing over of the equipment/tool kit.



Amal Ibrahim Hassan, a returnee and resident of Bashiqa to this day is still processing milk from her sheep; making the milk to yoghurt and cheese and selling in the local market, the income of which she uses to support her family and children.



Faiza Nawaf Rasho is a daughter of a sheep breeder from Sinjar but now staying in Asiq, Bashiqa. Their family is also a returnee. She is using the knowledge learned from the training to make cheese that she sells in the local market, the income of which helps provide for her family's needs.

## 2.2. Capacity building for household agri-businesses

### Assistance to put up Household Poultry Operations

The project assisted 68 women (48 returnees to Bashiqa and 20 IDPs from Shekhan) to put up their household poultry business, which as per experience of the previous JSB project (170203) had provided the women continuous source of income and food security for the family.

#### Profile of the 48 women beneficiaries in Bashiqa

- **Marital Status**

Marital Status	No. of Beneficiaries	Ratio
a. single	9	19%
b. married	34	71%
c. divorced/separated	1	2%
d. Widow	4	8%
<b>Total</b>	<b>48</b>	<b>100%</b>

- **Number of Children**

The average number of children for each beneficiary with child is 3.67

No. of Children	No. of Responses	Ratio
1	2	4%
2	7	15%
3	9	19%
4	5	10%
5	4	8%
6	7	15%
No answer	14	29%
<b>Total</b>	<b>48</b>	<b>100%</b>

- **Highest Educational Level**

73% of the 48 beneficiaries in Bashiqa have primary/elementary education as their highest educational level. Only 7 have gone to high school (5 Junior High and 2 Senior High).

Education Level	No. of Trainees	Ratio
a) Did not go to school	2	4%
b) Primary/Elementary	35	73%
c) Junior High School (Grade 7, 8, 9)	5	10%
d) Senior High School (Grade 10, 11, 12)	2	4%
e) Vocational Diploma	1	2%
g) University	3	6%
<b>Total</b>	<b>48</b>	<b>100%</b>

- **Average age of the beneficiaries**

The youngest beneficiary is 20 years and the oldest is 61 years. General weighted average age of the beneficiaries is 38.5 years. 17 beneficiaries (35%) are between 20 to 32 years old (belong to the Youth and young adult sector).

- **Number of people in their household**

The average number of people in the households of the beneficiaries is 5.

<i>How many people live with you in your house</i>	<i>No. of Trainees who responded</i>	<b>Ratio</b>
3	7	15%
4	4	8%
5	15	31%
6	9	19%
7	4	8%
8	5	10%
11	2	4%
20	1	2%
0	1	2%
<b>Total</b>	<b>48</b>	<b>100%</b>

- **Current Occupation**

From the responses, only 2 of the respondents are working part time (paid employment).

<b>Occupation</b>	<b>No. of Responses</b>	<b>Ratio</b>
No work	17	35%
No work - housewife	26	54%
Student	1	2%
Work part time	2	4%
Blank	2	4%
<b>Total</b>	<b>48</b>	<b>100%</b>

- **Experience in poultry raising**

21 (44%) of the beneficiaries had experience in household poultry operations. 26 (54%) had no experience.

<b>Own poultry before project</b>	<b>No. of Responses</b>	<b>Ratio</b>
No	26	54%
Yes	21	44%
(blank)	1	2%
<b>Total</b>	<b>48</b>	<b>100%</b>

Type of animals	No. of Responses	Ratio
Chicken	18	38%
Chicken 40, Duck, Turkey	1	2%
Chicken, Dove	1	2%
Doves	1	2%
No	9	19%
(blank)	18	38%
Total	48	100%

### Profile of the 20 women IDP beneficiaries in Sheikhan

- Marital Status**

Marital Status	No. of Responses	Ratio
a. single	2	10%
b. married	8	40%
c. divorced/separated	2	10%
d. Widow	6	30%
e. No answer	2	10%
Grand Total	20	100%

- Number of Children**

For the trainees who have children, the average number of children they have is 4.6

No. Of children	No. of Participants	Ratio
1	1	5%
2	3	15%
3	1	5%
4	2	10%
5	1	5%
6	5	25%
7	1	5%
10	1	5%
(blank)	5	25%
<b>Total</b>	<b>20</b>	<b>100%</b>

- Highest education level**

Only two out of the 20 beneficiaries attended school.

Education Level	No. of Participants	Ratio
a) Did not go to school	18	90%
b) Primary/Elementary	1	5%
c) Junior High School (Grade 7, 8, 9)	1	5%
<b>Total</b>	<b>20</b>	<b>100%</b>

- **Age of the Beneficiaries**

The youngest beneficiary is 24 years old and the oldest is 69 years old. The weighted average age of the women beneficiaries is 42.3 years old. 6 out of the 20 beneficiaries (20%) are between ages 24 to 35 years (youth and young adult sector)

- **People in the household of the beneficiary**

The average number of people in the household of each beneficiary is 5.

<b>How many people live with you in your house</b>	<b>No. of Responses</b>	<b>Ratio</b>
1	1	5%
2	2	10%
3	2	10%
4	3	15%
6	5	25%
7	1	5%
8	2	10%
10	1	5%
(blank)	3	15%
<b>Total</b>	<b>20</b>	<b>100%</b>

- **Role in the family**

11 of the trainees said that they are the sole breadwinner in their family. We note that all of the beneficiaries said they have no work when they were asked the question “if they were employed or not”.

<b>Are you sole breadwinner for the family?</b>	<b>No. of Responses</b>	<b>Ratio</b>
No	7	35%
Yes	11	55%
(blank)	2	10%
<b>Total</b>	<b>20</b>	<b>100%</b>

<b>Own poultry before project</b>	<b>No. of Participants</b>	<b>Ratio</b>
No	14	70%
yes	4	20%
(blank)	2	10%
<b>Total</b>	<b>20</b>	<b>100%</b>

### **Technical and EDP Training Provided**

The project conducted the Training on Household Poultry and EDP soft skills for the 68 beneficiaries. The training in Bashiqa was conducted in two batches: first batch of 24 (December 1-9, 2019) and second batch of 24 (December 10-23, 2019). The project conducted the same training for 20 protracted IDPs in Sheikhan, June 5-13, 2020

The training program was for 8 days of 3.5 hours every day divided into two modules: the technical module of 5 days (how to raise chickens) and EDP of 3 days (household poultry as a business). Below were the topics covered in the training:

#### **A. Technical Module**

- Day 1
- Introduction: Poultry Birds
  - Methods of raising Poultry
  - Organic poultry production
- Day 2
- Equipment used in habitation and types of habitation
  - Introduction of Egg laying Chickens
  - Optimum environmental factors of layer production
  -
- Day 3
- Management and properties that affect production
  - Feeding and preparation of Mixture Feeds
  - Q&A and practical
  -
- Day 4
- Health and diseases and common diseases
  - Protecting against illness and Hatching
  - Handling Chickens
  - practical
  -
- Day 5
- Types of eggs (external and internal attributes)
  - Making industrial Eggs and creating Enhanced Breeds
  - practical

#### **B. EDP MODULE**

- Day 6
- Introduction and Levelling of Expectations
  - Characteristics of successful entrepreneurs
  - Entrepreneurial Self-Assessment
  - Developing a Positive Attitude
  -
- Day 7
- Self-confidence and Assertiveness
  - Goal Setting
  - Time Management
  - Planning and Decision Making and working as a group
  -
- Day 8
- Poultry Farming as a Business
  - Poultry Grower as an Entrepreneur
  - Marketing of Eggs
  - Business and family budgeting (working as a group)



### **Household Poultry Kit Provided**

The following items consisted of the Household Poultry Kit given to each of the Bashiqa and Shekhan beneficiaries:

- Chickens (20 per family)
- Chicken Feeder
- Plastic Chicken Waterer (10 liters)
- Pair of Rubber Boots
- Aluminum Bucket with Handle (15 liters)
- Pair of Gloves
- Chicken Feed good for 2 months

In addition to the above, the project provided chicken coops to the 20 Sheikhan beneficiaries as they needed the coops in the camps. The Camp Management provided the area to put the chicken coops.

The 48 Bashiqa household poultry beneficiaries did not need a chicken coop as the practice in the area is to keep the chickens inside their homes or at the attic.

Below are some pictures taken of this intervention

### **BASHIQA HOUSEHOLD POULTRY**



**Anwar Collecting eggs**



**A little girl in the family gathering eggs from the chicken**



**Family with their brood of chickens (and a duck)**





**Chickens kept in the Attic**  
**Feed Distribution in Bashiq**



## SHEKAN HOUSEHOLD POULTRY



**Theoretical training  
(mandatory use of face masks as COVID 19 health protocol)**



**Practical demonstration**





**Handing over of the Chicken Coops in Sheikhan**



**The above two pictures –Sheikhan IDP women with their chickens inside the coop**



## Technical assistance to Sesame Farmers

As part of the sesame value chain, the project trained 26 sesame farmers supplying tahini factories in Bashiqa sub-district, either directly or through wholesalers.

### Profile of the 26 Sesame Farmers (All Male)

#### Age Distribution

Nine (35%) of the trainees belong to the youth and young adults' sector (18 to 35 years old). 65% are above 35 years old.

Age Group	No. of Trainees	Ratio
18-25	6	23%
25-35	3	12%
36-and Above	17	65%
<b>Total</b>	<b>26</b>	<b>100%</b>

#### Marital Status

Marital Status	No. of Trainees	Ratio
a. single	6	23%
b. married	20	77%
<b>Total</b>	<b>26</b>	<b>100%</b>

#### Highest Educational Level

23 trainees (88.46%) of the trainees have gone to school with 3 having university as the highest educational level reached and 14 having gone to high school.

Highest Educational Level	No. of trainees	Ratio
a) Did not go to school	3	11.54%
b) Primary/Elementary	6	23.08%
c) Junior High School (Grade 7, 8, 9)	7	26.92%
d) Senior High School (Grade 10, 11, 12)	7	26.92%
g) University	3	11.54%
<b>Total</b>	<b>26</b>	<b>100%</b>

#### Ownership of Farm

23 (88%) of the farmers own the farm they till.

Do you own the farm you till	No. of Participants	Ratio
No	2	8%
Yes	23	88%
No answer	1	4%
<b>Total</b>	<b>26</b>	<b>100%</b>

### **Number of donums<sup>7</sup> of the farm**

20 (76.9%) out of the 26, have farms 11 donums and above; 14 farmers (54%) have 11 to 20 donums.

<b>No. of Dunums Farmed</b>	<b>No. of Participants</b>	<b>Ratio</b>
<b>1 to 10</b>	<b>4</b>	<b>15%</b>
<b>11 to 20</b>	<b>14</b>	<b>54%</b>
<b>21 and above</b>	<b>6</b>	<b>23%</b>
<b>(blank)</b>	<b>1</b>	<b>4%</b>
<b>Grand Total</b>	<b>26</b>	<b>100%</b>

### **Training provided to the sesame farmers**

The training for the farmers was divided into two parts. The first part of the training was a practical demonstration on the use of sesame reaper/harvester machine conducted October 1-2, 2019. The second part of the training was on Sesame Farming and Farming as a Business (October 28-31,2019). Topics covered were as follows:

<b>Sesame Farming</b>	
Day 1	Introduction to sesame, Climate, Geographic Factors, Designing and preparing field Special Practices to Produce quality Sesame culture: Introduction of new varieties, Growth stages, Suitable environmental for Flowers type, Growth stages, Propagation, Symptoms of Plant Nutrient, Deficiencies, Nutrient Deficiencies
Day 2	Pest Control Introduction to Organic Farming - what is organic farming and benefits of organic farming Harvesting, temporary storage, packaging Temperature and relative humidity control; storage of Sesame crop Decay and Insect Control, Food Safety Practices
<b>Farming as a business</b>	
Day 3	Farming as a Business; Farmer as an Entrepreneur Subsistence Farming to Commercial Farming and Farming as a Family Business
Day 4	Planning a Farm Business; Farm Budgeting Marketing of Farm Products

### **Tool Support**

The project initially planned to provide the sesame farmers two sesame reaper binding machines that can they manage as a common facility. However, this did not materialize because of procurement challenges. The PMU issued an RFQ on September 27, 2019. Only two vendors responded. Hence, they reissued the RFQ. This time 2 responded with an offer and one declined. The PMU reviewed the two offers received. The lowest bidder however did not have a bank account and refused to open a bank account just for the UNIDO procurement. The next offer was \$5,000 more expensive than the lowest bid. By that time the COVID pandemic was spreading and importation and delivery of goods was becoming a problem. The PMU then decided not to proceed with the procurement and instead provided some tool support to the sesame farmers to help them in their post-harvest.

<sup>7</sup> 1 donum=1,000 square meters

Tools and supplies provided per farmer were as follows:

- Shovel long handle with end cushion grip; shovel is forged steel blade, large pointed for digging
- 6m x 6m plastic sheet for collecting the sesame
- Heavy duty long boots
- Heavy duty working gloves

### 2.3. The Project Beneficiaries and COVID 19

During the project evaluation, the evaluation survey questionnaire asked 55 project beneficiaries COVID 19 related issues. Below is the result of the survey.

#### Number of Respondents by Gender:

Gender	No. of Respondents	Percentage
Female	31	56%
Male	24	44%
<b>Total</b>	<b>55</b>	<b>100%</b>

#### Displacement Status of the 55 respondents

Displacement status	No. of Respondents	Percentage
Returnee	41	75%
Host	8	15%
IDP	6	11%
<b>Total</b>	<b>55</b>	<b>100%</b>

#### Three biggest problems faced during the COVID 19 Lockdown

The top 3 problems faced by the respondents during the lockdown were: 1) Cannot work 2) Children not able to go to school and the third and fourth of equal weights: Lost Job and No money to buy food

3 Biggest problems faced during the Covid lockdown	No. of Answers	Percentage
Cannot Work	31	28.18%
Children not able to go to school	25	22.73%
Lost Job	14	12.73%
No money to buy food	14	12.73%
No access to medical care	10	9.09%
Closed by business/income generating activity	7	6.36%
House too small for everybody	4	3.64%
Percentage of work is less than 50%	2	1.82%
Unable to reach customers	1	0.91%
No deliveries of stocks for the business	1	0.91%
Cannot go out of the house	1	0.91%
<b>Total answers</b>	<b>110</b>	<b>100.00%</b>



### Responses to the question “If money was the biggest problem, how did you manage to survive?”

“Reduced food intake” had the highest response rate (24 times or 47% of the total responses given) followed by “borrowed money from relatives/friends (15 times). Four respondents indicated that they did not have any financial problems.

Coping mechanism to meet financial problem	No. of Responses	Percentage
Reduced food intake	24	47%
Borrowed money from relatives/friends	15	29%
Borrowed from Creditors	4	8%
Do not have financial problem	4	8%
Sold assets	3	6%
Family members gave financial support	1	2%
<b>Total</b>	<b>51</b>	<b>100%</b>

### Responses to the question “What kind of income generating activity would you like to do in the case of a similar lock down to enable your family to survive?”

Raising of chickens or other animals had the most answers (31%); followed by farming easy to grow crops (29%) then financial support. From the responses given, it is safe to assume that the project intervention on promoting household poultry and dairy processing had contributed to the resiliency of the project beneficiaries during the lock down periods of COVID 19.

Kind of income generating activity to do in case of a similar lock down to enable family to survive	No. of responses	Percentage
Raising of chickens or other animals	16	31%
Farming cash crops (easy to grow)	15	29%
Financial support	13	25%
Producing food products	5	10%
Open retail shop (food, clothing)	2	4%
Beekeeping	1	2%
<b>Total responses</b>	<b>52</b>	<b>100%</b>

### 3. PRODUCTION OF RESULTS OUTPUT 2

#### Output 2. Accelerated return of communities to areas affected by the conflict over strengthened Vocational Training Centers and supported National Institutions.

##### *Indicators and Assessment of Results*

- By the end of 2020, 1 to 2 National Institution(s) and/or VTCs strengthened via equipment, resources and training skills capacities

**Achieved:** Yes. The Water Resources and Dams Engineering Department and the Department of Mechatronics Engineering of the University of Mosul have been strengthened with equipment and skills training of instructional staff.

- By the end of 2020, between 50 and 100 men and women received specific trainings in line with the identified needs and priorities in the assistance of the returnees to the Nineveh region

**Achieved:** Yes. More than 30 teachers of the University of Mosul have benefited from a Training of Trainers. More than 500 students have consequently benefited from being trained by their teachers, although COVID-19 lockdown and school closing measures limited the number of students being trained.

##### *Process, Major Activities and Status*

#### 3.1. Building the capacity of two Departments of the University of Mosul

##### **VTC and national institution needs assessment and priorities identified**

From April to June 2019, UNIDO's team carried out a review of the National Institutions relevant for Technical and Vocational Education and Training (TVET) in line with the priorities as defined in the Project Document, and with a long-term outlook to ensure long-term assistance to the civil society in the Nineveh region and particularly in the city of Mosul.

In June 2019, UNIDO's Team organized a fact-finding mission in Mosul, based on the previous information and data gathering phase operated from Erbil and Vienna. This included meetings at Mosul University – College of Engineering as well as at Mosul Civil Defense Headquarters.

##### **Mosul Civil Defense**

Mosul Civil Defense encompasses 16 stations, of which 6 are completely destroyed by ISIL and bombings by coalition military forces during the liberation. The Mosul Civil Defense Headquarters thus showed priority needs oriented towards heavy duty equipment's, such as firetrucks, forklifts, telehandlers, car-mounted fire pumps, rescue vehicles, rescue boats, etc.

A demonstration with Japanese firefighting pumps from Tohatsu was conducted in Erbil during the fact-finding mission:



A first estimate of the restoring needs was reaching, equipment-wise, above **one million US dollars**. While going along the discussions with the Civil Defense, even individual equipment (that were insignificant to provide tangible results throughout the project) were much greater than the project magnitude and it was mutually agreed that the **project will re-prioritize its intervention** and remain open for any possible future intervention onward.

### **University of Mosul**

The University of Mosul (UoM) is one of the largest educational and research centers in the Middle East, and the second largest in Iraq, behind the University of Baghdad. The UoM is a national institution which refers to the Iraq Ministry of Higher Education and Scientific Research. It hosts the College of Engineering since 1967 which expanded over the years and nowadays comprises eight scientific departments in different fields as listed below:

- Civil Engineering Department
- Electrical Engineering Department
- Mechanical Engineering Department
- Water Resource and Dams Engineering Department
- Architecture Engineering Department
- Computer Engineering Department
- Mechatronics Engineering Department
- Environmental Engineering Department

Unfortunately, a number of the college's buildings and laboratories have been totally and/or partially destroyed as a result of the fighting that hit the city of Mosul.

When engaging with various departments during the fact-finding mission, UNIDO' decision-making process included the following criteria: timeliness, relevance, impact and sustainability.

In terms of impact and relevance, water resources management is one of the main challenges currently faced in the region for social stabilization and economic resilience. Water is key for Iraq's industry, electricity generation (especially the Mosul dam, located 40 km north west of the city of Mosul) and agricultural production. The University's Department of Water Resource and Dams Engineering has a key role and provides scientific and technical education to generations of young Iraqis to cope with water resource challenges. Compared to other departments, its laboratories were functional as a rehabilitation programme implemented by UNDP supported by USAID had restored its functions in 2019.

Moreover, Department of Mechatronics Engineering of Mosul University is committed to provide young male and female Iraqis, the educational framework in response to industrial challenges and adaptation in the context of innovative and changing technology. Mechatronics includes mechanics, pneumatics, electronically controlled systems, programming, and robotics and systems development. Often found in factory assembly lines, it is used in everything from bottling machines to supermarket cash till and belt assemblies. Students who learn about mechatronics discover how to combine these elements and products to design, build, maintain, and repair many types of automated equipment and control systems. The Department has been profoundly looted and damaged during ISIL presence. Building and infrastructure have been progressively rehabilitated, and the structure was resumed to its functions in 2019.

Resulting from this assessment and fact-finding mission was to prioritize capacity building of the UoM with a focus on the Water Resource and Dams Engineering Department and the Mechatronics Engineering Department. Not only has there been a higher potential of a sustainable impact on teachers and students given the needs and current level infrastructure available. There has also been a strong enthusiasm and responsiveness from the potential beneficiaries' side.

### 3.1.2. Equipment, identified and procured, and training on equipment conducted

Various equipment for the Department of Water Resources and Dams Engineering and the Department of Mechatronics has been identified, procured and installed.

#### ***Equipment for both Departments (UoM, Mosul) & for Ministry of Labor and Social Affairs (Erbil)***

##### Interactive Touchscreens

The teaching style and multi-media capabilities were enhanced for teachers of the Mechatronics Engineering Department, the Water Resource and Dams Engineering Department and trainers from the Ministry of Labor and Social Affairs - KRG by the provision of an interactive touchscreens for the rehabilitation of classrooms at UoM, Mosul and the Ministry of Labor and Social Affairs in Erbil. In conjunction with the delivery, a series of remote training sessions on how to use the powerful software application built-in to the screen and on-board computer was performed by the manufacturer. The screen allows Windows and Android based applications, with an overlay program designed by the manufacturer specifically for teachers that permits recording, annotation, editing, screenshot, team competition and many other functions on-top of application software. The teachers are already using the same software to help prepare recorded content for upload to online lessons for remote learning as part of their COVID-19 teaching measures with Google Classroom. Mounted on a mobile trolley, the screen can move from room to room, or even be used directly next to an experiment area.

##### **Interactive Touchscreen equipment (for specifications see Annex C)**

<b>Item No</b>	<b>Specifications</b>	<b>Number of Units procured</b>
1	Interactive Touchscreen with Built-in PC	3
2	Webcam, Microphone and Speaker System	3
3	Interactive Touchscreen Software	3
4	Mobile floor trolley and frame for 65-70" interactive screen	3
5	Desktop visualizer	3
6	Wireless Keyboard and Mouse	3
7	Software training	1
8	Cabinet for the laptops	2
9	Digital and analogue Multimeters (LVA)	1



**Smartscreen being used with FESTO FluidSIM mechatronics software**



**Smartscreen moved to the experiment area for direct engagement with experimental theory and demonstration**



## **Water Resource and Dams Engineering Department**

More specifically, the following educational training equipment was identified, procured and installed at the Fluid Mechanics Laboratory, the Fluid Mechanics Classroom and the Tool Room of the Water Resource and Dams Engineering Department

### Fluid Mechanics Laboratory

This department utilized three learning spaces, a classroom, a theoretical experiment area and a larger river bed and flume channel for observation studies and practical work. A range of special didactic teaching and experimental equipment was identified, procured and installed. The configuration was carefully decided in consultation with the UoM department teachers, including the siting and layout of the equipment. The lecture space classroom and the experiment room were renovated by the UoM team, with the use of space designed in such a way to permit flexibility of group and individual learning.

### **Experiment room prior to renovations with heavy bench-tables in fixed positions**





**New tables can be moved and arranged for group work or for individual study/lecture**



Moreover, five hydraulic workstations were provided to the fluid mechanics laboratory that allow for the set-up of the experiments and a smaller 5-metre flume channel installed in the experiment room. This provides a start point for the monitoring and observations of fluid mechanics/hydraulics theory, prior to scaling up the experiments in the larger flume in the main areas. Spare parts for two years operation or repairs was provided, featuring mainly connectors or washers that might wear out during repeated set-up and take-down.

**Hydraulic workstations equipped with experimental models for test, observation and prediction learning**



The main flume was equipped with white plastic panels to block one side of the transparent channel panels and make it easier for students to observe dyes and patterns in the larger flume. A set of hand and power tools was added to the workshop room – these tools can be used to work metal, wood, plastic and stone into various obstacles and features that are part of the larger flume experimentation and tests.



**White panels fitted to the side of the main flume will permit students to view the contract medium (colored dye) and sediment flow patterns easier from the other side of the flume.**

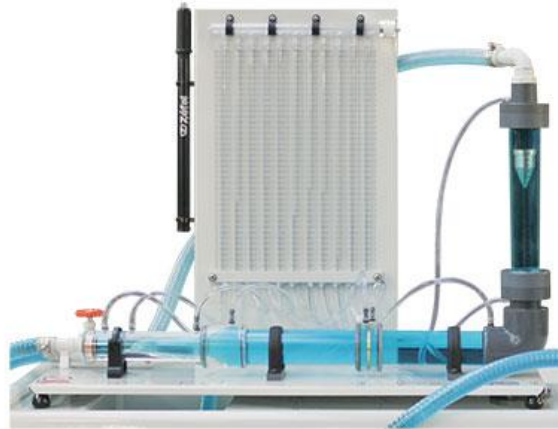
The full list of equipment procured can be found in Annex C. An illustration of didactic equipment purchased from the company TechEquipment for the Fluid Mechanics Laboratory are the Flow and Sediment Transport Channel, Flow measurement methods and Losses in Piping Systems shown below.

- 5 Metre Length Open Flow and Sediment Transport Channel (Flume):



An 80 mm, 5 m long flow and sediment transport channel with a starter kit of models and instruments. It provides students with the ability to study the varying effects of sediment transport, bedform dynamics and fluid flow around weirs and other objects in an open channel.

- Flow measurement methods:



This equipment includes a venturi meter, an orifice plate meter and a rotameter that demonstrate typical methods of measuring the flow of an incompressible fluid and show applications of Bernoulli's equation. With this tool, students can study Bernoulli's equation, flow measurement and losses.

- Losses in Piping Systems



This free-standing, mobile apparatus demonstrates pressure losses in several small-bore pipe circuit components, typical of those found in central heating systems. Students can learn about a comprehensive range of investigations into losses in a variety of pipes and pipe system components such as straight pipe loss, sudden expansion or contraction.



### Fluid Mechanics classroom

The existing desks in the Fluid Mechanics classroom which were in fixed position, with small table-tops and with damage to chairs and tops were removed and replaced with modern, movable and foldable design. A library bookcase and storage cupboards for the use by the lecturer and students was provided, and an additional desk and chair set was positioned in the large flume zone. This enables UoM staff and learners to comfortably sit and record experiment data and measurements on laptop computers in the flume zone.

The following items were procured for the Fluid Mechanics classroom (please see Annex D for more details)

Summary of furniture procured for Fluid Mechanics classroom

Item No	Specifications	Number of Units procured
1	Tables for Training Room	24
2	Chairs for Training Room	48
3	Desks for Instructor/teacher	1
4	Pedestal unit for Instructor/teachers	1
5	Extension desk for Instructor/teachers	1
6	Chairs for Instructors/Trainers	2
7	Library Bookcase	2
8	Storage Unit	2
9	Desks for Large Flume Experiment Area	2
10	Chairs for Large Flume Experiment Area	2

**Classroom with old furniture: Fixed desk/chair in the lecture classroom, many in damaged condition**



**New furniture provided: mobile and foldable for arranging in lecture position, group work, presentation or forum discussions**



Tool-Room

The tool-room was re-equipped with a comprehensive selection of workshop furniture with power and hand tools. This was procured from local companies in Iraq and was essential for assisting UoM staff in repairs and renovations to the rooms, however the main objective in furnishing the tool-room was for the **benefit of the students**. They now have the full capability to **create models and obstructions** to use in the water channel flume area from wood, plastic, metal or stone. Typical designs the students will create are buttress columns for bridge supports, steps or weirs for water speed and flow reductions and for modelling potential solutions to real-life engineering problems at scale.

For a detailed list of the items procured for the tool-room see Annex D

## List of tools procured for the tool-room

Item No.	Specifications	Number of Units procured
1.1	Variable Speed Impact Drill	1
1.2	13mm Drill Chuck Key	1
1.3	HSS Drill Bit Set	1
2.1	115mm Angle Grinder	1
2.2	115mm Cutting Disc	10
2.3	115mm Grinding Disc	10
3.1	Rotary Hammer Drill	1
3.2	SDS+ Drill Bit Set	1
3.3	SDS+ Chisel Bit Set.	1
4.1	Cordless Screwdriver	1
4.2	Screwdriver bit set.	1
5.1	Cordless Circular Saw	1
5.2	Cordless Circular Saw Blade – 24 Teeth	1
5.3	Cordless Circular Saw Blade – 80 Teeth	1
6	Mitre Saw	1
7	Foldable Workbench	2
8	Bench Grinder	1
9	Table Saw	1
10.1	Gasless MIG Welding Machine	1
10.2	Welding Wire	2
10.3	0.8mm Welding Torch Tips	1
10.4	Welding Clamp Set	1
10.5	Locking Plier Set	1
10.6	MIG Welding Plier	1
10.7	Welding PPE Kit	1
11	Spray Gun	1
12	40 Piece General Hand Tool Set	1
13	160mm Long Nose Plier	1
14	160mm Wire Stripping Plier	1
15	Pipe Cutter	2
16	Mitre Box and Back Saw Set	1
17	14" Pipe Wrench	2
18	Socket Set ¼ inch Drive	1
19	Socket Set ½ inch Drive	1
20	6-32mm Combination Spanner Set	1
21	2 Tonne Hydraulic Trolley/Floor Jack	1
22	Folding Platform Truck	1
23	Dial Caliper	2
24	Steel Ruler	1
25.1	Gasoline Trash Water Pump	1
25.2	Suction Pump Hose – 100mm Diameter	2
26	Benchtop Pillar Drill	1

27.1	Heavy Duty Workbench	1
27.2	150mm Workshop Vice	1
28	Storage Cabinet	2
29	Dustpan and Brush Set	1
29	Wire Brush	1
30	Safety Spectacles	5

### Power and hand tools for use in student design and solution projects

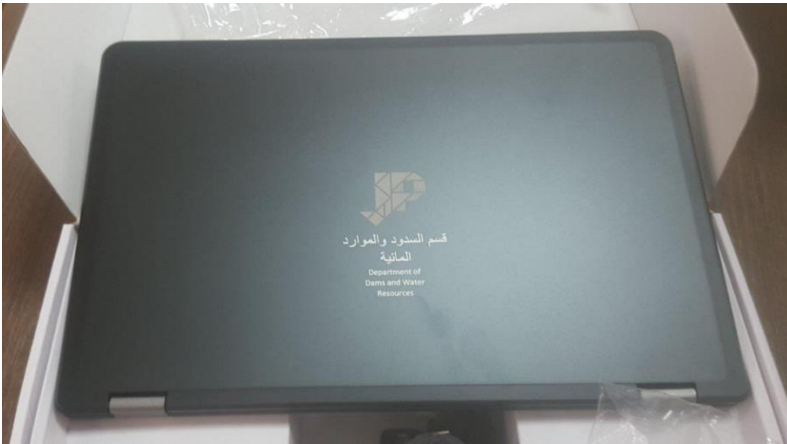



### IT equipment for the Water Resources and Dams Engineering Department

Educational grade laptop computers and wi-fi storage/access devices were procured to permit students of the Water Resources and Dams Engineering Department to create content for **field reports and assignments, edit images and graphs, build numerical spreadsheets and database information, and allow them to conduct experimental studies and research**. The laptops were engraved with the UoM name to prevent removal from premises and a storage cupboard was provided for secure storage when not in use. Microsoft Office perpetual license software was pre-loaded and registered. The wireless access point allowed lecturers to store digital files, presentations, videos and other data that students can access directly from the laptops using 'hotspot' wifi function; the access point can be used in any location, even taken into the field if necessary, to enable records and data to be saved on site, for example at a riverside location. The detailed specifications of the IT equipment are available in Annex D.



## List of IT equipment

Item No	Specifications	Number of Units procured
1	Educational Grade Laptop Computer 	20
2	Wireless Access Point and Content Server (mobile classroom) 	2

## Mechatronics Engineering Department

The following educational training equipment was identified, procured and installed for the Mechatronics Laboratory, the Mechatronics Bench, the Mechatronics Production Line of the Mechatronics Engineering Department. Additionally, a Computer Numerically Controlled (CNC) milling machine and Interactive Touchscreens have been provided to the Department.

### Mechatronics Bench

This department had seen considerable theft and fire damage to much of its industrial components during the occupation of the buildings by ISIS. The UoM staff had done their best to salvage and repair what was not entirely destroyed, but they still were unable to make functioning systems from what remained. One existing test bench from manufacturer K&H Mfg Co Ltd, was cleaned but lacked sufficient sensors and actuators to operate. A rapid procurement was initiated with the manufacturer that permitted UNIDO to source the parts directly to repair the existing test bench.

The K&H test bench, the only remaining set in clean condition but lacking parts for teaching.



Examples of the new parts to restore teaching capability of the test bench



List of items procured for reestablishing test bench (for detailed specifications see Annex D)

Item No	Specifications	Number of units procured
1	Air Service Unit	1
2	Single-Acting Air Cylinder	1
3	5/2-way directional control valve	1
4	5/2-way single solenoid valve	1
5	OR Valve (Shutile)	1
6	Sequence Valve	1
7	Pressure Switch	1
8	3-way distributor	1
9	Timing Relay	1
10	Hardcopy Experiment Manual	1

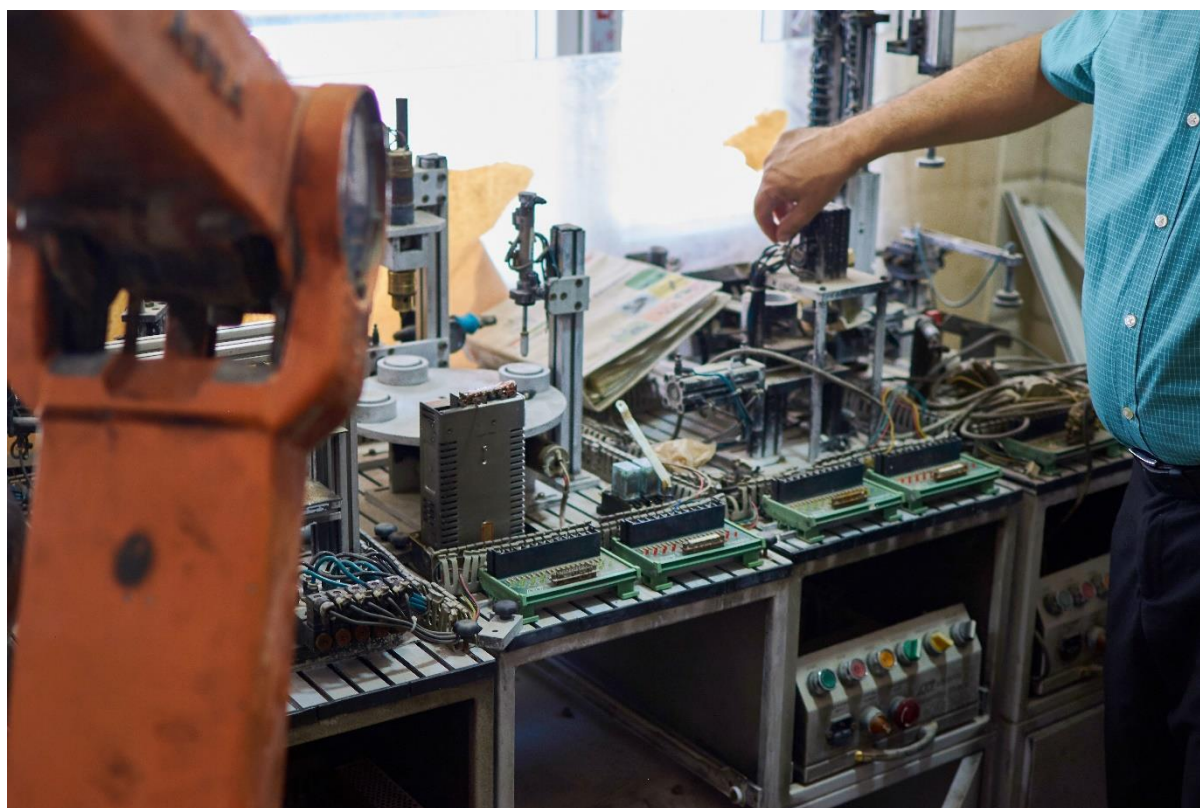
## Mechatronics Production Line

The Department had a full industrial process production line set that was entirely ruined by fire and water. It was thought at first that UNIDO could provide some ultrasonic cleaning baths to try and restore components which UoM staff had tested and found were still electrically working. The scale of the damage to major parts was too great, however, and UNIDO approached German manufacturer FESTO to determine what products may be possible to source from their range to repair the system. The discussion led to the **provision of a full production line system** originally used by FESTO for the WorldSkills Mechatronics competition in Kazan in 2019.

FESTO supplied the system significantly below their commercial value and further supported the restoration efforts with in-kind contribution of second-hand spare parts as a donation to the UoM. The system comprised of a product **Handling Station, a Distribution and Processing Station, a Vision quality Station and a Joining Station**, covering all the principles found in a modern, industrial manufacturing or processing plant. The advantages of the system for the UoM teachers is that it can be programmed and configured using a number of different types of manufacturers controllers found within the Iraqi market.

A series of online training sessions with a FESTO instructor was performed and which enabled the UoM staff to set up and configure the production line (see section 3.2. for more detail). Comprehensive user guides, along with instruction and teaching manuals were provided, with pre-defined exercises for each station.

### **Old system damaged by fire, smoke and water inside the Mechatronics laboratory**





## The rehabilitated and new production line system



### Computer Numerically Controlled (CNC) Milling Machine

To further supplement the capabilities in this the Mechatronics Engineering Department, a didactic sized Computer Numerically Controlled (CNC) Milling Machine and lathe was provided. These two machines, complete with accessories and computer stations, **allows the students to bring their 3D Computer Aided Design (CAD) product or parts designs into life**. The mill and lathe are able to fabricate parts in plastic or metal which can be used or incorporated into mechatronics systems.

### **Items procured for the CNC Milling Machine (for specifications see Annex D)**

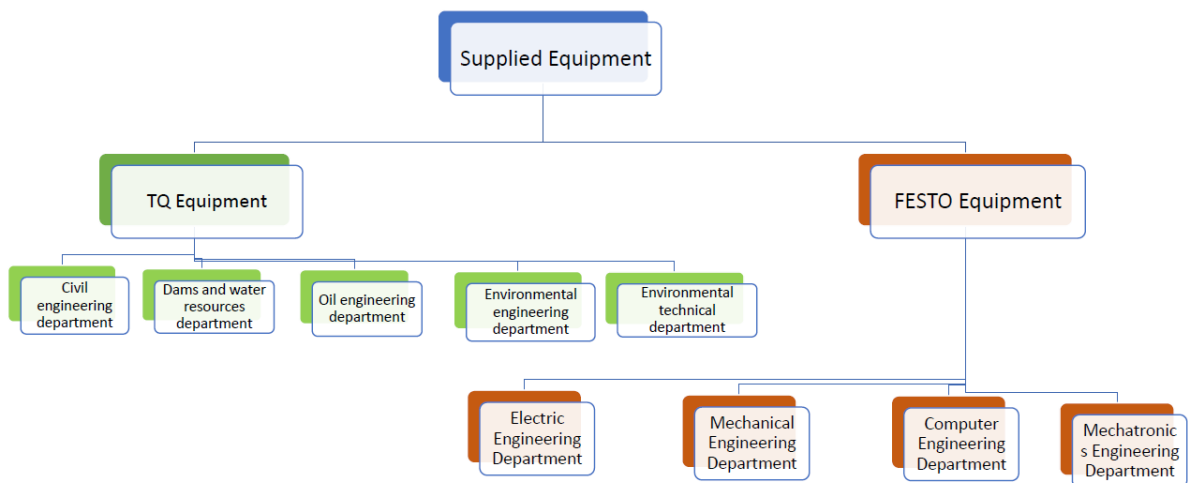
Item No	Specifications	Number of Units procured
1.1	CNC Mill Training System (Light Duty)	1
1.2	CNC Mill Software	1
1.3	Didactic Training Computer Device	1
2.1	CNC Lathe System Training System (Light Duty)	1
2.2	CNC Lathe Software	1
2.3	Didactic Training Computer Device	1

### CNC mill and lathe (with computers prior to set-up)



Supporting mainly the Water Resource and Dams Engineering Department and the Department of Mechatronics Engineering, the **technical didactic equipment procured from TechEquipment and Festo is equally used by other Departments of the College of Engineering**. The following graph gives an overview of the departments benefiting from the supplied equipment.

### Use of didactic equipment in the UoM



### 3.2. Capacity-building of the National Staff – Training of Trainers and Students

- Capacity building activities planned according to needs assessment and implemented

#### Training of Trainers on flood-risk management and hydromechanics and hydrodynamics fundamentals with the University of Natural Resources and Life Sciences, Vienna (BOKU)

From March to June 2020, several workshops and short courses in the field of hydromechanics and flood risk management for the professors and lecturers of the Water Resources and Dams Engineering Department were realized with the University of Natural Resources and Life Sciences, Vienna (BOKU).

Trainings on flood risk management is pertinent, as flood risks become the forefront of concerns of people at Mosul City after disastrous flood events. In 2017, a huge economic damage at Mosul City has been reported due to floods caused by the Tigris River and local torrential rainstorms. The level of concerns has been rapidly increased among civilians after reporting a serious damage in Mosul Dam foundation. The main objectives of the training course were to share best-of-art knowledge and international practices to implement flood risk management strategies through training in how to build a floodplain numerical model.

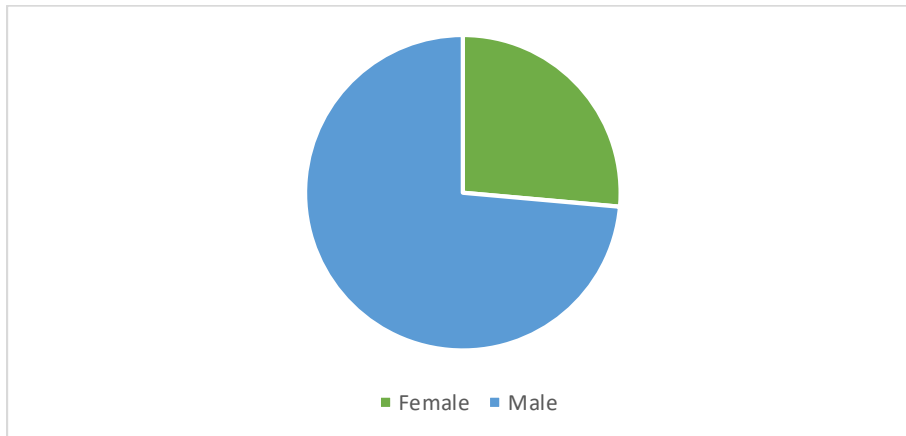
Training on hydromechanics and hydrodynamics fundamentals refer to advanced concepts in the field of hydraulics and fluid mechanics and their implementation in more sophisticated modelling schemes, such as computer-based river modelling and management. Regardless of the method and tool types, understanding the model formulation for any type of problem is very important for researchers and engineers of Mosul University.

#### Training schedule

	Dates, 2020	Number of Trainees	Main topics
Training 1 – Videoconference	March 26-30	25 (of which 3 female)	Integrated Flood Risk Management
Training 2 – Videoconference (planned as field mission but due to COVID 19 travel restrictions had to be held online)	April 5-9	22 (of which 4 female)	Fundamentals of <ul style="list-style-type: none"> <li>- Fluid properties and hydrostatics</li> <li>- Basics of hydrodynamics</li> <li>- Pipe flow</li> <li>- Open channel flow and sediment transport</li> </ul>
Training 3 – Videoconference	11-14 May	20 (of which 4 female)	Computer-Based River Modelling – Theory and Practice
Training 4 – Videoconference	15-18 June	26 (of which 3 female)	Computer-Based River Modelling – Theory and Practice

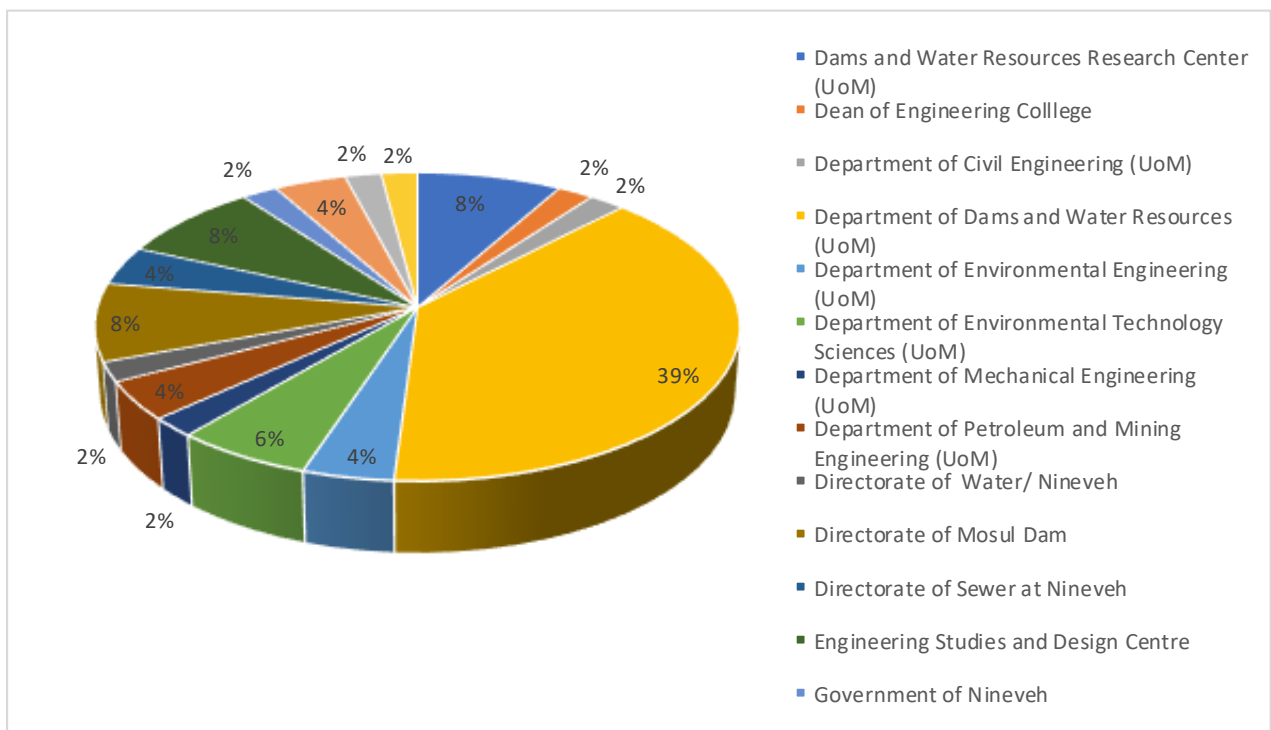
Overall, a total of **53 participants took part during the trainings (39 male and 14 female)** as indicated in the following graph.

### Gender distribution of total 53 participants



Analysing further details of a subsample of 49 participants, **69% of trainees were affiliated to the UoM, the majority coming from the Department of Water Resources and Dams Engineering.**

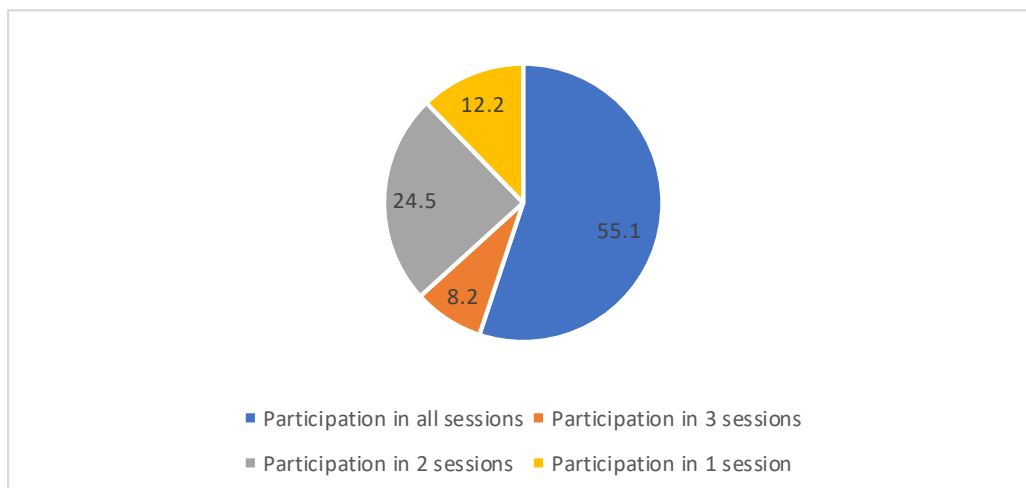
### Affiliation of training participants





Over the **majority of participants (55%)** took part in **all the four training sessions**. The graph below depicts the distribution of participants by session.

#### Training participation by number of training sessions, in percentage



With the newly acquired and strengthened knowledge in Integrated Flood Risk Management, Fundamentals of Fluid properties, Hydrostatics, Hydrodynamics, Pipe flow, Open channel flow and sediment transport as well as Computer-Based River Modelling, the participants from the UoM are able to:

- Improve the Curricula taught to the students of the University in the field of Hydraulics and Hydromechanics
- Leverage their expertise in the development of flood risk management that may result in sharing the results of the case studies prepared by the National Staff to actors from Nineveh governorate involved in Water Resources Management
- Strengthen the capacity of the National Staff in partnering with International Academies

**Online training, BOKU side**



**Online Training, BOKU side**



## Outline

### Density of Water

### Floating of Objects

- Archimedes' Principle
- Indirect Measurement of Fluid Density
- Stability of Floating Objects

### Surface Tension

### Pressure in Fluids

- Pascals' Law
- Pressure Measurement
- Pressure on Plane Surfaces

### Measurement of Fluid Levels



University of Natural Resources  
and Life Sciences, Vienna  
Department of Water, Atmosphere  
and Environment



Fig.: TecQuipment Hydrostatics and Properties of Fluids Apparatus

Michael Tritthart and Daniel Wildt  
23/06/2020

Capacity building  
Hydraulic Fundamentals – Properties of Fluids and Hydrostatics

1/21

## Smartscreen Training of UoM Teachers

The objective of this Training of Teachers was to further **develop the presentation skills of educational content** using the technology of interactive smartscreens provided under the project to the Department of Water Resources and Dams Engineering. Equipping teachers at UoM with smartscreen technologies enhances the way students learn for all subjects by enriching the lesson content with multi-media files.

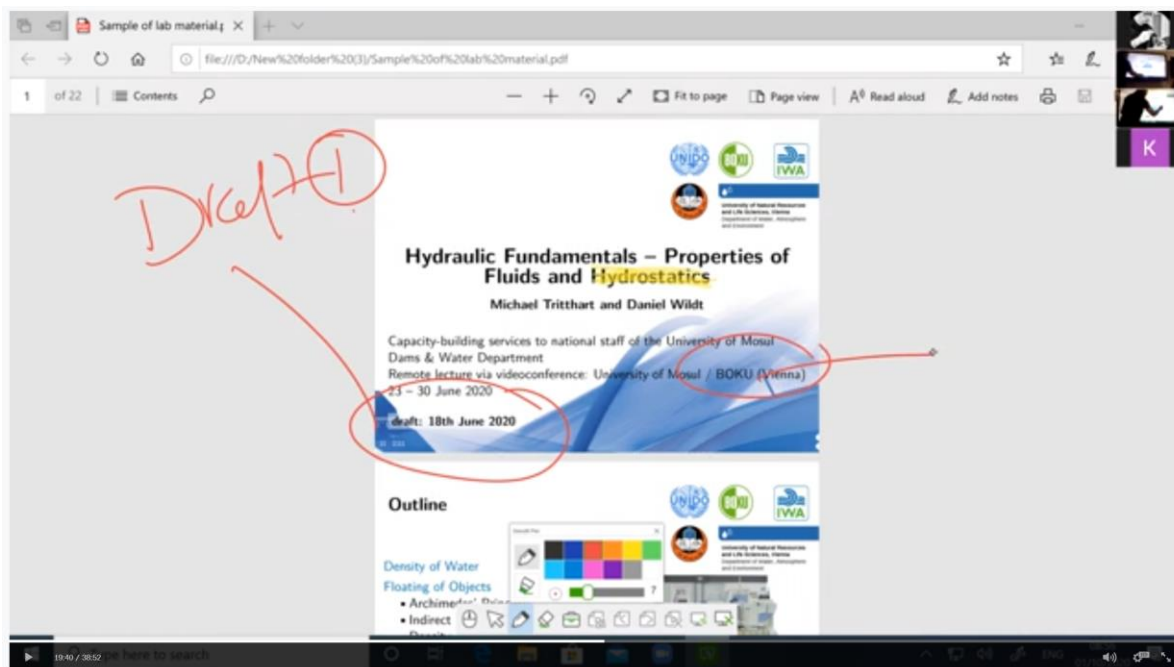
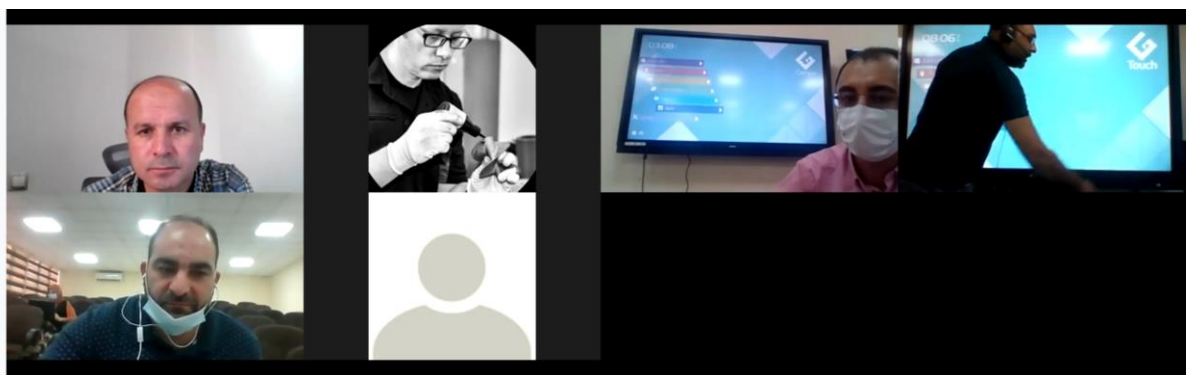
Students learn best when they are 'hands-on' and smartscreens have the ability to allow students to use their finger and write, draw, or take notes directly on them or use bluetooth/wifi connections to project from a tablet or laptop computer to the screen.

Online resources can be shown directly on the screen which enables a range of resources for their research projects and experiments. **Teachers can connect visualizers, digital cameras, microscopes, and other USB devices to help aid in instruction.** Looking to the future, collaboration between different Universities means that students can use the smartscreen and camera for group meetings, enabling instant feedback and discussions, making the process of research more effective and efficient.

The training of teachers in the functionality of the GENEE smartscreens took place via two Zoom connected conference calls (October 21, 2020 and January 21, 2021). The GENEE trainer, Mr Taz Arkate (a former UK school-system teacher) conducted the session. The trainer provided the training in English language.

The participants in the training have been identified together with the UoM, which selected **four staff for training (three male and one female) from the Department of Water Resources and Dams Engineering.**

### Screenshots from GENEE smartscreen Training



### Training of Trainers- Mechatronics Laboratory of Mechatronics Department

In August 2019, UNIDO organized a week of Training of Trainers which included staff from the UoM Mechatronics Department, as well as trainers from the Ministry of Labor and Social Affairs.

This training was conducted by FESTO International trainer, Mr Al-Shatel and aimed to **build capacity in the field of electro-hydraulic using the Mechatronics Laboratory of the UoM.** As such, Electro-hydraulic is widely adopted in most of industries.



## Electro-hydraulic ToT



The support given to the Mechatronics laboratory (also called Automation lab) allows the department to teach students before graduation, and the engineering community in the field of interest after graduation. This lab is the only one of its kind in all the educational institutions in Mosul city.

Automation lab experiments principally support the curricula of the automation subject given to the fourth-year students at the UoM, during the study of the automation subject and doing fourth class projects.



Mini-projects are also implemented by the second- and third-year class students, with first year students being introduced to the manufacturing processes. Graduates with mechatronics knowledge contribute in product research, analysis and development at all levels of a manufacturing process.

In particular, UoM alumnus are involved in design and management of important facilities and infrastructures, such as electrical power plants, industrial projects, laboratories for ministry of health, automatic production lines in factories.

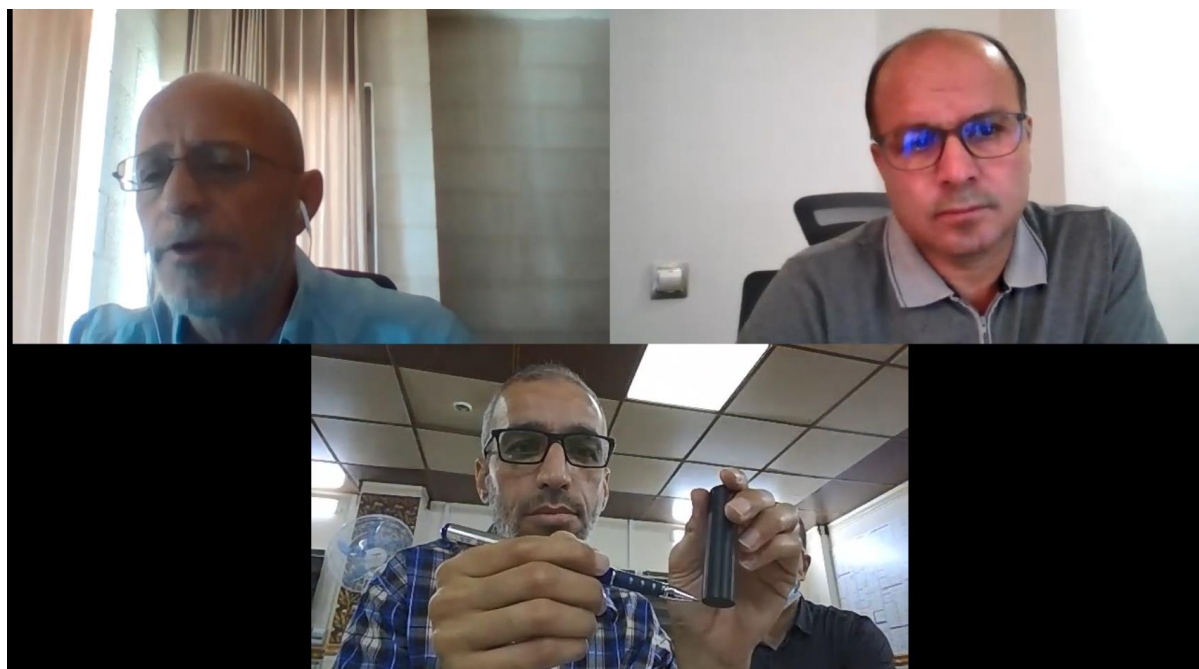
They can typically find employment in different industries where automation is found, and in Iraq this is most likely to be oil and gas systems maintenance, transport and warehousing systems, or computer-aided design.

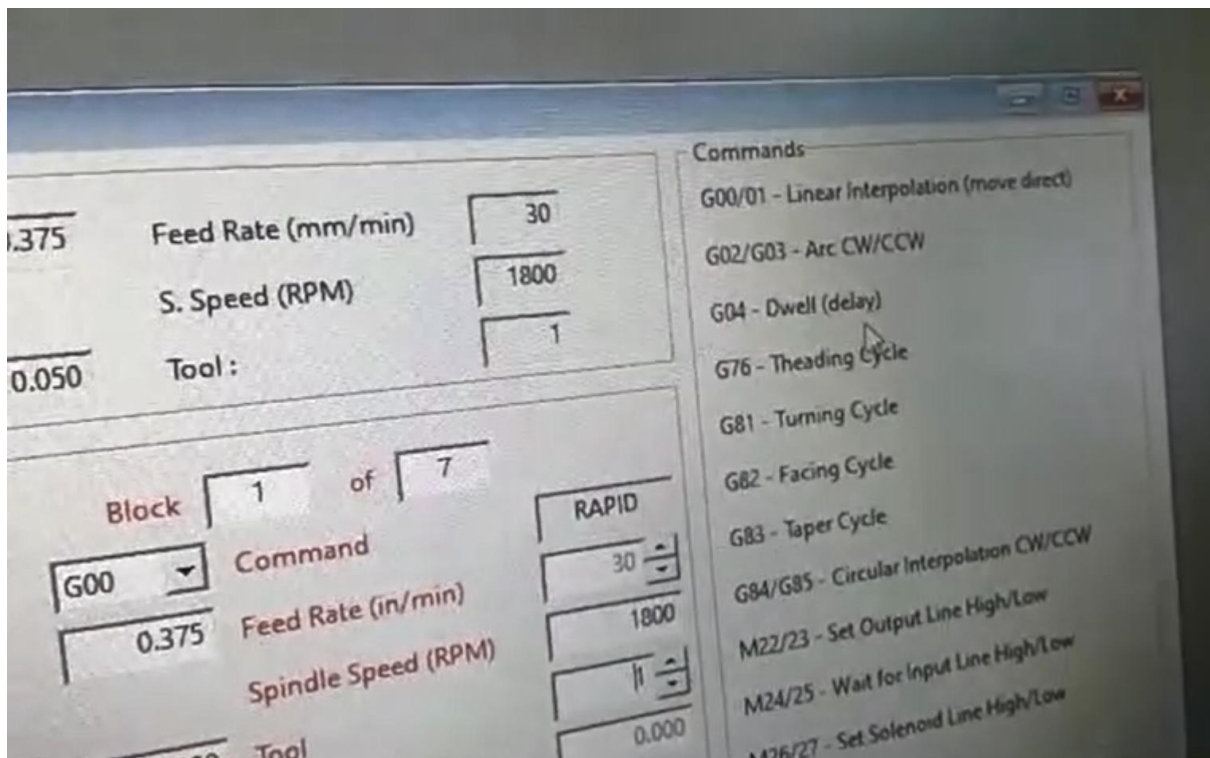
A second training took place online in October and November 2020. This training aimed at making a different group of participants familiar with the procured equipment from FESTO, namely the CNC Milling Machine. All participants of both of the trainings were male.

#### Participants of Mechatronics Department training

Participants	Electro-hydraulic Training	CNC Milling Machine Training	Total
From Department of Mechatronics (UoM)	3	4	7
Ministry of Labor and Social Affairs (Erbil)	3	0	3
<b>Total</b>	<b>6</b>	<b>4</b>	<b>10</b>

#### Screenshots from second training (online)



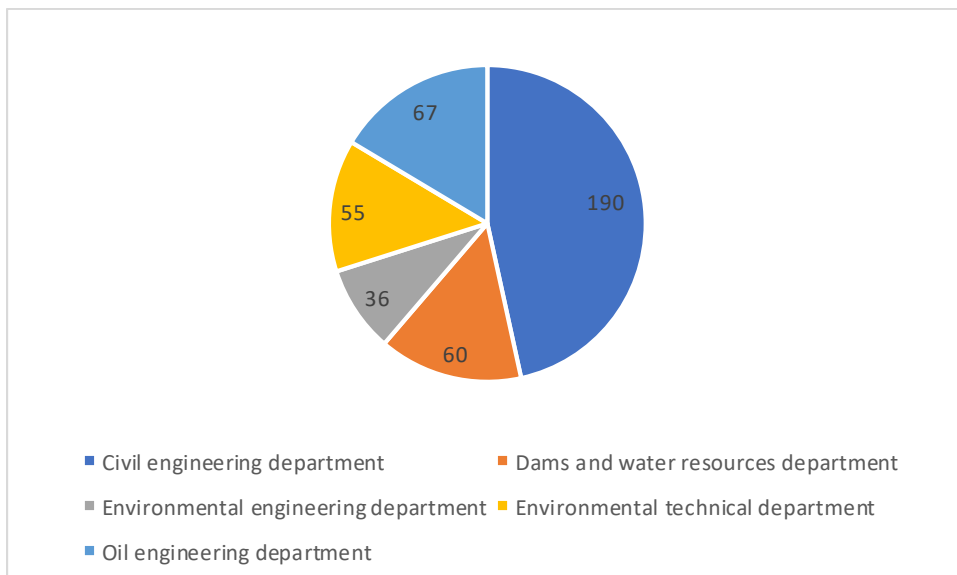


- **VTC supported in providing assistance to returnees and ensuring skills development**

#### **Training of Students using TecQuipment provided**

The equipment purchased and installed under the project has **benefited to over 500 indirect beneficiaries**. The hydraulic lab equipment has been used by five departments in the engineering college with over 400 students.

**Graph: Number of students from affiliated departments using hydraulic lab equipment**



Moreover, the **CNC/Mille machines** have been used by Mechatronics department with a **130 students per year**, of which approximately 40% are female.

**Type of students from the Mechatronics department using CNC/Mille machines**

<b>Mechatronics Department</b>	<b>Number of students</b>
Senior students	30
Junior student	40
Sophomore students	60

**Students trained on new equipment of the Department of Water Resource and Dams Engineering**



## **4. PROJECT CHALLENGES**

### **4.1. Output 1 Challenges**

#### ***Security and Travel***

The PMU and most of the trainers are based in Erbil, KRI. UNDSS travel restrictions for UN personnel from Erbil to Bashiqa, Nineveh requires a convoy of 2 armored vehicles, 1 security personnel, required personal protection equipment, maximum of 3 passengers in each car including the driver, and security clearances from UNDSS, and the Iraqi authorities. UNIDO does not have any of the assets required for the travels.

Hence, the PMU coordinated with the IOM who were kind enough to provide the 2 armored vehicles equipped with the PPEs, and a security personnel. IOM also processed all the necessary documentation and clearances for the travels. The PMU used the kind services of IOM for two official travels to Bashiqa.

Trainers who were under subcontract were not covered by the restrictions. The PMU, however, had to ensure the safe passage and safety of the trainers. A Bashiqa-based car picked up the trainers from Erbil and brought them back. The driver of the car is known to those manning the check-points, which helps in the passage without any problems.

No overnight stays were also allowed in Bashiqa. Hence, project staff and trainers have to time the visits and see to it that they leave Bashiqa early enough to reach Erbil before dusk.

#### ***Procurement Challenges***

UNIDO Finance had made a ruling that all payments above US\$2,000 will have to be through bank transfers. The PMU is finding it a challenge to identify vendors with bank accounts under the name of their respective companies. The smaller vendors either do not have a bank account or if they do, the bank account is under their name and not under the name of their business. If however, the business registration certificate indicates the name of the owner, then this is acceptable, as it will not be a third party payment.

#### ***Effect of COVID on the beneficiaries***

Based on the interview results among the project beneficiaries, the top three problems they faced during the lockdown was that they could not work; children are not able to go to the schools and the third and fourth with equal weights was that they lost their job and there is no money to buy food.

With their financial problems, the beneficiaries coped best by reducing the food intake of the family. As to the type of income generating activity, they would like to do in the case of a similar lock down to enable their family to survive, 31% of the beneficiaries surveyed answered "raising chickens or tending animals". It is safe therefore to assume that the 68 household poultry beneficiaries had benefited from the intervention during the COVID lockdown.

The SME tahini factories in Bashiqa have been hard hit because the flow of factory supplies for processing and packaging as well as movement of finished goods have been hampered due to the lockdown and limited movement. As a result, they have to reduce their operations, which meant also temporarily laying off or reducing the hours of some of their workers.

### ***Effect of COVID on project implementation***

The procurement of sesame reaper had to be called off because the lowest bidder had difficulty getting the machines from China due to lockdown. Eventually he withdrew his commitment. As a result, the PMU was not able to provide the sesame reaper to the farmers and instead provided them some supplies for their harvesting needs.

Due to the pandemic, the training in Sheikhan was only implemented in June 2020 when government eased the lockdown. COVID-19 Health protocol measures were implemented in the training.

## **4.2. Output 2 - Challenges**

### ***Security and travel***

Restrictions of movement due to the COVID 19 crisis put some constraints on the project. Because of the pandemic, all UN mission closed from April to July 2020 in Iraq. Some missions have resumed, however only for limited activities. Since April 2020 it has been difficult for UNIDO staff on the ground to visit projects sites such as the UoM.

### ***Effect of COVID on the beneficiaries***

With the beginning of the COVID 19 crisis in March 2020, Iraq entered into a three-month lockdown and the UoM closed and shifted to online teaching. After the lockdown, only 25% of staff were allowed to return to office, diminishing the number of female lecturers in the premises further. Students were not allowed to return to class until the end of the academic year. Only in mid-September 2020, grades one and two were allowed to come to class, while grades three and four are still taught online. The COVID 19 crisis thus worsened the enabling learning environment for students. Later as planned, and fewer students than expected are able to learn with the new didactic equipment at the UoM.

### ***Effect of COVID on final project implementation***

Apart from the difficulties of travel for national UNIDO staff, and teachers and students' difficulties to return to University, project implementation had to adapt to the situation as well. Part of the trainings with the UoM should have taken place in person but had to be shifted online due to international travel restrictions.

### ***Procurement challenges***

At the start of the COVID 19 pandemic borders to neighboring countries closed and delayed some procurement activities. Items were blocked at the Turkish border and delivered with a delay of 20 days to one month.

## **5. Impact, Sustainability and Recommendations**

### **5.1. Impact**

UNIDO commissioned evaluation expert, Ms. Elizabeth Catharina Stigter, to conduct the terminal self-evaluation of the project. Due to COVID related travel restrictions, the expert managed the evaluation process remotely and worked with a local subcontractor in gathering data. She interviewed key informants via skype; the local evaluation coordinator translated as required. The evaluation took place from 27 May to June 30, 2020.



### ***Summary Findings of the Terminal Self- Evaluation of the Project***<sup>8</sup>

The impact on the self-reliance and resilience of the targeted beneficiaries, their families and sometimes also their employees had been visible in a change in income, improved knowledge and skills and exposure during the training, which has resulted in a more positive outlook on life and economic prospects. Overall, the project had led to one or several positive changes in the professional and/or personal lives of the beneficiaries of both components interviewed during this evaluation.

The project was overall relevant considering its alignment with international, national and institutional policies and strategies, and in light of the needs of the main beneficiaries of both project components. The project's relevance had been examined during the project's inception phase, and its design was fine-tuned to meet the different interests and needs of the main stakeholders to the greatest extent possible considering available resources. For component I, a comprehensive needs assessment of tahini company owners in Bashiqa had been undertaken to identify common and individual needs to tailor project activities, and support had been sought of local government authorities to assist with the selection of female beneficiaries. For component II, a comprehensive assessment of the nine department of the Faculty of Engineering had been completed based on the criteria timeliness, relevance, impact and sustainability in order to get an informed decision on the selection of beneficiaries and type of technical assistance. Duplication of efforts was avoided by means of either coordination or the obvious complementarity of activities of different agencies.

The project was efficient to a large extent, especially considering the short duration of the project which did not offer much leeway to the dedicated project teams, and their additional efforts to mitigate the consequences of the Covid-19 on efficiency, including procurement, delivery of equipment and the implementation of the last set of training activities. The final training activities were implemented just before project completion at the end of June, although some equipment and tools (both project components) and also the chickens (component I) still had to be handed over at the time of completing this evaluation. Inputs were overall assessed in a positive light, and also training was evaluated favorably by involved stakeholders for both project components, that is, for training provided on location (component I and II), and also the online training provided by the Institute of Hydraulic Engineering of BOKU (component II).

The project had to some extent been effective. Both project components have had a clear positive effect to those receiving UNIDO's technical assistance, with female returnee women using the opportunity to support the diet of their family, save money and generate an income by means of selling eggs or dairy products. The different stakeholders of the sesame/tahini value chain also conveyed some positive effects, with especially the company owners noting the benefits of UNIDO assistance by means of higher production rates, and therefore more profit. This component had had a positive effect on the income of approx. forty percent of the respondents of the beneficiary survey. The training and equipment offered to the two departments of the College of Engineering will support them in their objectives and operations, and enhance their teachings to the next generation of academics and policy makers.

Project impact was found in training as a personal learning opportunity, including by means of exposure to fellow trainees and teachers, which instilled confidence in some of the participants, under component I, and opportunities for international academic cooperation between Austria and Iraq,

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<sup>8</sup> Project 180207 Terminal Self-Evaluation Report, Stigter E.C. UNIDO June 2020

governorate-level coordination between academics and government officials and peace-building under component II.

Sustainability was considered in project planning and implementation to some extent, including by means of promoting government ownership. For project component I, results for owners and employees of tahini companies, and also the poultry component seemed to a large extent sustainable, although the future, after the depletion of all assistance, including chicken feed, and the continued impact of the Covid-19 pandemic, remained. A more diverse picture had emerged of female returnees involved in dairy processing, with some not owning their livestock any longer because of a depletion of assets, partially because of the seasonal nature of livestock ownership, and others still being able to utilize their skills to generate a regular income to support their families. ***The above confirms that a relatively small amount of support could improve economic resilience of households beyond the project's lifetime.***

For component II, the short duration of the project did not offer space to formalize certain results but most certainly left the faculties with knowledge, skills and equipment for the two labs that staff will start to apply and use in their courses based on an informal understanding with UNIDO. Courses are foreseen to start again with the new academic year. Additionally, some results might hopefully be taken forward by means of other initiatives, such as the cooperation between government staff and academics, to connect theoretical knowledge with the practices of grounded policy design and implementation.

This evaluation concluded that the project's relevance and efficiency were satisfactory, and its efficiency and sustainability moderately satisfactory as per UNIDO's evaluation rating scale. The key findings further confirmed that direct beneficiaries had benefited from the technical and financial assistance which had enabled them to start or expand their business, be able to better provide for their families and enhance future teaching and research in the College of Engineering. While these results are definitely important, these are drops in the vast landscape of institutional and local household needs. Yet these relatively small initiatives could offer entry points for larger programs and have definitely contributed towards social stabilization and economic resilience in this part of Iraq.

### **Human Stories and Quotes Showing Impact of the Project**

#### **Case study 1: Tahini production company owner (From the evaluation report)**

The owner of a tahini production company in Bashiqa had a well-functioning factory before the arrival of ISIL in 2014. He had 12 sesame mills, and produced 3 tons of fried sesame and over 3 tons of tahini with the assistance of 30 employees at that time. He fled Bashiqa with his entire family with the arrival of ISIL, and found refuge in Erbil where he barely managed to survive with his extended family by means of operating a small tahini shop, although his older children had to drop out of school as financial means were unavailable to continue their education. In 2018, he returned with his family to their severely damaged house in Bashiqa, which has been gradually rebuilding. He also started operating three sesame mills as his factory had been looted and all equipment had been lost. His income is less than half of the pre-ISIL period, and he has ten employees now. The support provided by UNIDO in terms of training and equipment was therefore appreciated, especially as he can now export to other governorates with the Lasik stamp machine, including Kurdistan, by branding the products in accordance with government rules and regulations. He anticipates that this could double his income. The training provided to his three employees motivated them, and he has already reorganized the work space and his workers to better meet hygienic standards.

**Case 2. Examples of changes in income/productivity -Tahini company owners  
(From the Evaluation Report)**

Before the UNIDO intervention I had limited production in my factory but now produce 70 percent more. I produce half a ton of tahini in my factory (per week) and sell it in market for 2000 IQD per kilo.

My income has increased by 30 percent since the intervention.

The system with trained workers in my company has proven to work well. Every Thursday each worker is rewarded with half a kilo of Rashi<sup>9</sup>. I have now eleven workers, and almost 40 families directly and indirectly benefiting from the employment opportunities in my company. In Winter, I have 35 workers because of the production peak.

The tahini company owners who had received their equipment had observed an increase in production, income and profit - two with the same number of employees and one with an increase from 8 to 12 employees.

**Case 3. Household Poultry Beneficiary in Bashiq**

I am Wasan Sulaiman Rasheed, an Arab Yazidi in Bashiq. I am 27 years old, married and have two daughters. My husband is 33 years old. I have a university bachelor degree in Mathematics – College of Education but my husband has finished only primary school. I live in my house at Bashiq and I am permanent resident there but I have been IDP in the years 2014 to 2016 in Erbil/Ankawa District, Ashtar School. My husband is unemployed and jobless.

Before the ISIS attack in 2014, my husband was working as construction worker and he was making between 100,000IQD to 200,000IQD a month. But now all we have are the 20 chickens I received from UNIDO at the beginning of February 2020. I take care of the chickens. My husband helps me but most of the time I do the job. I give them food 3 times a day, clean their place, change their water and sterilize the equipment.

I have benefited from the project a lot. I have 5, 7, 10, 11, 15 egg a day. The family eats some of the eggs and the others we sell. Every 2 or 3 days I sell one set of 30 eggs. I sell them to my neighbors or to those people who order in our neighborhood. Each set of 30 eggs is 5000IQD. I do not spend the 5000IQD which I get from selling eggs. I have to save the money for one month and then spend. Each month I have minimum 25000IQD. This is the only income we have now.

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<sup>9</sup> Rashi is the local name of Tahini in the area; Tahini is a paste made from sesame seeds

#### Case 4. Household Dairy Processing Beneficiary in Bashiq

I am Salama Jejo Jumaah an Arab Yazidi living in Baashiq. I am 40 years old and married. I have 6 children, 4 girls and 2 boys. My husband is Marwan Alias Jumaah who is 52 years old. My husband had a heart attack and still suffering from the symptoms. We have been IDPs from 2014-2016. We first stayed at the Shekhan Camp but moved because life was difficult at the Camp. We moved to a big shop together with the family of my bother-in-law. In total we were 14 people living in one place for 3 years. After the liberation of Mosul, we moved back to Bashiq in 2017.



I used to own seven cows but ISIS took them all during the attack. Now, I only have 2 female cows. One gave birth to a calf 40 days ago, which has to feed her calf. Hence, I get milk now only from 1 cow, which produces 12 liters of milk a day. I bought each cow for 2,500,000IQD. I borrowed 1,000,000IQD each from my brother and mother-in-law who is living with us. She gets pension as beneficiary of my late father-in-law who was a guard in the Directorate of Electricity before he died. Each month I pay them back 200,000IQD to 250,000IQD.

From the cow's milk I produce yoghurt and sell to my neighbors, relatives and shops who have regular orders with me built over time.

I had participated in the UNIDO 10-day training course. I have learned entrepreneurial skills from the training, how to behave with your workers and you treat them, how to milk cow and how to process milk safely into yoghurt and cheese. The training was very useful and I benefited from it a lot. I am now applying what I have learned. The teachers were all very good. I received a certificate at the end of the training.

I received a set of equipment from UNIDO which includes one table, gas bottle, 2 food keeper, buckets, spoon, scale, pieces of clothes, food thermometers, masks, hand gloves, aprons, pots and some other pieces. All the items I have received are very useful and I use all them every day when I make yoghurt.

All my income comes from the milk of the cows that I process; I have no other source of living or income. I run a house, spend on my family and my children who are all students at schools and universities with the money I get, which is about 500,000IQD to 600,000IQD in a month. I have benefited from a lot; without the cows' milk that I process my family wouldn't have survived until now.

### Case 5. Household Poultry Beneficiary in Bashiq

I am married and have 4 children (3 sons and 1 daughter). We moved to Duhok following the ISIL attack on Bashiq. We stayed for year in Duhok moving from one building to the next and then left Duhok for Ma'adi, and stayed there in unfinished buildings until Mosul was liberated and we were able to go home to Bashiq. Before 2014, my husband was a construction worker with daily wages of 15,000 to 20,000 IQD. Now he has diabetes, and has difficulties to find work. This became even more difficult after the Covid-19 outbreak while payments for water, electricity and mobile credit still need to be made. Our economic situation is getting worse day by day.

I already had experience in raising chickens, as I used to have around 20 local chickens, but I sold them to feed my family. My children wanted me to find new chickens as they like them. I do not remember the number of hours of the poultry training but it was very useful and I learned a lot, such as raising chickens, preparing a coop for chickens, hygiene and how to sell eggs. I received a certificate at the end of the training, and also 95,000 IQD as reimbursement for transportation. I really liked the training and the group of participants.

I received 20 chickens from UNIDO as they promised and I am very happy about it. As soon as I received them, I built a coop with my husband and started taking care of them. I clean and wash their place every day, and give them food regularly. I received also seven bags of chicken feed the first time and then another two bags the second time. I open the coop door every morning so the chickens can walk around freely. Unfortunately, four of the chickens died because they got the flu. Now I have only 16 chickens left. I harvest about eight to ten eggs per day. I sell them to shops and my neighbors. One set of thirty eggs is 4,500 IQD for shops. I give neighbors six eggs for 1,000 IQD. I use the money to buy milk and diapers for my one-and-a-half-year-old child or I buy other things for the family.

### Quote from an Interview with Dr. Bayar Jafer Al-Sulayvani Dean, University of Mosul, Engineering College

“UNIDO appeared at the right time and gave us tremendous support. We greatly appreciate it. They started by renovating and equipping the Fluid Mechanics laboratory and another laboratory at the department of Mechatronics. By supporting these modern laboratories, they have really aided scientific progress at the College of Engineering.”





**Quote from an Interview with Dr. Saad Zaghlol Saaed  
Head of Mechatronics Engineering Department**

“UNIDO contributed to the development of this section, after ISIS destroyed and stole all equipment, through the provision of advanced machinery and equipment, as well as through the establishment of training for trainers.

This support helped us to raise the level of education for us as a teaching staff, as well as for the students, so we extend our sincere thanks to UNIDO and the donor country Japan”



## **5.2. Sustainability**

### **Output 1**

The project has built and strengthened the capacities of the project beneficiaries and provided them durable assets to start and/or strengthen their livelihoods or businesses. If they are able to manage these resources well amidst the challenges of current pandemic, then they can sustain their sources of livelihoods strengthened by the project.

### **Output 2**

Capacity in the UoM was raised sustainably for the following reasons. The technical didactic equipment procured only needs electrical power and water to be functional. There is no need to update the machines or purchase any licenses. Likewise, teachers were trained on GIS and monitoring software that is open source, so there are no costs implied for further use in the future.

Expecting an average lifespan of the didactic equipment of ten years and an average of 500 yearly students, all things equal, the project equipment has the potential to benefit to up 5,000 students, including 2,000 females until the end of the decade. As the previous didactic equipment has been used since the 1970's, it could be that the newly procured equipment is functional for even longer than 10 years given diligent handling and maintenance by University staff.

## **5.3. Recommendations**

### **UNIDO and the Ministry of Planning/Iraq**

The rehabilitation of small and medium industries is one key intervention in accelerating the growth and development of the devastated areas of the country, promoting employment among the returnees and developing ancillary industries and much needed push of the agricultural sector.

For food security and additional incomes among the returnees and protracted IDPs interventions in agri-businesses need to be promoted. Human capacities have to be strengthened coupled with provision of productive assets for sustained livelihoods.

### **Joint Crisis Coordinating Center**

Continue to support the agri-business of the IDPs and refugees by providing the land and other facilities to help them establish and manage their income generating activities for their own economic resiliency.

### **Mosul Civil Defense**

The needs of Mosul's Civil Defense have been superior to this projects' capacity, nevertheless they are pertinent and need to be addressed. The Department of Civil Defense Mosul is the national institution which oversees two main type of interventions: providing rescue and assistance to persons as well as acting as fire-fighters. This national institution, which belong to the Ministry of Interior is composed of 700 officers including 500 active firefighters.

Mosul Civil Defense encompasses 16 stations, (one per district, among 6 are completely destroyed - previously occupied by ISIL and bombed by coalition military forces during the liberation).

During the second output's fact-finding mission, exchanges with Colonel Zakaria, Director of Civil Defense Mosul, revealed that priority needs are oriented towards heavy duty equipment's, such as firetrucks, forklifts, telehandlers, car-mounted fire pumps, rescue vehicles, rescue boats, etc.

Being a world leader in manufacturing products, Japan could be in a strong position to support Iraq's Civil Defense which is the key institution to provide rescue to its population in cases of danger and fire.

### **Technical and tertiary education in Iraq**

In Iraq, Technical Vocational Education and Training (TVET) is part of secondary education where the best students can continue their education at technical colleges. Challenges persist however, that few students have the opportunity to acquire the skillset to access a decent job.

Challenges of the TVET system in Iraq includes fragmentation of responsibilities into different ministries, insufficient policy development, limited budget allocation, destroyed and obsolete educational infrastructure and equipment, curricula irrelevant to the needs of the labor market, lack of substantial practical training and inadequately skilled teacher.<sup>10</sup>

From 2012 onwards, Iraqi youth unemployment continuously increased from 16% to 25.5% in 2017. The last years saw a stabilization in the numbers, but 25.1% of the 15 to 24-year-olds were still unemployed in 2020.<sup>11</sup>

The Government of Iraq has adopted several national policies and strategies to strengthen the TVET sector to provide relevant technical skills. The National Strategy for Education and Higher Education in Iraq for 2012-2022, Iraq's first ever national education strategy<sup>12</sup>, puts emphasis on increasing enrolment rates in TVET and offer demand driven TVET<sup>13</sup>.

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<sup>10</sup> UNESCO Reforming Technical and Vocational Education and Training in Iraq. Infographics; <https://en.unesco.org/fieldoffice/baghdad/tvet>

<sup>11</sup> <https://data.worldbank.org/indicator/SL.UEM.1524.ZS?locations=IO>

<sup>12</sup> [https://www.unicef.org/media/media\\_66597.html](https://www.unicef.org/media/media_66597.html)

<sup>13</sup> <https://www.indeson.net/project/reforming-technical-and-vocational-education-and-training-tvet-in-iraq/>

Participation in tertiary education is below 20% in Iraq<sup>14</sup>. Higher technical education has equally suffered from 2003 invasion and ISIL presence which left classrooms and didactic equipment severely destroyed and education attendance diminished.

A thorough assessment on investment for education in emergencies from the Overseas Development Institute confirms the high importance of education within emergency contexts for communities and individuals while funding is often erratic<sup>15</sup>. Further supporting the rebuilding of technical and tertiary education in Iraq is key for the country's industrialization, reconstruction effort and reduction of poverty as well as to help maintaining peace and security.

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<sup>14</sup> World Bank (2020) Internationalization of Tertiary Education in The Middle East and North Africa

<sup>15</sup> <https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/9450.pdf>

## Annex A: Project Log Frame

Results	Indicators	Means of verification	Assumptions & Risks
<b>Development Objective</b>			
To contribute to social stabilization and economic resilience in Nineveh Governorate in Iraq.	After the completion of the project, number of micro- and small enterprises assisted by the project and employment generated by them; number of returnee families who have established their income generating activities increased.	<input type="checkbox"/> Baseline data <input type="checkbox"/> Surveys and interviews	Security situation does not deteriorate.  Conflicts in the region and in the country do not affect the economic activities in the target areas.
<b>Outcome</b>			
1. Micro- and small enterprises restarted for sustainable livelihoods and economic recovery in the Nineveh Plains.	After the completion of the project, at least 70% of the micro- and small enterprises assisted by the project are fully operational and at least 75% of the returnee families are sustaining the income-generating activities they were assisted to establish	<input type="checkbox"/> Baseline data <input type="checkbox"/> Surveys and interviews <input type="checkbox"/> Evaluation report	Conflicts in the region and in the country do not drastically affect the economic activities in the target areas.
2. Vocational Training Centers (VTCs) and/or National Institutions strengthened to improve conditions allowing for return in conflict-affected areas.	After the completion of the project, at least 1 national institution/VTC is fully operational in the field of intervention of the project and at least 75% of the required staff have received trainings on the equipment supplied		
<b>Outputs</b>			
1. Micro- and small enterprises re-established and income-generating activities for returnees supported.	By the end of March 2020, a minimum of 25 micro- and small enterprises directly benefit from the training, technical assistance and material support (30% of who are female owned enterprises)  By the end of March 2020, a minimum of 50 returnee households have been assisted to establish their own agri- or food processing income-generating activity (30% of who are female headed households)	<input type="checkbox"/> Baseline data <input type="checkbox"/> Training reports; training completion and records <input type="checkbox"/> Training modules <input type="checkbox"/> Field visits <input type="checkbox"/> Equipment purchases <input type="checkbox"/> Interviews with beneficiaries	Commitment of project beneficiaries in attending the training programs and coaching sessions does not change during the project period.  Support and ownership from the related Government institutions remain the same.  Commitment of Government counterpart in the training and monitoring/follow-up process does not change.  The security situation in the target area does not drastically deteriorate.  Severe internal conflict between beneficiaries with different backgrounds is not present.  Local culture does not affect much the participation of women in project activities.

<p>2. Accelerated return of communities to areas affected by the conflict over strengthened Vocational Training Centers (VTCs) and supported National Institutions.</p>	<p>By the end of 2020, 1 to 2 National Institution(s) and/or VTCs strengthened via equipment, resources and training skills capacities.</p> <p>By the end of 2020, between 50 and 100 men and women received specific trainings in line with the identified needs and priorities in the assistance of the returnees to the Nineveh region.</p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Baseline data</li> <li><input type="checkbox"/> Training reports; training completion and records</li> <li><input type="checkbox"/> Training modules</li> <li><input type="checkbox"/> Field visits</li> <li><input type="checkbox"/> Equipment purchases</li> <li><input type="checkbox"/> Interviews with beneficiaries</li> </ul>	<p>Full support and ownership from the related Government institutions is ensured.</p> <p>Commitment of Government counterpart in the training and monitoring/follow-up process is not changed.</p> <p>The security situation in the target area does not drastically deteriorate .</p>
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## Annex B - VISIBILITY ACTIVITIES



UNIDO contracted Linx Video Production and produced two video deliverables to highlight project activities in Iraq. The first is a short one-minute video with aim for outreach purpose. The second a nine-minute detailed video showcasing the impact of the project on local economy. The videos highlight UNIDO's employment generating initiatives through this project. Economic activities highlighted include Beekeeping in Koya, car diagnostics training in Erbil, support for Mosul University as well as tahini factory in Bashiqa





## UNIDO helps local economic recovery by supporting household production in Iraq

Decades of turmoil, most recently at the hands of ISIS have meant that 30 per cent of Nineveh's families are still displaced in camps and 70 per cent are living in out-of-camp settings. The protracted nature of the displacement has led to increased vulnerability among these groups as they struggle with depleted savings and destroyed livelihoods. Funded by the Japanese government, the UNIDO project "Promotion of social stabilisation and acceleration of economic recovery in the Nineveh Governorate of Iraq" is striving to bring economic stability back to these households by supporting individual skillsets and providing access to resources and markets. This comprehensive approach starts with assistance in procuring productive livestock such as cows, training beneficiaries on household dairy processing including providing the necessary tools and equipment, and supporting throughout with technical assistance, hygiene practices and entrepreneurial skills. The hope is that beneficiaries, in particular vulnerable women and youth, can scale up their production and earn a stable income.

The success of the project for its beneficiaries has been crucial, particularly during the COVID-19 pandemic, as one beneficiary explains: "I sell the yoghurt to my neighbours, shops, as well as relatives. All my income comes from the cows." Even at the height of the pandemic, she says "We had the same amount of milk and yoghurt during lockdown and curfew because the cows were well fed and well taken care." Moving forward, the project is continuing to promote livelihood activities that provide immediate economic benefits for the beneficiary families and, through that, help alleviate the hardships brought about by the COVID-19 lockdown.

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## Japan continues to promote social stability and economic recovery in Iraq



VIENNA, 11 May 2020 – In line with ongoing efforts to promote social stabilization and accelerated economic recovery in Iraq, the United Nations Industrial Development Organization (UNIDO) and the Government of Japan have recently launched a new technical cooperation project to help build the economic resilience of internally displaced persons (IDPs) in the Nineveh Governorate.

Nineveh Governorate has been severely affected by the ISIS conflict. Despite significant numbers of people returning to the areas from which they had initially been displaced, many are still facing obstacles in their attempts to return. Thirty per cent of the internally displaced families in Nineveh are still living in camps, and the protracted nature of the displacement has led to increased vulnerability.

UNIDO's project, "Promotion of social stabilization and acceleration of economic recovery in Nineveh Governorate of Iraq", will provide IDPs in the Nineveh Governorate with technical skills and entrepreneurship training, as well as equipment and tool support to establish their own livelihoods and income-generating activities. UNIDO will give particular attention to promoting livelihood activities that provide immediate economic benefits for beneficiary families and, through that, help alleviate the hardships brought about by the COVID-19 lockdown. The Government of Iraq imposed stringent curfews and movement restrictions for several weeks.

The project will additionally support Mosul University's College of Engineering in strengthening its teaching and training capacities and, as a result, accelerate access to employment in the newly liberated areas.

Japan's Ambassador to Iraq, His Excellency Naofumi Hashimoto, stated, "Japan has recently decided to provide a new assistance package for Iraq amounting to US\$41m including this project to assist IDPs in Nineveh Governorate. With this package, the total amount of Japan's assistance to the people affected by the crisis has reached US\$540m since 2014."

He added, "I hope that the assistance from the Government and people of Japan will help IDPs to rebuild livelihoods and economic resilience." The project is a continuation of a previous UNIDO intervention in the Nineveh Governorate which focused on training and institutional capacity-building as a means to ensure long-term and sustainable economic resilience.

For further information, contact:



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## Rebuilding Bashiqa's Tahini Industry Post-ISIS

font size Print Email



**By United Nations Industrial Development Organization (UNIDO) Iraq**  
**Bashiqa, a diverse sub-district located 12 kilometers northeast of Mosul is well known for the production of tahini, a thick paste made from roasted and ground sesame seeds.**

Popular in the Middle East, tahini is a staple in most households, often used as a simple breakfast item alongside date syrup and eaten with bread, or as an ingredient in popular Mediterranean foods such as hummus.

Prior to the rise of ISIS in 2014 and the occupation of the sub-district in June of that year, 25 tahini factories operated in the area. However, the takeover of Bashiqa by ISIS destroyed this booming industry and forced the community to seek shelter elsewhere, becoming Internally Displaced Persons (IDPs) mostly in the Kurdistan Region of northern Iraq.

"Before 2014, we had very developed tahini factories," one factory owner, Sabah Jaboor explained. "When ISIS came, we lost everything."

Jaboor, a 67-year old retired school teacher first opened his factory during the first Gulf War in 1990.

After the sub-district was liberated in late 2016 and the security situation improved, IDPs began to return home.

"When we returned, we found that our factories had been looted, burned, partially damaged or completely destroyed," he added.

After returning, he found that half of his factory had been demolished in an airstrike, equipment and materials had been looted or destroyed, and he had also lost 350 olive trees and poultry.

Jaboor says that he once provided jobs to nearly 40 people. Since reopening his factory last year, he now only has the capacity to employ six to eight laborers.

Another factory owner in Bashiqa, Sayd Haji, has been in the tahini production business since 1980, as his family has been working in the industry for generations.

"I lost \$800,000 because of ISIS," Haji explained, as walls in his factory were demolished and all equipment and raw materials were stolen.

Haji once employed nearly 45 people and produced over 10 tons of tahini per day. Now he's down to less than 20 employees and only producing four tons per day of tahini.

Today, only 17 factories have reopened, but the process has been difficult and production has decreased dramatically from what it once was.

"But we have will and vision. We were strong and were able to reopen our factories by working during displacement and saving money," Jaboor said.

"We need international support to rebuild," he explained. "It's urgent and migration has become a disease due to lack of job security."

This is how the United Nations Industrial Development Organization (UNIDO) became involved in assisting to reestablish the tahini industry in Bashiqa, Nineveh. Jovita Culaton Viray, Chief Technical Adviser said, "It is part of the process to help revive the local economy and generate employment in Bashiqa. The revitalization of the industries operational prior to the conflict and support of economic livelihood activities along a value chain can play a crucial role in this process".

By providing training in modern factory operation techniques as well as food safety and hygiene, factory owners will improve their business operations which will eventually allow for more employability opportunities within the community.

"We focused on tahini because Bashiqa is well known for its tahini production, especially with the local variety of sesame seeds that they use," explained UNIDO's National Coordinator Mahmood Khoshnaw.

He added that 16 tahini factory owners participated in the ten-day training that took place in Baradaresh beginning in mid-August.

"We focused on food safety, hygiene, factory layout and all of the technical parameters required of such food processing factories to operate in a safe environment and produce safe and hygienic food," Khoshnaw said.

The training also covered business and financial management as well as soft entrepreneurial skills.

UNIDO will allow time for the factory owners to implement what they have learned in the training and plan on a follow up assessment by late September.

Based on the assessment, Khoshnaw said that the project will give additional technical assistance including some equipment support to the beneficiaries of the training.

Participants in the program were happy with the training provided by UNIDO and are looking forward to implementing their newfound knowledge to improve their factories and help create jobs in the community.

"We received a lot of new information not only for tahini, but also for foods processing and safety and how to store foods to prevent bacteria and contamination," Haji said. "We also learned about factory layout and managing the factory."

Jaboor also commented on the results of the UNIDO training.

He explained that the layout and management of his factory was very "chaotic" before.

"It was as if we never had a factory before. The instructor is very knowledgeable and we are pleased with him," Jaboor said.

He added that everything in the training was beneficial. He highlighted some important points which hadn't been implemented before such as learning the organizational chart for employees, management of the factory layout, and the physical and mechanical process of how to properly clean the machines as well as food hygiene and safety standards.

"In this training program, we were exposed to a lot of new information," he said. "As a teacher, I can say that this is a very successful training program."

UNIDO is implementing the tahini factory training with funding from the Japanese Government in order to help revive the local economy of Bashiqa, Nineveh, Iraq.

Text and photos: United Nations Industrial Development Organization (UNIDO) Iraq

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Source – [http://www.unirag.com/index.php?option=com\\_k2&view=item&id=11151:rebuilding-bashiqa%E2%80%99s-tahini-industry-post-isis&Itemid=606&lang=en](http://www.unirag.com/index.php?option=com_k2&view=item&id=11151:rebuilding-bashiqa%E2%80%99s-tahini-industry-post-isis&Itemid=606&lang=en)





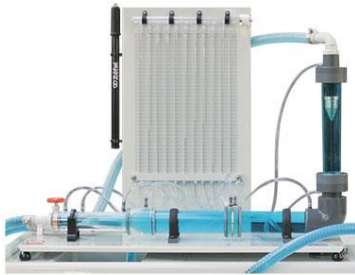
**Annex C. – List of Dairy Processing Equipment, Tools and Supplies given to the Dairy Processing Training Beneficiaries**





#	Items and Specifications	Qty	Unit
1	Cheese cloth color: white. Food Grade product ,100% safe. Cut into 1.5M2 meter/piece. Pack 2 pieces plastic bag.	50	meters
2	Curd knife -stainless steel 50 cm long	16	pieces
3	Milk thermometer / 304 Stainless steel, food grade analog thermometer 0 TO 120 degree Celsius Can be with 304 SS clip to adhere to any edge of pot Stem diameter: (3.8mm), Stem length: 250mm, the indicator gauge 5-7 cm. Temperature range: 0/110C. with three degree Celsius pointed 72, 42,38 Cellces inside the gauge, Accuracy: +/-2% of the whole scale	30	pcs
4	Milk strainer/High quality big Size stainless steel strainer with handle	16	pieces
5	Stainless Steel Food Sieve: - Strong and durable stainless steel construction o Hemispherical sieve for straining and purees, Supported by heavy wire frame and wire handle, One millimeter sieve gauge, o Target Dimensions: 250mm X 250mm X 300mm (Height)	16	pieces
6	Bucket with handle; 15 Liter capacity Material stainless steel	16	piece
7	Food Grade PP Plastic bucket with lid round shape white color use for yogurt packaging With Handle. Capacity:1 kilo	60 0	pieces
8	Food Grade PP Plastic bucket with lid round shape white color use for yogurt packaging With Handle. Capacity: 2 kilos: 400 pieces	30 0	pieces
9	High transparency and high quality 2kilos food grade plastic with lid, use for cheese packing;	15 0	pieces
10	Stainless steel (or aluminum) milk bucket 10 Liter capacity.	30	pieces
11	Plastic bags 25*35 (pack of 120 pieces) high quality food grade	30	packs
12	Plastic Refuse Bins with 10 plastic liners Pop up cover with foot pedal, suitable for plastic bag lining, Size 350mm diameter, 500 mm high; Each complete with 50 plastic bag liners	18	pcs
13	Pyrex Measuring Jugs Constructed from durable Pyrex glass1000ml capacity with 100ml graduations Wide handle for comfortable grip	30	pcs
14	Steel funnel food grade, Conical shaped funnel and constructed 130mm top diameter. 75mm deep, 40mm bottom diameter, 25mm lower lip to locate the funnel inside the jam jar	15	pcs
15	Good Quality Plastic washing bowl rectangular shape white color Size: 50 *25 cm diameter *20 cm high or round as market availability	34	pcs

16	High Precision 25 kg Electronic weighing digit scale for kitchen use type: food scale, Power Supply: AC AND DC, Display Type: LCD, Rated Load:25KG Accuracy:1G, accuracy:1gplate size:280*19.5mm battery: DC 6v rechargeable battery windows: no. weight. total no. adapter: optional, Certificate: CE ISO9001, Display: Big LCD Display, Warranty: 1 Year Guarantee	15	pieces
17	Large cooking pot Steel cooking pot (high quality) Food cooking and stock 30x20 cm, 20 LTR capacity Size: 600*H800 Volume:225L	15	pieces
18	Medium cooking pot Steel or food grade 12-15L capacity better to be scaled inside	15	piece
19	Customized Stainless steel commercial work table with under shelf, Size 600X1500xH600, Material: Stainless steel 304, Tube thickness: 0.9mm, Shelf thickness:0.8mm, Type: kitchen work table - Usage: Commercial kitchen, hotel, warehouse, Keywords: work bench	15	tables
20	Tray stainless steel 304 / Aluminum Food grade, Food factory / Home kitchen, Raised edge design, 600mm X 400 mm, 19-gauge thickness	16	pieces
21	Perforated stirring spoon Extended length 42.8-50 cm (Steel)	16	pieces
22	Large ladle Stainless Steel Kitchen Tool Material Top: 430 stainless steel,	16	pieces
23	Plastic washing brush	30	pieces
24	LPG tank home cooking gas cylinder Iraq made std. 12.5kg full	15	tanks
25	Gas Stove / burner double ring design with stand 30X60CM with all accessories (regulator and high pressure- good quality Turkish or German made) with plastic house 4m long.	15	pieces
26	Microbial meito rennet 100gr. Expiration date 2 years; good quality Japan made	32	packets
27	Industrial kitchen cooking Apron with customized logo; midarm and big size	18	pcs
28	Hygiene kit (with Disposable gloves 100pcs per box and face mask disposable for food service 50 pcs/pack, Disposable Hair Cover 100 pcs per box)	35	kits
29	70-liter high impact storage box with cover; durable, color: white	15	boxes

## Annex D. List of educational training equipment procured and installed at the University of Mosul

The following educational training equipment was identified, procured and installed at the Department of Water Resource and Dam Engineering:


Item No	Specifications	Qty Procured
1	<p><b>Digital Hydraulic Bench</b>            ONE (1) x Digital hydraulic bench which provides a controlled recirculating water supply and accurate flowmeter for hydraulic and fluid mechanics experiments. Bench is fitted with an electronic flowmeter and digital display for accurate measurements and must include water additive and all necessary pipes and pipe clips for operation.</p> 	5
2	<p><b>Venturi Meter</b>            ONE (1) x Venturi meter set that allows students to see and measure the complete static head distribution along a horizontal Venturi tube and study Bernoulli's theorem. The equipment set must be supplied with a hand-pump, length of outlet tubing and suitable pipe clips.</p> 	1
3	<p><b>Flow Measurement Methods</b>            ONE (1) x Flow measurement methods set showing typical measuring of the flow of an incompressible fluid and demonstration of the applications of Bernoulli's equation. The equipment set must be supplied with necessary lengths of tubing and suitable pipe clips.</p> 	1

4	<p><b>Losses in Piping Systems</b></p> <p>ONE (1) x Losses in piping systems free-standing set that shows pressure losses in several small-bore pipe circuit components, typical of those found in central heating installations. The equipment set must be supplied with a hand pump to adjust the datum position of the manometers, a <i>roughened pipe option</i> and a frame fitted with wheels for easy movement in the classroom area.</p>		1
5	<p><b>Osborne-Reynolds Number and Transitional Flow</b></p> <p>ONE (1) x Osborne-Reynolds number and transitional flow <i>free-standing</i> apparatus that gives a visual demonstration of laminar and turbulent flow. The equipment set must be supplied with a <i>heater module</i> that allows testing at various viscosities and a 250ml dye injector bottle and tube.</p>		1
6	<p><b>Flow Through An Orifice</b></p> <p>ONE (1) x Flow through an orifice <i>free-standing</i> apparatus that shows different flow rates through a variety of orifices. The equipment set must be supplied with a set of interchangeable aluminum orifices.</p>		1
7	<p><b>Impact of A Jet</b></p> <p>ONE (1) x Impact of a jet free-standing apparatus that investigates the force generated by a jet striking plate (representing turbine vanes). The equipment set must be supplied with a minimum of FOUR (4) plates and all necessary tubing and pipe clips.</p>		1


8	<p><b>Jet Trajectory and Orifice Flow</b></p> <p>ONE (1) x Jet trajectory and orifice flow free-standing apparatus that shows vertical flow and horizontal jet trajectory through different orifices (nozzles). The equipment set must be supplied with a minimum of FOUR (4) nozzles and all necessary tubing and pipe clips.</p>	1
9	<p><b>Flow Visualization Channel</b></p> <p>ONE (1) x Flow visualization channel apparatus that gives a visual demonstration for visualizing flow patterns around weirs and other objects in an open channel. The equipment set must be supplied with a <i>heater module</i> that allows testing at various viscosities and a 250ml dye injector bottle and tube.</p>	1
10	<p><b>Hydrostatics and Properties of Fluids Unit</b></p> <p>Hydrostatics and properties of fluids self-contained, mobile unit for conducting experiments in fluid mechanics. The equipment set must be supplied with a <i>Hares tube set</i> and a <i>Surface tension balance set</i> that allows establishment of specific gravity and determination of surface tension of liquids.</p>	1





11	<p><b>5 Metre Length Open Flow and Sediment Transport Channel (Flume)</b></p>  <p>ONE (1) x 5 Metre length open flow and sediment transport channel (flume) that provides the ability to study the varying effects of sediment transport, bedform dynamics and fluid flow in an open channel. The equipment set must be supplied with a digital flow meter and a range of gates, weirs, humps and piers that allows for accurate measurements and experiments.</p>	1
12	<p><b>Acrylic Plastic Sheets</b></p> <p>ONE (1) x Acrylic plastic sheet for mounting on the outside of a large flume.</p>	15

The following educational training equipment training was identified, procured and installed at the Mechatronics Department of the UoM:

Item No	Specifications	Number of Units procured
1		
2	Air Service Unit	1
3	Single-Acting Air Cylinder	1
4	5/2-way directional control valve	1
5	5/2-way single solenoid valve	1
6	OR Valve (Shuttile)	1
7	Sequence Valve	1
8	Pressure Swtich	1
9	3-way distributor	1
10	Timing Relay	1
11	Hardcopy Experiment Manual	1

The following interactive touchscreens for the rehabilitation of classrooms at Mosul University and the for Ministry of Labor and Social Affairs for Training in Erbil were identified, procured and installed. The screens were used primarily for delivery of learning and training content to students in both, the Water resource and dams Engineering Department and the Mechatronics Department.

Item No	Specifications	Number of Units procured
2	<p><b>Interactive Touchscreen with Built-in PC</b>            ONE (1) x Interactive LED 65-70" touchscreen classroom "whiteboard"            Complete with inbuilt PC.            Touchscreen minimum specifications:            230-240V 50 Hz, 2 pin Schuko plug (Type F) input            1920 x 1080 pixel resolution            High definition screen infrared touchscreen technology            10-point touch to permit use with pen or finger            Commercial panel build for daily use            Viewing angle 178° with anti-glare/anti-friction Surface            Multimedia USB connection with built-in front facing speakers            Single, front facing power button            Size approximately 1540 x 866mm            Weight 64kgs approximately.</p> <p>Inbuilt PC minimum specifications:</p> <ul style="list-style-type: none"> <li>• i5-7200U CPU or greater</li> <li>• 3.10 GHZ</li> <li>• 8GB RAM (4G x2 slots)</li> <li>• 500G HD drive</li> <li>• RJ45 ethernet connection</li> <li>• Wifi network card</li> <li>• Microphone in, HDMI, and USB inputs</li> <li>• Pre-installed Windows 10 Pro English operating system</li> </ul>	3
3	<p><b>Webcam, Microphone and Speaker System</b>            ONE (1) x Webcam, microphone and speaker system for use with the interactive screen.            Suitable for small meetings/huddles with super-wide 120 deg. field of view.            Bluetooth technology to allow connection to laptops or mobile devices using applications such as Whatsapp or Skype calls.            Plug and play from USB cable that connects to the interactive screen.</p>	3
4	<p><b>Interactive Touchscreen Software</b>            ONE (1) x One-time installation of utility classroom software packages that permit the use of screen-based tools such as brush, intelligent pen, protractor, eraser, compass, spotlight, ruler and a customisable built- in image library for quick and easy access to subject specific images.            Software permits lessons and presentations to be recorded using the 'own file recorder' function and then output to AVI &amp; WMV formats for uploading to the internet or for use as podcasts/webinars.</p>	3

	<p>Key requirements of the software:</p> <ul style="list-style-type: none"> <li>• Windows/Mac compatible</li> <li>• Image library function</li> <li>• Infinite canvas area ability</li> <li>• Import images and documents with simple interface</li> <li>• A floating toolbar</li> <li>• Annotation tools for marking comments</li> <li>• File recorder function</li> <li>• Toolbar for presentations that allows movement backwards and forwards through slides, to stop slide shows, annotate and highlight over anything displayed on the screen, reveal and spotlight items of interest.</li> <li>• Ability to play interactive content, such as Flash animations and videos, audios files, images and You Tube videos, as well as providing tools for writing and drawing over live videos.</li> </ul>	
<b>5</b>	<p><b>Mobile floor trolley and frame for 65-70" interactive screen</b>  ONE (1) x Mobile floor trolley and frame suitable for 65-70" screens. Allows the screen to be moved within the classroom.  High quality steel frame and brackets with universal screen mounts.  Four locking castor wheels.  One adjustable shelf.  Accommodates screens up to 100kg weight.</p>	<b>3</b>
<b>6</b>	<p><b>Desktop visualizer</b>  ONE (1) x Desktop visualizer that allows display of objects, books etc onto the interactive screen.  Built in arm lighting, 5MP camera with digital zoom.  Features black and white, colour, focus free, freeze, negative and positive imagery.  Powers directly from USB cable that connects to the interactive screen.</p>	<b>3</b>
<b>7</b>	<p><b>Wireless Keyboard and Mouse</b>  ONE (1) x Wireless keyboard and mouse set for use with the interactive screen and inbuilt PC.  English QWERTY keyboard.  Nano-receiver for USB port.  Must be suitable for use with Windows 10 operating software.</p>	<b>3</b>
<b>8</b>	<p><b>Software training</b>  ONE (1) x Software training support for a period of ONE (1) year from installation of screens and software, delivered by webinar/Skype/remote access.</p>	<b>1</b>
<b>9</b>	<p><b>Cabinet for the laptops</b></p>	<b>2</b>
<b>10</b>	<p><b>Digital and analogue Multimeters (LVA)</b></p>	<b>1</b>

For the Fluid Mechanics Laboratory of the Water Resource and Dams Engineering Department, the following teaching and experimental equipment were identified, procured and installed:

Item No	Specifications	Number of Units procured
1	<p><b>Digital Hydraulic Bench</b></p> <p>ONE (1) x Digital hydraulic bench which provides a controlled recirculating water supply and accurate flowmeter for hydraulic and fluid mechanics experiments. Bench is fitted with an electronic flowmeter and digital display for accurate measurements and must include water additive and all necessary pipes and pipe clips for operation.</p> <p>General specifications:</p> <ul style="list-style-type: none"> <li>• Fiberglass molded bench with a flat top surface for experiments and a raised rim around the top to prevent spillage.</li> <li>• The body of the bench forms a reservoir containing a submersible pump.</li> <li>• Castor wheels for easy transportation, two of which are lockable.</li> <li>• A small recess or 'trough' in the top works with a removable drain valve to trap a small volume of water.</li> <li>• Hand operated control valve adjusts the water flow rate.</li> <li>• Electrical box contains a pump switch, circuit protection and a digital display of flow.</li> <li>• Sight gauge allows the user to check the water level.</li> <li>• Electronic flowmeter to measure the outlet flow from the submersible pump.</li> <li>• Simultaneous display in L/s-1 and L.min-1</li> <li>• 0.001 L/s-1 and 0.1 L.min-1 resolution</li> <li>• Sump tank capacity between 100-160 litres</li> <li>• Electric submersible pump 200 watts power.</li> <li>• Pump capacity 55 L.min-1 at 1.5m head.</li> <li>• Maximum pressure 450 mbar at working surface height.</li> </ul> <p>Overall bench size 1250mm wide x 780mm deep x 950mm tall</p>	5
2	<p><b>Venturi Meter</b></p> <p>ONE (1) x Venturi meter set that allows students to see and measure the complete static head distribution along a horizontal Venturi tube and study Bernoulli's theorem. The equipment set must be supplied with a hand-pump, length of outlet tubing and suitable pipe clips.</p> <p><u>General specifications:</u></p> <ul style="list-style-type: none"> <li>• Maximum flow rate: Nominally 27 L.min<sup>-1</sup> <ul style="list-style-type: none"> <li>○ Venturi tube.</li> <li>○ Material clear acrylic.</li> <li>○ Inside diameter of Venturi inlet: 26 mm ± 0.05mm.</li> <li>○ Inside diameter of Venturi throat: 16 mm ± 0.02mm.</li> <li>○ Inside diameter of Venturi outlet: 26 mm ± 0.05mm.</li> </ul> </li> </ul>	1

	<ul style="list-style-type: none"> <li>○ Upstream taper 22.6°</li> <li>○ Downstream taper 6.4°</li> <li>● Pressure tapings: 11.</li> <li>● Diameter Ratio = 0.615.</li> <li>● Manometer scale: Millimetres.</li> <li>● Manometer tube range: 0 to 400 mm.</li> </ul> <p>Overall equipment size 650mm wide x 300mm deep x 720mm tall.</p> <p><u>Permits experiments/learning in:</u></p> <ul style="list-style-type: none"> <li>● Direct measurement of the static head distribution along a Venturi tube.</li> <li>● Comparison of experimental results with theoretical predictions.</li> <li>● Measurement of the meter coefficient of discharge at various flow rates.</li> </ul> <p><b><i>MUST be compatible with the digital hydraulic bench offered in Item 1</i></b></p>	
3	<p><b>Flow Measurement Methods</b></p> <p>ONE (1) x Flow measurement methods set showing typical measuring of the flow of an incompressible fluid and demonstration of the applications of Bernoulli's equation. The equipment set must be supplied with necessary lengths of tubing and suitable pipe clips.</p> <p><u>General specifications:</u></p> <ul style="list-style-type: none"> <li>● Orifice plate 20 mm diameter with corner tapings, manufactured to BS1042</li> <li>● Sudden enlargement 26 mm to 51.9 mm</li> <li>● Rotameter scaled 0 to 210 mm.</li> <li>● Includes calibration chart for 0-35 L.min<sup>-1</sup></li> <li>● Drawing and dimensions of Venturi meter and Orifice meter silk-screened onto a clear acrylic baseplate. <ul style="list-style-type: none"> <li>○ Upstream diameter 26mm ± 0.05mm.</li> <li>○ Throat diameter 16mm ± 0.02mm.</li> <li>○ Downstream diameter 26mm ± 0.05mm.</li> <li>○ Upstream taper 22.6°</li> <li>○ Downstream taper 6.4°</li> </ul> </li> <li>● Manometer: 11 Manometer tubes, scaled 0 to 380mm.</li> <li>● Maximum flow: 28 L.min<sup>-1</sup></li> </ul> <p>Overall equipment size 900mm wide x 380mm deep x 900mm tall.</p> <p><u>Permits experiments/learning in:</u></p> <p><i>Study of Bernoulli's equation, flow measurement and losses including:</i></p> <ul style="list-style-type: none"> <li>● Application of the Bernoulli equation for incompressible fluids</li> <li>● Direct comparison of flow measurement using a Venturi meter, orifice plate and rotameter</li> </ul>	1



	<ul style="list-style-type: none"> <li>• Comparison of pressure drops across each flow measurement device</li> <li>• Comparison of pressure drops across a sudden enlargement and a 90-degree elbow</li> </ul> <p><b><i>MUST be compatible with the digital hydraulic bench offered in Item 1</i></b></p>	
4	<p><b>Losses in Piping Systems</b></p> <p>ONE (1) x Losses in piping systems free-standing set that shows pressure losses in several small-bore pipe circuit components, typical of those found in central heating installations. The equipment set must be supplied with a hand pump to adjust the datum position of the manometers, a <i>roughened pipe option</i> and a frame fitted with wheels for easy movement in the classroom area.</p> <p><u>General specifications:</u></p> <ul style="list-style-type: none"> <li>• Two colour-coded circuits made of small-bore copper pipe, mounted on a vertical board with castors</li> <li>• First colour circuit to contain: <ul style="list-style-type: none"> <li>○ Straight pipe with 13.7mm bore.</li> <li>○ 90° Sharp bend (mitre).</li> <li>○ Proprietary 90° elbow.</li> <li>○ Gate valve.</li> </ul> </li> <li>• Second colour circuit to contain: <ul style="list-style-type: none"> <li>○ Sudden expansion – 13.6mm/26.2mm</li> <li>○ Sudden contraction – 26.2mm/13.6mm</li> <li>○ Smooth 90° bend with 50.8mm radius</li> <li>○ Smooth 90° bend with 100mm radius</li> <li>○ Smooth 90° bend with 152mm radius</li> <li>○ Globe valve</li> </ul> </li> <li>• Straight pipe 26.4mm</li> <li>• 90-degree mitre bend (no radius)</li> <li>• Elbow (13.6 mm radius)</li> <li>• Small radius, smooth 90° bend (50 mm radius)</li> <li>• Medium radius, smooth 90° bend (100 mm radius)</li> <li>• Large radius, smooth 90° bend (150 mm radius)</li> <li>• Pressure loss across valves measured by pressure gauge</li> <li>• Pressure across all other component to be measured by 8 piezometer tubes.</li> <li>• Roughened pipe 22mm outer diameter, 20mm internal diameter and internal coating thickness 300µm to 600µm.</li> </ul> <p><u>Permits experiments/learning in:</u></p> <p><i>Investigations into losses in pipes and pipe system components, including:</i></p> <ul style="list-style-type: none"> <li>• Straight pipe loss</li> <li>• Sudden expansion</li> <li>• Sudden contraction</li> <li>• Bends with different radius</li> <li>• Valves</li> </ul>	1

	<ul style="list-style-type: none"> <li>• Elbows</li> <li>• Flow in a roughened pipe – <i>using the Roughened Pipe fitting</i></li> </ul> <p>Overall equipment size 2600mm wide x 800mm deep x 1700mm tall.</p> <p><b><i>MUST be compatible with the digital hydraulic bench offered in Item 1</i></b></p>	
5	<p><b>Osborne-Reynolds Number and Transitional Flow</b></p> <p>ONE (1) x Osborne-Reynolds number and transitional flow <i>free-standing</i> apparatus that gives a visual demonstration of laminar and turbulent flow. The equipment set must be supplied with a <i>heater module</i> that allows testing at various viscosities and a 250ml dye injector bottle and tube.</p> <p><u>General specifications:</u></p> <ul style="list-style-type: none"> <li>• Protective glass fibre housing.</li> <li>• 12mm diameter precision bore tube x 900mm length.</li> <li>• 120mm diameter constant head tank, approximately 300mm height, with a bell mouth entry.</li> <li>• Stilling bed of glass beads.</li> <li>• Heater module to vary and control temperature.</li> </ul> <p><u>Permits experiments/learning in:</u></p> <ul style="list-style-type: none"> <li>• Demonstrations of transition between laminar and turbulent flow.</li> <li>• Determination of transition Reynolds numbers and comparison with accepted values.</li> <li>• Investigations of the effect of varying viscosity and demonstration that the Reynolds number at transition is independent of viscosity.</li> </ul> <p>Overall equipment size 700mm wide x 400mm deep x 1500mm tall.</p>	1
6	<p><b>Flow Through An Orifice</b></p> <p>ONE (1) x Flow through an orifice <i>free-standing</i> apparatus that shows different flow rates through a variety of orifices. The equipment set must be supplied with a set of interchangeable aluminum orifices.</p> <p><u>General specifications:</u></p> <ul style="list-style-type: none"> <li>• Cylinder dimensions approximately 400mm x 160mm diameter.</li> <li>• Maximum flow rate around 13 L/min<sup>-1</sup></li> <li>• Head 365mm maximum.</li> <li>• Manometer scale 100mm to 390mm.</li> <li>• Pitot micrometer: 1 Division = 0.1mm / 1 Complete turn = 1mm</li> <li>• <i>Aluminum orifice set comprising of:</i></li> <li>• ONE (1) x Standard sharp-edged orifice 13mm diameter.</li> <li>• ONE (1) x Circular orifice length 13mm, with 60° contraction and 60° diverging section.</li> </ul>	1t

	<ul style="list-style-type: none"> <li>• ONE (1) x Circular orifice length 13mm, with 29mm diameter bell-mouth approach to 60° diverging section.</li> <li>• ONE (1) x Circular orifice length 60mm, with 29mm diameter bell-mouth approach to 51mm long parallel section.</li> <li>• ONE (1) x Circular orifice length 60mm, with 29mm diameter bell-mouth approach, to 30° diverging section and 25mm long parallel section.</li> <li>• ONE (1) x Triangular orifice, each side nominally 12.1mm, including 1.5mm corner radius.</li> <li>• ONE (1) x Square orifice, each side 9mm long.</li> </ul> <p><u>Permits experiments/learning in:</u></p> <p><i>Investigations into flow through orifices and flow rates, including:</i></p> <ul style="list-style-type: none"> <li>• Determination of contraction and velocity coefficients.</li> <li>• Calculation of discharge coefficient.</li> <li>• Determination of actual discharge coefficient, and comparison with calculated values.</li> <li>• Determination of the various coefficients over a range of flow rates to show the influence of Reynolds number.</li> <li>• Study of the characteristics of different orifices.</li> </ul> <p>Overall equipment size 350mm wide x 400mm deep x 670mm tall.</p> <p><b><i>MUST be compatible with the digital hydraulic bench offered in Item 1</i></b></p>	
7	<p><b>Impact Of A Jet</b></p> <p>ONE (1) x Impact of a jet free-standing apparatus that investigates the force generated by a jet striking plates (representing turbine vanes). The equipment set must be supplied with a minimum of FOUR (4) plates and all necessary tubing and pipe clips.</p> <p><u>General specifications:</u></p> <ul style="list-style-type: none"> <li>• Cylinder dimensions approximately 400mm x 160 mm diameter.</li> <li>• Weight beam scale 250mm in 1mm divisions.</li> <li>• Jockey weight 600g.</li> <li>• Nozzle diameter and area: 10mm and 78.54mm<sup>2</sup></li> <li>• Distance from nozzle tip to impact point on vane 35mm.</li> <li>• Comes with all necessary tubing and pipe clips.</li> <li>• ONE (1) x Flat plate, 80mm long with a 75mm diameter flat face at right angles to the jet.</li> <li>• ONE (1) x Hemispherical vane, 110mm long with a 30mm internal radius hemisphere</li> <li>• ONE (1) x 120° Conical plate, 100mm long with a 75mm diameter 120° conical face</li> </ul>	1

	<ul style="list-style-type: none"> <li>• ONE (1) x 30° Angled plate, 100mm long with a 75mm diameter plate at 30° to the jet.</li> </ul> <p><u>Permits experiments/learning in:</u></p> <ul style="list-style-type: none"> <li>• Measurement of the impact force on a flat plate and comparison with momentum change.</li> <li>• Measurement of the impact force on a hemispherical plate and comparison with momentum change.</li> <li>• Measurement of the impact force on an inclined flat plate (available separately) and comparison with momentum change.</li> <li>• Measurement of the impact force on a conical plate (available separately) and comparison with momentum change.</li> </ul> <p>Overall equipment size 420mm wide x 310mm deep x 740mm tall.</p> <p><b><i>MUST be compatible with the digital hydraulic bench offered in Item 1</i></b></p>	
8	<p><b>Jet Trajectory and Orifice Flow</b></p> <p>ONE (1) x Jet trajectory and orifice flow free-standing apparatus that shows vertical flow and horizontal jet trajectory through different orifices (nozzles). The equipment set must be supplied with a minimum of FOUR (4) nozzles and all necessary tubing and pipe clips.</p> <p><u>General specifications:</u></p> <ul style="list-style-type: none"> <li>• Cylinder dimensions approximately 400mm x 160 mm diameter.</li> <li>• Cylinder mounts on a stand, with apertures in the base and on the side of the cylinder for the insertion of orifices/nozzles.</li> <li>• A plotting board is fixed to the side of the cylinder with 10 adjustable rods allowing the shape of the jet trajectory to be recorded.</li> <li>• Maximum flow rate 13 L/min<sup>-1</sup></li> <li>• Head 365mm maximum.</li> <li>• Manometer scale 100mm to 390mm</li> <li>• Pitot Micrometer: 1 Division = 0.1mm / 1 Complete turn = 1mm</li> <li>• Supplied with a set of FOUR (4) interchangeable orifices (nozzles) with 13mm bore which can be mounted horizontally in the base of the cylinder for Orifice experiments, or vertically in the side of the cylinder for Jet Trajectory experiments: <ul style="list-style-type: none"> <li>○ ONE (1) x Sharp edged orifice</li> <li>○ ONE (1) x Converging/diverging nozzle</li> <li>○ ONE (1) x 30° Angled entrance and exit</li> <li>○ ONE (1) x Curved entrance</li> </ul> </li> </ul> <p><u>Permits experiments/learning in:</u></p> <ul style="list-style-type: none"> <li>• Determination of the contraction and velocity coefficients; hence the calculation of the discharge coefficient.</li> </ul>	1

	<ul style="list-style-type: none"> <li>• Determination of the actual discharge coefficient by measurement of flow rate for comparison against calculated value.</li> <li>• Determination of the above over a range of flow rates to show the influence of Reynolds number.</li> <li>• Determination of discharge characteristics (jet trajectory) for an orifice mounted in the side of a vertical tank and comparison with simple theory.</li> </ul> <p>Overall equipment size 700mm wide x 400mm deep x 700mm tall.</p> <p><b><i>MUST be compatible with the digital hydraulic bench offered in Item 1</i></b></p>	
9	<p><b>Flow Visualization Channel</b></p> <p>ONE (1) x Flow visualization channel apparatus that gives a visual demonstration for visualizing flow patterns around weirs and other objects in an open channel. The equipment set must be supplied with a <i>heater module</i> that allows testing at various viscosities and a 250ml dye injector bottle and tube.</p> <p><u>General specifications:</u></p> <ul style="list-style-type: none"> <li>• Acrylic flow channel section with a detachable white backdrop, screen-printed with centre-line for lock gates, horizontal line as a horizontal reference and a protractor to set hydrofoil angles.</li> <li>• TWO (2) x Model holders, one on the base for the weirs and one on the side for shapes.</li> <li>• ONE (1) x Folded 1.5mm stainless steel reservoir with UPVC inlet tube and PPI foam as a diffuser in the tank (8L capacity approx).</li> <li>• ONE (1) x Tripod front leg with height adjustability to tilt the channel through +1 to -3°</li> <li>• ONE (1) x Dye injector manifold and funnel with height adjustability and flow control valve</li> <li>• SIX (6) x Dye injector nozzles</li> </ul> <p><u>Permits experiments/learning in:</u></p> <ul style="list-style-type: none"> <li>• Visualization of flow around objects in an open channel.</li> <li>• Study of flow around submerged sharp-crested weir.</li> <li>• Study of a broad-crested weir and the effects of changing the profile of the weir.</li> <li>• Visual demonstration of hydraulic jump.</li> <li>• Visual demonstration at varying angles of flow around a hydrofoil.</li> <li>• Visual demonstration of the mixing of two fluids with different properties.</li> <li>• Visual demonstration of the energy released when a block of ice turns.</li> <li>• Visual demonstration of ice melt in fresh and salt water.</li> </ul>	1



	Overall equipment size 800mm wide x 190mm deep x 750mm tall. <b><i>MUST be compatible with the digital hydraulic bench offered in Item 1</i></b>	
<b>10</b>	<p><b>Hydrostatics and Properties of Fluids Unit</b></p> <p>ONE (1) x Hydrostatics and properties of fluids self-contained, mobile unit for conducting experiments in fluid mechanics. The equipment set must be supplied with a <i>Hares tube set</i> and a <i>Surface tension balance set</i> that allows establishment of specific gravity and determination of surface tension of liquids.</p> <p><u>General specifications:</u></p> <p><i>The mobile unit shall comprise of teaching equipment that is either rigidly mounted on the bench or as free-standing experiment items suitable for use on the bench top, containing as a minimum:</i></p> <ul style="list-style-type: none"> <li>• ONE (1) x Reservoir Tank with hand pump</li> <li>• ONE (1) x Drain Tray with cover and rubber bung, 29-33 mm</li> <li>• TWO (2) x Sink covers</li> <li>• ONE (1) x Pyrex Measuring Beaker, 100 ml</li> <li>• ONE (1) x Pyrex Measuring Beaker, 800 ml</li> <li>• ONE (1) x Triple Beam Balance with weights</li> <li>• ONE (1) x Eureka Can</li> <li>• ONE (1) x Density Bottle</li> <li>• ONE (1) x Header Tank with Hook Depth Gauge</li> <li>• ONE (1) x Capillarity apparatus comprising of a set of glass tubes: 1.6 mm, 0.8 mm and 0.4 mm bores, glass plates with side clamps and a set of plastic shims for various separations (0.002"–0.020").</li> <li>• ONE (1) x Set of spheres for viscometer experiment.</li> <li>• ONE (1) x Set of graduated Jars – 0-1000 ml, complete with "O" Rings.</li> <li>• FIFTY (50) x Stainless Steel balls, 1/16" outside diameter.</li> <li>• FIFTY (50) x Stainless Steel balls, 1/32" outside diameter.</li> <li>• FIFTY (50) x Stainless Steel balls, 1/8" outside diameter.</li> <li>• FIFTY (50) x Stainless Steel balls, 5/32" outside diameter.</li> <li>• ONE (1) x Stopwatch.</li> <li>• FIVE (5) x Pascal's Tubes: interconnected glass tubes of varying cross sections and shapes.</li> <li>• ONE (1) x Archimedes' weight.</li> <li>• ONE (1) x Floating rectangular pontoon fitted with plastic sail with adjustable centre of gravity, weight and magnets.</li> <li>• ONE (1) x Centre of pressure tank and balance consists of a clear Perspex quadrant with inner radius 100mm, outer radius 200mm, breadth 75mm. Moment arm radius to be 200mm.</li> <li>• TWO (2) x 10g Weight Hangers with ONE HUNDRED (100) x 10g weights.</li> <li>• ONE (1) x Bourdon gauge with visible mechanism and dead weight calibrator</li> <li>• ONE (1) x Pressure gauge calibration cylinder with piston weight platform and PVC tube.</li> </ul>	<b>1</b>

	<ul style="list-style-type: none"> <li>• ONE (1) x 200g slotted cast iron weight.</li> <li>• TWO (2) x 0.5kg slotted cast iron weights.</li> <li>• FOUR (4) x 1kg slotted cast iron weights.</li> <li>• ONE (1) x Fluid manometer with SG 1.99 manometer fluid.</li> <li>• ONE (1) x Water manometer.</li> <li>• ONE (1) x Cycle pump.</li> <li>• ONE (1) x Hydrometer 0.7–2.0.</li> <li>• ONE (1) x Ball guide.</li> <li>• ONE (1) x Pipette tube.</li> <li>• ONE (1) x Level indicator assembly.</li> <li>• ONE (1) x Bilge pump.</li> <li>• ONE (1) x 250 ml bottle of extract of Barley Straw water treatment.</li> <li>• ONE (1) x Pint of SAE 30 oil.</li> <li>• ONE (1) x 500 ml Blue liquid colouring.</li> <li>• ONE (1) x -10° to 110° thermometer.</li> <li>• ONE (1) x Hoffman type tube clip.</li> <li>• ONE (1) x Magnet.</li> </ul> <p><i>The set shall also include:</i></p> <ul style="list-style-type: none"> <li>• ONE (1) x Free-standing Hares Tube unit on a metal frame comprising of TWO (2) x graduated glass tubes connected by flexible tubes to a bulb hand pump and with TWO (2) x 100ml glass beakers.</li> <li>• ONE (1) x Searle’s torsion balance with scale and pointer for the determination of the surface tension of liquids.</li> </ul> <p><u>Permits experiments/learning in:</u></p> <ul style="list-style-type: none"> <li>• Determination of fluid density and specific gravity.</li> <li>• Principles and use of a hydrometer.</li> <li>• Capillarity in tubes and between plates.</li> <li>• Measurement of viscosity by falling sphere method.</li> <li>• Demonstration of Pascal’s law.</li> <li>• Measurement of fluid levels by vernier hook gauge.</li> <li>• Fluid flow head relationship.</li> <li>• Verification of Archimedes’ principle and demonstration of principles of flotation.</li> <li>• Stability of a floating body and determination of metacentric height.</li> <li>• Measurement of force and centre of pressure on a plane surface.</li> <li>• Operation and calibration of a Bourdon pressure gauge.</li> <li>• U-tube manometers with fluids of different density.</li> </ul> <p>Overall equipment size 1700mm wide x 750mm deep x 1700mm tall.</p>	
11	<p><b>5 Metre Length Open Flow and Sediment Transport Channel (Flume)</b></p> <p>ONE (1) x 5 Metre length open flow and sediment transport channel (flume) that provides the ability to study the varying effects of sediment transport, bedform dynamics and fluid flow in an open channel. The equipment set must be supplied</p>	

with a digital flow meter and a *range of gates, weirs, humps and piers* that allows for accurate measurements and experiments.

General specifications:

- Working section of transparent acrylic channel walls approximately 5000mm long x 80mm wide and 250mm deep.
- Stainless steel beams.
- Flow rate of 0 to 200 litres per minute.
- Flume inclinable by -1 to +3 degrees.
- 320 litre water tank capacity with level gauge.
- 0.5kw submersible pump with stainless steel shaft, urethane impeller and silicon carbide mechanical seal giving a max flow of 12 m<sup>3</sup>/h.
- Built-in recirculating water supply connected to a digital flow-meter for accurate measurements.
- TWO (2) x Limnimeters
- TWO (2) x bags of graded sand for sediment experiments.

*Supplied with these STANDARD ancillaries:*

- ONE (1) x Broad-crested weir
- ONE (1) x Sharp-crested weir
- ONE (1) x Venturi flume
- ONE (1) x Sluice gate

*And supplied with these EXTRA ancillaries for additional experiments:*




- ONE (1) x Cylindrical gate
- ONE (1) x Radial sector gate
- ONE (1) x Crump weir
- ONE (1) x Dam spillway
- ONE (1) x Streamlined hump
- ONE (1) x Siphon spillway
- ONE (1) x Parshall flume
- ONE (1) x Culvert model
- ONE (1) x Roughened bed
- ONE (1) x Wave generator and beach
- ONE (1) x Flow splitter
- ONE (1) x Set of Bridge piers: cylinder, round nose, square, sharp nose
- ONE (1) x *Sediment feeding device* using either a vibrating conveyor mounted above the inlet to the experimental section or by a separate pump, tube and dispenser nozzle, via which sediment grain 1-2mm size can be introduced into the flume.

Permits experiments/learning about:



- Sluice gates, investigating hydraulic jump, specific energy and the determination of discharge coefficient.




	<ul style="list-style-type: none"> <li>Submerged sharp-crested weirs, revealing the relationship between head over a weir and discharge.</li> <li>Broad-crested weirs and the effects of changing the profile of the weir.</li> <li>Uniform flow in inclined channels, investigating the Chezy factor and coefficient.</li> <li>Venturi flume, indicating discharge and surface profiles, deriving the discharge coefficient.</li> </ul> <p>Overall equipment size 1200mm wide x 5650mm length x 1400mm tall.</p>	
<b>12</b>	<p><b>Spare Parts Package for Items 1 to 11</b></p> <p>ONE (1) x Set of spare parts for 24 months operation of all teaching equipment described by items 1 to 11.</p> <p>Bidders should propose a 'package' of essential and commonly replaced serviceable parts for a <b>minimum of 24 months</b> operation, for example, tubes/pipes, clips, pins, switches, dyes etc. and which can be easily fitted or replaced by the end-users.</p> <p><i>Bidders should list the item to which the part belongs, the parts product code, description, quantity and unit prices in Annex V and transfer the sub-total to this bid form.</i></p>	<b>1</b>
<b>13</b>	<p><b>Acrylic Plastic Sheets</b></p> <p>ONE (1) x Acrylic plastic sheet for mounting on the outside of a large flume.</p> <p>High gloss WHITE opaque finish.</p> <p>3mm thickness.</p> <p>Each sheet cut to size <b>650mm tall x 1220mm width</b></p>	<b>15</b>
<b>14</b>	<p><b>Hook and Loop Sticky Tapes - Hook</b></p> <p>ONE (1) x Roll of WHITE coloured self-adhesive backed HOOK tape.</p> <p>Width 25mm x 25 metres length reel.</p> <p>Uses a general-purpose rubber-resin based adhesive suitable for most surfaces including metal, glass, cardboard, wood and plastics (including Polyethylene and Polypropylene).</p> <p>Operating temperature range approx. -15°C to +90°C.</p>	<b>3</b>
<b>15</b>	<p><b>Hook and Loop Sticky Tapes - Loop</b></p> <p>ONE (1) x Roll of WHITE coloured self-adhesive backed LOOP tape.</p> <p>Width 25mm x 25 metres length reel.</p> <p>Uses a general-purpose rubber-resin based adhesive suitable for most surfaces including metal, glass, cardboard, wood and plastics (including Polyethylene and Polypropylene).</p> <p>Operating temperature range approx. -15°C to +90°C.</p>	<b>3</b>


For the rehabilitation of the Fluid Mechanics classroom of the Water resource and dams Engineering Department, the following furniture was identified, procured and installed:

Item No	Specifications	Number of Units procured
1	<p><b>Tables for Training Room</b></p> <p>ONE (1) x Foldable training / conference table suitable for two people to sit at comfortably            Size 1400mm wide x 600mm deep x 720mm height            Tabletop 23mm chipboard with laminate / melamine surface            Colour : WHITE table top            Underframe folding mechanism            Powder coated (silver) steel tubing legs with plastic/rubber feet            Maximum load of 75kgs  <i>Similar to this shape/style:</i></p> 	24
2	<p><b>Chairs for Training Room</b></p> <p>ONE (1) x Semi-upholstered chair, 550mm wide x 570mm deep x 825mm height            Seat height 470mm            Stackable up to 4 chairs high            Four-legged underframe with plastic feet            Powder coated (silver grey) or chrome steel tubing            Plastic or fabric/foam coated arm rests which gives the armchair an elegant look.            Seat base fully upholstered in fabric colour LIGHT GREY (similar to Nemi Melange 5192)  <i>Similar to this shape/style :</i></p> 	48
3	<p><b>Desks for Instructor/teacher</b></p> <p>ONE (1) x Nano-style desk with round or square legs            Size 1200mm wide x 600mm deep x 740mm fixed height            Tabletop 23mm chipboard with laminate/melamine surface            Colour : WHITE desktop</p> 	1



	<p>Underframe/legs in silver grey coloured steel tubing  Rear modesty panel in silver perforated sheet finish  Fitted with cable tray accessory and cut out  <i>Similar to this shape/style (with WHITE top):</i></p>	
<b>4</b>	<p><b>Pedestal unit for Instructor/teachers</b></p> <p>ONE (1) x Mobile pedestal unit with two drawers to match style of desk.  Size 400mm wide x 600mm deep x 537mm height  Carcass 16mm / top 20mm chipboard with laminate/melamine surface  Colour : WHITE  Grey metal underframe with lockable castors  <i>Similar to this shape/style :</i></p> 	<b>1</b>
<b>5</b>	<p><b>Extension desk for Instructor/teachers</b></p> <p>ONE (1) x Nano-style desk with round or square legs  Size 600mm wide x 600mm deep x 740mm fixed height  Tabletop 23mm chipboard with laminate/melamine surface  Colour : WHITE desktop  Underframe/legs in silver grey coloured steel tubing  Rear modesty panel in silver perforated sheet finish  Fitted with cable tray accessory and cut out</p>	<b>1</b>
<b>6</b>	<p><b>Chairs for Instructors/Trainers</b></p> <p>ONE (1) x Fully upholstered chair, 550mm wide x 570mm deep x 825mm height  Seat height 470mm  Stackable up to 4 chairs high  Four-legged underframe with plastic feet  Powder coated (silver grey) or chrome steel tubing  Plastic or fabric/foam coated arm rests which gives the armchair an elegant look.  Seat back and base fully upholstered in fabric colour LIGHT GREY (similar to Nemi Melange 5192)  <i>Similar to this shape/style :</i></p> 	<b>2</b>

7	<p><b>Library Bookcase</b></p> <p>ONE (1) x Freestanding open front bookcase with wall fixings for safety</p> <p>Material 16-19mm chipboard with laminate / melamine surface</p> <p>Colour : WHITE</p> <p>Approximate size 900mm wide x 450mm deep x 2000mm tall</p> <p>Sides with complete hole pattern to allow different shelf heights/spacing</p> <p>Supplied with FIVE (5) shelves and fixings</p> <p><i>Similar to this shape/style:</i></p>		2
8	<p><b>Storage Unit</b></p> <p>ONE (1) x Storage unit with lockable sliding doors and one adjustable shelf.</p> <p>Complete with levelling legs or adjustable feet.</p> <p>Colour : Frame in white with doors in birch (light wood) laminate/melamine.</p> <p>Approximate size 1200mm wide x 470mm deep x 690mm tall</p> <p>Weight approximately 65 kg</p> <p><i>Similar to this shape/style (but in light birch finish):</i></p>		2
9	<p><b>Desks for Large Flume Experiment Area</b></p> <p>ONE (1) x Nano-style desk with round or square legs</p> <p>Size 1200mm wide x 600mm deep x 740mm fixed height</p> <p>Tabletop 23mm chipboard with laminate / melamine surface</p> <p>Colour : WHITE desktop</p> <p>Underframe/legs in silver grey coloured steel tubing</p> <p>Rear modesty panel in silver perforated sheet finish</p> <p>Fitted with cable tray accessory and cut out</p> <p><i>Similar to this shape/style (with WHITE top):</i></p>		2
10	<p><b>Chairs for Large Flume Experiment Area</b></p> <p>ONE (1) x Semi-upholstered chair, 550mm wide x 570mm deep x 825mm height</p> <p>Seat height 470mm</p> <p>Four-legged underframe with plastic feet</p> <p>Powder coated (silver grey) or chrome steel tubing</p>	2	

	<p>Plastic or fabric/foam coated arm rests which gives the armchair an elegant look.          Seat base fully upholstered in fabric colour LIGHT GREY (similar to Nemi Melange 5192)  <i>Similar to this shape/style :</i></p>		
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The following educational grade laptop computers and wi-fi storage/access devices were identified, procured and installed to permit students of the UoM to create content for field reports and assignments, edit images and graphs, build numerical spreadsheets and database information, and allow them to conduct experimental studies and research.

Item No	Specifications	Number of Units procured
1	<p><b>Educational Grade Laptop Computer</b>            ONE (1) x Educational grade laptop computer suitable for use in university class environments and conforming to the following:  <i>Minimum specifications required are</i></p> <ul style="list-style-type: none"> <li>• 13" touch-screen with 1920 x 1080 16:9 format.</li> <li>• Dual core processor (such as Intel Celeron N4000).</li> <li>• Windows 10 Pro operating system.</li> <li>• Integrated graphics chipset (such as UHD Intel 600).</li> <li>• 4GB memory.</li> <li>• 64GB eMMC storage.</li> <li>• Wireless connectivity 802.11 ac dual band(1x1) and Bluetooth 4.</li> <li>• English language QWERTY keyboard configuration.</li> </ul> <p><i>Laptop must have</i></p> <ul style="list-style-type: none"> <li>• TWO (2) x USB 3.0 type-A ports.</li> <li>• ONE (1) x USB 3.0 type-C port with charging and full function.</li> <li>• ONE (1) x USB 3.0 type-C port with data only.</li> <li>• ONE (1) x headset/microphone combo-jack.</li> <li>• ONE (1) x micro-SD card slot.</li> <li>• ONE (1) x 230-240V AC power adapter with plug and power cord.</li> <li>• ONE (1) x front facing webcam with integrated microphone and built-in speakers.</li> </ul> <p><i>Laptop must be pre-loaded and registered with</i></p> <ul style="list-style-type: none"> <li>• MS Office Home and Student 2019 software.</li> </ul>	20

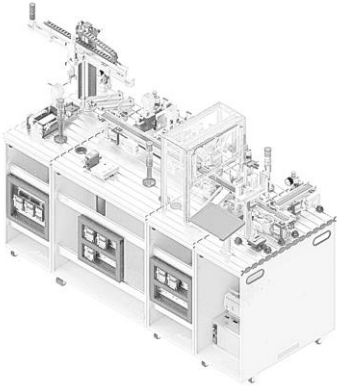
	<ul style="list-style-type: none"> <li>Software must be the perpetual license version (i.e. no subscription fees or internet connection required for operation of Word, Excel and PowerPoint applications).</li> </ul>	
<b>2</b>	<p><b>Wireless Access Point and Content Server</b></p> <p>ONE (1) x Wireless access point and content server device that is designed to access, store and distribute digital content in a traditional classroom setting without the need for standard infrastructure.</p> <ul style="list-style-type: none"> <li>Device must be fully portable, transmit its own wi-fi signal to create a local cloud connection and have a back-up battery with approx. 5 hours continuous use in case of mains power outages.</li> <li>Teachers can separate and manage content that is available to learners directly from the devices interface.</li> </ul> <p><i>Minimum specifications required are</i></p> <ul style="list-style-type: none"> <li>4GB memory</li> <li>500GB storage space</li> <li>Wireless connectivity 802.11 a/b/g/n/ac (2x2)</li> </ul> <p><i>Device must have</i></p> <ul style="list-style-type: none"> <li>ONE (1) x USB 3.0 port</li> <li>ONE (1) x RJ45 port</li> </ul>	<b>2</b>
<b>3</b>	<p><b>Spare Power Cord</b></p> <p>ONE (1) x Spare AC power cord for the laptop.</p> <p><b><i>MUST be compatible with the laptop computer offered in Item 1.</i></b></p>	<b>1</b>
<b>4</b>	<p><b>Warranty</b></p> <p>ONE (1) x Return to base warranty cover for 24 months for the laptop.</p>	<b>20</b>

The following new and reconditioned equipment was identified, procured and installed for both teaching mechatronics and permitting students of the UoM to conduct experimental studies and research:

<b>Item No</b>	<b>Specifications</b>	<b>Number of Units procured</b>
<b>1.1</b>	<p><b>CNC Mill Training System (Light Duty)</b></p> <p>ONE (1) x CNC Mill Training System (Light Duty) which shall allow students to practice computer numerical controlled (CNC) code programming and editing, learn to operate mill components, controls, and tools, set a programmed reference zero, follow the steps necessary to machine a part to programmed specifications, and apply the machine code language to current mill technology.</p>	<b>1</b>

	<p><u>General specifications:</u></p> <ul style="list-style-type: none"> <li>• Programmable speeds of 0 – 36 cm/ min (0 – 14 in/min).</li> <li>• Mechanical Working Range <ul style="list-style-type: none"> <li>○ X Axis (Longitudinally) 184 mm (7.25 in)</li> <li>○ Y (Transversely) 102 mm (4 in)</li> <li>○ Z Axis (Vertically) 159 mm (6.25 in)</li> </ul> </li> <li>• Dimensions (H x W x D) 750 x 864 x 597 mm (29.5 x 34 x 23.5 in)</li> </ul> <p>MUST be supplied with training manuals, operation and maintenance documentation, accessories, software, and cables required for system operation.</p>	
1.2	<p><b>CNC Mill Software</b>  ONE (1) x CNC Mill Software program.  The software features a parametric-based graphical tool editor, a 3D tool path emulator and an easy-to-use graphical interface. The software shall import NC part, programs created with other CAM, programs that support the G and M codes.</p>	1
1.3	<p><b>Didactic Training Computer Device</b>  ONE (1) x Didactic training computer device to work in synergy with the CNC Mill Training System (Light Duty).  <u>General specifications:</u></p> <ul style="list-style-type: none"> <li>• Desktop unit</li> <li>• Monitor</li> <li>• Perpetual windows Licence</li> </ul> <p>MUST be supplied with cables required for CNC Mill system operation.  <b><i>MUST be compatible and allow best-of-art utilization of CNC Mill Software described in Item 1.1</i></b></p>	1
2.1	<p><b>CNC Lathe System Training System (Light Duty)</b>  ONE (1) x CNC Lathe Training System (Light Duty) which shall allow students to practice computer numerical controlled (CNC) code programming and editing, learn to operate lathe components, controls, and tools, set a programmed reference zero, follow the steps necessary to machine a part to programmed specifications, and apply the machine code language to current lathe technology.</p> <p><u>General specifications:</u></p> <ul style="list-style-type: none"> <li>• Programmable Speed Range 0-2800 r/min</li> <li>• Lathe <ul style="list-style-type: none"> <li>○ Swing Over Bed 90 mm (3.5 in)</li> <li>○ Center Height 101.6 mm (4 in)</li> <li>○ Distance Between Centers 200 mm (8 in)</li> <li>○ Swing Over Cross Slide 48 mm (1.9 in)</li> <li>○ X-Axis Travel 47.8 mm (1.88in)</li> <li>○ Z-Axis Travel 105.4 mm (4.15in)</li> <li>○ Resolution ±0.00318 mm (±0.000125 in)</li> </ul> </li> <li>• Dimensions (H x W x D) 750 x 864 x 597 mm (29.5 x 34 x 23.5 in)</li> </ul>	1



	Including Training Manuals, Operation & Maintenance Documentation, accessories, software, and cables required for system operation.	
<b>2.2</b>	<p><b>CNC Lathe Software</b>  ONE (1) x CNC Lathe Software program.  The software features a parametric-based graphical tool editor, a 3D tool path emulator and an easy-to-use graphical interface. The software shall import NC part, programs created with other CAM, programs that support the G and M codes.</p>	<b>1</b>
<b>2.3</b>	<p><b>Didactic Training Computer Device</b>  To work in synergy with CNC Lathe Training System (Light Duty)  <u>General specifications:</u></p> <ul style="list-style-type: none"> <li>• Desktop Unit</li> <li>• Monitor</li> <li>• Perpetual windows Licence</li> </ul> <p>MUST be supplied with cables required for CNC Lathe system operation.  <b><i>MUST be compatible and allow best-of-art utilization of CNC Lathe Software described in Item 2.1</i></b></p>	<b>1</b>
	<b>MECHATRONICS TEACHING EQUIPMENT – RECONDITIONED:</b>	
<b>3</b>	<p>Mechatronics Production Line/System Set  ONE (1) x Mechatronics Production Line/System Set that is composed of a total of FOUR (4) individual training units/stages reconditioned after use in previous didactic training environments, comprising as a minimum:</p> <ul style="list-style-type: none"> <li>• ONE (1) x Handling Station,</li> <li>• ONE (1) x Distribution and processing Station</li> <li>• ONE (1) x Vision quality Station</li> <li>• ONE (1) x Joining Station</li> </ul> <p>Similar to this style of equipment:</p> <div style="text-align: center;">  </div> <p style="text-align: right;">and</p> <p>Included Accessories:</p> <ul style="list-style-type: none"> <li>• ONE (1) x Simulation box for the simulation and display of analog signals in the range 0 – 10 V complete with analog cross-over digital cables.</li> <li>• FOUR (4) x Power supplies.</li> <li>• ONE (1) x Set of workpieces.</li> <li>• ONE (1) x Toolbox for general fitting and assembly.</li> <li>• ONE (1) x Software and cables required for total system operation.</li> <li>• MUST be supplied with training manuals and necessary operation and maintenance documentation.</li> </ul>	<b>1</b>


	<p>System Overview -</p> <p>Handling station containing -</p> <p>ONE (1) x Handling station with electric drive, equipped with a flexible two-axis handling device for workpieces.</p> <ul style="list-style-type: none"> <li>• Operating pressure 400 kPa (4 bar)</li> <li>• Power supply 24 V DC</li> <li>• 8 digital inputs</li> <li>• 7 digital outputs</li> </ul> <p>ONE (1) x Stacking magazine module with workpiece holder to separate workpieces or end caps.</p> <ul style="list-style-type: none"> <li>• Operating pressure: 600 kPa (6 bar)</li> <li>• Power supply: 24 V DC</li> <li>• 3 digital sensors</li> <li>• 1 digital actuator</li> <li>• Length with workpiece holder: 310 mm</li> <li>• Length without workpiece holder: 240 mm</li> </ul> <p>ONE (1) x Metal trolley with height adjustment (lift) and through holes for easy cable mounting.</p> <ul style="list-style-type: none"> <li>• Size 750mm high x 350mm wide x 700mm depth.</li> </ul> <p>ONE (1) x Signal columns.</p> <p>ONE (1) x A4 assembly boards used to mount the various terminals or other components that can be mounted on the H-rail.</p> <ul style="list-style-type: none"> <li>• Size 279mm high x 314mm wide x 40mm depth.</li> </ul> <p>ONE (1) x A4 mounting frames to allow for PLC or assembly board hanging in the trolley.</p> <p>Distribution and processing station containing -</p> <p>ONE (1) x Module conveyor 700mm with DC motor and motor controller.</p> <p>ONE (1) x Module identifier.</p> <p>ONE (1) x Module stopper.</p> <p>THREE (3) x Stacking magazine module with workpiece holder to separate workpieces or end caps.</p> <ul style="list-style-type: none"> <li>• Operating pressure: 600 kPa (6 bar)</li> <li>• Power supply 24 V DC</li> <li>• 3 digital sensors</li> <li>• 1 digital actuator</li> <li>• Length with workpiece holder: 310 mm</li> <li>• Length without workpiece holder: 240 mm</li> </ul> <p>ONE (1) x IO-Link-DA Interface with cover for universal interface from modules to different communication/bus systems:</p> <ul style="list-style-type: none"> <li>• M12 I-Port IO-Link interface with 24 V/0 V</li> <li>• 2x 15-pin Sub-D HD sockets (each 4DI/4DO; 2AI/1AO, 24 V/0 V)</li> <li>• 2 LED indicators.</li> </ul> <p>ONE (1) x Flow sensor.</p> <p>ONE (1) x Trolley 700mm x 700 mm (with lift).</p> <p>ONE (1) x Signal column.</p>	
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	<p>ONE (1) x A4 assembly boards used to mount the various terminals or other components that can be mounted on the H-rail.</p> <ul style="list-style-type: none"> <li>• Size 279mm high x 314mm wide x 40mm depth.</li> </ul> <p>ONE (1) x A4 mounting frames to allow for PLC or assembly board hanging in the trolley.</p> <p>Vision quality station containing -</p> <p>ONE (1) x Trolley 350mm x 700 mm (with lift).</p> <p>ONE (1) x Module conveyor module 350mm with integrated 24V / 1.5A DC motor with</p> <ul style="list-style-type: none"> <li>• diffuse sensors</li> <li>• light barrier and</li> <li>• mini I/O terminal.</li> </ul> <p>ONE (1) x Module stopper/separator.</p> <p>ONE (1) x Module camera and camera housing.</p> <p>ONE (1) x 250mm slide with height adjustment.</p> <p>ONE (1) x A4 assembly boards used to mount the various terminals or other components that can be mounted on the H-rail.</p> <ul style="list-style-type: none"> <li>• Size 279mm high x 314mm wide x 40mm depth.</li> </ul> <p>ONE (1) x Signal column.</p> <p>ONE (1) x A4 mounting frames to allow for PLC or assembly board hanging in the trolley.</p> <p>Joining station containing -</p> <p>ONE (1) x Trolley 350mm x 700mm (with lift)</p> <p>ONE (1) x Separation station with pick and place module.</p> <p>ONE (1) x Tablet PC and holder.</p> <p>ONE (1) x PLC training controller CECC complete with programming for the production line system.</p>	
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The following selection of maintenance power and hand tools, along with workshop furniture and equipment were identified, procured and installed to support the Department of Water Resource and Damns Engineering teaching and learning / research activities.



Item No	Specifications	Number of Units procured
1.1	<p><b>Variable Speed Impact Drill</b></p> <p>ONE (1) x Variable speed impact drill. 680-850W corded version, 240V power. 13mm keyed chuck. Side handle and depth gauge.</p>	1
1.2	<p><b>13mm Drill Chuck Key</b></p> <p>ONE (1) x 13mm drill chuck key</p>	1
1.3	<p><b>HSS Drill Bit Set</b></p> <p>ONE (1) x HSS drill bit set for general purpose use in 0.5mm increments. Industrial quality with ground flute.</p>	1


	Supplied in indexing metal cases. Set contains: 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0, 5.5, 6.0, 6.5, 7.0, 7.5, 8.0, 8.5, 9.0, 9.5, 10.0, 10.5, 11.0, 11.5, 12.0, 12.5 and 13.0mm.	
<b>2.1</b>	<b>115mm Angle Grinder</b> ONE (1) x 115mm Angle grinder. 680-800W corded version, 240V power. Side handle and safety guard. Comes with disc removal key.	<b>1</b>
<b>2.2</b>	<b>115mm Cutting Disc</b> ONE (1) x 115mm cutting disc. Depressed centre disc A24RBF for general purpose cutting with angle grinder machine. 115mm diameter x 3mm x 22mm bore.	<b>10</b>
<b>2.3</b>	<b>115mm Grinding Disc</b> ONE (1) x 115mm grinding disc. Depressed centre disc A30TBF for general purpose <i>grinding</i> with angle grinder machine. 115mm diameter x 6mm x 22mm bore.	<b>10</b>
<b>3.1</b>	<b>Rotary Hammer Drill</b> ONE (1) x Rotary hammer drill for SDS+ drill bits. 800W corded drill, 240V power. Side handle and depth gauge.	<b>1</b>
<b>3.2</b>	<b>SDS+ Drill Bit Set</b> ONE (1) x SDS+ drill bit set for general use in demolition/construction. Tungsten carbide tipped SDS masonry drills. Set contains ONE (1) each of sizes: 5, 5.5, 6 and 7mm x 160mm overall length. 8 x 210mm, 8 x 260mm, 12 x 216mm, 12 x 316mm, 16 x 250mm overall length.	<b>1</b>
<b>3.3</b>	<b>SDS+ Chisel Bit Set</b> ONE (1) x SDS+ Chisel drill bit set for general use in demolition/construction. Tungsten carbide tipped SDS masonry drills. Set contains ONE (1) each of sizes: 20mm chisel, 40mm chisel and point chisel 280mm overall length.	<b>1</b>
<b>4.1</b>	<b>Cordless Screwdriver</b> ONE (1) x Cordless screwdriver 3.6-4.8V Li-ion battery powered compact screwdriver with adjustable handle for straight or pistol grip use for accurate tightening of screws. ¼" hex drive <i>Complete with</i> battery charger or charging plug adaptor	<b>1</b>
<b>4.2</b>	<b>Screwdriver bit set</b> ONE (1) x Screwdriver bit set in a case with magnetic ¼" drive adaptor. Set contains ONE (1) each of: 11 x 25mm PZ (2 x #1, 6 x #2 and 3 x #3), 6 x TX (T15, T20, T25, T27, T30 and T40), 9 x Phillips (1 x #1, 6 x #2 and 2 x #3), 4 x slotted bits (3, 4, 5 and 6mm), hex to ¼" adaptor and lockable magnetic bit holder.	<b>1</b>
<b>5.1</b>	<b>Cordless Circular Saw</b> ONE (1) x Cordless circular saw with safety guard. 18V Li-ion battery powered. 165-185mm cutting blade.	<b>1</b>


	<i>Complete with TWO (2) batteries and charger unit/adaptor.</i>		
<b>5.2</b>	<p><b>Cordless Circular Saw Blade – 24 Teeth</b>  ONE (1) x Cordless circular saw blade.  165-185mm cutting blade x 24 teeth  Ideal for ripping and cross cutting natural timbers and cutting composite wood based sheet materials like plywood, MDF and chipboard.  <i>Must be suitable for use with Item 5.1</i></p>	<b>1</b>	
<b>5.3</b>	<p><b>Cordless Circular Saw Blade – 80 Teeth</b>  ONE (1) x Cordless circular saw blade.  165-185mm cutting blade x 80 teeth.  Ideal for cutting plastic sheet material.  <i>Must be suitable for use with Item 5.1</i></p>	<b>1</b>	
<b>6</b>	<p><b>Mitre Saw</b>  ONE (1) x Mitre saw with base.  1000-1500W corded version, 240V power.  255-260mm cutting blade x 40 teeth.  Ideal for cutting natural timbers and materials like MDF and plastic.  Aluminum base and blade safety guard.  Built-in dust collection system (bag).</p>	<b>1</b>	
<b>7</b>	<p><b>Foldable Workbench</b>  ONE (1) x Foldable workbench for general use.  Two top panels with plastic pegs and multiple holes for holding workpieces of various sizes.  Two handles to open and close the board gap thereby acting as a simple vice.  Can be folded up and carried easily around worksite.  <i>Similar to this image:</i></p>	<p>site</p>  <p>the</p>	<b>2</b>
<b>8</b>	<p><b>Bench Grinder</b>  ONE (1) x Bench grinder  Double ended, 300-375W motor, 240V power  Grinding wheel 32mm Bore  Grinding wheel 150mm diameter  <i>Complete with TWO (2) grinding wheels, x1 fine and x1 coarse, safety eye shields, tool rests and spark guards.</i></p>	<b>1</b>	









<p><b>10.6</b></p>	<p><b>MIG Welding Plier</b>          ONE (1) x MIG Welding plier with a specially-designed nose for efficient removal of welding spatter.          Induction-hardened cutting edge stays sharp longer.          Multiple jaws for drawing out wire and removing installing tips and nozzles.          Hammer designed for light welding gun maintenance.          Spring-loaded for ease of use.  <i>Similar to this image:</i></p> 	<p><b>1</b></p> <p>of</p>
<p><b>10.7</b></p>	<p><b>Welding PPE Kit</b>          ONE (1) x Welder's PPE kit comprising of:          Welder's Apron - leather welder's apron with reinforced eyelets and ties.          Welder's Gauntlets - 330mm length, fully lined, palm thickness 1.2mm.          Welder's Chipping Hammer – 250mm length, one pointed end and one chisel end with sprung handle to prevent kickback.          Welder's flip-up helmet - 4 1/4" x 3 1/4" viewing area with Shade 10 glass shield.</p>  <p><i>Similar to this image:</i></p>	<p><b>1</b></p>
<p><b>11</b></p>	<p><b>Spray Gun</b>          ONE (1) x Spray gun with adjustable easy-clean nozzle.          240V power, 100W with 2 metre cable.          Max. spray pressure: 140 bar.          Nozzle diameter 0.8mm.          Plastic reservoir approx. 0.8-1 Litre.          Flow rate (water) 300ml/min.  <i>Complete with a cleaning needle.</i></p>	<p><b>1</b></p>
<p><b>12</b></p>	<p><b>40 Piece General Hand Tool Set</b>          ONE (1) x 40-piece general hand tool set in a carry bag or toolbox  <i>comprising of at least:</i>          ONE (1) x Ratcheting screwdriver and bit set          ONE (1) x 200mm long nose pliers,          ONE (1) x 160mm combination pliers          ONE (1) x 160mm long diagonal cutting pliers,          ONE (1) x 200mm adjustable wrench,          ONE (1) x 16oz claw hammer,          ONE (1) x 225mm magnetic torpedo level,</p>	<p><b>1</b></p>

	<p>ONE (1) x 5 metre tape measure,  FIVE (5) x assorted screwdrivers (flat, posidriv and crosspoint)  ONE (1) x folding metric hex keys (8),  ONE (1) x junior hacksaw,  ONE (1) x snap-off knife and pack of blades,  ONE (1) x 200mm medium half-round file,  ONE (1) x 210mm heavy duty scissors.</p>	
<b>13</b>	<p><b>160mm Long Nose Plier</b>  ONE (1) x Long nose plier, 160mm long  Plastic coated handles</p>	<b>1</b>
<b>14</b>	<p><b>160mm Wire Stripping Plier</b>  ONE (1) x Wire stripping plier, 160mm long  Plastic coated handles</p>	<b>1</b>
<b>15</b>	<p><b>Pipe Cutter</b>  ONE (1) x Pipe cutter for cutting copper and plastic pipes.  Cuts 15-45mm diameter pipe.  Steel construction and blade.  Manual operation.</p>	<b>2</b>
<b>16</b>	<p><b>Mitre Box and Back Saw Set</b>  ONE (1) x Mitre box 300 x 140 x 80mm  Mitre box and saw for guided cutting at 45°  90° angles.  Includes steel back saw (300mm) with  universal hard-point teeth for cross and rip  cutting.  <i>Similar to this image:</i></p>	<b>1</b>
		and
<b>17</b>	<p><b>14" Pipe Wrench</b>  ONE (1) x 14" length pipe wrench  Chrome vanadium steel construction with powder-coated finish  Metal Handle  Opening between 50-70mm</p>	<b>2</b>
<b>18</b>	<p><b>Socket Set ¼ inch Drive</b>  ONE (1) x Socket set ¼ inch drive, 24 pieces  6-point sockets with accessories and x10 bits.  Plastic or metal storage case.  Sockets in chrome vanadium steel, satin finish.  72-Tooth ratchet handle  <i>Contains ONE each of metric size sockets 4, 5, 5.5, 6, 7, 8, 10, 11, 12 and 13mm,  11 x ¼" hex bits (3, 5 and 6mm, TX10, TX15 and TX20, flat 4 and 5.5mm and Phillips  PH1 and PH2), a 72T flexible ratchet, coupler adaptor, universal joint and 75mm  extension bar.</i></p>	<b>1</b>
<b>19</b>	<p><b>Socket Set ½ inch Drive</b>  ONE (1) x Socket set ½ inch drive, 34 pieces  6-point sockets with accessories.  Plastic or metal storage case.  Sockets in chrome vanadium steel, satin finish.</p>	<b>1</b>

	<p>45-Tooth ratchet handle</p> <p><i>Contains ONE each of metric size sockets 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24 and 27mm, deep 6-point sockets 13, 14, 15, 16, 17, 18, 19 and 24mm, spark plug sockets 16 and 21mm, hex keys 1.5, 2 and 2.5mm, FRP ratchet handle, extension bars 150 and 250mm, a universal joint and 3/8" female to 1/2" male adaptor.</i></p>	
<b>20</b>	<p><b>6-32mm Combination Spanner Set</b></p> <p>ONE (1) x 6-32mm combination spanner set, 25 pieces.</p> <p>Chrome vanadium steel construction</p> <p>12-Point head, satin Finish</p> <p>Supplied in tool roll/bag</p> <p><i>Contains ONE each of size metric: 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 30 and 32mm.</i></p>	<b>1</b>
<b>21</b>	<p><b>2 Tonne Hydraulic Trolley/Floor Jack</b></p> <p>ONE (1) x 2 tonne hydraulic trolley/floor jack</p> <p>All-steel construction.</p> <p>Compact, heavy duty jack with lifting range of 135 to 340mm.</p> <p>Swivel castors for portability and easy operation.</p> <p>Built-in pump prevents overloading for safe operation with hydraulic bypass system to stop ram over travel.</p>	<b>1</b>
<b>22</b>	<p><b>Folding Platform Truck</b></p> <p>ONE (1) x 150kg platform truck, with or without folding handle</p> <p>Load capacity 150kgs</p> <p>2 fixed and 2 swivel castor wheels</p> <p>Steel, powder-coated finish</p> <p><i>Similar to this image:</i></p>	<b>1</b>
		
<b>23</b>	<p><b>Dial Caliper</b></p> <p>ONE (1) x Vernier dial caliper, 0-150mm scale.</p> <p>Graduation 0.02mm.</p> <p>Length - 231mm.</p> <p>Jaw length - 40mm.</p> <p>Easy to read dial.</p> <p>Clear graduations.</p> <p>Thumb wheel and locknut.</p>	<b>2</b>
<b>24</b>	<p><b>Steel Ruler</b></p> <p>ONE (1) x Steel ruler, 1000mm long</p> <p>Rigid Blade - Metric - subdivided to 0.5mm and 1mm, figured every 10mm.</p>	<b>1</b>
<b>25.1</b>	<p><b>Gasoline Trash Water Pump</b></p>	<b>1</b>

	<p>ONE (1) x Gasoline trash water pump, self-priming, powered by a 4-stroke petrol engine, 10 HP, 2000 Litres per minute flow rate.          Lightweight, aluminum pump housing with cast iron impellers and volutes.          Easy-carry wrap frame, rubber feet and oil alerts.          Used for applications where water contains solids up to 35mm.          The pump housing incorporates an inspection cover which allows easy access to the impeller.          Must be supplied with hose couplings, washers, clips and strainers.          Maximum suction lift is 8 metres.          Inlet and outlet: 100mm (4") diameter.  <i>Similar to this image:</i></p>		
<p><b>25.2</b></p>	<p><b>Suction Pump Hose – 100mm Diameter</b>          ONE (1) x Suction pump hose, 100mm diameter reinforced PVC.          Working pressure 3 bar.          Spiral helix reinforced flexible hose, reel length 15 metres.</p>		<p><b>2</b></p>
<p><b>26</b></p>	<p><b>Benchtop Pillar Drill</b>          ONE (1) x Benchtop pillar drill <i>fitted with a keyless 16mm chuck.</i>          Heavy-duty aluminum-bodied 370W motor for long and reliable performance.          230V power          No-volt release switch to prevent inadvertent start up and pulley cover protected by microswitch to prevent drill operating when cover is open.          Supplied with an electrically inter-locked chuck guard.          Large sized square table fitted with precision rack and pinion height adjustment.          16 speeds.          Overall height 1050mm          Speed range 190-3000rpm          Spindle centre to column 165mm          Spindle nose taper MT2          Spindle travel 80mm  <i>Similar to this image:</i></p>		<p><b>1</b></p>
<p><b>27.1</b></p>	<p><b>Heavy Duty Workbench</b>          ONE (1) x Heavy duty workbench with wooden/MDF work surface, 40mm thick.          Heavy-duty powder coated metal frame.</p>		<p><b>1</b></p>

	<p>One section with three drawers, second with a single cupboard and third section is an open space with adjustable shelf.  Ball bearing drawer slides.  Fully lockable and features adjustable feet to help stability when placed on an uneven surface.  Supplied with two keys.  Overall size: 1690 x 600 x 865mm  Drawer (x3): 415 x 160 x 415mm  Capacity: 300kg</p> <p><i>Similar to this image:</i></p> 	
27.2	<p><b>150mm Workshop Vice</b></p> <p>ONE (1) x 150mm workshop vice with swivel base and 360° rotating head. Powder-coated, cast iron components and construction for strength, durability and rust resistance.  <i>Complete with FOUR (4) sets of fixing bolts, nuts and washers for workbench.</i></p>	1
28	<p><b>Storage Cabinet</b></p> <p>ONE (1) x Storage cabinet for Industrial quality, double door, freestanding cabinet with five shelves. Durable, scuff resistant, adjustable shelves, each holding up to 150kg.  Reinforced steel doors with zinc plated locking bars providing three-point locking mechanism.  Supplied with two coded keys.  Overall size: 900 x 450 x 1800mm</p> <p><i>Similar to this image:</i></p> 	2
29	<p><b>Dustpan and Brush Set</b></p> <p>ONE (1) x Plastic dustpan and brush set</p>	1
29	<p><b>Wire Brush</b></p> <p>ONE (1) x Wire brush, 4 row, plastic or wooden handle. For general cleaning of metal before and after welding or for removing dirt, debris, rust, scale, paint and slag. 4 rows of steel bristles.</p>	1

30	<b>Safety Spectacles</b>  ONE (1) x Safety spectacles, anti-mist wrap-around lens; Polycarbonate impact tested to EN 166 1F; Nose bridge and flexible arms/adjustment. <i>Similar to this image:</i>		5
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