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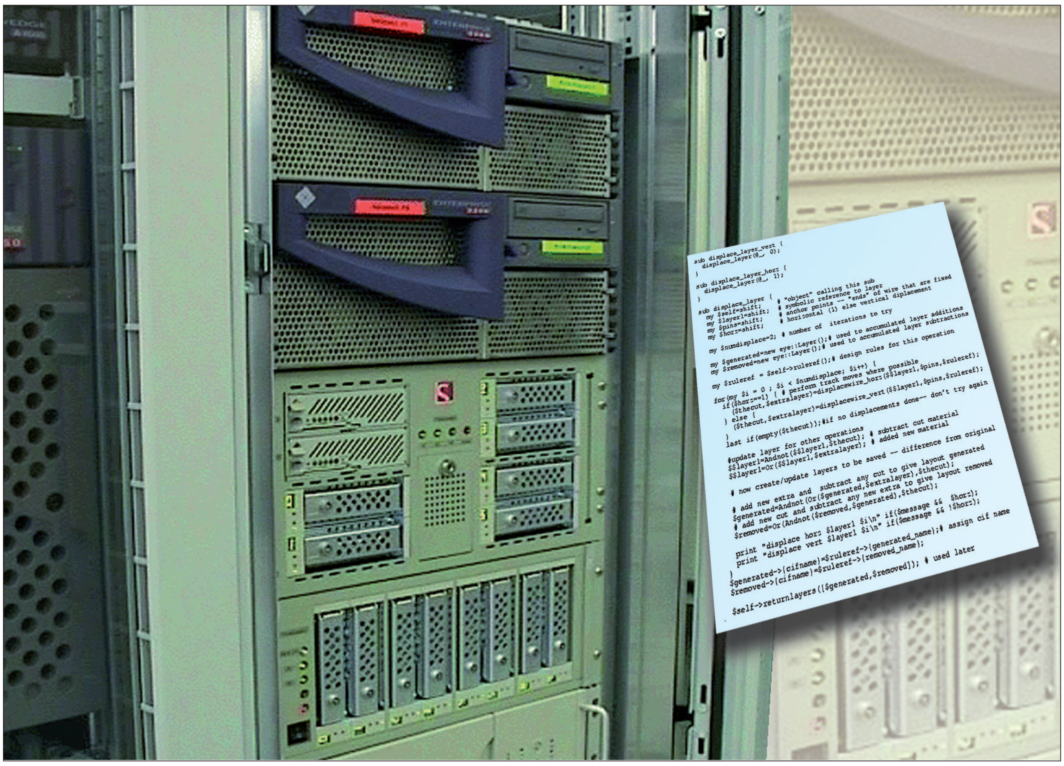

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of OIML Members

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Contents

OIML
BULLETIN
VOLUME XLVII • NUMBER 4
OCTOBER 2006

technique

evolutions

update

INFORMATION TECHNOLOGY AT THE SERVICE OF OIML MEMBERS (SEE PAGE 49)

Sommaire

BULLETIN
OIML
VOLUME XLVII • NUMÉRO 4
OCTOBRE 2006

technique

évolutions

informations

Editorial

Jean-François Magana
BIML Director

Joint BIPM-BIML Action Plan

Following discussions held at the level of the Metre Convention and OIML Presidencies and to capitalize on the excellent - yet informal - relations between the two Bureaux, the BIPM and the BIML have set up and started implementing a joint Action Plan which will present the consistency and coherence of the missions and actions of the two Organizations to all the parties concerned worldwide.

The focus has been put on very concrete actions, in two directions: 1) communication and awareness, the aim being to present the global nature of International Metrology using various media, and 2) strengthening the links between the scientific and technical work of the respective Organizations by addressing a number of issues, for example traceability in specific domains.

Over the coming months this joint Action Plan will result in very visible and solid results for the promotion of International Metrology, and in a number of contributions to the technical work carried out by OIML Technical Committees and Subcommittees. ■

Plan d'Action conjoint BIPM-BIML

Faisant suite aux discussions au niveau de la Présidence de la Convention du Mètre et de l'OIML, et dans le prolongement des excellentes relations bien qu'informelles, entre les deux Bureaux, le BIPM et le BIML ont établi et commencé à mettre en oeuvre un Plan d'Action conjoint qui présentera, à toutes les parties concernées au niveau mondial, la cohérence des missions et des actions des deux Organisations.

L'accent a été mis sur des actions très concrètes, dans deux directions: 1) la communication et la sensibilisation, en présentant la globalisation de la Métrologie Internationale au travers de différents médias, et 2) le renforcement des liens entre les travaux scientifiques et les travaux techniques respectifs des deux Organisations, en traitant un certain nombre de sujets tels que la traçabilité dans des domaines spécifiques.

Ce Plan d'Action conjoint conduira dans les prochains mois, à des résultats solides et visibles pour la promotion de la Métrologie Internationale, et à un certain nombre de contributions utilisables dans les travaux techniques menés par les Comités Techniques et les Sous-comités de l'OIML. ■

STATISTICS

Inferences based on the examination of statistical data

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Summary

Statistical data may consist, for instance, of repeated observations of the value of a certain physical quantity. The number of these observations will be small compared with all the conceivable observations that might have been made under the given conditions. From the observations on hand, sample parameters are evaluated with the aid of which inferences can be drawn about the value of the quantity. An uncertainty is associated with this value.

The sample parameters can be given either as a specific value or as an interval. How both forms can be used as a basis for inferences about the value of the quantity and its uncertainty is considered in this paper.

1 Introduction

The data to be dealt with may consist, for example, of 1) repeated observations of the value of a certain physical quantity or 2) results of testing similar discrete units of a lot of an industrial product for the purpose of quality control. In real situations the number of observations in 1) and 2) is quite small compared with the number of all the conceivable observations that might have been made under the given conditions. The observations on hand are the statistical data. Their treatment results in values which include uncertainties.

Frequently, the so-called sample parameters, e.g. the well-known arithmetic mean and standard deviation, are used to treat the statistical data. Necessarily uncertainties exist in their values so inferences based on them are made under conditions of partial ignorance. Examples of this are given in Sections 3 and 4. Section 2 presents some concepts together with examples of some special inferences.

Section 5 gives notes on the reasons why the probability distribution of observations such as those above can be normal or sometimes non-normal.

References are made to publications on the application of statistical methods, but mainly to textbooks on statistics represented here by [3]. The examples in Section 2 and an analogy in Section 3 are taken from some lectures and discourses on the rudiments of statistics and are not included in the References.

2 Concepts, examples of inferences and interpretations

2.1 Population

In order to discuss the meaning of the statistical data the concepts of population and sample (2.2) are considered.

The population comprises all the conceivable observations/results (realizations of the random variable to be inspected) that could be made under the given conditions. If they were actually known, then the values of the population parameters, i.e. the "true" values of the corresponding sample parameters without uncertainties, could be determined and with their aid the population would be fully known. But this rarely occurs because the number of all the conceivable results is usually very large and may even be infinite if a physical quantity is being considered. The data in the population are not statistical.

If a lot comprising a large number of similar discrete units of an industrial product is considered, then the population containing all the conceivable results of testing these units is quite often regarded as indefinitely large. This is an approximation that simplifies the treatment of the values of the units. The treatment is frequently based on the population distribution which is a model. In many applications it is the normal distribution (Note in 4.2 and Section 5) defined within $-\infty$ to $+\infty$.

2.2 Sample

2.2.1 Random sample

As mentioned above, usually it is not feasible to determine the values of the population parameters. Therefore instead of the whole population, a sample (a small collection of data drawn from the population) is investigated and with its aid inferences about the population are drawn. The data in the sample are statistical.

Only samples drawn at random are dealt with here. This means, e.g. that the selection of an individual result for the sample must not depend on its value or on the discretion of the investigator treating the results.

2.2.2 Nature of samples and estimators/estimates

Imagine that several samples are drawn from the same population containing an infinite number of possible results - realizations x_1, x_2, x_3, ... of a random variable $\mathbf{x}$. If the values of the sample parameters, say, the arithmetic mean $\bar{x}$ and the standard deviation s, are evaluated for each sample, then their values would vary from one sample to another, i.e. $\bar{x}$ and s are respectively realizations of the random variables $\bar{\mathbf{x}}$ and **s.** The uncertainties of $\bar{x}$ and s can be summarized by suitable distributions induced by the population distribution of the random variable $\mathbf{x}$.

The sample parameters are estimators of the corresponding population parameters, and their numerical values are estimates. The difference between the estimator and the estimate can be described respectively by the formula and the numerical value of the corresponding sample parameter [3].

2.3 Final result

2.3.1 Point estimates (numerical values) and a supplement

The final result may be, for example, the value of an arithmetic mean, another sample parameter or that of a formula when the appropriate values of the sample parameters are substituted in it. So, the final result obtained from sample parameters/estimates is an estimate, too. If the final results and in general, the estimates are single values, then they are called point estimates.

A point estimate needs to be supplemented, e.g. by a purpose-calculated uncertainty [1], the result of an error analysis or in some cases by explanations such as is given in the examples in 2.4.

2.3.2 Interval estimates (numerical values)

The combination of the final result and the uncertainty, e.g., the value of the "final result ± uncertainty" is called an interval estimate. Another type of interval estimate - confidence interval - consists of an interval specified by its upper and lower limits but without giving a single value, a practical final result, within it. Both types of interval estimates should cover the "true" final result with quite a high "reliability" or confidence level.

Note: If a formula of the final result is given and it is for the calculation either of a point or an interval estimate, then the formula is respectively either a point or an interval estimator. Examples of this are given in 4.3.

2.4 Inferences about:

2.4.1 The final result obtained from a small sample

In the following a slightly diverting example is given. It concerns the influence of a medicine on a small group of patients.

Example *A medicine was administered to four patients. Three of them could confirm that they recovered with the aid of the medicine. An erroneous inference: the medicine is effective in 75 % of all cases.*

An established empirical fact is that no regularity can be found if only a small number of observations is available. But if their number is increased some evidence of a stable value may be recognized. So if several groups of four patients were observed and the same medicine were used, then for each group different recovery percentages (final results) could be recorded. The percentages would vary around a stable, "true", value.

If this "true" value of the effect of the medicine in the above example is unknown, then the final result of the experiment could be only a report on what has been done and the supplement of 2.3.1 an explanation of the previous empirical fact.

2.4.2 Samples of different sizes

In order to acquire more exact knowledge of the effect of the sample size, consider the length of a confidence interval (2.3.2).

Frequently, a confidence interval is used to estimate an unknown population parameter. In 4.3.1 the formulae (3), (4) and (5) give the confidence intervals (interval estimators) of the population standard deviation σ of a normal distribution. Their confidence level is 95 %. They are obtained with the aid of the sample standard deviations s (point estimators of σ) from samples of sizes n = 6, 11 and 31.

From them, one can see that the larger the sample size the shorter the confidence interval. For example, the length of the confidence interval (3) obtained when the sample size is $n = 6$ is about 3.4 times that of (5) obtained when the sample size is $n = 31$. On the other hand, the shorter the interval is the better the information obtained and the more reliable the inferences that can be drawn from it.

Another example of the effect of the sample size is in 3.2.3 where some risks can be more effectively avoided by using larger sample sizes.

2.4.3 The correlation coefficient (the covariance divided by the product of standard deviations)

With the aid of the following example a characteristic that can make the correlation coefficient between two variables spurious is dealt with.

Let one of the two variables be the number of complications (skin disease, indisposition, etc.) suffered by people and caused by the temperature and the sun during different summers. The other variable is the consumption of ice cream during the same periods.

Example *Compare the number of complications* ***x*** *caused by the temperature and the sun and the consumption* ***y*** *of ice cream during different summers. The calculated correlation coefficient between* ***x*** *and* ***y*** *is quite large and positive. An erroneous inference: there is a relationship between* ***x*** *and* ***y****.*

Both **x** and **y** increase, the higher the temperature and the more sunshine during the summer. However, **x** and **y** are separate events without any causal relationship and thus their real correlation coefficient should be zero although the calculated one is > 0.

The calculated coefficient > 0 between **x** and **y** is due to the fact that there exists a third variable **z** (the temperature and the effect of the sun) and that both **x** and **y** depend on **z**. To obtain the real correlation coefficient between **x** and **y** the effect of **z** should be eliminated using partial correlation coefficients. However, in this case a moment's reflection will show that the real correlation between **x** and **y** is zero and thus the process of eliminating **z** is unnecessary.

The supplement of 2.3.1 should include an explanation of the third variable **z** being the reason for the calculated positive and spurious correlation between **x** and **y**.

2.5 Tasks of the investigator

In order to arrive at the correct inferences the investigator may need to make some interpretations as actually was done in 2.4.3. The interpretations resulting from human thought cannot be replaced by any formula, calculated or measured value. The following typical example may confirm this.

Example *Calculate the mean and the mean error of 1, 2 and 3 (the mean error is the standard deviation divided by $\sqrt{n}$, in this case $n = 3$).*

Clearly the question is of the population 1, 2 and 3 (not statistical data (2.1)). The population mean is 2 and thus the mean error is zero. Only if the question were of a sample 1, 2 and 3 (statistical data (2.2.1)) drawn from a larger population, the formula $s/\sqrt{n}$ is used and its value likely differs from zero.

3 Notes on statistical methods, their nature and application

3.1 An analogy

With the aid of the following analogy an important feature of the results obtained by means of statistical methods can roughly be described. Examples are given in 3.2.4 and 4.5.2.

Analogy *Statistical methods can be compared with a street lamp. Leaning against it is easy but it does not shed light very far.*

3.2 An application of statistical methods to quality control

3.2.1 Example problem

Let us deal with some basics of the statistical quality control in the case where "inspection by variables" [2] is applied. Consider a factory producing commodities for retail stores. Commodities of a certain nominal weight produced during one day constitute the lot to be inspected. Suppose their number is "large" (2.1) and their weights are normally distributed. The aim is 1) that the average of the weights in the lot is equal to or greater than the nominal weight and 2) that only a "small" proportion of the individual weights in the lot would be below that nominal weight.

Problem *The quality of the above lot is to be inspected in accordance with the preceding aims 1) and 2) using a sample drawn from the lot. The weights of the commodities in the sample are determined and treated as follows.*

Determine the arithmetic mean $\bar{x}$ and the standard deviation s of the weights in the sample. From them a difference $\bar{x} - ks$ is determined. The following condition is used:

$$\bar{x} - ks \geq L \tag{1}$$

where L is the nominal weight (a practical lower limit of the weights). The coefficient k depends on the sample size n and on two "method" parameters. They are (3.2.2) the proportion p of individual weights below L in the lot/population and a probability P(p; n).

If (1) is met, the lot is accepted and marketed, otherwise it is rejected.

3.2.2 Finding k and the "good" and the "bad" lot

Let n be given. Select the values p_o and p_1 of p so that $p_o < p_1$ and the corresponding probabilities $P(p_o; n)$ and $P(p_1; n)$ as explained in 1) to 3) below. With their aid k can be found, e.g. in [4] or in the US Military Standard MIL-STD 414 the main idea of which is presented in [2].

1) If the value of p is in the range 0 to p_o, then the lot is defined to be a "good" one. Such a lot should be accepted with a large probability $P(p_o; n) \geq 1 - \alpha$, α is "small". (The probability P(p; n) when $0 \leq p \leq 1$ and n is given is a continuously decreasing ordinate of the so-called OC-characteristic (the operating characteristic curve). The ideal OC-characteristic would be a step curve which takes on the value 1 when $0 \leq p \leq p_o$ and 0 when $p > p_o$).
2) If $p \geq p_1$ $(p_1 > p_o)$, then the lot is defined to be a "bad" one. A "bad" lot can be accepted but only with a quite small probability $P(p_1; n) \leq \beta$.
3) The coefficient k can be obtained so that it corresponds to the given n, the values p_o and p_1 and the probabilities $P(p_o; n)$ and $P(p_1; n)$. Only if n is sufficiently large, then $P(p_o; n) \geq 1 - \alpha$ and $P(p_1; n) \leq \beta$, and $\beta < P(p; n) < 1 - \alpha$ when $p_o < p < p_1$ and $P(p; n) < \beta$ when $p > p_1$.

3.2.3 Risks

Condition (1) is based on the estimators $\bar{x}$ and s which include uncertainties. Therefore, the risks of erroneous acceptance or rejection can exist [2]. According to 1) to 3) above the risks are:

a) The producer's risk: a "good" lot $(p \leq p_o)$ is rejected.
b) The consumer's risk: a "bad" lot $(p \geq p_1)$ is accepted and marketed.
c) Only if n is large enough the probability of the risk is $\leq \alpha$ in a) and $\leq \beta$ in b).

3.2.4 References to 2.3.1 and 3.1

The final result of problem 3.2.1 is either acceptance or rejection of the lot. This result is such that the supplement of 2.3.1 could only be the information on the probabilities of the risks in 3.2.3.

The coefficient k for condition (1) can be adopted from tables and standards. If the investigator is used to working with them, then k is easy to obtain and this can be compared with an "easy leaning against the street lamp" in 3.1, otherwise not. Due to the risks one cannot be one hundred per cent sure that the final result (either acceptance or rejection) is fully correct. This could be equivalent to the event that the "street lamp does not shed light very far".

4 What can happen if for practical reasons $\bar{x}$ and s are regarded as deterministic?

4.1 Deterministic values and example problems

4.1.1 Deterministic values

Consider the arithmetic mean $\bar{x}$ and the standard deviation s obtained from the results in a sample. For practical reasons they are sometimes used as if they were non-stochastic, deterministic, without uncertainties. However, this can very likely be misleading. In the following this is investigated.

4.1.2 Problems A) and B) the solutions of which show consequences of the deterministic interpretation

A). As in 3.2.1 the population comprising the results of the units of a lot is investigated with regard to a practical lower limit. Instead of L the lower limit is now the limit L' below which there is a certain proportion of the results in the population, e.g. 0.025 or 0.10. On the other hand, the proportion equals the probability, e.g. 0.025 that there are results below L'.

Consider L' for the lot of the commodities in 3.2.1. If $L' \geq L$ and if the proportion below L' equals p_o in 3.2.2, then the lot should be accepted and $L' \geq L$ could be compared with (1). But the problem is to determine L'. This is dealt with in connection with the following problem A) for the case when the proportion/probability below L' is 0.025.

Problem A) *Estimate the above limit L′ (0.025) with the aid of* $\bar{x}$ *and* s *obtained from a sample of size* n = 11 *drawn from a normal population.*

B). Draw a sample from a population and calculate $\bar{x}$ and s. With their aid determine $\bar{x} \pm as$. The coefficient a is an arbitrary constant chosen here to be a = 1.96. The problem is:

Problem B) *Estimate a confidence level indicating the proportion of the population that is within the limits* $\bar{x} - 1.96s$ *and* $\bar{x} + 1.96s$. *The arithmetic mean* $\bar{x}$ *and the standard deviation* s *are obtained from a sample of size* n = 11 *drawn from a normal population.*

Realistic although approximate solutions for Problems A) and B) are presented in 4.3 and 4.4. Conclusions about the deterministic interpretation are separately drawn in 4.5.

4.2 Ideal solutions for Problems A) and B)

The ideal solutions are given in order to obtain a starting point and objects of comparison for the realistic solutions in 4.3 and 4.4.

The ideal solutions are obtained supposing that the population mean μ and standard deviation σ of the normal distribution/population are known. The main features of the normal distribution [3] are briefly given in the following note, Figure 1 and Table 1.

Note The density of the normally distributed results (on the x-axis) can be described by the normal curve (the graph of the probability density function of the normal distribution, Figure 1). The maximum density of the results corresponds to the maximum of the normal curve. The density decreases continuously from the maximum down to both the symmetrical tails of the curve.

The location of the normal curve on the x-axis is defined by the population mean μ. With the aid of the population standard deviation σ, the normal curve can either be stretched (σ assumes "large" values) or compressed (σ assumes "small" values). Compression means that the maximum height of the curve is increased while the tails seemingly become shorter, and the stretching that the height is decreased while the tails seemingly become longer. μ and σ are respectively the **location** and the **scale parameters** of the normal distribution/population.

Consider the symmetrical limits μ ± kσ in Figure l. Let k assume values from 0.95 to 3.23. The correspondence between k and the area under the normal curve between the limits is given in Table 1. This area equals the probability P that the results in the population are within these limits. P approaches 1 as k increases, say, k > 3.23.

The ideal solution to Problem A) is L′ = μ – 1.96σ (below it the area of the tail of the normal curve, the probability is 0.025).

The ideal solution to Problem B) is 95 % (this equals the area 0.95 under the normal curve between μ ± 1.96σ).

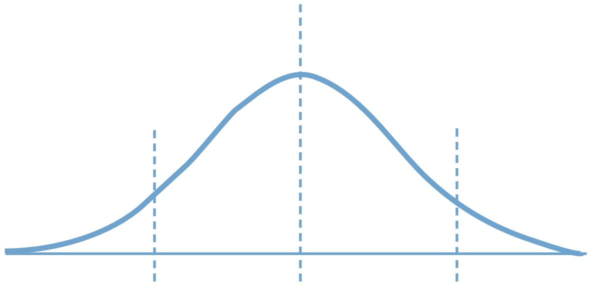

Figure 1 The normal curve N(μ, σ) and the limits μ ± kσ. The area under the curve between the limits equals the probability P that the results in the population are within the limits.

Table 1 The correspondence between k of μ ± kσ and the probability P

k	0.95	1.12	1.29	1.96	2.37	2.80	3.23
P	0.66	0.74	0.80	0.95	0.98	0.995	0.999

4.3 Realistic solution for Problem A) obtained by means of simplified methods

4.3.1 *Point and interval estimator of the ideal solution L′ = μ – 1.96σ*

The point estimator is:

$$\bar{x} - 1.96s \tag{2}$$

It is arrived at by replacing the parameters μ and σ of the normal population in L′ = μ – 1.96σ with $\bar{x}$ and s (n = 11) respectively.

In order to obtain the interval estimator a confidence interval of σ (2.4.2) is employed. It is determined by means of s and the Chi squared (χ^2) distribution [3]. Some notes on χ^2 are given in Note **A)**.

Note A) $\chi^2 = (n-1)s^2/\sigma^2$ and $\sigma^2 = (n-1)s^2/\chi^2$ and the confidence interval of σ is obtained from $\sqrt{n-1}\ s/\chi_{P2} \le \sigma \le \sqrt{n-1}\ s/\chi_{P1}$ (χ^2_P is the P-fractile of χ^2). Here P1and P2 are selected so that P1 = 0.025 and P2 = 0.975. Thus P2 – P1 = 0.95 = 95 %.

Examples of the confidence interval of σ (confidence level P2 – P1 = 95 %) for sample sizes n = 6, 11 and 31 are given below. For each sample n = 6, 11 and 31 drawn from the same normal population a standard deviation s is obtained. With their aid the confidence intervals of σ are as follows:

from 0.62 s to 2.45 s (n = 6) (3)

from 0.70 s to 1.75 s (n = 11) (4)

from 0.80 s to 1.34 s (n = 31) (5)

Consider the confidence interval (4) with the limits 0.70s and 1.75s. Rewrite $\mu - 1.96\sigma$ replacing μ with $\bar{x}$ and σ with 0.70s and 1.75s so that $\bar{x} - 1.96 \times 0.70s = \bar{x} - 1.37s$ and $\bar{x} - 1.96 \times 1.75s = \bar{x} - 3.43s$ are obtained. Use them to form the interval

from $(\bar{x} - 3.43s)$ to $(\bar{x} - 1.37s)$ (6)

This is an interval estimator for $L' = \mu - 1.96\sigma$ and a solution for Problem A) although a deficient one. More about this is in the following notes **B)**, **C)** and **D)**.

A confidence level can also be introduced into (6). In this case it is approximately the same as the confidence level of the confidence interval of σ and thus, it is approximately 95 %.

Notes B), C) and D)

Note **B**) explains a reason why the solution $(\bar{x} - 3.43s)$ to $(\bar{x} - 1.37s)$ is deficient. Note **C**) outlines a method with the aid of which the solution of Problem A) is obtained without simplifications. Therefore, a special distribution is used. Note **D**) gives an example of the distribution of the combination of $\bar{x}$ and s. It is a special case of the distribution in Note **C**). Both are induced by the normal population distribution with the (unknown) parameters μ and σ.

B) In $(\bar{x} - 3.43s)$ to $(\bar{x} - 1.37s)$ the variations of $\bar{x}$ from one sample to another (2.2.2) are not taken into account. This is the reason why (6) is deficient and the confidence level of (6) is only approximately known.

C) Consider the difference between $\bar{x}$ and a parameter (related to $\mu - 1.96\sigma$) divided by $s/\sqrt{n}$. It is a random variable the distribution of which is the non-central t-distribution [4]. With its aid a confidence interval of $\mu - 1.96\sigma$ can be determined. The 95 % confidence interval of $\mu - 1.96\sigma$, without giving details of how it is obtained, is

from $(\bar{x} - 3.67s)$ to $(\bar{x} - 1.18s)$ (6')

It is the correct solution for problem A). If (6') is compared with (6), then one can conclude that the mean error $s/\sqrt{n} \approx 0.3s$ (n = 11) of $\bar{x}$ reduced by 0.1s is possible to use to correct (6) approximately. This is done adding 0.2s to – 1.37s (of (6)) and subtracting 0.2s from – 3.43s. Nevertheless, the uncorrected value of (6) is used in the following discussions.

D) Let the random variable be the difference between $\bar{x}$ and the mean μ divided by $s/\sqrt{n}$. Its distribution is the central t-distribution or Students' t-distribution [3]. Frequently, it is used to obtain a confidence interval for μ. For example, let $\bar{x} \pm t\, s/\sqrt{n}$ (t is a coefficient of Students' t-distribution) be the 95 % confidence interval of μ. $\bar{x} - ts/\sqrt{n}$ is the lower limit of the interval in which μ lies. This does not answer the question: which is the estimator of $\mu - 1.96\sigma$?

4.3.2 Length of $(\bar{x} - 3.43s)$ to $(\bar{x} - 1.37s)$ and the quantitative part Q_p

At first sight it might be thought that the interval $(\bar{x} - 3.43s)$ to $(\bar{x} - 1.37s)$ (6) indicates the qualities such as inaccuracy, ambiguity or uncertainty of the solution of Problem A). This is due to the length of (6). The quantitative part of the solution - a single value which should sometimes be accessible for further treatment and calculation - can be found only if special steps are taken. For example, the steps can be as follows.

If n > 3, then the probable value of χ^2 (Note **A**), 4.3.1) or the abscissa of the maximum of the density curve of the χ^2 - distribution is n – 3. Use $\sigma^2 = (n-1)\, s^2/\chi^2$ and replace χ^2 with n – 3. This leads to $\sigma^2 = [(n-1)/(n-3)]\, s^2$ and $\sigma = \sqrt{(n-1)/(n-3)}\, s$. Insert this σ and $\mu = \bar{x}$ (which is a rough approximation) in $\mu - 1.96\sigma$. The quantitative part Q_p of (6) can be defined as:

$Q_p = \bar{x} - 1.96\sqrt{(n-1)/(n-3)}\, s$ or $Q_p = \bar{x} - 2.19\, s$ for n = 11 (7)

Q_p is a point estimator. According to 2.3.1 it needs to be supplemented. This is done in 4.3.3.

Note that an interval estimator with a positive confidence level always has a certain length. Only if the confidence level is zero is a point estimator with zero length obtained. However, this zero confidence level means no "reliability".

4.3.3 Uncertainty of Q_p

The uncertainty of Q_p is the interval (6) covering Q_p with the confidence level associated with (6). Q_p should be presented together with the limits of the uncertainty interval. They could be, e.g. $Q_p + \Delta_1$ and $Q_p - \Delta_2$ where $\Delta_1 + \Delta_2$ is the length of (6). When n = 11 and $Q_p = x - 2.19s$ (7) Δ_1 and Δ_2 assume the values $\Delta_1 = 0.82s$ and $\Delta_2 = 1.24s$.

4.3.4 Consequences of deterministic interpretation

If $\bar{x}$ and s were deterministic (4.1.1), then (2) would equal the ideal solution of Problem A) in 4.2. But this is contrary to the fact that $\bar{x}$, s and (2) are estimators (2.2.2) which include uncertainties. However, if the estimator (2) the confidence level of which is zero were used instead of the interval estimator (6) or (7) together with its uncertainty, negative effects would arise. These effects could be as follows:

1) The zero confidence level of (2) would mean no "reliability";

2) The estimator (2) would include errors of at least 0.6s to 1.5s (n = 11); that is the absolute values of the differences between 1.95s of (2) and 1.37s and 3.43s of (6);

3) The use of (2) would be misleading due to the facts in 1) and 2).

4.4 Realistic but approximate solution for Problem B)

4.4.1 Assumptions and the normal curves to be investigated

According to 4.1.2 B) the confidence level which can be used together with the interval bounded by the random limits $\bar{x} \pm 1.96s$ (n = 11) should be estimated. Therefore:

1) Use the confidence interval (4) of σ and both its limits 0.70s and 1.75s. Suppose they are the values of σ of the two following normal curves to be investigated.

2) For the time being suppose that the means μ for both the following normal curves are $\mu = \bar{x}$ ($\bar{x}$ is random including errors. Therefore, instead of $\mu = \bar{x}$ the relation $\mu \neq \bar{x}$ is usually met and the use of $\mu = \bar{x}$ may cause errors which can be taken into account as explained in 4.4.3 and the Annex).

Consider two normal curves **N(μ, σ = 0.70s)** and **N(μ, σ = 1.75s).** Limits similar to μ ± kσ in Figure 1 should be given for both these curves. They are obtained from $\bar{x} \pm 1.96s$. From σ = 0.70s and σ = 1.75s (assumption 1)) solve s = σ/0.70 and s = σ/1.75. Use both these values of s and assumption 2) in $\bar{x} \pm 1.96s$ and write the following limits I) and II):

limits I) $= \bar{x} \pm 1.96s = \mu \pm 1.96 \times \sigma/0.70 = \mu \pm 2.80\sigma$ for the curve N(μ, σ = 0.70s) and

limits II) $= \bar{x} \pm 1.96s = \mu \pm 1.96 \times \sigma/1.75 = \mu \pm 1.12\sigma$ for the curve N(μ, σ = 1.75s).

4.4.2 Interval of confidence levels

Consider the normal curve N(μ, σ = 0.70s) and the area P_I under this curve between the limits I) = μ ± 2.80σ. Write k = 2.80. On the basis of Table 1 in 4.2 the area P_I between these limits is 0.995 = 99.5 %.

Consider the normal curve N(μ, σ = 1.75s) and the area P_{II} under this curve between the limits II) = μ ± 1.12σ. Write k = 1.12. On the basis of Table 1 the area P_{II} between these limits is 0.74 = 74 %.

So two values P_I = 99.5 % and P_{II} = 74 % corresponding respectively to the lower and upper limits of the interval (4), are obtained. P_I and P_{II} are confidence levels. Regard the interval between them

from 74 % to 99.5 % (8)

as the solution of problem B). The "reliability" which can be associated with (8) is approximately the same as the confidence level of the confidence interval of σ (4). Thus, the "reliability" of (8) is approximately 95 %.

4.4.3 Errors caused by $\mu = \bar{x}$

Let us deal with an error Δ of $\bar{x}$. With its aid μ of the normal curves in 4.4.1 could be found within $\bar{x} \pm \Delta$.

Suppose the error Δ of $\bar{x}$ is the mean error $s/\sqrt{n} \approx 0.3s$ (n = 11) of $\bar{x}$ (see the end of Note **C**) in 4.3.1) and also the error caused by the use of $\mu = \bar{x}$. The limits of (8) should be corrected for this error Δ = 0.3s. The corrected limits are 73 % and 99 %. How they are obtained is explained in the Annex.

4.4.4 Consequences of deterministic interpretation

If a single confidence level from (8), say, 95 % (the ideal solution of Problem B) in 4.2) were used, then 95 % which can be obtained regarding $\bar{x}$ and s as deterministic (4.1.1) would very likely include errors. They could equal the differences between 95 % and the limits of (8). They are approximately from 4 % to 21 %; |95 % – 99.5 % | ≈ 4 % and |95 % – 74 %| = 21 %.

4.5 Conclusions

4.5.1 Point and interval estimators for Problem A) and B)

If $\bar{x}$ and s are interpreted deterministic (4.1.1), the solution of Problem A) would be the point estimator $\bar{x} - 1.96s$ (2) and the confidence level of Problem B) would be 95 %. However, these solutions are very likely misleading due to the fact that:

1) The confidence level or the "reliability" which can be associated with $\bar{x} - 1.96s$ and 95 % is zero.

2) The errors including in $\bar{x} - 1.96s$ and 95 % can be considerable according to 4.3.4 and 4.4.4.

A pertinent way to express the solutions is in the form of interval estimators, i.e. the interval (6) or the value in (7) together with its uncertainty for Problem A) and (8) for Problem B).

4.5.2 References to 2.3.1 and 3.1

An advantage in using an interval estimator is that it includes the supplement of 2.3.1 automatically. A disadvantage is that a practical single value of the solution is not usually available.

The realistic solutions for Problems A) and B) cannot be obtained simply enough. So the "easy leaning against the street lamp" in 3.1 does not characterize the way of obtaining the solutions. However, the final result in the form of an interval estimator which covers the "true" final result with a confidence level $< 100\ \%$ can be compared with the fact that the street lamp "does not shed light very far".

5 Normality and non-normality

In many applications the population distribution is normal or at least approximately normal. The reason for this is the Central Limit Theorem [3] that states that the distribution of the sum of n independent random variables tends to the normal distribution as $n \to \infty$. Conditions for the validity of the theorem are, e.g. that the variance (the square of the standard deviation) of each variable is small compared with that of the sum. For example, an error of a measured value will very likely have a normal distribution because the error can be regarded as the sum of many "small" independent elementary errors.

Sometimes the normal distribution can be arrived at after some mathematical transformations. For example, although the measured values are not normally distributed their logarithms may be [3].

However, in some cases the normal distribution is not the correct one. Reasons for that can be skewness (a lack of symmetry), kurtosis (a peaked or flat shape of the maximum of the density curve which deviates from that of the normal curve) or heterogeneity (the density curve consists of more than one local maximum).

An example of skew distributed measured values could be as follows. Imagine that the depth of the liquid in a cistern is measured using a measuring tape at the end of which is a conical weight with a nib. The weight is gradually allowed to fall vertically until the nib just makes contact with a plate fixed at the bottom of the cistern. The depth is then read. Usually, the result cannot be too short because the weight must make contact with the plate. But it may be too long since the weight may be tilting at the moment it contacts the plate so that the measuring tape is out of the vertical. So results that are too long can be observed. But this means that the distribution of the results is skewed, with the density curve of the distribution having a "long" tail to the right but a very "short" tail to the left.

Note The population distribution is a mathematical-statistical model which should give a satisfactory description of how the results are distributed in the population. The distributions of the sample parameters are induced by the population distribution (2.2.2 and Notes **B**), **C**) and **D**) in 4.3.1). So there are more than one reason why the model should be a correct one. The correctness can usually be tested by various known methods.

Sometimes the correctness of the model is confirmed on the basis of a graphical analysis of the observed data. If the model is the normal distribution, then a special graph paper, probability paper, can be used. However, such methods have many shortcomings and they should be applied only if other more powerful methods have proved impracticable. ■

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Annex

Corrected limits of (8)

According to 4.4.3 the error caused by the use of $\mu = \bar{x}$ (assumption 2) in 4.4.1) equals the mean error $s/\sqrt{n} \approx 0.3s$ ($n = 11$) of $\bar{x}$. How it influences the limits of (8) in 4.4.2 is dealt with as follows.

The error 0.3s is regarded as the displacement $\Delta = 0.3s$ of the mean μ of the normal curves $N(\mu, \sigma = 0.70s)$ and $N(\mu, \sigma = 1.75s)$ (4.4.1). As a result of the displacement Δ both $\mu + \Delta$ and $\mu - \Delta$ should be used instead of μ in the curves. The areas under the curves with $\sigma = 0.70s$ between the limits I) = $\mu \pm 2.80\sigma$ (4.4.1) and those under the curves with $\sigma = 1.75s$ between the limits II) = $\mu \pm 1.12\sigma$ should be determined. Because of the symmetry of the normal curves the areas under the curves with $\sigma = 0.70s$ between the limits I) are the same irrespective of the mean $\mu + \Delta$ or $\mu - \Delta$. The same is met for the areas under the curves with $\sigma = 1.75s$ and between the limits II). Thus, it is sufficient to deal e.g. only with $\mu + \Delta$ and the curves to be dealt with are: **a**) $N(\mu + \Delta, \sigma = 0.70s)$ and **b**) $N(\mu + \Delta, \sigma = 1.75s)$.

Write the above limits in the form $\mu \pm k\sigma$ ($k = 2.80$ or 1.12). The areas under both the curves **a**) and **b**) between the appropriate limits $\mu \pm k\sigma$ is now denoted by $P_{\Delta>0}$. Part A) in Figure 2 illustrates $P_{\Delta>0}$. If $P_{\Delta>0}$ is determined using the curve **a**) between the limits with $k = 2.80$, then an upper limit of $P_{\Delta>0}$ is obtained (it corresponds to P_I ($\Delta = 0$) in 4.4.2). If $P_{\Delta>0}$ is determined using the curve **b**) between the limits with $k = 1.12$, then the question is of a lower limit of $P_{\Delta>0}$ (it corresponds to P_{II} ($\Delta = 0$) in 4.4.2). They are the corrected limits of (8).

As will be clear from Part B) in Figure 2 the above area $P_{\Delta>0}$ can also be obtained considering the area under the normal curve $N(\mu, \sigma)$ between the limits $(\mu + \Delta) \pm k\sigma$ ($k = 2.80$ or 1.12). This is applied in **1º**) and **2º**) below.

1º) Consider the normal curve $N(\mu, \sigma = 0.70s)$ and the limits $(\mu + \Delta) \pm k\sigma$ ($k = 2.80$). Because $s = \sigma/0.70$ the displacement $\Delta = 0.3s \approx 0.43\sigma$. With its aid the limits can be written in the form $(\mu + 0.43\sigma) \pm 2.80\sigma$ or $\mu - 2.37\sigma$ and $\mu + 3.23\sigma$ (2.37 and 3.23, see Table 1). The area under this normal curve between the limits $\mu - 2.37\sigma$ and $\mu + 3.23\sigma$ is $0.9905 \approx 99$ %. This is the upper limit of (8) corrected for $\Delta = 0.3s$.

2º) Consider the normal curve $N(\mu, \sigma = 1.75s)$ and the limits $(\mu + \Delta) \pm k\sigma$ ($k = 2.12$). Because $s = \sigma/1.75$ the displacement $\Delta = 0.3s \approx 0.17\sigma$. With its aid the limits can be written in the form $(\mu + 0.17\sigma) \pm 1.12\sigma$ or $\mu - 0.95\sigma$ and $\mu + 1.29\sigma$ (0.95 and 1.29, see Table 1). The area under this normal curve between the limits $\mu - 0.95\sigma$ and $\mu + 1.29\sigma$ is 0.73 = 73 %. This is the lower limit of (8) corrected for $\Delta = 0.3s$.

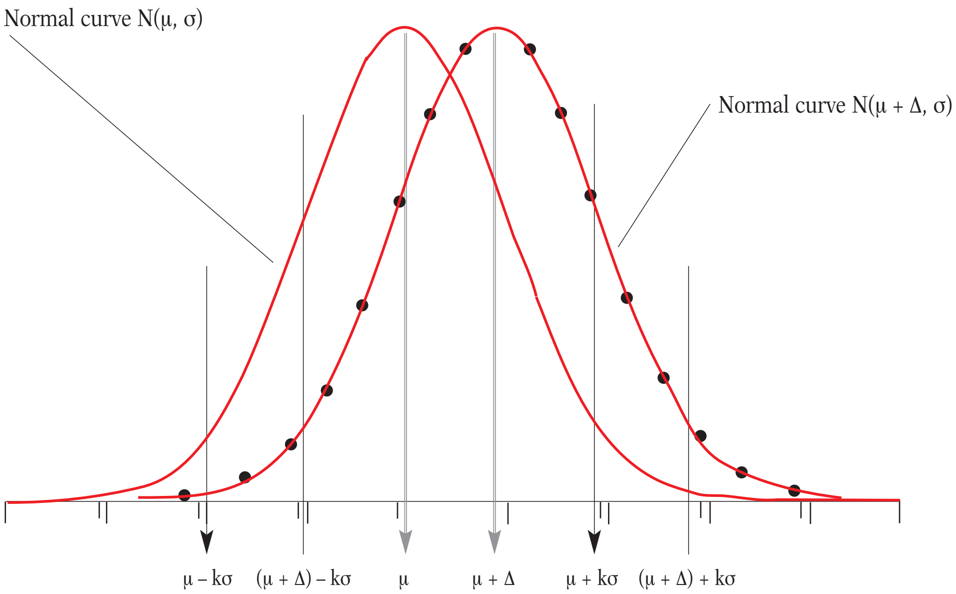

Figure 2

Part A). Let the location of the normal curve $N(\mu, \sigma)$ change from μ to $\mu + \Delta$. Thus, the normal curve $N(\mu + \Delta, \sigma)$ is achieved. The area under this curve between the limits $\mu \pm k\sigma$ is $P_{\Delta>0}$.

Part B). The previous area $P_{\Delta>0}$ can also be obtained under the curve $N(\mu, \sigma)$ between the limits $(\mu + \Delta) \pm k\sigma$.

SI UNITS

Fundamental constants: Metrology and physics

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1 Introduction

Measurements play an increasing role in all areas of modern life: in science, industry, agriculture, trade, public health services, environmental protection, criminology, etc. The science of measurements - metrology - was created as an independent science, with its own object of research, methods and area of application in the 20th century. However, some problems related to the very foundations of metrology have not yet been resolved [1].

The tools that are necessary for metrology are the International System of Units (SI) and the family of standards related to it. With the development of metrology, various systems of units were developed over time, e.g. MKSA, CGSE, CGSM, CGS, and of course the SI. Standards of base units of physical values were created and subsequently replaced by others. Now, all over the world, the SI is approved in the vast majority of national legislations. In it, as well as in some other systems, the definitions of certain units of physical values and the functioning of their standards directly depend on the values of fundamental physical constants (FPCs) and their stability, since the characteristics of practically all physical phenomena in the world are quantitatively determined on the basis of the existing theories of fundamental physical interactions. The accuracy with which any characteristic of a process can be calculated appreciably depends on the accuracy with which the corresponding FPCs are known.

The number of constants used in physics in the description of only fundamental interactions is now already about twenty [2]. Each concrete physical theory includes dimensional physical constants. In the development of science, some of these theories are replaced with more general ones, generally speaking, with other constants. Therefore it is possible to speak not of an absolute set of FPCs, but rather a set that corresponds to the modern level of physical science. As the theories and their constants change, there is also a necessity to account for these changes in metrology.

This paper briefly considers some questions of principle related to the use of the systems of units, their standards and the role of FPCs in their definition, and the prospects for their development. For those readers who wish to become acquainted in more detail with the questions of interrelation of metrology, fundamental science and the role of FPCs in metrology, Refs. [3-5] are recommended.

2 SI, standards, and fundamental constants

The SI system, whose choice of basic units was obviously motivated by the need for practical measurements for trade, industry and scientific experiments, contains seven basic units of physical quantities: meter, second, kilogram, ampere, kelvin, mole and candela. The definitions of these units and their standards are in different ways connected with stable physical phenomena and the constants that determine them.

Meter

The *meter* has undergone a number of transformations. Even before the introduction of the SI, it had been defined as the distance between two points on a platinum-iridium rod kept at the BIPM. The SI defined the meter in terms of the wavelength of a certain line of radiation of krypton (1960), which immediately connected the meter with the fine structure constant. In 1983, the unit of length was redefined in terms of the speed of light. This became possible owing to two outstanding achievements, the creation of highly stabilized lasers and the radio-frequency bridge, which allowed a connection between the optical range of laser radiation with the radio frequency range; this in turn made it possible to fix a certain value of the speed of light, one of the major fundamental constants of physics, c = 299792458 km/s, as the exact value.

Second

The *second* is also connected with a fundamental physical constant, namely, the fine structure constant. This constant determines the frequency of radiation corresponding to a transition between two superfine structure levels of the basic state of a cesium 133 atom, taken as the reference for the definition of the second.

Kilogram

The *kilogram* is the only basic quantity of the SI which is an artifact unrelated to any stable physical phenomenon and the corresponding fundamental constant. Now, throughout the world, there is a concentrated activity on the development of a new standard of the kilogram. There are two basic variants: in terms of Planck's constant, using a watt balance, and in terms of the atomic mass unit and of Avogadro's number, using a sample of pure silicon crystal.

Ampere

The *ampere* is formally defined in the SI through a mechanical force, as a current flowing in a pair of infinitely long and infinitely thin parallel conductors, located at a 1 meter distance from each other in vacuum, producing an interaction force between them equal to 2×10^{-7} N/m along the conductors. In practice, it appears impossible to create such a standard of unit of current. Nowadays, the reproduction of the ampere at the standard level is based on the Josephson effect and the quantum Hall effect. The use of these effects connects the ampere with the Josephson and von Klitzing constants, which excludes the use of mechanical quantities. As a result, in practice, the electric quantities turn out to be independent of other quantities of the SI [6].

Kelvin

The *kelvin*, a unit of the thermodynamic temperature T, is defined as 1/273.16 of the thermodynamic temperature of the triple point of water. It is a unique reference point on the thermodynamic scale of temperatures. Absolute measurements of the thermodynamic temperature are extremely difficult in practice, and for this reason the International Scale of Temperatures uses a set of fixed reference points, interpolation methods and equations of state. Fixing some value of Boltzmann's constant k_B, as an exact value (similarly to the speed of light for the meter) could become an alternative approach in defining the unit of temperature. This is connected with the fact that, from a physical point of view, the temperature is naturally defined in energy units $\theta = k_B T$ [7]. This permits absolute determination in experiments. In doing so, before fixing the exact value of Boltzmann's constant, it is first necessary to determine it with sufficient accuracy by methods independent of measurements of the thermodynamic temperature.

Mole

The *mole* is the amount of substance containing as many of its elementary components as are contained in 0.012 kg of carbon-12. This quantity is in essence equivalent to Avogadro's number N_A.

Candela

The *candela* is a unit of luminous intensity, equal to a luminous intensity in a given direction produced by a source emitting monochromatic radiation at a frequency of 540×10^{12} Hz, whose power of light in this direction is equal to 1/683 W/sr. This quantity reduces to an energy flow, and some researchers even call it a vestige among the basic SI units [6] although its importance in photometry and radiometry is recognized.

Immediately after the approval of the SI in 1960, in the scientific literature there began a discussion of the problems arising in its application in science and education, and this discussion is still largely ongoing [8,9]. In Ref. [6] it is pointed out that a rapid development of science and modern technologies leads to an increasing gap between the SI and modern physics. This work analyzes a possible change in the definitions of the basic units of the SI in accord with the development of modern science and technologies. This gap leads to a wide application of the so-called natural systems in theoretical physics, based on the use of certain values of a set of FPCs.

From Gauss's time it is known that, for representation of the dimension of practically any physical quantity, it is sufficient to use only three basic dimensions: length, time and mass. The introduction of "superfluous" units (i.e. other than the basic ones) inevitably leads to the occurrence, in the expressions of physical laws, of dimensional factors which have no independent physical meaning. Thus, the introduction of the ampere as a basic unit (in addition to the meter, kg and second) leads to the occurrence, in the relations of electro- and magneto-statics, of the dimensional "electric permittivity and magnetic permeability of free space" which are simply equal to unity in the Gausian system.

In the natural system of units, for basic units one accepts certain FPCs, i.e. the choice of basic units is motivated by the laws of nature rather than the historically developed practice of measurements and the existing realization of standards [2]. One of the first natural systems of units was put forward by J. Stoney [10], then M. Planck chose Planck's constant h, the speed of light c, the gravitational constant G and Boltzmann's constant k_B as basic units [11]. Besides Planck's system, the following are also known: the system of atomic units, or Hartree's system, characterized by the relations $e = m_e = \hbar = 1$; the system of units of quantum electrodynamics, such that $c = m_e = \hbar = 1$; the relativistic quantum system of units $c = \hbar = 1$. In the recent years, such systems of units started to be used not only by theorists but also by experimenters. They are also increasingly beginning to make headway into high technologies which are being developed in close relation to fundamental science.

Let us note that in the further development of fundamental metrology and the construction of a system (or systems) of units, it would be useful, as one of the ways of development, to carry out an axiomatic construction, that is, to define precisely the basic concepts and the basic postulates of each system as well as their interrelations [1].

3 Quantum metrology - a basic way of increasing the accuracy and reproducibility of the results of measurements

A basis for improving the accuracy, stability and reproducibility of units of physical quantities (as well as the results of measurements) by means of new generation standards is the use of quantum laws of microphysics and fundamental physical constants [12]. A transition to quantum standards has become, in recent years, a basic direction in the improvement of reference bases in the metrological organizations of many countries, since the quantum standards possess a number of evident advantages in maintaining the stability and unity of measurements. A good example is the perfection of the primary standards used in the reproduction, keeping and transport of the values of basic SI units: length and time. As is known, a transition to the atomic standards of units of length and time (frequency) has allowed one to essentially increase the accuracy of reproduction of these units, to define with high accuracy a fundamental physical constant, the speed of light, which in turn has made it possible to introduce a new standard of a length unit, the so-called "light meter".

Despite the record parameters of accuracy and stability achieved in the microwave standards of frequency and time, there is an opportunity to significantly improve these parameters by a transition from microwave to optical standards of frequency and time [13] and to new generation frequency standards: atomic fountains, which use atoms and ions cooled by laser radiation to temperatures of the order of a millikelvin. It is anticipated that in the near future, the relative uncertainty of the frequency value of the time and frequency standard will reach 10^{-16} [14,15]. In this case, the use of optical frequency standards opens a unique opportunity of creating time–frequency–length standards of a new generation and their application in basic research for precision FPC measurements [16]. By using a cesium atomic fountain, the relative uncertainty of realization of the second is now within 7×10^{-16} [17].

Now there remains a unique standard of a basic SI unit, which is completely determined by an artificially created material prototype, namely, the kilogram. Considering the ageing of the kilogram prototype and also the risk of damage to it or even its destruction, we see that such a definition of the mass unit is no longer in line with modern science. Therefore, at present, a potential direction of metrological research is the replacement of the platinum-iridium prototype of the kilogram with a quantum standard of mass which will most likely be based on the atomic mass unit and Avogadro's number, or on Planck's constant [18,19]. For this purpose, it is necessary to raise the accuracy of determining Avogadro's number and Planck's constant and also to develop the most precise experimental and theoretical methods of finding the masses of elementary particles, atoms and molecules, and methods of creating super-pure materials with prescribed physical characteristics. Another direction is the definition of an "electric kilogram", that is, establishment of a relationship between a mass unit and Planck's constant through the quantum Hall effect, the Josephson effect and the watt balance.

4 Possible variations of fundamental constants and their role in metrology

The FPC concept has, to some extent, a conditional nature and is connected with the physical theories accepted now. A physical constant can be named fundamental within the limits of one or other theory (or consistent set of theories) of physical interactions, if it cannot be calculated through other "more fundamental" constants of a given theory [2,20].

The question of possible variability of some FPCs is closely related to the problem of testing the validity of existing theories. Really, if a given quantity (e.g. the constant of gravity G or the fine structure constant) depends on the time and position in space, then, quite obviously, this quantity cannot be a fundamental constant, and the theory in which it is considered constant, should be replaced with a new, better one. Apparently, by virtue of this circumstance, the question of FPC variability is now at the center of attention of physicists, both experimenters and theorists. For fundamental metrology, the problem of FPC variability is also of paramount significance since the choice of basic units of measurement and stability of standards are directly connected with the choice of the fundamental physical theory and with the stability of the FPCs used.

In practical metrology, the topicality of this problem depends on the relation between the changing rate of one or other "former FPC" and the achieved accuracy of measurements. So, for example, modern astrophysical observations [21] point at possible time variations of the fine structure constant α at a cosmological time scale. As is known, the electromagnetic interaction, whose intensity is characterized by this constant, plays a crucial role in the macroscopic structure of matter and in the great majority of observable phenomena.

Therefore, a possible variability of α should in principle lead to variability of most of the existing standards of physical quantities, including such fundamental ones as the standards of length, mass, time-frequency, etc. However, the variations at present do not exceed a few units of the 17th meaningful digit per year [22], while the present accuracy of measurement of α is of the order of 10^{-9}. Thus there is no reason to expect, in the foreseeable future, any appreciable change in this constant, and hence, there is no necessity to account for these changes in the construction and analysis of standards of units of physical quantities for the needs of terrestrial measurements [23]. There were indications of possible time variations of the electron to proton mass ratio $\mu = m_p/m_e$ [24]. Additional careful measurements of this ratio are, however, required. Numerous theories with variable speed of light [25] are now being developed. Such theories even began appearing from the beginning of the last century. The extent to which these theories conform to the modern observational and experimental data is a question for further research. It is important here to note that fixing the speed of light in metrology leads to the fact that the "new" meter, defined on the basis of the speed of light, can, strictly speaking, appear to be variable with respect to some hypothetical "absolute" standard of length associated with flat space. Here a question can occur as to the search for and the definition of this new standard, as well as on the comparison of the two standards of length, modern and hypothetical. Anyhow, we can ascertain that fixing the speed of light in metrology with c = 299792458 km/s does not at all solve the problem of temporal and spatial variations of the speed of light (expressed in terms of variations of the length standard) which is so widely discussed in modern physics.

Conclusion

The application of the recent achievements in physics and modern technologies in metrology has led to a significant revision of the role of the SI as the basic system of physical units and the basic set of standards of physical quantities. A basic direction of development of fundamental metrology is now revealing a foundation of interrelations between the basic units of measurement and the fundamental constants of physics and the development, on this basis, of standards of units of physical quantities. In this connection, an increasing significance is gained by the development and application of both quantum standards, directly based on fundamental physical constants and allowing reproduction of units of physical quantities with maximum accuracy, and new precision ways of transferring the values of physical quantities. However, due to an accelerated development of science and high technologies, their gap with the SI, pointed out in [6], will increase. Thus, the application of the natural systems of units, based on certain sets of FPCs, will extend in both science and technologies although in the majority of areas of everyday life, the SI still meets the basic demands of manufacturers and consumers. ■

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STANDARDIZATION

Preoccupation at national level, in Romania, concerning standardization in the field of electrical energy

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Abstract

This paper depicts the ongoing activities both at European level and worldwide regarding standardization in the field of electrical energy measurement. It also considers the metrological aspects of electrical energy at the national level, since these aspects are considered to be part of the public domain activities and, therefore, subject to mandatory state metrological control. The contribution of the Romanian Standardization Association and of ASRO TC 164 concerning the harmonization of the specific Romanian standards with the appropriate international and European standards and norms is also reviewed.

1 Introduction

The importance of the accurate measurement of electrical energy used by small energy consumers (households and small businesses) has increased in recent years as a result of new legislation aiming at providing consumer protection in this field.

Measuring electrical energy represents one of the activities involved in commercial transactions, the accuracy and correctness of the measurement being therefore of interest to all the parties involved: producers, importers, transporters, distributors and consumers.

The measuring instruments and installations used to measure electrical energy in the public domain fall under the regulated area and, in order to avoid incorrect measurements and to protect the consumer, they are subject to mandatory state metrological control.

The manufacturers of measuring instruments in Romania (such as AEM and Luxten Lighting from Timisoara or Electromagnetica from Bucharest) are interested in providing quality products that meet the requirements of international standards (especially European ones) in order to comply with the requirements of the European Union.

2 Standardization in measuring electrical energy

2.1 Standardization in measuring electrical energy at the *international* level

The main international standardization bodies for the field of electrical energy are:

Worldwide:	ISO - International Organization for Standardization IEC - International Electrotechnical Commission
European level:	CEN - European Committee for Standardization CENELEC - European Committee for Electrotechnical Standardization

The importance of electrical energy and the dynamics of this commodity on the international market call for widely recognized and accepted concepts, methods and references.

The current increase and diversification of the producers of electrical energy and of the techniques used to produce it (thermoelectric, hydroelectric, nuclear or environmentally friendly techniques such as solar, sea or wind energy) have led to an increased need for new high performance solutions to protect the electrical energy systems.

The liberalization and globalization of the international electrical energy market calls for a unification of geographically scattered electrical energy systems, to facilitate an optimum management of the production, transport and distribution thereof, based on a realistic estimation and prediction of consumption.

At the same time, there is increasing consumer awareness regarding the importance of maintaining the appropriate level of quality of the power sold to them. As a result, the quality of the electrical energy has become an issue requiring mutual understanding and widely accepted solutions.

The increasing number of consumers calls for new ways to measure the amount of electrical energy transferred, such as remote metering.

Under these circumstances standardization has to permanently maintain the focus on all these developments and trends in order to facilitate the harmonization of the way these problems are perceived, understood and solved with the needs of the market for this commodity. Hence, the need for coordinated international and national standardization in this field.

This is why, for instance, for the European Committee for Electrotechnical Standardization (CENELEC) and especially for its specialized Technical Committees, standardization in this field is a permanent issue on their agenda.

This evolution of the market calls for a different approach in standardization for the measurement of electrical energy, with a special emphasis on the measurement of the parameters defining the quality of the energy.

For example, the European standard EN 50160:1999, describing the commodity "electrical energy" for voltages up to 35 kV and the parameters defining the quality of the electrical energy (the values of the voltage and of the frequency, flicker, power breaks, over-voltages, etc.) needs to be revised and is in fact now under revision by CENELEC.

One effect of the globalization of this market is the tendency for the producers and transporters of electrical energy to refer to standards issued by *international* standardization bodies rather than to those issued by the *national* standardization bodies.

2.2 Standardization in measuring electrical energy at the *national* level

In Romania, the national standardization body is ASRO (the Association for Standardization of Romania). Confronted with the same challenges as other national standardization bodies and having, in addition, the task of underpinning the relaunching of the national economy and the integration of Romania into the European Union, ASRO is fully committed to adopting the appropriate international and European standards and in harmonizing the Romanian standards with them in order to provide specific support for various branches of the national economy. Within the same framework, ASRO has established and developed close ties with all the major international standardization bodies. Thus ASRO is now:

- a full member of CEN,
- an affiliate member of CENELEC,
- a member of ISO (it also represents ISO in Romania),
- a member of the IEC (it also represents IEC in Romania),
- an observer with ETSI - the European Telecommunications Standards Institute.

There is also close collaboration with those relevant national bodies and institutes which provide a strong informational, scientific and technical input to the standardization activity.

The Romanian Bureau of Legal Metrology (BRML) is a specialized body of the state controlled public administration; its main mission is to ensure the scientific background for the consistency and accuracy of measurements in Romania.

In 1956, Romania became a founding member of the OIML. Romania has participated in the analysis of draft OIML Recommendations and Documents and votes as an active Member of the CIML.

These Recommandations and Documents are also the basis for the documents issued in Romania which regulate metrological activity in our country.

Thus, in the field of metrology, ASRO collaborates closely with the Romanian Bureau of Legal Metrology (BRML) and with the National Institute of Metrology (INM), either on a joint basis or within the framework of various programs, in revising and updating Romanian standards, as well as in adopting specific international and European standards. INM is also committed to supporting specialized ASRO Technical Committees, in some cases as TC chair.

An example of this collaboration is the joint project "Adopting European Standards as Romanian standards in various subject fields in the electrotechnical domain", carried out by INM and ASRO within the framework of the national program CALIST 2003 (Quality and Standardization).

Another example is ASRO TC 164, dealing with "Measuring equipment for electrical energy and load control" which is hosted and chaired by INM and which is also actively involved in adopting specific European standards and norms as Romanian standards. Thus some 35 standards have been adopted so far within the framework of various programs financed by the Ministry of Economy and Trade, the Ministry of Education, Research and Youth or as part of contracts such as that with the Academy for Economical Studies. Practical examples of the fruitful collaboration within TC 164 may be represented by the 9 standards adopted within the framework of the national programme CALIST 3, namely:

- IEC 61358:1996 - Acceptance inspection for direct connected alternating current static watt-hour metres for active energy (classes 1 and 2),
- IEC 62053-31:2001 - Electricity metering equipment (A.C.) - Particular requirements Part 31: Pulse output devices for electromechanical and electronic metres (two wires only),
- IEC 62053-61: 2001 - Electricity metering equipment (A.C.) - Particular requirements, Part 61: Power consumption and voltage requirements, and
- IEC 62056-2:2001 - Electricity metering - Particular requirements, data exchange for meter reading, tariff and load control. Part 21: Direct local data exchange.

3 Conclusions

An important role of the international and European standards is to set up widely recognized and accepted references for the quality of products.

In this context, the sustained efforts of ASRO, INM and BRML to harmonize specific Romanian standards with international and European ones are part of the concerted actions currently ongoing in Romania aiming at improving the quality of Romanian products and at increasing the competitivity of Romanian industry on the European and global markets.

All these actions are integrated into the general effort to prepare Romania to become a member state of the European Union.

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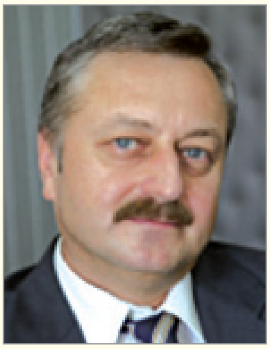

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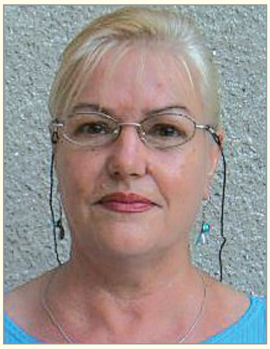

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CHINA METROLOGY 2006

Risk-based approach to legal control of measuring instruments - UK professional enforcement practice

MARTIN BIRDSEYE AND RICHARD FREWIN, NWML

Introduction

In the UK we control trade measurement, by legal and other means, to protect consumers and encourage fair trade. This is done by control of quantities, for packaged goods and direct sales, and by control of measuring instruments. This paper is about control of measuring instruments and in particular about in-service control of instruments in use for trade. We call this 'in-service enforcement' because in essence it is the legal control of fair and legal instruments to ensure fair trade.

Legal control of measuring instruments in the UK includes some medical, environmental and law enforcement applications but by far the most important is control of instruments in use for trade. NWML, a part of the department of Trade and Industry, is responsible for policy and legislation and is involved in product certification for most weighing and measuring instruments. Since April 2006 we also deal with energy measurement, being responsible for gas and electricity meters.

Control of measuring instruments

Control of measuring instruments can be most efficient because it is done by a combination of processes which take account of the manufacture, installation and use of the instruments. Thus we have type approval, verification, market surveillance and in-service inspection. This is the typical set-up in the UK - based on a well established national system and enhanced by modern European practice.

Type approval is done by NWML, verification is done by both public and private bodies, and in-service enforcement is done by local weights and measures authorities (LWMAs). These authorities are based exclusively on local government which itself is divided up into about 200 small towns, counties and city districts. This may be the optimum size for local government but it may well be too small for weights and measures authorities, and so some resources and facilities are shared.

Type approval is functionally a certification of the design of a measuring instrument, usually by testing of an example of the manufactured product, but we are developing optional procedures for directly examining the design.

Verification is applied to each production item (or in some cases on a sampling basis) to ensure that every installed instrument meets the required metrological performance. We recognise that by virtue of production under appropriately certified quality systems, the manufacturers themselves can take responsibility for conformity of all the individual instruments - in effect they do the verification themselves. The UK has national and European systems for implementing this so-called 'self-verification' process.

Market surveillance is a process that can be applied to any product. The idea is that by testing samples of the product "from the market", i.e. when the process of conformity control is completed but often before the instruments are first used, it is possible to see if the whole conformity process is functioning correctly. This is particularly relevant for the procedures that are based on quality systems. If problems are found then the process can be corrected and the defective products taken off the market.

In principle it is necessary to control the metrological properties throughout the whole life of an instrument. So we apply **in-service inspection** for installed instruments. Instruments can be deliberately tampered with or used incorrectly, or by a lack of care they can be operated when damaged or simply worn out. Therefore there is an ongoing requirement to police the system; we need professionally qualified inspectors to watch over all the instruments in use for trade. This paper is about how the inspectors work and how they use limited resources to efficiently police the system.

How to watch over many thousands of measuring instruments?

How can we watch over many thousands of measuring instruments in use for trade? We know that many millions of pounds worth of goods are traded on these instruments every day. In the UK it amounts to more than £2 billion every week.

In principle we could use a fixed regular inspection or prescribe a mandatory reverification at a fixed interval. We do not do this. It would not be the most effective use of our limited resources. Resources should be focussed on where they are most needed, but we need methods for doing this. To some extent the system is complaint driven - we respond to complaints from consumers and less often from traders. We also have coordinated programmes in particular sectors of the market and there is some supervision of measuring instrument service contracts. Another important factor is the personal knowledge and responsibility of the inspectors.

All of this activity is backed by a range of sanctions available to the inspectors. The strength of the system is in its flexibility and the opportunities for a proportionate response to problems encountered. Thus we have **informal warnings**; **28-day notices**, within which improvements must be made; **cautions**, which are a citable record of an admission of guilt; and **prosecutions**, by which fines may be imposed. Fines may only be imposed through a court of law, but they can be very heavy - £5000 is standard for one offence. Finally there is publicity. Imposition of a fine is nearly always reported in local newspapers, so the public are warned against the dishonest traders and, in lost business, this probably costs them more than the fine.

So we have to focus on the real problems and apply the most effective controls. The best tool for this is a formal or informal risk assessment – broadly speaking there is analysis or personal judgement. First we should consider the method of risk analysis, which most simply is done by estimating the probability of various non-compliances, considering the consequences of each type of non-compliance and assessing both together in a 'risk assessment matrix'.

Risk analysis

To judge the probability of non-compliance we can consider historical data, current population, operator incentives, results of market surveillance and we can make some rather empirical measurements. One such programme we called the **Snapshot Project** because of its broad scope and pragmatic, once only, assessments. The objective was to assess in-service accuracy of various instrument types and look for correlations of accuracy with instrument type, usage, location, business type and inspection regime. All of these factors can give us risk assessment data. The project was centrally funded and directed, and data was gathered in five counties from a balanced selection of around 5000 measuring instruments. The results were not very surprising in that most of the intuitive knowledge of inspectors was confirmed and there was some evidence for the critical relationship between inspection rates and overall risk.

Everyone agrees that there is some relationship between the risk of non-compliance and inspection rate but it is not easy to predict and, in the critical areas, we would rather not test it. This is because it is likely to be highly nonlinear, moving from highly efficient at a low inspection rate to calamitous at a zero rate. We should work at an inspection rate which is above the point at which compliance becomes a way of life, but not too far above it (Fig 1).

Having estimated the probability of various types of non-compliance we complete the simple risk analysis by considering the consequences of the various compliance failures. In this respect we should consider the instrument population and the value of goods traded to estimate an overall consumer deficit. We should also consider effects on trade and almost certainly there are social costs. Then we can construct a risk matrix diagram (Fig 2.). The inputs require some judgment - it is not a quantitative analysis - but nevertheless it is a good comparative assessment and therefore it meets the objective of prioritisation. The matrix may be constructed for instrument types or for business types and operating conditions. The objective is to see where the problems are and to plan inspection programmes accordingly, keeping in mind the threshold levels for good compliance.

Judgement

Alongside even the best analysis there must be good judgement and discretion. Inspectors should have local knowledge and a relationship of mutual respect for the traders. They should be free to initiate a proportionate response to the problems that they find, applying the range of sanctions available and working on the basis that prevention is the objective whereas prosecution is one tool to achieve it. Of course this requires the highest professional standards of the inspectors. They must be highly qualified and should have a status and remuneration consistent with an enforcement role.

So, to summarise, we can direct resources efficiently by a risk based approach which includes some research and simple analysis and also a good deal of personal discretion and judgement, which of course calls for professional and highly motivated staff.

This is in general the situation that prevails in UK weights and measures inspection. It is risk based, mainly by virtue of personal judgement on deployment of limited resources. It is in some respects enabled by

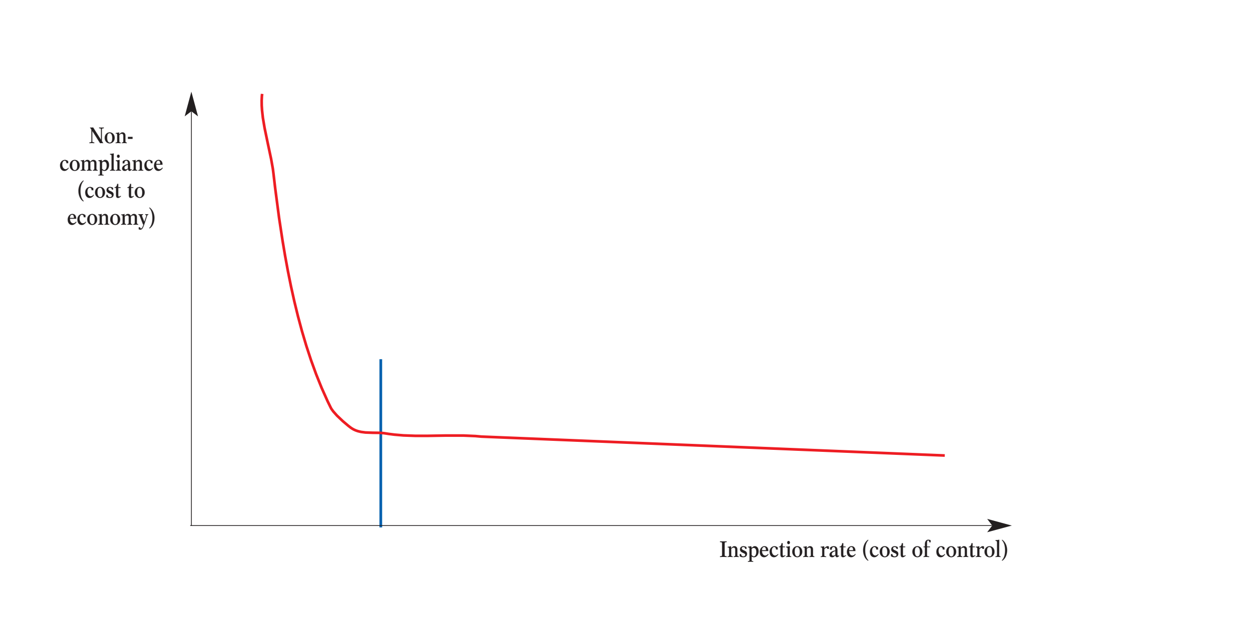

Fig. 1 Optimisation of inspection regime

the much broader responsibilities of the inspectors. They are in fact **Trading Standards Officers** with many other responsibilities, including product safety, food safety, pricing and financial regulation and prevention of under-age sales as well as weights and measures. The effect is to bring them closer to the communities which they serve, able to take action on a range of issues on any one inspection visit. The relatively small size of the weights and measures authorities enhances their multi-role, close to the people, capability. However, the system is threatened by the increasing complexity of all the enforcement tasks, calling for greater specialisation, and by economic forces which call for ever greater efficiency. The pursuit of efficiency in any one sector may threaten the viability of the whole system - the outcome may be a number of different systems. That is one reason why we have an interest in other national systems of enforcement and why we should look ahead to see the scope for international cooperation in what is increasingly a global market place.

International cooperation

In principle, and in basic functionality, we all have the same needs and problems to solve. Therefore each country is a kind of test laboratory for the systems that they apply. How can we learn from each other and profit by our diversity?

In so far as we do any formal research we could exchange the results, or at least make them freely available. The next step would be to coordinate research. At a practical level there is already information on certification and market surveillance that could be made available by more open systems.

On the other hand the best route to a profitable exchange is probably through people. Secondments and staff exchanges require some courage and perseverance to organise but the benefits can be outstanding and long lasting. From our own experience in NWML we can say that the Chinese Government has a commendable record in this kind of investment. I hope this cooperation can be extended to staff exchanges in the field of trading standards enforcement.

Another approach to development and cooperation is based around the people we invest in. In the OIML we have long-standing harmonization projects in the fields of technical requirements and conformity assessment. The next priority, building on the work done so far, should be in the training and qualification of staff. An international qualification for weights and measures enforcement must now be a practical possibility. There could be many benefits:

- a powerful and radically different route to harmonization of practice;
- a renewed high status for metrology enforcement;
- a genuinely portable qualification, allowing mobility of staff and flexibility of employment;

	Very likely	Likely	Possible	Unlikely	Very unlikely
Very high impact		NAWI > 5 t	Automatic weighing	NAWI 30 kg – 5 t	
High impact		NAWI < 30 kg		Liquid fuel	
Low impact	Unstamped capacity measures	Spirit measuring instruments		Weights	Capacity serving measures
Very low impact					Length measures

Fig. 2 Risk assessment matrix

- an increased incentive (in the UK) for trading standards officers to specialize in metrology;
- a benefit for developing countries by enabling international standards of competence along with the correct professional and social status for enforcement officials.

The development and implementation of this concept would bring together the whole spectrum of legal metrology, from ground-level enforcement to international negotiation. By implementing OIML D 14 in their national training requirements many countries are already obtaining some of the above benefits. A mutual acceptance agreement based on internationally accredited courses would complete the process and be a major step forward, strengthening legal metrology at all levels.

Conclusions

So, to conclude and summarise; efficient control of measuring instruments requires risk assessment. We will assess risk by scientific analysis and by intuitive judgment. We will apply a professional approach to both methods, and we will build an international status for the profession.

About the authors

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Richard Frewin is the NWML Enforcement Team Manager. His responsibilities include assessment of commercial companies for legal metrology work, development of the UK national qualification for legal metrologists, support for local weights and measures authorities and national coordination in this field. He was formerly an inspector of weights and measures. He has experience in trading standards legislation and is currently involved with environmental protection in the UK electronics industry.

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Martin Birdseye is the Director of Regulation at the UK National Weights and Measures Laboratory. His work in legal metrology has included type approvals, OIML Recommendations and European legislation. He also has experience in electronics design and systems engineering management in the defence, computing and communications sectors of UK industry.

REPORT

Milestones in Metrology

Groningen, The Netherlands

14–17 May 2006

Pauline Huijzer
Marketing & Communication
NMi Certin B.V.

The world of legal metrology homed in on Groningen, The Netherlands from 14–17 May 2006 to attend the second edition of the international congress *Milestones in Metrology*.

Twice as many participants attended the 2006 event compared to 2003, representing 28 different countries. Thirty-one speakers from 12 different countries gave talks and presentations on a vast range of topics, the focus of which was on Global Market Access, the Measuring Instruments Directive (MID) and the future of Legal Metrology. The event was highly appreciated by all concerned and contained a wealth of practical information of great interest to participants.

On Sunday *Milestones* opened with a welcome reception in the Academy building of the City of Groningen. Delegates were able to become acquainted prior to the congress and had the opportunity to meet counterparts from all over the world.

The Congress

On Monday the congress was opened with a spectacular laser show in which all the topics of the three congress days were presented.

Key-note speeches were given: Mr. Hideki Nahara of Ishida (Japan) expressed the point of view of manufacturers, one of whose concerns was that OIML Recommendations should be reasonable and practical (i.e. clean, definitive and unambiguous). Certain allowances should, he felt, be allowed for additional national requirements as the main objective was to avoid possible misinterpretations of OIML Recommendations. Manufacturers were ready to work for the OIML to achieve this aim. Mr. Alan Johnston (CIML President) agreed with this standpoint and went on to speak about the MAA which included a new Forum in which manufacturers were welcome to express their points of view. He went on to explain in detail the advantages of the MAA and how it would help the OIML to enable manufacturers to access a truly global market. The OIML's objective was to involve manufacturers more in the decision process concerning OIML requirements in the future, and though not yet complete, inroads had already been made.

Mr. Don Onwiler (NCWM Chairman) gave a presentation on the organization of legal metrology in the USA, stressing that even though model regulations are developed by NCWM, their adoption by the various states is voluntary. He noted that participation by industry in standards development has proven to be of value in the United States. Mr. Onwiler emphasized that the NCWM recognizes the benefits of harmonization of international standards in this global market.

Mr. Gerald Freistetter (WELMEC Chairman) gave a detailed presentation on the MID requirements and on the various Modules on which conformity assessment is based [Note: See the WELMEC Committee Meeting report in this Bulletin]. He recommended referring to the various WELMEC Guides in which correspondence between OIML requirements and the essential requirements of the MID were detailed.

Mrs. Anneke van Spronssen of the Dutch Ministry of Economic Affairs presented the Dutch vision of the national Metrology Law.

Mr. Alan E. Johnston, CIML President

On the Wednesday the congress closed with a *Voting the Future* session: by means of an electronic voting system all the participants could contribute their own views on the future of legal metrology.

During all three days parallel sessions were organized for several speakers from various countries to delve deeper into specific matters of interest to them, in particular:

- Manufacturers' experience in test recognition,
- The benefits of the DoMCs for manufacturers,
- The missing link for Normative Documents - OIML/MID cross-references,
- OIML prepackages,
- Prepackages in Europe, and
- Uncertainty in legal metrology measurement.

With a panel discussion on the Monday and a *Meet the expert* meeting on the Tuesday, the topics were perfectly summarized and concluded each day.

The evenings

Both evenings during the congress were well spent with a dine-around on the Monday, during which guests had the opportunity to visit the City of Groningen; several guides took everyone on a tour around the city during which interesting historical places were pointed out and some historic facts of the city were shared. The starter, main course and desert were served in different restaurants, hence the term "dine-around" – an original idea greatly appreciated by the delegates! On the Tuesday there was an informal dinner during which guests were treated to a variety of dishes and music from all over the globe.

The future

Congress Chairman and NMi director Jan Ridder said that he was already looking towards 2009, when the third edition of this congress would possibly take place at another location somewhere in the Netherlands possibly in conjunction with the WELMEC Plenary Meeting on the occasion of the Twentieth Anniversary of the current form of NMi. ■

CECIP

56th General Assembly

Varèse, Italy

26 May 2006

Michel Turpain
CECIP Permanent Secretary

CECIP, the European Committee of Weighing Instruments Manufacturers, held its 56th General Assembly in Varèse in Italy, at the invitation of the Italian Federation.

The General Assembly took place in the salons of the Grand Palace Hotel in Varèse, situated at the top of a hill dominating the lakes region and offering a superb view. A number of guests and members of CECIP gave presentations on a wide range of topics concerning our activity:

- Mrs. Caroline Obrecht, CECIP Vice-President, officially opened the 56th CECIP General Assembly in the absence of the President Mr. Antonio Matute, who was unable to attend due to serious health problems in his family,
- Dr. Alberto Ribolla, President of the Varèse Entrepreneurs and Manufacturing Companies Association, gave a presentation entitled: “The Chinese market: opportunities and strategies for industrial cooperation”,
- Dr. Walter Baggini, Vice-President of the Varèse Chamber of Commerce presented: “Perspectives for the Italian economy with the introduction of the New Policy”,
- Dr. Vicente Petrucciano, Head of the Varèse Metrology Service, presented: “Legal metrological control in Italy”,
- Prof. Dr. Manfred Kochsiek, CIML Vice-President, who has just retired as PTB Vice-President, presented: “The OIML Certificate System is a success. Is the OIML Mutual Acceptance Arrangement the solution for the future?”.

Since 2003, CECIP has been composed of 15 Federations from the following countries:

Czech Republic	Romania
Finland	Russia
France	Slovak Republic
Germany	Spain
Hungary	Switzerland
Italy	Ukraine
Netherlands	United Kingdom
Poland	

Each Federation then presented the situation of the weighing industry in its country during 2005. The table summarizes the weighing industry production in Europe and indicates an increase in production compared to 2004 in the Czech Republic, Finland, Germany, Hungary, Italy and Russia, and indicates a decrease in Spain and France (in fact a decrease in consumer products but an increase in industrial products), and in the United Kingdom. Overall, the European average is + 0.7 %.

Exports rose in Finland, Hungary, Russia, Switzerland and the United Kingdom, but decreased in the Czech Republic, France, Germany, Italy and Spain.

Imports rose in the Czech Republic, France, Germany, Hungary, Italy, Russia and the United Kingdom but decreased in Finland, Spain and Switzerland.

During the afternoon the statutory part included, as usual, the program as stated below:

- the activity report of the Legal Metrology Group, which is continuing with its task of coming up with proposals on and examinations of OIML publications (especially the revisions of OIML Recommendations dealing with automatic weighing instruments which will accompany the Measuring Instruments Directive (MID) when it comes into force on 30 October 2006), of WELMEC documents, European Cooperation in Legal Metrology, (especially harmonization Guides). Since 1993, this report has been presented by Mr. John Anthony, President of this Group, who is stepping down and handing over responsibility to Mr. Martin Stoll, the new President of the Legal Metrology Group,
- the activity report of the Bureau, which takes care of the day-to-day management of the Committee and of its development by passing on experience acquired to the younger Federations of those countries that come knocking at the European Union’s door (as was the case for Bulgaria which was invited again this year), by making contacts with the Federations of weighing instrument manufacturers around the world, and by bringing on board new CECIP Members, such as Poland, Romania and Russia in 2003.

This year a partial CECIP Bureau election took place to replace Mrs. Caroline Obrecht, Vice-President, who had many times temporarily stepped in as President since her election in 2000. Mr. Martin Stoll was elected as a new Vice-President and so the composition of the Bureau is now as follows:

President	Mr. Antonio Matute Spanish Federation
Vice-President	Mr. Richard Herbert United Kingdom Federation
Vice-President	Dr. Fabio Martignoni Italian Federation
Vice-President	Mr. Martin Stoll Swiss Federation
Member	Dr. Günther Maaz German Federation
Member	Mr. Daniel Stastny Czech Republic Federation
Permanent Secretary	Mr. Michel Turpain French Federation

The General Assembly ended with a Gala Dinner in the superb Grand Palace Hotel in Varèse during which CECIP medals were awarded to:

- Prof. Dr. Manfred Kochsiek for his extensive activity in the field of legal metrology and for his numerous presentations during the CECIP General Assemblies over the last twenty years, all of which were very much appreciated; we wish him a long and happy retirement,
- Mrs. Caroline Obrecht for her efficient work carried out for the CECIP Bureau, for the numerous times she has stood in as President since her election in 2000 as Vice-President and whose excellent work and friendly attitude we are rewarding, and
- Mr. John Anthony for his key role as President of the Legal Metrology Group since 1993 - Mr. Anthony was also always ready to listen during his efficient representation of CECIP at OIML, European Commission or WELMEC meetings.

The following day was devoted to a visit to the Varèse Sacro Monte and its Holy Walk, which were together listed among the Unesco World Heritage Sites in 2003. At the summit, the Santa Maria Sanctuary is particularly beautiful and rich. The little town that surrounds the sanctuary has managed to maintain its medieval aspect and the path down the Holy Walk, lined by 14 chapels, offers magnificent views over the surrounding lakes.

We express our sincere thanks to our Italian friends, to President Luciano Macchi, to Dr. Fabio Martignoni, to Mr. Maurizio Curioni, to Mr. Abramo Monari, and to all the members of the Italian Federation for their warm welcome. See you next year in the United Kingdom! ■

CECIP

56ème Assemblée Générale

Varèse, Italie

26 mai 2006

Michel Turpain
Secrétaire Permanent du CECIP

Le CECIP, Comité Européen des Constructeurs d'Instruments de Pesage, vient de tenir sa 56ème Assemblée Générale à Varèse en Italie, à l'invitation de la Fédération Italienne.

Notre Assemblée Générale s'est tenue dans les salons du Palace Grand Hôtel de Varèse situé au sommet d'une colline dominant la région des lacs, une vue superbe ! De nombreux invités et membres du CECIP sont intervenus dans des domaines très variés intéressant notre activité:

- Mme Caroline Obrecht, Vice-Présidente du CECIP, a ouvert officiellement la 56ème Assemblée Générale, en l'absence du Président, M. Antonio Matute, retenu par un grave problème de santé dans sa famille,
- Dr. Alberto Ribolla, Président de l'Association des Entrepreneurs des Sociétés Manufacturières de Varèse, nous a présenté: "Le Marché Chinois: opportunités et stratégies pour la coopération industrielle",
- Dr. Walter Baggini, Vice-Président de la Chambre de Commerce de Varèse, nous a présenté: "Les Perspectives de l'Economie Italienne avec la mise en place de la Nouvelle Politique",
- Dr. Vicente Petrucciano, Chef de l'Office de Métrologie de Varèse, nous a présenté: "Les contrôles en métrologie légale en Italie",
- Prof. Dr. Manfred Kochsiek, Vice-Président du CIML, qui vient juste de prendre sa retraite de Vice-Président du PTB nous a présenté: "Le Système de Certification de l'OIML est un succès. Est-ce que l'Accord d'Acceptation Mutuelle de l'OIML est la solution pour le futur ?"

Depuis 2003, le CECIP est composé de 15 Fédérations venant des pays suivants:

Allemagne	République Slovaque
Espagne	République Tchèque
Finlande	Roumanie
France	Royaume-Uni
Hongrie	Russie
Italie	Suisse
Pays-Bas	Ukraine
Pologne	

Chaque Fédération a présenté la situation de l'industrie du pesage en 2005 dans son pays, résumée dans un tableau récapitulatif détaillant la production d'instruments de pesage en Europe et montrant une hausse de la production par rapport à 2004 en Allemagne, en Finlande, en Hongrie, en Italie, en Russie et en République Tchèque, et une baisse en Espagne, en France (en baisse dans les produits grand public mais en hausse dans les produits industriels), et au Royaume-Uni. Ceci nous amène à une moyenne européenne de + 0.7 %.

Les exportations sont en hausse en Finlande, en Hongrie, au Royaume-Uni, en Russie et en Suisse, et en baisse en Allemagne, en Espagne, en France, en Italie et en République Tchèque.

Les importations sont en hausse en Allemagne, en France, en Hongrie, en Italie, au Royaume-Uni, en Russie et en République Tchèque, et en baisse en Espagne, en Finlande et en Suisse.

La partie statutaire s'est déroulée l'après-midi avec le programme habituel suivant:

- le rapport d'activité du Groupe Métrologie Légale qui poursuit sa tâche de propositions et d'examens des publications de l'OIML (en particulier la révision des Recommandations touchant les instruments de pesage à fonctionnement automatique qui accompagneront la Directive sur les Instruments de Mesure (MID) lors de sa mise en application le 30 octobre 2006), des documents du WELMEC, European Cooperation in Legal Metrology, (en particulier les Guides d'harmonisation). Ce rapport était présenté depuis 1993 par M. John Anthony, Président de ce Groupe qui laisse sa place à M. Martin Stoll, nouveau Président du Groupe Métrologie Légale,
- le rapport d'activité du Bureau qui assure la gestion quotidienne du Comité et son développement, en apportant notre expérience aux jeunes Fédérations des pays qui frappent à la porte de l'Union Européenne, comme la Bulgarie de nouveau invitée cette année, en prenant contact avec les Fédérations de constructeurs d'instruments de pesage à travers le monde, amenant de nouveaux membres au CECIP, comme la Pologne, la Roumanie et la Russie en 2003.

Puis cette année nous avions une élection partielle du Bureau du CECIP pour remplacer Mme Caroline Obrecht, Vice-Présidente, qui a assuré de nombreux intérim de la présidence depuis son élection en 2000. M. Martin Stoll a été élu comme nouveau Vice-Président. La composition du Bureau est maintenant la suivante:

Président	M. Antonio Matute Fédération de l'Espagne
Vice-Président	M. Richard Herbert Fédération du Royaume-Uni
Vice-Président	Dr. Fabio Martignoni Fédération de l'Italie
Vice-Président	M. Martin Stoll Fédération de la Suisse
Membre	Dr. Günther Maaz Fédération de l'Allemagne
Membre	M. Daniel Stastny Fédération de la République Tchèque
Secrétaire Permanent	M. Michel Turpain Fédération de la France

L'Assemblée se termina par un dîner de gala dans le superbe Palace Grand Hôtel de Varèse avec la remise de la médaille du CECIP:

- au Prof. Dr. Manfred Kochsiek pour son immense activité dans le domaine de la métrologie légale et pour ses nombreuses interventions, toujours très appréciées depuis plus de vingt ans, au cours des Assemblées Générales du CECIP et à qui nous souhaitons une heureuse et longue retraite,
- à Mme Caroline Obrecht pour son travail efficace au sein du Bureau du CECIP, pour ses nombreux intérim de la présidence depuis son élection en 2000 comme Vice-Présidente et à qui nous avons rendu hommage pour son excellent travail et pour son sourire,
- à M. John Anthony pour son rôle moteur comme Président du Groupe Métrologie Légale depuis 1993, toujours à l'écoute et représentant efficace du CECIP dans les réunions de l'OIML, de la Commission Européenne ou du WELMEC.

La journée suivante fut consacrée à la visite du Sacro Monte de Varèse et de sa Voie Sacrée, ensemble classé au patrimoine mondial de l'Unesco en 2003. Au sommet, le Sanctuaire de Santa Maria del Monte est d'une grande beauté et d'une grande richesse. Le petit bourg qui entoure le sanctuaire a gardé son aspect médiéval et la descente de la Voie Sacrée, jalonnée de 14 chapelles, ouvre de splendides perspectives sur les lacs environnants.

Merci à nos amis Italiens, au Président Luciano Macchi, au Dr. Fabio Martignoni, à M. Maurizio Curioni, à M. Abramo Monari et à tous les membres de la Fédération Italienne pour leur chaleureux accueil. A l'année prochaine au Royaume-Uni !

Statistiques - Industrie du Pesage — Results - Weighing Industry

Année 2005 — *Year 2005*

Pays / Country	Production		Variation	Export	Import
	Hors taxe Monnaie locale Local currency	Hors taxe Without tax Million Euro	2005 / 2004	Variation/2004 Million Euro	Variation/2004 Million Euro
ALLEMAGNE *GERMANY*		750.8	+ 5.2 %	477.4 – 3.7 %	195.4 + 1.7 %
ESPAGNE *SPAIN*		41.3	– 14.8 %	9.8 – 70.8 %	27.2 – 57.7 %
FINLANDE *FINLAND*		29.3	+ 2.8 %	6.41 + 12.6 %	10.48 – 8.5 %
FRANCE *FRANCE*		147.2	– 5.5 %	68.6 – 13.4 %	143.1 + 2.3 %
HONGRIE *HUNGARY*		9.6	+ 4.3 %	6.5 + 10.0 %	9.6 + 10.0 %
ITALIE *ITALY*		133.9	+ 6.8 %	18.9 – 12.9 %	38.6 + 16.6 %
PAYS-BAS *NETHERLANDS*		140.0			
POLOGNE *POLAND*					
REPUBLIQUE SLOVAQUE *SLOVAK REPUBLIC*					
REPUBLIQUE TCHEQUE *CZECH REPUBLIC*		12.7	+ 0.1 %	1.3 – 25.8 %	11.35 + 3.6 %
ROUMANIE *ROMANIA*					
ROYAUME-UNI *UNITED KINGDOM*		172.1	– 7.0 %	129.1 + 1.9 %	132.0 + 1.9 %
FEDERATION RUSSE *RUSSIAN FEDERATION*		52.4	+ 19.0 %	7.23 + 13.2 %	44.11 + 10.5 %
SUISSE *SWITZERLAND*				108.0 + 1.3 %	41.8 – 2.3 %
UKRAINE *UKRAINE*					

RLMO NEWS

22nd WELMEC Committee Meeting

Plovdiv, Bulgaria

4–5 May 2006

GABRIELE WESSELY, WELMEC Secretary

The 22nd WELMEC Committee Meeting, which took place in Plovdiv (Bulgaria) on 4–5 May 2006, was opened by the President of the Bulgarian State Agency for Metrological and Technical Surveillance Dr. Katerin Katerinov, who also gave a presentation on metrology in Bulgaria.

Mr. Freistetter, WELMEC Chairman, thanked the former representative of Bulgaria Mrs. Ani Todorova for her excellent work and her valuable contributions to WELMEC.

Mrs. Lagauterie, WELMEC Vice-Chairperson, gave a short presentation about the WELMEC Workshop held on 17 November 2005 in Paris which had been attended by approximately 100 participants and for which the presentations were now available on the WELMEC web site. She commented that in 2006 there would be no seminars or workshops, though WG 5 was planning on holding a law enforcement seminar in 2008 which would be organized by the UK.

As far as WELMEC membership policy was concerned, it was agreed that the "acquis communautaire" should be mentioned as such in the requirements to become an Associate Member, and that corresponding organizations' access to information concerning WELMEC should be extended.

Croatia had applied for membership prior to the Committee Meeting, and Mr. Vukovic from the Croatian State Office for Metrology had thus been invited to give a presentation of legal metrology in his country. Croatia had signed an agreement with the EC and since June 2004 has been a Candidate Country; Croatia was welcomed as Associate Member following the presentation.

The following documents were discussed during the meeting and it was decided that they would be accepted by e-mail consultation and voting after revision:

- Procedures for WELMEC Activities 2006;
- Working Group Instructions 2006; and
- Member Policy Document 2006.

Next year an election would have to be held for the position of Vice-Chairperson, and Mrs. Lagauterie declared that she was willing to continue in this role. Nevertheless, there would be a call for candidates during the preparation phase for the 23rd Committee Meeting.

The next topic was the WELMEC Type Approval Agreement (TAA). Mr. Freistetter reminded the Committee that most instruments covered by the TAA and by OIML International Recommendations were covered by the MID, which would enter into force on 30 October 2006.

Mr. Magana gave some information about changes in the OIML Certificate System (OIML B 3 is being revised) and explained that the Mutual Acceptance Arrangement might be a way to support both the acceptance of test results in fields covered by the MID and the recognition in non EU-harmonized fields. He explained that in the ongoing revisions of B 3 and B 10 (MAA) there would not be many changes, and that this would be done gradually over several years.

It was agreed to leave the TAA as it was presently until the next Committee Meeting, by which time the Chairman would present a review or evaluation.

Next on the agenda was the European Commission. Mr. Hanekuyk explained about the procedure for the OIML Reference Tables, the drafts of which had been passed to the Commission at the end of May. The Commission Working Group on Measuring Instruments and the Measuring Instruments Committee would then discuss them and hopefully endorse them for application within the scope of the MID. After that, links to the WELMEC web site would be established for them and additional WELMEC guidance documents would be presented to the Commission Working Group (Software, NAWI).

The designation of Notified Bodies would be simplified and Mr. Hanekuyk presented a paper requesting information about contact persons at each notifying authority. Mr. Hanekuyk informed the Committee about the possibility to log into the nando-is database (European database for notified bodies - http://ec.europa.eu/enterprise/nando-is) and promised further information in due course.

As far as MID was concerned there would be a transition period of ten years during which there would be several requests for updating existing type approvals (both national and the EC-old approach). The MID would "freeze" the state of the art of measuring instruments (national and EC-old approach) by October 2006. Additions or extension to these type approval certificates should not contain technical amendments.

As for the Old Approach Directives, one had to consider that seven instrument-related Directives and also the Directive concerning alcohol tables were possibly still in use. After a short discussion the Commission representative agreed to send out an inquiry to those EU-Member States in which these Directives are still in use.

Mr. Freistetter thanked the Working Groups for preparing the cross reference tables for OIML International Recommendations and the requirements of the MID.

As for further procedures, first of all the cross reference tables would have to be simplified for publication (only short comments would be included), which would be done by a small WG. After endorsement by the Commission Working Group on Measuring Instruments the WELMEC web site would be hosting the documents in full. Secondly, it was clearly stated that the Measuring Instruments Committee had the authority to decide whether the simplified reference documents were now ready for publication.

Mr. Magana asked what would happen if there were new OIML International Recommendations or updates. The response was that these new documents would be subject to analysis in the same way, and would have to pass through the Measuring Instruments Committee.

Mr. Magana noted that there would be a revision of OIML R 49 (Water meters) by the end of the year which would include hot water meters. The corresponding tables were based on the latest available draft, subject to CIML approval in Cape Town in October 2006. The cross reference tables could be passed on to the EC and published as soon as the CIML decision was taken.

The Directive on Pre-packages was under revision. The British Presidency already had the challenge to produce an amended and accepted version, and now the Austrian Presidency was trying to reduce various kinds of package sizes. Afterwards there would be a common position taken by the Council and the Commission and maybe the Finnish Presidency would finalize this Directive.

WELMEC Working Group Reports

Working Group 2 *Directive implementation*

WELMEC Guide 3.1 (now Guide 2.7 *Directive 90/384/EEC - Explanation and Interpretation*) was approved (after discussion) with two small amendments as well as a request for a mandate letter for amending EN 45 501.

Working Group 4 *General aspects of legal metrology*

Mr. Lindlov, Chairman of WG 4, reported that concerning Guide 4.2 *Elements for deciding the appropriate level of confidence in regulated measurements* there had been a survey among the member states as to whether they prescribed different accuracy classes and if so why. It turned out that there were differences from country to country; the document had been circulated in 2005 and could now be published (after approval) and should be updated after the MID enters into force.

Guide 4.2 was approved. Additionally, Mr. Lindlov stated that there were different explanations in OIML publications and in standards on "uncertainty", and this should be harmonized either by the OIML or by WG 4 (if possible).

Working Group 5 *Metrological supervision*

Mr. Ian Turner from LACORS was elected as co-convenor and confirmed by the Committee. The Committee thanked Mrs. Lawrence for her work. Mr. Björkqvist suggested that WG5 should manage market surveillance information exchange for a short term.

Concerning the information exchange about notified bodies, the following was decided after a short discussion: The Commission was very much interested in the distribution of the information but did not feel that it should be done on a national basis.

Working Group 6 *Prepackages*

The WG 6 report was presented by Mr. Burnett.

Mr. Johansen commented that the name Market Surveillance for the draft Guide 6.7 was an Old Approach term and that there should be a new name. He was under the impression that the WG was not acting directly within the scope of its TOR.

Mr. Klenovský asked who was behind the pressure to regulate pack sizes and Mr. Freistetter replied that the amended Directive was seen (from the Commission's side) as an example of simplification and better regulation in the European Union.

Amendments to the TOR were discussed and agreed on. Furthermore, the WG was asked to contact WG4 concerning measurement uncertainty and to review its work plan.

WELMEC Guide 6.8 *Guidance for the verification of drained weight, drained washed weight and deglazed weight and extent of filling of rigid food containers* was accepted without any discussions.

Working Group 7 *Software*

Mr. Schulz gave a report for WG 7 and informed the Committee that Mr. Dieter Richter was standing for election as Convenor. The Committee thanked Mr. Schwartz for his work.

Working Group 8 *Measuring Instruments Directive*

Mr. Lagauterie gave his report for WG8 and its program of activities.

Guide 8.1 *Terms and definitions in the MID and their relation to terms defined in other international metrologically relevant documents* was accepted with a minor amendment. The Draft Guide H1 was presented by Mr. Birdseye, since the UK had prepared the draft of the text and the comments and developed a new procedure. The Annexes to the Guide include comments about adequate information by the manufacturer, since there are different approaches. There was also an editorial subgroup that together with CECIP made some amendments in January, mainly concerning the use of the words "shall/should". It was agreed to ask the Committee members for comments and then to conduct a vote by e-mail.

Working Group 10 *Measuring equipment for liquids other than water*

Mrs. van Spronssen gave a report and added information from the recent meeting. The cross-references table was finalized and the Guide *Marking of Fuel Dispensers* was ready for e-mail vote. The Guide *Test Procedures for Electronic Conversion Devices* was, however, not yet ready.

Working Group 11 *Utility meters*

Mr. Schulz presented the WG report. WG 11 had to consider the technical issues involved for water, electricity, gas and heat utility meters.

Ad-hoc Working Group for *Information Exchange*

This report was presented by Mr. Schulz. The main question was which kind of solution was best for the various kinds of information required by the MID. Existing data bases could be used but were not really set up to cater for the special needs of legal metrology.

Mr. Magana suggested that WELMEC should establish its own server, since subcontracting was not very advisable in his OIML experience. He would be willing to present the OIML solution, but did not have the capacity to take care of another database. Mr. Birdseye said that the Committee should consider the need for and the cost of such a project.

Mr. Freistetter requested the WG to examine this. Mr. Schulz commented that EMeTAS was not sufficient and suggested first a national, and then a central database.

Mr. Freistetter proposed that Market Surveillance would for a short term be managed by WG 5 then maybe by CIRCA or ICSMS and the topic would be on the next Committee Meeting agenda. Mr. Klenovský said that maybe his institute might host the server and that he would look into the details. This information would be handed over to the Ad hoc WG.

The next topic on the agenda was the EMeTAS report presented by Mr. Birdseye; then Mrs. Lagauterie reported that there had been a meeting between WG 5 and EMeTAS and it had turned out that information about notified bodies from Spain and Italy was missing. The Committee was informed by Mr. Robles and Mr. Francisci that their countries did not send any information to EMeTAS but only on request to the member countries.

Mr. Magana presented the OIML report update and contributed by his suggestions and points of view on a number of occasions during this meeting.

It was decided that the 23rd Committee Meeting would be held in Romania on 3-4 May 2007.

Main Decisions

The 22nd Committee Meeting:

- Approved the Minutes of the 21st Committee Meeting held in Edinburgh
- Accepted the Chairman's Report for 2005
- Approved the Report concerning the Budget for 2005
- Agreed to amend the proposed *Member Policy Document 2006* and send it out for e-mail confirmation
- Welcomed Croatia as an Associate Member (new issue WELMEC 1 - 2006)
- Approved an e-mail consultation and voting for *Procedures for WELMEC Activities 2006* and *Working Group Instructions 2006* after taking into account the discussions held during the Committee Meeting
- Took note of the Meeting of the Chairman's Group with the Convenors of the Working Groups
- Took note of the need for the election of a Vice-Chairperson in 2007

- Approved the plan to maintain the Type Approval Agreement for another year, realizing the MID influence on it, and asked the Chairman to review/evaluate the need for the TAA and present a report during the 23rd Committee Meeting
- Took note that the presentations given at the WELMEC Workshop (Paris, November 2005) would be made available on the WELMEC web site
- Took note of the EC's intention to ask about the future use of the remaining Old Approach Directives in legal metrology
- Took note of the information given by the EC concerning the addition of existing type approvals (no technical amendments)
- Adopted the procedure for the use of the reference tables concerning MID-OIML requirements:
  - Accepting the existing tables as WELMEC Guidance Documents (done)
  - Setting up a small WG to prepare the simplified version needed by the EC (C. Lagauterie, Lindlov, Commission Services)
- Accepted all the corresponding tables except MI 005 (e-mail procedure on the latest version provided by WG 10)
- Approved all Working Group Reports
- Approved WELMEC Guide 3.1 (now Guide 2.7 *Directive 90/384/EEC - Explanation and Interpretation*) with two small amendments
- Approved WELMEC Guide 4.2 *Elements for deciding the appropriate level of confidence in regulated measurements*
- Recommended that for the short term, market surveillance information should be managed by WG 5
- Approved WELMEC Guide 6.8 *Guidance for the verification of drained weight, drained washed weight and deglazed weight and extent of filling of rigid food containers*
- Approved WELMEC Guide 8.1 *Terms and definitions in MID and their relation to terms defined in other international metrologically relevant documents* with an amendment concerning sub assemblies
- Agreed to an e-mail procedure for WELMEC Guide 8.2 as soon as possible
- Invited Members of WELMEC to take into consideration, as much as possible, useful drafts under preparation in WG 8 when they are close to reaching consensus (to facilitate the common approach in the implementation of the MID)
- Agreed to have an e-mail procedure for the guide concerning *Marking of Fuel Dispensers*
- Recommended the ad hoc Working Group to obtain information from the BIML database system
- Recommended the ad hoc Working Group to examine the cost of the various systems, the content, functionality and access possibilities
- Took into account the proposal from Mr. Klenovský to explore possibilities to run a database for the needs of information exchange for Certificates
- Thanked Mr. J.F. Magana for his update on OIML activities
- Took note of the report of EMeTAS
- Thanked Bulgaria for hosting the 22nd Committee Meeting
- Accepted the invitation to hold the 23rd Committee Meeting in Romania on 3–4 May 2007
- Accepted the invitation to hold the 24th Committee Meeting in Croatia in 2008 (date to be confirmed) ■

NCWM NEWS

MAA Presentation at the 91st Annual Meeting of the NCWM

9–13 July 2006

Chicago, United States

Régine Gaucher
MAA Project Leader, BIML

Introduction

During the second meeting of the Committee on Participation Review (CPR), the United States representative indicated that his country intended to participate in the R 60 Declaration of Mutual Confidence (DoMC) as a Utilizing Participant with additional national requirements.

Taking into consideration the organization of legal metrology in the United States where a private volunteer organization, the National Conference on Weights and Measures (NCWM) develops model legal metrology standards and administers the National Type Evaluation Program (NTEP) and each State is responsible for adopting standards and regulating legal metrology within their respective borders, the BIML was invited to present the OIML Mutual Acceptance Arrangement (MAA) during the 91st NCWM Meeting.

The meeting was also a good opportunity for the BIML to broaden its knowledge of the Type Approval Process and of legal metrology legislation in the United States and to meet local responsible Type Approval bodies.

The National Conference on Weights and Measures (NCWM)

The NCWM is a standards development organization for regulatory weights and measures agencies in the States, counties and cities of the United States. It comprises 2184 Members, of which:

- 39 % are representatives from industry, called Associated Members;
- 37 % are representatives from States, called Government Members;
- 23 % are representatives from the counties and cities, called Local Government Members;
- 1 % are representatives from overseas governments.

The management of the NCWM is operated by the Board of Directors which oversees the activities of four standing committees, each addressing a specialized area of the NCWM standards program:

- The Specifications and Tolerances Committee;
- The Laws and Regulations Committee;
- The Professional Development Committee;
- The National Type Evaluation Program Committee (NTEP).

The Board is composed in particular of a chairman elected for one year, the NTEP Committee Chair, a representative of the associated Members and one representative of each of the four regional associations (Northeastern, Central, Southern and Western).

The NCWM develops and recommends laws and regulations, technical codes for weighing and measuring devices used in trade, test methods, enforcement procedures and administrative guidelines for adoption by regulatory agencies in the interest of promoting uniformity of requirements and methods among State and local jurisdictions.

The NCWM works in partnership with the National Institute of Standards and Technology (NIST) which is its technical advisor. NIST participates in the NCWM Committees and is responsible for publishing NCWM model standards (e.g. NIST Handbook 133 *Checking the Net Contents of Packaged Goods*, NIST Handbook 44 *Specifications and Tolerances for Weighing and Measuring Devices*, and NIST Handbook 130 *Uniform Laws and Regulations*).

NCWM Meetings

The NCWM meets twice a year in January (Interim Meeting) and in July (Annual Meeting).

The main purpose of the Interim Meeting is to receive and examine the inputs from Members in order that the NCWM may draw up its recommendations for amending national metrological and technical requirements and/or testing requirements. This meeting is open to anyone and provides opportunities at open hearings for additional input on all agenda items.

As with the Interim Meeting, the Annual Meeting is accessible to NCWM Members and non-members.

Representatives of the States and delegates vote on the recommendations of the NCWM Committees for amending the relevant NCWM Publications.

This Annual Meeting gathers together government officials and representatives from business, industry, and trade organizations for the purpose of listening to and discussing subjects relating to the field of weights and measures technology and administration.

The NCWM Annual Meeting is composed of several sessions, among which:

- An *Open Hearings* session which allows each NCWM Committee to present its interim report drawn up after the interim meeting, following which each participant may input comments and make proposals to the NCWM Committees;
- *Committee Work* sessions, during which each NCWM Committee finalizes its recommendations to be submitted for voting, taking into account the comments and proposals made during the Open Hearings session;
- A *General Voting* session during which each NCWM Committee presents its recommendations, which are at the same time submitted for approval to the representatives of the States and delegates.

Presentation of the OIML Mutual Acceptance Arrangement (MAA)

The OIML MAA was mentioned in the Report of the NCWM Board of Directors. Therefore, the BIML presentation was given during the Open Hearings session following the presentation of the Report of the Board of Directors.

The MAA was presented as being an additional tool to the existing OIML Certificate System:

- To facilitate and harmonize the work of national and regional bodies in charge of type evaluation of measuring instruments;
- To harmonize the practices of testing laboratories; and
- To help manufacturers demonstrate the conformity of the measuring instruments they manufacture to the requirements in the various countries in which they request type approval.

The following difficulties encountered with the existing OIML Certificate System were described:

- No criteria are defined in OIML B 3 related to the OIML Certificate System to designate OIML Issuing Authorities;
- No requirements are defined in OIML B 3 to evaluate Testing Laboratories;
- There is no guarantee that OIML Evaluation Reports will be taken into account for issuing national Type Approvals; and
- The manufacturer has no information about national specificities when he starts the Type Approval process.

The BIML presentation detailed some of the solutions to these concerns which are provided by the OIML MAA and which represent significant improvements:

The United States, Canada and The Netherlands sign their registration forms for the OIML R 60 and R 76 DoMCs

- The OIML MAA establishes an evaluation of Testing Laboratories to increase confidence in test results;
- It helps Members who do not have their own test facilities by becoming Utilizing Participants; and
- It takes into account the additional national requirements of the participants in a DoMC in order to facilitate the recognition of test results for issuing national Type Approvals.

Lastly, the advantages for the different interested parties were presented:

- The OIML MAA offers manufacturers a one-stop testing process which is certainly an important issue and which serves to provide more accurate information at the beginning of the Type Approval process;
- For the OIML, the MAA is one tool which can be used to increase technical cooperation between Member States; Secretariats of the Technical Committees and Subcommittees should be informed of the technical conclusions of the CPRs and of the difficulties encountered in the recognition of the Evaluation Reports issued under the various DoMCs; and
- The MAA is also definitely an advantage for the Type Approval Bodies of those countries which do not have test facilities.

Conclusions, reactions and the DoMC signature

The main concern expressed by the representatives of States on the OIML MAA (and in particular on the status of becoming a Utilizing Participant) was that it could lead to a reduction in competence due to the fact that they no longer examine the measuring instrument and no longer perform any tests.

The BIML indicated that recognizing an Evaluation Report did not mean that the recognizing Authority did not examine any specimens of the instrument type. A visual inspection could still be necessary in each country, in particular when specific software was required to operate the instrument according to a defined procedure.

The BIML added that if a country was not happy with some of the test results or if it considered that the testing procedure had not been correctly implemented, then the tests may be performed again. In such a case, it was important to clearly explain the reasons for such a decision to the manufacturer and also to inform the BIML. These elements would be extremely important for the continuation of the MAA.

Finally, as CIML President Alan Johnston (Measurement Canada, Canada) and Pieter van Breugel (NMi, The Netherlands) were in attendance at the meeting, the BIML took the opportunity to start the official process of the signature of the R 60 and R 76 DoMCs. Canada, The Netherlands and the United States signed their registration forms during this meeting. ■

OIML Certificate System:

Certificates registered 2006.05–2006.07

Up to date information (including B 3): www.oiml.org

The *OIML Certificate System for Measuring Instruments* was introduced in 1991 to facilitate administrative procedures and lower costs associated with the international trade of measuring instruments subject to legal requirements.

The System provides the possibility for a manufacturer to obtain an OIML Certificate and a test report indicating that a given instrument type complies with the requirements of relevant OIML International Recommendations.

Certificates are delivered by OIML Member States that have established one or several Issuing Authorities responsible for processing applications by manufacturers wishing to have their instrument types certified.

The rules and conditions for the application, issuing and use of OIML Certificates are included in the 2003 edition of OIML B 3 *OIML Certificate System for Measuring Instruments.*

OIML Certificates are accepted by national metrology services on a voluntary basis, and as the climate for mutual confidence and recognition of test results develops between OIML Members, the OIML Certificate System serves to simplify the type approval process for manufacturers and metrology authorities by eliminating costly duplication of application and test procedures. ■

This list is classified by Issuing Authority; updated information on these Authorities may be obtained from the BIML.

Cette liste est classée par Autorité de délivrance; les informations à jour relatives à ces Autorités sont disponibles auprès du BIML.

OIML Recommendation applicable within the System / Year of publication

Recommandation OIML applicable dans le cadre du Système / Année d'édition

Certified type(s)

Type(s) certifié(s)

► Issuing Authority / *Autorité de délivrance*

Netherlands Measurement Institute (NMi)
Certin B.V., The Netherlands

R60/2000-NL1-02.02
Type 0765 (Class C)
Mettler-Toledo Inc., 150 Accurate Way,
Inman, SC 29349, USA

The code (ISO) of the Member State in which the certificate was issued, with the Issuing Authority's serial number in that Member State.

Le code (ISO) indicatif de l'État Membre ayant délivré le certificat, avec le numéro de série de l'Autorité de Délivrance dans cet État Membre.

For each instrument category, certificates are numbered in the order of their issue (renumbered annually).

Pour chaque catégorie d'instrument, les certificats sont numérotés par ordre de délivrance (cette numérotation est annuelle).

Year of issue

Année de délivrance

Applicant

Demandeur

Système de Certificats OIML:

Certificats enregistrés 2006.05–2006.07

Informations à jour (y compris le B 3): www.oiml.org

Le *Système de Certificats OIML pour les Instruments de Mesure* a été introduit en 1991 afin de faciliter les procédures administratives et d'abaisser les coûts liés au commerce international des instruments de mesure soumis aux exigences légales.

Le Système permet à un constructeur d'obtenir un certificat OIML et un rapport d'essai indiquant qu'un type d'instrument satisfait aux exigences des Recommandations OIML applicables.

Les certificats sont délivrés par les États Membres de l'OIML, qui ont établi une ou plusieurs autorités de délivrance responsables du traitement des demandes présentées par des constructeurs souhaitant voir certifier leurs types d'instruments.

Les règles et conditions pour la demande, la délivrance et l'utilisation de Certificats OIML sont définies dans l'édition 2003 de la Publication B 3 *Système de Certificats OIML pour les Instruments de Mesure.*

Les services nationaux de métrologie légale peuvent accepter les certificats sur une base volontaire; avec le développement entre Membres OIML d'un climat de confiance mutuelle et de reconnaissance des résultats d'essais, le Système simplifie les processus d'approbation de type pour les constructeurs et les autorités métrologiques par l'élimination des répétitions coûteuses dans les procédures de demande et d'essai. ■

INSTRUCTION CATEGORY

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Water meters intended for the metering of cold potable water
Compteurs d'eau destinés au mesurage de l'eau potable froide

R 49 (2003)

▶ Issuing Authority / *Autorité de délivrance*

Laboratoire National de Métrologie et d'Essais, Certification Instruments de Mesure, France

R049/2003-FR2-2006.01
Water type A1 (ALTAIR, Vega ou Bonyto), class 2
Sappel, 67, rue du Rhône, BP 160, F-68300 Saint-Louis Cedex, France

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Automatic catchweighing instruments
Instruments de pesage trieurs-étiqueteurs à fonctionnement automatique

R 51 (1996)

▶ Issuing Authority / *Autorité de délivrance*

Netherlands Measurement Institute (NMi) Certin B.V., The Netherlands

R051/1996-NL1-2006.02
*Automatic catchweighing instrument - Family of type: DACS-Z-***-***
Ishida Co., Ltd., 959-1, Shimomagari, Ritto, 520-3026 Shiga, Japan

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Metrological regulation for load cells (applicable to analog and/or digital load cells)
Réglementation métrologique des cellules de pesée (applicable aux cellules de pesée à affichage analogique et/ou numérique)

R 60 (2000)

▶ Issuing Authority / *Autorité de délivrance*

International Metrology Cooperation Office, National Metrology Institute of Japan (NMIJ) National Institute of Advanced Industrial Science and Technology (AIST), Japan

R060/2000-JP1-2006.01
Type LCM13K100, LCM13K200, LCM13K300
A&D Company Ltd., 3-23-14 Higashi-Ikebukuro, Toshima-Ku, 170-0013 Tokyo, Japan

▶ Issuing Authority / *Autorité de délivrance*

National Weights and Measures Laboratory (NWML), United Kingdom

R060/2000-GB1-2005.04 Rev. 1
Stainless steel single ended shear beam (bending) strain gauge load cell
Applied Weighing International Ltd., Unit 5, Southview Park, Marsack Street, Caversham, Reading RG4 5AF, Berkshire, United Kingdom

R060/2000-GB1-2005.05 Rev. 1
Aluminium single ended shear beam (bending) strain gauge load cell
Applied Weighing International Ltd., Unit 5, Southview Park, Marsack Street, Caversham, Reading RG4 5AF, Berkshire, United Kingdom

R060/2000-GB1-2005.07 Rev. 1
Stainless steel, compression strain gauge load cell
Weightron Bilanciai Ltd, Bridge Way off Broombank Road, Chesterfield Trading Estate, Chesterfield S41 9QJ, United Kingdom

R060/2000-GB1-2006.01
Single Ended Shear Beam (bending) strain gauge load cell
Avery Weigh-Tronix, Foundry Lane, B66 2LP, Smethwick, West Midlands, United Kingdom

Issuing Authority / *Autorité de délivrance*

Netherlands Measurement Institute (NMi) Certin B.V., The Netherlands

R060/2000-NL1-2006.05
A shear beam load cell - Type: SK...
Scaime S.A., Z.I. de Juvigny, B.P. 501,
F-74105 Annemasse Cedex, France

R060/2000-NL1-2006.06
A shear beam load cell - Type: SPS14
Soehnle-Waagen GmbH + Co.,
Fornsbacher Straße 27-35, D-71540 Murrhardt, Germany

R060/2000-NL1-2006.07
A bending beam load cell - Type: Z6
Hottinger Baldwin Messtechnik GmbH, Im Tiefen See 45,
D-64293 Darmstadt, Germany

R060/2000-NL1-2006.08
Load cell - Type: QS series
Keli Electric Manufacturing (Ningbo) Co. Ltd.,
199 Changxing Road, Jiangbei District, Ningbo City, China

R060/2000-NL1-2006.10
A bending beam load cell - Type: 1510
Vishay-Transducers, 5 Hazoran Street, New Industrial,
IL-42506 Netanya, Israel

Issuing Authority / *Autorité de délivrance*
OIML Chinese Secretariat,
State General Administration for Quality Supervision and Inspection and Quarantine (AQSIQ), China

R060/2000-CN1-2006.01
Load cell Type L6F
Zhonghang Electronic Measuring Instruments Co. Ltd.,
P.O. Box 2, Hanzhong, 723007 ShaanXi, China

R060/2000-CN1-2006.02
Load cell Type B3G
Zhonghang Electronic Measuring Instruments Co. Ltd.,
P.O. Box 2, Hanzhong, 723007 ShaanXi, China

R060/2000-CN1-2006.03
Load cell Type L6W
Zhonghang Electronic Measuring Instruments Co. Ltd.,
P.O. Box 2, Hanzhong, 723007 ShaanXi, China

R060/2000-CN1-2006.04
Load cell Type L6N
Zhonghang Electronic Measuring Instruments Co. Ltd.,
P.O. Box 2, Hanzhong, 723007 ShaanXi, China

R060/2000-CN1-2006.05
Load cell Type B8D
Zhonghang Electronic Measuring Instruments Co. Ltd.,
P.O. Box 2, Hanzhong, 723007 ShaanXi, China

R060/2000-CN1-2006.06
Load cell Type HM9B
Zhonghang Electronic Measuring Instruments Co. Ltd.,
P.O. Box 2, Hanzhong, 723007 ShaanXi, China

R060/2000-CN1-2006.07
Load cell Type BM14G
Zhonghang Electronic Measuring Instruments Co. Ltd.,
P.O. Box 2, Hanzhong, 723007 ShaanXi, China

R060/2000-CN1-2006.08
Load cell Type L6E3
Zhonghang Electronic Measuring Instruments Co. Ltd.,
P.O. Box 2, Hanzhong, 723007 ShaanXi, China

R060/2000-CN1-2006.09
Load cell Type H8
Zhonghang Electronic Measuring Instruments Co. Ltd.,
P.O. Box 2, Hanzhong, 723007 ShaanXi, China

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Automatic gravimetric filling instruments
Doseuses pondérales à fonctionnement automatique

R 61 (1996)

Issuing Authority / *Autorité de délivrance*

National Weights and Measures Laboratory (NWML), United Kingdom

R061/2004-GB1-2006.01
PN Series Weigher
Prins UK Ltd, Unit 140, Hartlebury Trading Estate,
Kidderminster, Worcestershire DY10 4JB,
United Kingdom

Issuing Authority / *Autorité de délivrance*

Netherlands Measurement Institute (NMi) Certin B.V., The Netherlands

R061/1996-NL1-2006.01
Automatic gravimetric filling instrument - Family of type: CCW-R-xxx and CCW-RS-xxx
Ishida Co., Ltd., 959-1, Shimomagari, Ritto,
520-3026 Shiga, Japan

Issuing Authority / *Autorité de délivrance*

Physikalisch-Technische Bundesanstalt (PTB), Germany

R061/2004-DE1-2005.02 Rev. 1
Automatic Gravimetric Filling Instrument - Type Bagging Controller Chrotec
CHROTECH GmbH, Joseph - Dietzgen - Strasse 12, D-5773 Hennef, Germany

R061/2004-DE1-2006.01
Automatic Gravimetric Filling Instrument designed as selective combination weigher - Type CP8xxXX/Pxx-126/Bxx-126/Gxx-126/Wxx-126
S&B Verpackungsmaschinen GmbH, Industriestrasse 27, D-63674 Altenstadt, Germany

R061/2004-DE1-2006.02
Automatic Gravimetric Filling Instrument designed as selective combination weigher - Type CP8xxXX/Pxx-126/Bxx-126/Gxx-126/Wxx-126
SORMA S.p.A., via delle Mele 65, I-47020 Cesena (FC), Italy

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Nonautomatic weighing instruments
Instruments de pesage à fonctionnement non automatique

R 76-1 (1992), R 76-2 (1993)

Issuing Authority / *Autorité de délivrance*

Czech Metrology Institute (CMI), Czech Republic

R076/1992-CZ1-2006.01
Non-automatic weighing instrument, accuracy class III - Type: L-PC series, PCS series
Fabricantes De Basculas Torrey S.A. De C.V., Los Andes 605, Col. Coyoacan, Monterrey, N.L., C.P. 64510, Mexico

R076/1992-CZ1-2006.02
Non-automatic weighing instrument, accuracy class III - Type: SC-100
Fabricantes De Basculas Torrey S.A. De C.V., Los Andes 605, Col. Coyoacan, Monterrey, N.L., C.P. 64510, Mexico

Issuing Authority / *Autorité de délivrance*

International Metrology Cooperation Office, National Metrology Institute of Japan (NMIJ) National Institute of Advanced Industrial Science and Technology (AIST), Japan

R076/1992-JP1-2006.03
Type GX-..K
A&D Company Ltd., 3-23-14 Higashi-Ikebukuro, Toshima-Ku, 170-0013 Tokyo, Japan

Issuing Authority / *Autorité de délivrance*

National Weights and Measures Laboratory (NWML), United Kingdom

R076/1992-GB1-2004.02 Rev. 1
Rice Lake Weighing Systems 820i and 920i indicating devices
Rice Lake Weighing Systems, 230 West Coleman Street, 54868 Wisconsin, Rice Lake, Wisconsin, United States

R076/1992-GB1-2006.01
E1020 Baggage Weigher
Avery Weigh-Tronix, Foundry Lane, Smethwick B66 2LP, West Midlands, United Kingdom

R076/1992-GB1-2006.02
Mains/battery operated non-automatic weighing instrument - Checklode DP
Central Weighing Ltd, Unit 142, Hartlebury Trading Estate, Kidderminster, Worcestershire DY10 4JB, United Kingdom

Issuing Authority / *Autorité de délivrance*

Netherlands Measurement Institute (NMi) Certin B.V., The Netherlands

R076/1992-NL1-2006.13
Non-automatic weighing instrument - Type: Shtrih M5
SHTRIKH-M, 1, Kholodilny Pereulok, Moscow 113191, Russian Federation

R076/1992-NL1-2006.14
Non-automatic weighing instrument - Type: Shtrih-Print
SHTRIKH-M, 1, Kholodilny Pereulok, Moscow 113191, Russian Federation

R076/1992-NL1-2006.16
Non-automatic weighing instrument - Family of type: Viper... and BBA 4...
Mettler-Toledo (Albstadt) GmbH, Unter dem Malesfelden 34, D-72458 Albstadt, Germany

R076/1992-NL1-2006.18
Non-automatic weighing instrument - Family of type: bPro... /bC-.../ RL20-...
Mettler-Toledo (Changzhou) Precision Instruments Ltd., 5 HuaShanZhong Lu, ChangZhou, JiangSu, China

R076/1992-NL1-2006.19
Non-automatic weighing instrument - Type: Diva
Mettler-Toledo Inc., 1150 Dearborn Drive, 43085-6712 Ohio, Worthington, Ohio, United States

R076/1992-NL1-2006.20
Non-automatic weighing instrument - Family of type: LP-25...
DIBAL S.A., c/ Astintze Kalea, 24, Poligono Industrial Neinver, E-48016, Derio (Bilbao-Vizcaya), Spain

R076/1992-NL1-2006.21
Non-automatic weighing instrument - Type: PO-2010
Charder Electronic Co., Ltd, 103, Kuo Chung Road, Dah Li City, Taichung Hsien 412, Chinese Taipei

R076/1992-NL1-2006.22
Non-automatic weighing instrument - Family of type: SM-500...
Teraoka Weigh-System PTE LTD, 4 Leng Kee Road, #06-01 SIS Building, 159088 Singapore, Singapore

R076/1992-NL1-2006.23
Multi-range non-automatic weighing instrument - Type: DLT
Grupo Epelsa, S.L. or EXA, Ctra. Sta. Cruz de Calafell, 35 km. 9,400, Sant Boi de Llobregat, E-08830 Sant Boi de Llobregat - Barcelona, Spain

R076/1992-NL1-2006.24
Non-automatic weighing instrument - Type: Jaguar or JagXtreme
Mettler-Toledo Inc., 1150 Dearborn Drive, 43085-6712 Ohio, Worthington, Ohio, United States

R076/1992-NL1-2006.25
Non-automatic weighing instrument - Type: OPS-series
Dikomsan Elektronik Sanayi Ve Ticaret Ltd. Sti., Oto Sanayi Sitesi 19, Menderes Cad 4. Levent, 34418 Istanbul, Turkey

R076/2000-NL1-2006.07
A bending beam load cell - Type: Z6
Hottinger Baldwin Messtechnik GmbH, Im Tiefen See 45, D-64293 Darmstadt, Germany

Issuing Authority / *Autorité de délivrance*
Physikalisch-Technische Bundesanstalt (PTB), Germany

R076/1992-DE1-2003.01 Rev. 2
Non-automatic electromechanical weighing instruments without lever systems - Types 635x1, 635x2, 645x1, 645x2, 657x1, 657x2, 665x2, 665x1, 675x1, 675x2, 677x1, 677x2, 685x1, 685x2
SECA GmbH & Co. kg., Hammer Steindamm 9-25, D-22089 Hamburg, Germany

R076/1992-DE1-2005.09 Rev. 1
Non-automatic electromechanical weighing instrument with or without lever works - Type: AV...-C, AS..-C
Ohaus Corporation, 19A Chapin Road, NJ 07058-9878 New Jersey, Pine Brook, New Jersey, United States

R076/1992-DE1-2006.01 Rev. 1
Non-automatic electromechanical weighing instrument - Type BD ED 100, BD ED 200
Sartorius A.G., Weender Landstraße 94-10, D-37075 Göttingen, Germany

R076/1992-DE1-2006.02
Non-automatic electromechanical weighing instrument with or without lever works - Type: Classic
Mettler-Toledo GmbH, Im Langacher, CH-8606 Greifensee, Switzerland

R076/1992-DE1-2006.03
Nonautomatic electromechnical weighing instrument - Types: NT ...
Bizerba GmbH & Co. KG, Wilhelm-Kraut-Straße 65, D-72336 Balingen, Germany

R076/1992-DE1-2006.04
Nonautomatic electromechanical weighing instrument - Type: BT...
Bizerba GmbH & Co. KG, Wilhelm-Kraut-Straße 65, D-72336 Balingen, Germany

R076/1992-DE1-2006.05
Nonautomatic electromechanical weighing instrument - Type: ST...
Bizerba GmbH & Co. KG, Wilhelm-Kraut-Straße 65, D-72336 Balingen, Germany

Issuing Authority / *Autorité de délivrance*

DANAK The Danish Accreditation and Metrology Fund, Denmark

R076/1992-DK1-2002.01 Rev. 2

Non-automatic weighing instrument, Type: CUC-Ex

Kosan Crisplant A/S, P.O. Pedersens Vej 22, DK-8200 Aarhus N, Denmark

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Direct mass flow measuring systems
Ensembles de mesurage massiques directs

R 105 (1993)

Issuing Authority / *Autorité de délivrance*

Norwegian Metrology Service, Norway

R105/1993-NO1-2006.01

Sensor: Foxboro CFS 10 and CFS 20, Transmitter: Foxboro CFT 50

Invensys Process Systems Inc., 33 Commercial Street, MA 02035 Foxboro, MA, United States

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Automatic rail-weighbridges
Ponts-bascules ferroviaires à fonctionnement automatique

R 106 (1997)

Issuing Authority / *Autorité de délivrance*

Russian Research Institute for Metrological Service (VNIIMS)

R106/1997-RU1-2006.01

Automatic rail-weighbridge Type ABP-B-CD

Avitec-Plus Ltd., 122, Malisheva str, Yekaterinburg, Sverdlovsk Region 620078, Russian Federation

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Fuel dispensers for motor vehicles
Distributeurs de carburant pour véhicules à moteur

R 117 (1995) + R 118 (1995)

Issuing Authority / *Autorité de délivrance*

Netherlands Measurement Institute (NMi) Certin B.V., The Netherlands

R117/1995-NL1-2006.01

Fuel dispenser for Motor Vehicles - Type: EURO 1000 VI R

Petrotec - Assistencia Tecnica ao Ramo Petrolifero, S.A., Parque Industrial de S. Joao De Ponte - Pav. C2, 4800-493 Guimaraes, Portugal

Issuing Authority / *Autorité de délivrance*

Russian Research Institute for Metrological Service (VNIIMS)

R117/1995-RU1-2006.02

Fuel Dispensers EPCO Series

Energy & Petroleum Co, Ltd Korea (Epco.Korea), Shihwa 2RA-411, 1363-10 Jeongwang-Dong - Shinung-SI, Kyungi-Do, Korea (R.)

R117/1995-RU1-2006.03

Fuel Dispensers Advantages Series

Beijing Chang Gi Service Station Equipment Co., Jianshe W. Street, Binhe Industrial Zone, Pinggu District, 101200 Beijing, China

Issuing Authority / *Autorité de délivrance*

Swedish National Testing and Research Institute AB, Sweden

R117/1995-SE1-2001.01 Rev. 1

Fuel dispenser for Motor Vehicles, model Global Century

Dresser Wayne Pignone, Dresser Wayne AB, Limhamnsvägen 109, SE-200 61 Limhamn, Sweden

R117/1995-SE1-2005.01 Rev. 2

One or two sided fuel pumps/dispensers for motor vehicles Type 3/Vista (from 387 to 595V series)

Dresser Wayne Inc., 3814 Jarrett Way, Austin TX 78728, United States

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Multi-dimensional measuring instruments
Instruments de mesure multidimensionnels

R 129 (2000)

▶ **Issuing Authority / *Autorité de délivrance***

Netherlands Measurement Institute (NMi) Certin B.V., The Netherlands

R129/2000-NL1-2006.01
Multi-dimensional measuring instrument for measuring cubic and rectangular, non-irregular shaped, non reflective and opaque boxes - Type: VMS 510
SICK AG., Nimburger Strasse 11,
D-79276 Reute, Germany

▶ **Issuing Authority / *Autorité de délivrance***

Norwegian Metrology Service, Norway

R129/2000-NO1-2006.02
Type: Dimensioner: Cargoscanner CN810, Display: Cargoscanner CS2200
Mettler-Toledo Cargoscan AS, Grenseveien 65/67,
N-0663 Oslo, Norway

▶ **Issuing Authority / *Autorité de délivrance***

Physikalisch-Technische Bundesanstalt (PTB), Germany

R129/2000-DE1-2005.01 Rev. 1
Multi-dimensional measuring Instrument - Type: Volumec HS2
VITRONIC Dr.-Ing. Stein Bildverarbeitungssysteme GmbH, Hasengartenstrasse 14, D-65189 Wiesbaden, Germany

OIML CERTIFICATE SYSTEM

List of OIML Issuing Authorities (by Country)

The list of OIML Issuing Authorities will now be published in each issue of the OIML Bulletin. For more details, please refer to our web site: www.oiml.org/certificates. There are no changes since the July 2006 issue of the Bulletin.

AUSTRALIA

AU1 - National Measurement Institute	R 50	R 51	R 60	R 76	R 85	R 106
	R 107	R 117/118	R 126	R 129		

AUSTRIA

AT1 - Bundesamt für Eich- und Vermessungswesen	R 50	R 51	R 58	R 61	R 76	R 85
	R 88	R 97	R 98	R 102	R 104	R 106
	R 107	R 110	R 114	R 115	R 117/118	

BELGIUM

BE1 - Metrology Division	R 76	R 97	R 98

BRAZIL

BR1 - Instituto Nacional de Metrologia, Normalização e Qualidade Industrial	R 76

BULGARIA

BG1 - State Agency for Metrology and Technical Surveillance	R 76	R 98

CHINA

CN1 - State General Administration for Quality Supervision and Inspection and Quarantine	R 60	R 76	R 97	R 98

CZECH REPUBLIC

CZ1 - Czech Metrology Institute	R 76	R 117/118

DENMARK

DK1 - The Danish Accreditation and Metrology Fund	R 50	R 51	R 60	R 61	R 76	R 98
	R 105	R 106	R 107	R 117/118	R 129	
DK2 - FORCE Technology, FORCE-Dantest CERT	R 49					

FINLAND

FI1 - Inspecta Oy	R 50	R 51	R 60	R 61	R 76	R 85
	R 106	R 107	R 117/118			

FRANCE

FR1 - Bureau de la Métrologie	*All activities and responsibilities were transferred to FR2 in 2003*				
FR2 - Laboratoire National de Métrologie et d'Essais	R 31	R 49	R 50	R 51	R 58
	R 60	R 61	R 76	R 85	R 88
	R 97	R 98	R 102	R 105	R 106
	R 107	R 110	R 114	R 115	R 117/118
	R 126	R 129			

GERMANY

DE1 - Physikalisch-Technische Bundesanstalt (PTB)	R 16	R 31	R 49	R 50	R 51
	R 58	R 60	R 61	R 76	R 88
	R 97	R 98	R 102	R 104	R 105
	R 106	R 107	R 110	R 114	R 115
	R 117/118	R 128	R 129	R 133	

HUNGARY

HU1 - Országos Mérésügyi Hivatal	R 76

JAPAN

JP1 - National Metrology Institute of Japan	R 60	R 76	R 115	R 117/118

KOREA (R.)

KR1 - Korean Agency for Technology and Standards	R 76

THE NETHERLANDS

NL1 - NMi Certin B.V.	R 31	R 49	R 50	R 51	R 60
	R 61	R 76	R 81	R 85	R 97
	R 105	R 106	R 107	R 117/118	R 126
	R 129	R 134			

NEW ZEALAND

NZ1 - Ministry of Consumer Affairs, Measurement and Product Safety Service	R 76

NORWAY

NO1 - Norwegian Metrology Service	R 50	R 51	R 61	R 76	R 105
	R 106	R 107	R 117/118	R 129	

POLAND

PL1 - Central Office of Measures	R 76	R 98	R 102

ROMANIA

RO1 - Romanian Bureau of Legal Metrology	R 97	R 98	R 110	R 114	R 115

RUSSIAN FEDERATION

RU1 - Russian Research Institute for Metrological Service	R 31	R 50	R 51	R 58	R 60
	R 61	R 76	R 85	R 88	R 93
	R 97	R 98	R 102	R 104	R 105
	R 106	R 107	R 110	R 112	R 113
	R 114	R 115	R 117/118	R 122	R 126
	R 128	R 129	R 133		

SLOVAKIA

SK1 - Slovak Legal Metrology (Banska Bystrica)	R 76	R 117/118

SLOVENIA

SI1 - Metrology Institute of the Republic of Slovenia	R 76

SPAIN

ES1 - Centro Español de Metrología	R 51	R 60	R 61	R 76	R 97
	R 98	R 126			

SWEDEN

SE1 - Swedish National Testing and Research Institute AB	R 50	R 51	R 60	R 61	R 76
	R 85	R 98	R 106	R 107	R 117/118

SWITZERLAND

CH1 - Swiss Federal Office of Metrology and Accreditation	R 16	R 31	R 50	R 51	R 60
	R 61	R 76	R 97	R 98	R 105
	R 106	R 107	R 117/118		

UNITED KINGDOM

GB1 - National Weights and Measures Laboratory	R 49	R 50	R 51	R 60	R 61
	R 76	R 85	R 98	R 105	R 106
	R 107	R 117/118	R 129	R 134	
GB2 - National Physical Laboratory	R 97				

UNITED STATES

US1 - NCWM, Inc.	R 60	R 76

Modern BIML communication methods:

INFORMATION TECHNOLOGY

AT THE SERVICE OF OIML MEMBERS

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Chris Pulham Editor and WebMaster, BIML

1 Introduction: Global OIML/BIML objectives

For a number of years now, one of the BIML's main priorities has been to improve communication with Members and to reinforce our image worldwide as an active, dynamic Inter-Governmental Organization.

Over the past couple of years the BIML has further expanded its use of the internet with the objective of making information available to Members as rapidly, frequently and reliably as possible.

This article gives Members and Readers a behind the scenes insight into our working methods, and explains how we are modelling our communication policy to provide an ever improving service, making the most of the low-cost, efficient communication vehicle that is the internet.

In passing, we note a very positive bi-product of these efforts: closer and more frequent relations with Members on a day-to-day basis and a growing "degree of confidence" (to use the metrological expression!) in the activities of the BIML.

2 Roles of the OIML – who needs information?

The OIML has two key roles:

i) To organize and circulate information among OIML Members and other legal metrology bodies worldwide, and

ii) To develop and publish OIML Recommendations and guidance Documents which support the legal metrology activities of Members and which lead to the elimination of technical barriers to trade

So who needs information on metrology?

Non specialists need to be informed of the importance of metrology for the economy, for health, safety, and the environment. *Policy makers* need to be informed of the possibilities that measurement techniques may provide to achieve their goals, *industry* must be aware of the evolution of legal metrology structures and regulations in Member States, and *legal metrology bodies* must be informed of technical developments and what is accepted (or not) as "good practice". Not least of all, *Developing Countries* rely on sources of metrological information to implement legislation, technology and regulatory practices in fields in which, by definition, they may have little or no prior experience.

Traditionally since 1955 and until recent years, information was exchanged essentially through the OIML Bulletin, through the Directory of Legal Metrology in Member States, or via inquiries on the application of OIML Recommendations in Member States' national regulations.

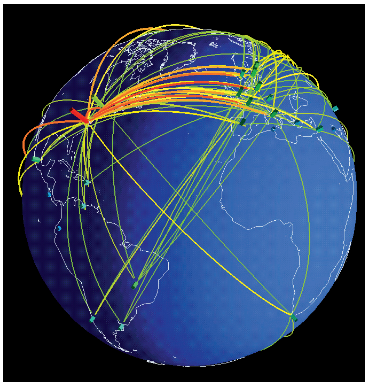
These traditional means of circulating information were often rather formal and even cumbersome, resulting in a braking effect, long delays between updates and shortfalls in fulfilling Members' expectations. Some inquiries on technical work could take up to a year to complete and analyze! The Bulletin, the only publication still printed on paper, is now also available in electronic format to increase readership and exposure.

3 Production process of publications and their dissemination - History

The OIML's primary mission, i.e. developing Recommendations and other publications, consists of three stages: drafting the publications, adopting them, and finally publishing and distributing them. In the past, this process was often rather lengthy since a number of stages are involved in the process, from TC/SC level through CIML approval and finally publication by the BIML.

The major disadvantage of this process is that it does not allow us to adapt fast enough to technical progress, and also more and more domains must now be addressed by OIML publications due to changes in technology.

In the past, each round of consultation was carried out by postal mail and required at least three months to complete. E-mail has now replaced postal mail, speeding up this part of the procedure. Globally, a draft publication still requires at least three years to be developed and published from start to end, though the BIML is implementing ways of speeding up certain parts of the procedure.



4 Actions taken by the BIML to improve the global flow of information

I) Development of the information available on the web site

The Bureau has constantly increased the information content of the OIML web site, which now provides in particular:

- General information on the OIML including whom to contact at the BIML for specific inquiries,
- Names and contact details of CIML Members and Corresponding Members, including e-mail addresses and web sites,
- All OIML publications (freely downloadable), including the OIML Bulletin and Expert Reports,
- Lists of OIML Certificates (including PDF files from January 2005 onwards) and Issuing Authorities,
- Full information on Technical Committees and Subcommittees (Secretariats, composition, liaisons, projects, detailed information on the state of progress of and actions planned for technical work),
- Status of online CIML voting,
- The OIML Mutual Acceptance Arrangement (MAA),
- Information of special interest to Developing Countries,
- Liaison activities and Organizations,
- Announcement of OIML TC/SC meetings, OIML Seminars, regional or national metrology events, joint seminars organized with Liaison Organizations.

II) Development of a database for internal BIML use

In 2002 it was decided to merge all the information available at the BIML (previously often been scattered or even duplicated) into one single database in which each piece of information which is common to several records is recorded in a specific table, each table cross-referring to several other tables. Prior to 2002 there was a risk of inconsistency among records which were themselves not correctly formatted for incorporation into the OIML web site. This huge project is now complete as far as the inputting of information is concerned, and the database now contains a large amount of data.

From the beginning, this database was designed to interact with the OIML web site, via scripts which display the contents requested by users of the site directly from the database. Today, changes made to the database are displayed live in real time on the site - this is discussed in more detail below.

The internal database has grown progressively from basic information such as Member contact details to now include all the information listed in 4 i) above. A future step will be to include the votes and comments of TCs/SCs members on Committee Drafts (see 4 vi).

Setting up such a database has also required a reorganization of the internal flow of information in the Bureau, an ongoing process requiring special care, attention and commitment on the part of most of the BIML Staff - a challenge taken up with vigour and enthusiasm! Responsibilities have been redefined, notably concerning TCs and SCs, so that Members know exactly whom to contact for specific inquiries.

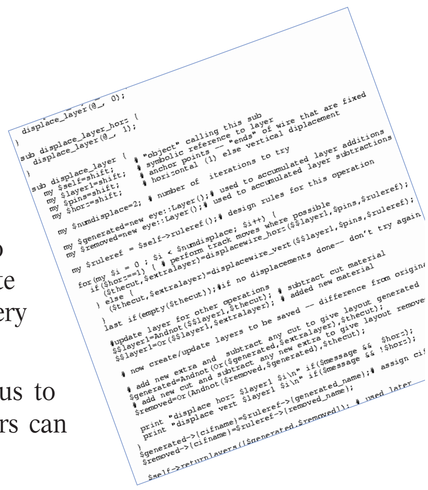
III) Introduction of dynamic information on the web site

As the database expanded, it became possible to develop “dynamic” pages on the web site to automatically post the most recently updated information. These dynamic pages were progressively developed in-house at the BIML by our Systems Engineer using Practical Extraction & Report Language (PERL) and Structured Query Language (SQL) to directly access the database tables and are specifically now used to display:

- Member contact details,
- Publications,
- OIML Certificates, Issuing Authorities, Applicants and instrument categories,
- Composition of TCs/SCs, liaisons, progress of work and planned actions,
- Status of CIML Members’ votes on draft publications.

Advanced functions are being considered and will be developed in order to take advantage of the quantity of information available in the database. The web site will progressively be equipped with advanced query facilities which will allow the database to be searched: for example sorting lists of Certificates by manufacturer, by Issuing Authority or by category. A global search engine has already been incorporated into the site.

IV) Interactivity



The developments explained above allow us to better manage the information that the Bureau always used to collect, and to make it available to Members. Whilst this is a necessary and very important step, this is only one part of the OIML’s mission. We have to develop the **exchange** of information with and among Members, and facilitate and accelerate the technical work. This means not only *collecting* and *distributing* information, but - very importantly - also collecting *feedback* from Members.

The logic behind this is that the staff resources of the Bureau do not currently allow us to significantly increase the quantity of information and feedback that BIML Staff members can collect themselves from Members. Here again the internet provides a solution:

- Members can directly update the majority of data in the database by themselves,
- Members can now vote and submit comments online on draft publications (preliminary votes and also ballots),
- Members can post a link related to metrology in their country,

and in the future the site will be developed so that:

- Regional Legal Metrology Organizations can post information related to their activities,
- Secretariats of TCs/SCs can post Committee Drafts and information,
- P and O-Members of TCs/SCs and Liaisons (P-Members) can comment and vote on Committee Drafts (see 4 vi),
- Developing Countries can express their needs, raise questions and receive answers from other countries,
- Committees on Participation Review (CPRs) can comment and vote on applications for participation in the OIML MAA.

This raises two categories of questions: technical questions concerning the facilities on the web site, and questions related to the resources and commitment of our Members. The technical questions are almost resolved.

V) Updating the database online

The very first application designed and rendered operational by the BIML was to allow Members to directly update their contact information in the database. The aim of our ongoing development is to **put the onus on Members, Issuing Authorities and TCs/SCs to update their own information**, and the project requires the BIML to supply personalized logins and passwords to the parties concerned. It should be noted that such updates consist for the moment in modifying existing data; no outside body is authorized to add a new record to the database and this activity is still handled by the BIML Secretariat Staff, who first check that the information supplied does not already exist somewhere in the database. Similarly if a request to delete a record is received, checks are made to ensure that the information should really be deleted.

The possibilities of updating the database online will continue to be developed, but this will take some time and needs to be done very carefully, step by step, as allowing external people to add records requires special precautions.

VI) Direct information, feedback and workgroups (forums)

The online database provides specific, standardized formatted data concerning which queries may be made to retrieve given information or to issue reports in a predefined format.

The OIML web site has also recently been expanded to include pilot Workgroups, or discussion forums, in which a manager or managers may upload documents, and members of the Workgroup may send comments and upload contributions in the form of files. This module is also being developed in-house using two specific software programs called Zope[1] and Plone[2] and the forums may be accessed at http://workgroups.oiml.org

Using a standard web browser, the manager allocates access rights to the members of his or her group and may make any pages or files public (accessible to anyone) or private, i.e. restricted to (certain) members of the Workgroup. Once they have logged in with their personal login and password, group members may download these files, add comments in the discussion threads, or upload files to the various available folders as defined by the manager.

Such a system allows information to be directly uploaded online from a member to a group of members, it allows online discussions in a group without convening a meeting, and it allows votes and comments to be collected in the same way as for Committee Drafts, but in real time. This does not dispense with the need for convening meetings, but can be used as a complement to meetings in order to accelerate the work, to better prepare the discussions for the meeting and to focus these on the most crucial issues.

This system is being trialed for several groups: the first Workgroup put online was for the MAA, to allow manufacturers to comment on issues related to the MAA. The Presidential Council, TC 3/SC 5, TC 5/SC 2 and the Working Group on the Revision of the Directives for Technical Work also now have experimental Forums. In the near future, another Workgroup will be set up for Developing Country activities. In the coming years, it is envisaged that such Workgroups will be used by the majority of the active working bodies of the OIML.

5 COMMITMENT OF MEMBER STATES AND CORRESPONDING MEMBERS

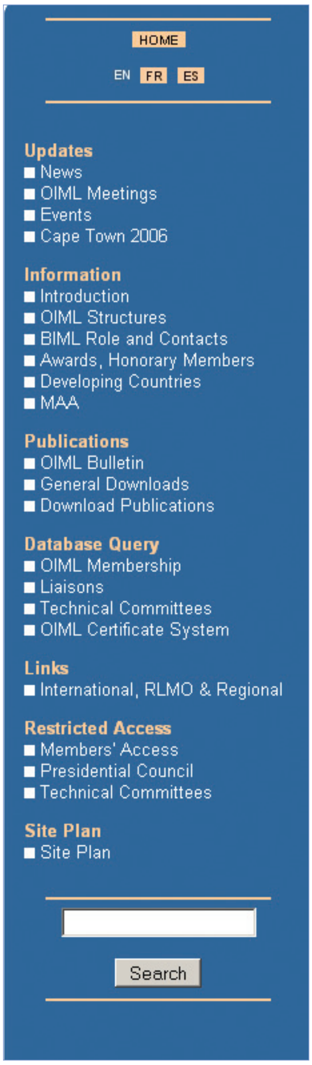
Setting up new tools on the OIML web site does not automatically ensure that information will be developed and that technical work will speed up. To use a metaphor, the BIML is building the roads, but any driver must have a road map and know the highway code, not to mention gasoline ... should we open a Forum for fuel dispensers??

During the past years, we have seen that national legal metrology resources have often been decreasing, and that national systems have been evolving to face the new conditions of an opening market.

In Europe, a new Directive on Measuring Instruments (MID) is replacing the existing national regulations and all legal metrology services have to transcribe it and put it into force. All this requires a great deal of work in each country and the consequence is that additional information is required now to demonstrate conformity between the MID requirements and OIML requirements. It is therefore essential that OIML work continues to be given high priority by all our Members.

OIML work benefits all Members and has the same goals as the policies which are developed at each national level: to answer the needs of consumers, while still ensuring the openness of the market and allowing industry to benefit from the elimination of technical barriers to trade (this is the reason why the OIML was accepted as an Observer in the WTO Technical Barriers to Trade - TBT - Committee).

Those responsible for national legal metrology services should continue to integrate OIML work in their policy and never downgrade its importance. One could say that at worldwide level, one day of work on OIML issues can pay back as much as ten days of work on national issues, and the benefit will be the same for all countries. Allocating resources to OIML work therefore saves resources otherwise dedicated to national work.



6 CONCLUSION

In this article we have shown what the BIML is doing to improve communication, maximise its resources, notably internet-related, as we feel this is the way forward to considerably improve the flow of information to and among OIML Member States and Corresponding Members and other national, international and regional bodies.

With the use of the internet, new organizational schemes arise. Where previously the organization of information was centralized and fully driven by the Bureau, the new organization is largely decentralized, information being posted online by the person it originated from but ending up in a common place, accessible to everyone.

For the BIML's e-strategy to succeed, we encourage Members to continue to actively use the new tools at their disposal in the way that many have already started doing.

And, as ever, we always welcome feedback from Members and other users of the OIML web site - your comments will help us to continually improve our services and achieve our objective of improving the flow of metrological information worldwide.

WWW.OIML.ORG

[1] http://www.zope.org [2] http://www.plone.org

13th International Metrology Congress

-

Lille, France

June 2007

www.cfmetrologie.com

The International Metrology Congress is organized every two years by the French College for Metrology.

The aim of the Congress is to:

- Bring forth and to highlight new techniques of measurement and calibration that have been or are being developed.
- Present the evolution of metrology, and its implications in industry, research, the environment, safety, the economy and quality at national and international levels.

The Congress gathers together over 800 people from 45 different countries and from every circle concerned with measurement:

- Metrologists from companies,
- Metrologists from calibration, analysis and testing laboratories,
- Manufacturers and users of metrological equipment,
- Quality managers,
- Teachers and researchers.

The OIML is pleased to welcome the following new

CIML Member

- **Germany: Prof. Roman Schwartz**

OIML Meetings

21 November 2006 - London, UK

TC 8/SC 5 Water meters

8–9 March 2007 - Vienna, Austria (To be confirmed)

TC 8/SC 1 Static volume and mass measurement

www.oiml.org

Stay informed

Committee Drafts

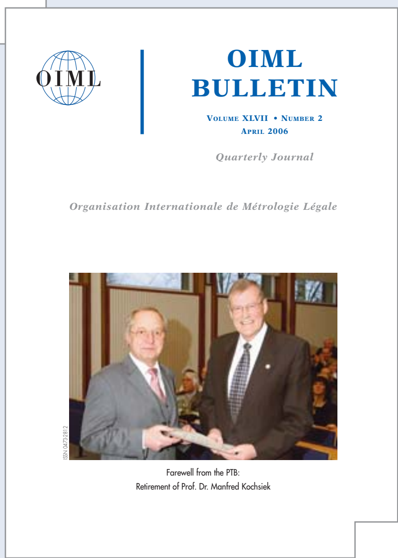
Received by the BIML, 2006.06 – 2006.07

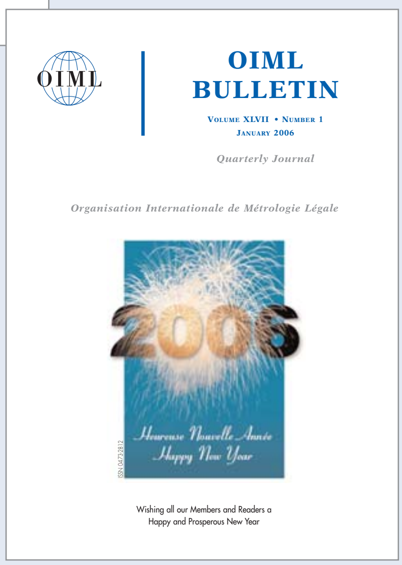
Revision R 106: Automatic rail weighbridges. Parts 1 & 2	E	2 CD	TC 9/SC 2	UK
Revision R 21: Taximeter systems	E	5 CD	TC 7/SC 4	UK
Guide for the application of ISO/IEC 17025 to assessment of Testing Laboratories involved in legal metrology testing	E	2 CD	TC 3/SC 5	US + BIML
Guidelines for the application of ISO/IEC Guide 65 in the field of legal metrology	E	1 CD	TC 3/SC 5	US + BIML
Revision R 107: Discontinuous totalizing automatic weighing instruments (totalizing hopper weighers). Parts 1 & 2	E	2 CD	TC 9/SC 2	UK

Call for papers

OIML Members
RLMOs
Liaison Institutions
Manufacturers' Associations
Consumers' & Users' Groups, etc.

- Technical articles on legal metrology related subjects
- Features on metrology in your country
- Accounts of Seminars, Meetings, Conferences
- Announcements of forthcoming events, etc.





The **OIML Bulletin** is a forum for the publication of technical papers and diverse articles addressing metrological advances in trade, health, the environment and safety - fields in which the credibility of measurement remains a challenging priority. The Editors of the Bulletin encourage the submission of articles covering topics such as national, regional and international activities in legal metrology and related fields, evaluation procedures, accreditation and certification, and measuring techniques and instrumentation. Authors are requested to submit:

- a titled, typed manuscript in Word or WordPerfect either on disk or (preferably) by e-mail;
- the paper originals of any relevant photos, illustrations, diagrams, etc.;
- a photograph of the author(s) suitable for publication together with full contact details: name, position, institution, address, telephone, fax and e-mail.

Note: Electronic images should be minimum 150 dpi, preferably 300 dpi.

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