CERATIZIT in the automotive industry

Fascination

Challenge

Aluminum wheel machining

- OvalFlex optimization
- Projects with machine manufacturer
- Successful projects

Aluminium wheel machining
OvalFlex optimization

Aluminium wheel machining
OvalFlex optimization – X32 with ribbing

- Better protection against pulling out
- Higher tool life (tool holder)
- Higher tool life (insert)
- Higher process reliability
- Defined deformation of tip seat
- Improved efficiency

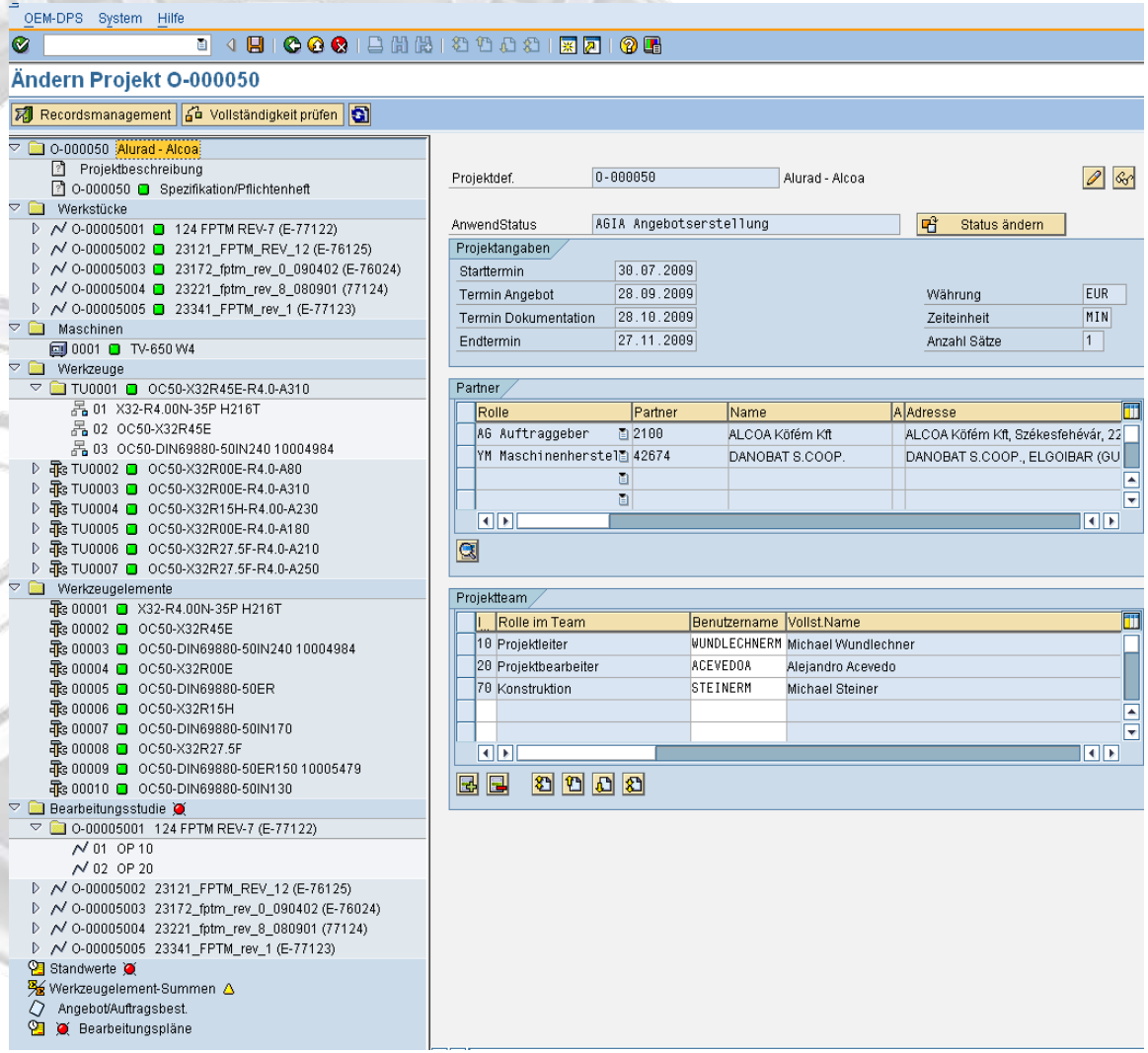
Aluminium wheel machining
OvalFlex optimization – small HubStar

- OC50-HUB56R15K for Ø 56 mm
- Wider wheels range
- Same indexable insert applicable
- Increasing of profitability over time saving

Aluminium wheel machining
Projects with machine manufacturer

Aluminium wheel machining
New SAP – software for OEM projects

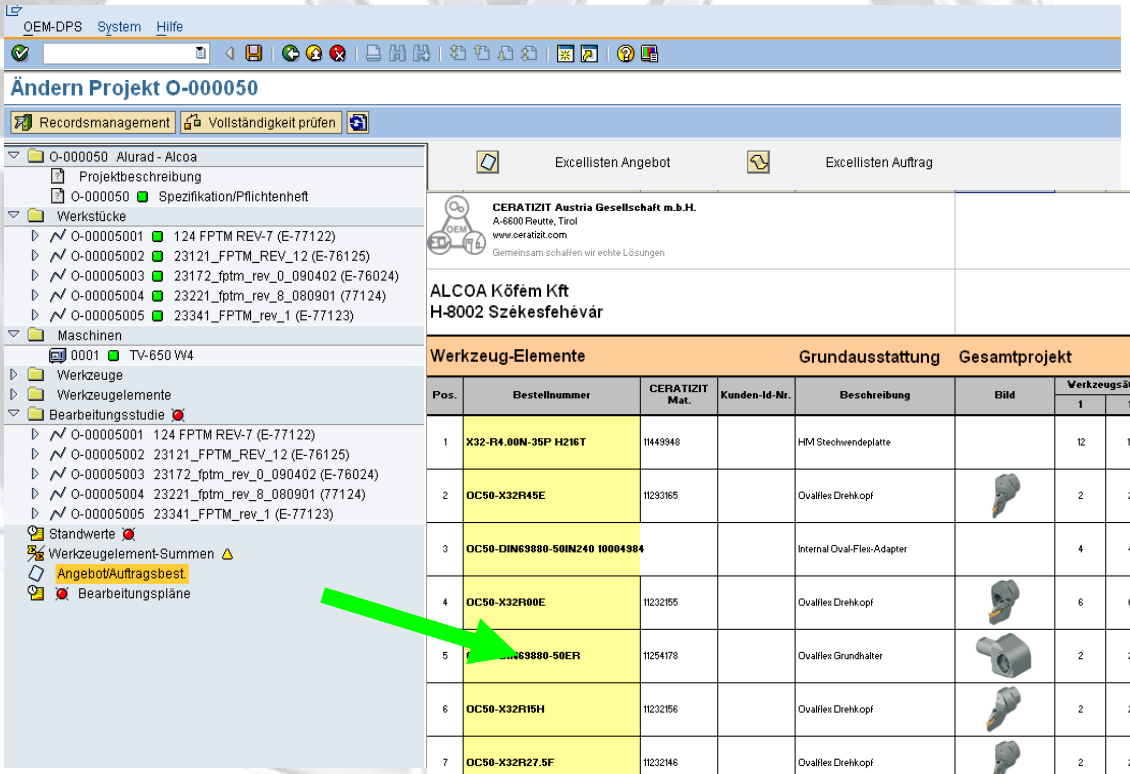
- Project
- Work piece
- Machines
- Tooling
- Processing
- Quotation
- Confirmation of order
- Delivery note
- Archive



Aluminium wheel machining
New SAP – software for OEM projects

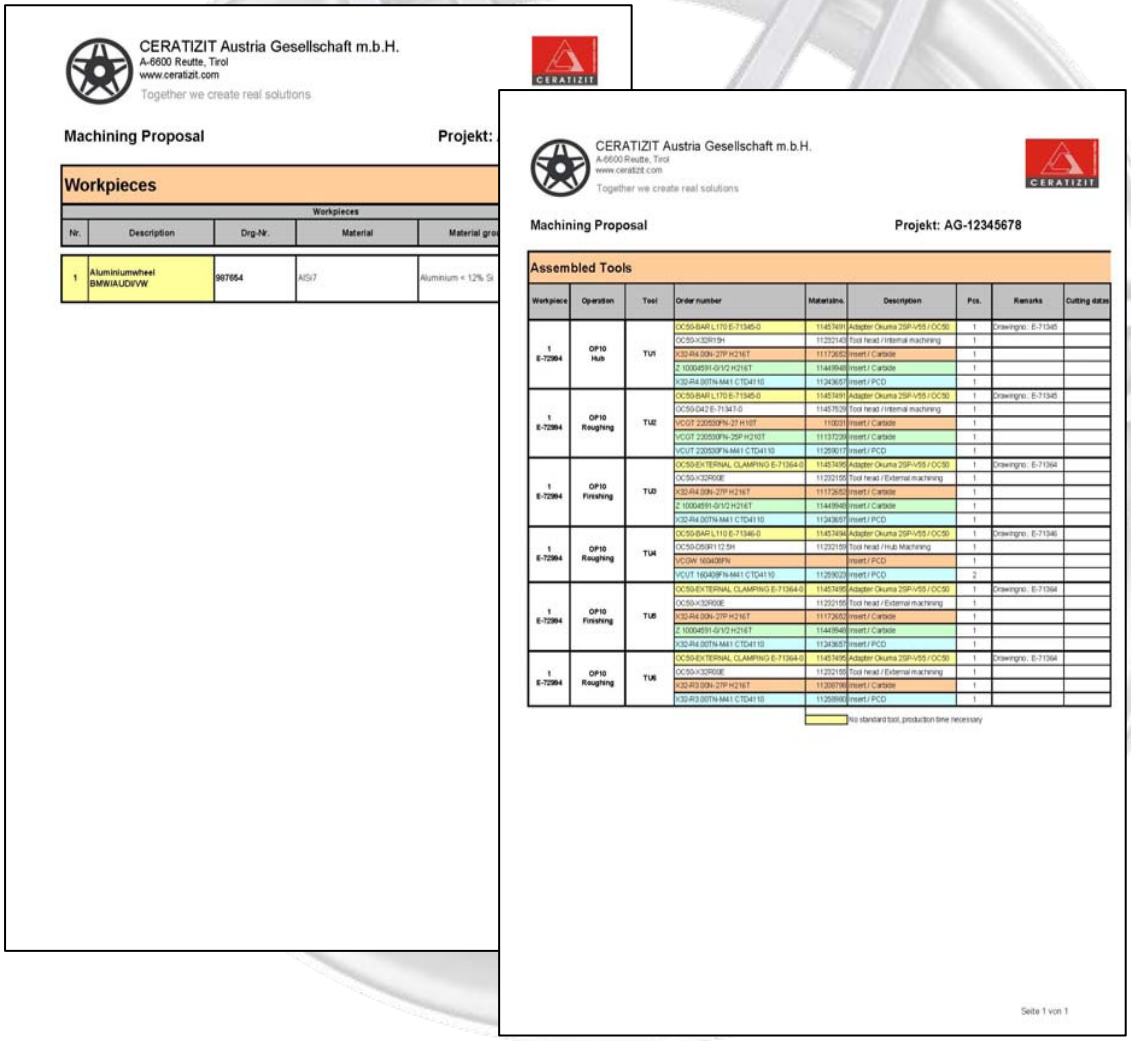
Quotation:

- Basic equipment
- Tool consumption



Pos.	Bestellnummer	CERATIZIT Mat.	Kunden-Id-Nr.	Beschreibung	Bild	Werkzeugsätze 1	Werkzeugsätze 1	Verwendet in Werkzeug
1	X32-R4.00N-35P H216T	11449948		HM Stechwendeplatte		12	12	[TU0001] [TU0002] [TU0003] [TU0004] [TU0005] [TU0006] [TU0007]
2	OC50-X32R45E	11293165		Ovalflex Drehkopf		2	2	[TU0001]
3	OC50-DIN69880-50IN240 10004984			Internal Oval-Flex-Adapter		4	4	[TU0001] [TU0003]
4	OC50-X32R00E	11232155		Ovalflex Drehkopf		6	6	[TU0002] [TU0003] [TU0005]
5	[illegible]69880-50ER	11254178		Ovalflex Grundhalter		2	2	[TU0002]
6	OC50-X32R15H	11232156		Ovalflex Drehkopf		2	2	[TU0004]
7	OC50-X32R27.5F	11232146		Ovalflex Drehkopf		2	2	[TU0006] [TU0007]
8	OC50-DIN69880-50ER150 10005479			External Oval-Flex-Adapter		2	2	[TU0005]
9	OC50-DIN69880-50INI30	11254175		Ovalflex Grundhalter		4	4	[TU0004] [TU0006]

Aluminium wheel machining
Workpiece- and Tool description



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A-6600 Reutte, Tirol
www.ceratizit.com
Together we create real solutions

Machining Proposal **Projekt:**

Workpieces

Workpieces				
Nr.	Description	Drg-Nr.	Material	Material grp
1	Aluminiumwheel BMW/AUDI/VW	987654	AlSi7	Aluminium < 12% Si

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Machining Proposal **Projekt: AG-12345678**

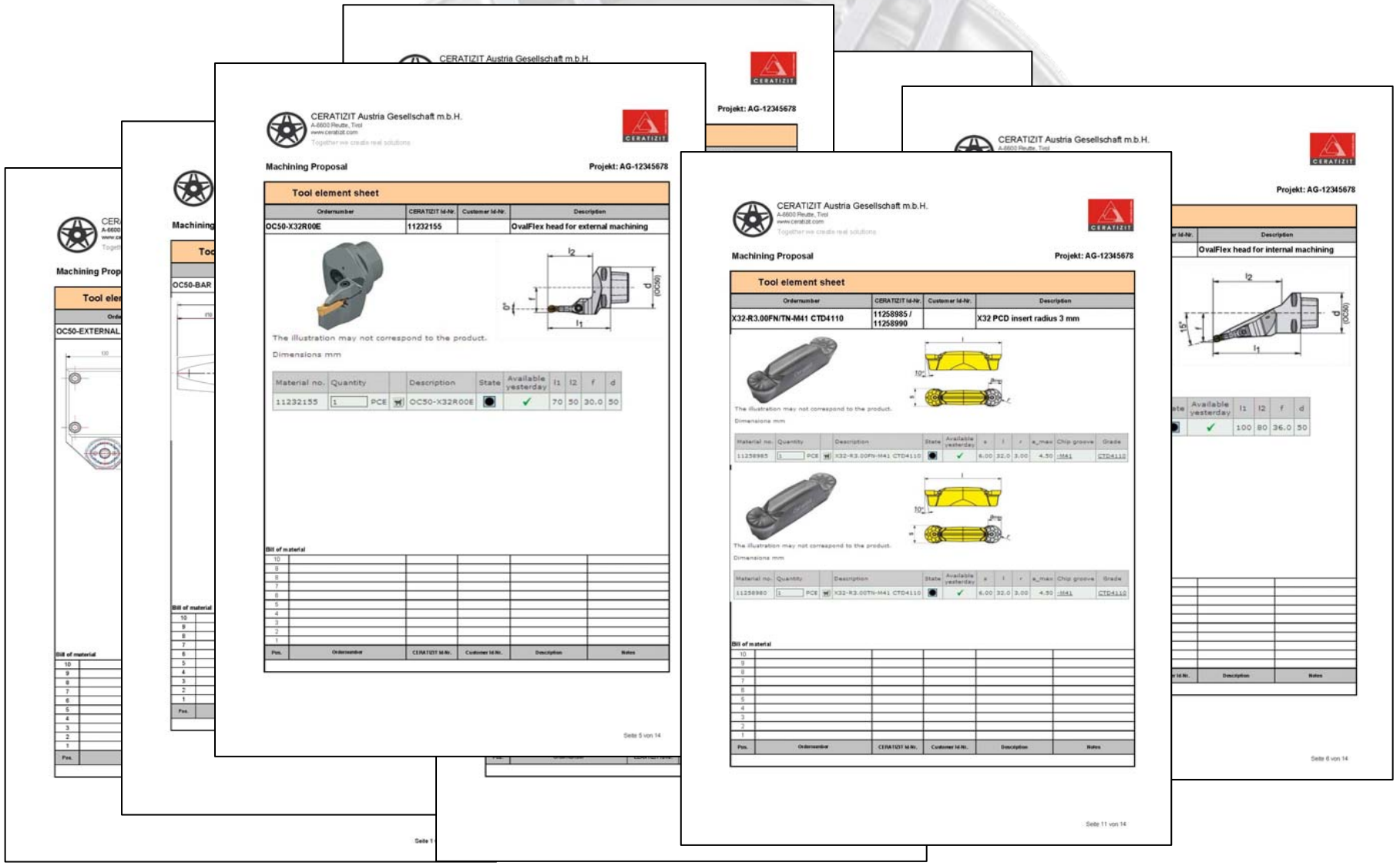
Assembled Tools

Workpiece	Operation	Tool	Order number	Materialno.	Description	Pcs.	Remarks	Cutting data
1 E-72984	OP10 Hub	TU1	OC50-BAR L170 E-71345-0	11457491	Adapter Okuma 25P-V55 / OC50	1	Drawingno.: E-71345	
			OC50-X32R12H	11232145	Tool head / Internal machining	1		
			X32-R4.00N-2TP H216T	11172652	Insert / Carbide	1		
			Z 10004591-0/1/2 H216T	11449948	Insert / Carbide	1		
			X32-R4.00TN-M41 CTD4110	11243657	Insert / PCD	1		
1 E-72984	OP10 Roughing	TU2	OC50-BAR L170 E-71345-0	11457491	Adapter Okuma 25P-V55 / OC50	1	Drawingno.: E-71345	
			OC50-D42 E-71347-0	11457529	Tool head / Internal machining	1		
			VCGT 220530FN-27 H10T	110031	Insert / Carbide	1		
			VCGT 220530FN-25P H210T	11137239	Insert / Carbide	1		
			VCUT 220530FN-M41 CTD4110	11259017	Insert / PCD	1		
1 E-72984	OP10 Finishing	TU3	OC50-EXTERNAL CLAMPING E-71364-0	11457495	Adapter Okuma 25P-V55 / OC50	1	Drawingno.: E-71364	
			OC50-X32R08E	11232155	Tool head / External machining	1		
			X32-R4.00N-2TP H216T	11172652	Insert / Carbide	1		
			Z 10004591-0/1/2 H216T	11449948	Insert / Carbide	1		
			X32-R4.00TN-M41 CTD4110	11243657	Insert / PCD	1		
1 E-72984	OP10 Roughing	TU4	OC50-BAR L110 E-71346-0	11457496	Adapter Okuma 25P-V55 / OC50	1	Drawingno.: E-71346	
			OC50-D50R1 12.5H	11232159	Tool head / Hub Machining	1		
			VCGW 160408FN		Insert / PCD	1		
			VCUT 160408FN-M41 CTD4110	11259022	Insert / PCD	2		
1 E-72984	OP10 Finishing	TU5	OC50-EXTERNAL CLAMPING E-71364-0	11457495	Adapter Okuma 25P-V55 / OC50	1	Drawingno.: E-71364	
			OC50-X32R08E	11232155	Tool head / External machining	1		
			X32-R4.00N-2TP H216T	11172652	Insert / Carbide	1		
			Z 10004591-0/1/2 H216T	11449948	Insert / Carbide	1		
			X32-R4.00TN-M41 CTD4110	11243657	Insert / PCD	1		
1 E-72984	OP10 Roughing	TU6	OC50-EXTERNAL CLAMPING E-71364-0	11457495	Adapter Okuma 25P-V55 / OC50	1	Drawingno.: E-71364	
			OC50-X32R08E	11232155	Tool head / External machining	1		
			X32-R3.00N-2TP H216T	11200799	Insert / Carbide	1		
			X32-R3.00TN-M41 CTD4110	11258983	Insert / PCD	1		

No standard tool, production time necessary

Seite 1 von 1

Aluminium wheel machining
Tool element sheets



Aluminium wheel machining
Time calculation with saving for the customer

Machining study / current situation — 1. Set up — Machine 1

Operation			Tool			Dimensions		Cutting data					Time calculation		
Nr.	Type	Description	Nr.	Place	Spindle	D [mm]	L [mm]	v_c [m/min]	n [min^{-1}]	f [mm/U]	$a_{p\,max}$ [mm]	i	t_c [min]	t_n [min]	t_g [min]
1	Down time	Change of part			1										
2	Turning	Internal profile 1	TU1		1	402	512	722-2267	2300	0,436	2,5	1	0,11	0,016	
3	Turning	Internal profile 2	TU2		1	65	150	3200	2000	0,39-0,43	6,3	1-3	0,89	0,016	
4	Turning	External profile	TU3		1	460	190	3600	2400	0,20	4,4	1	0,40	0,016	
															1,448

Machining study / current situation — 2. Set up — Machine 1

Operation			Tool			Dimensions		Cutting data					Time calculation		
Nr.	Type	Description	Nr.	Place	Spindle	D [mm]	L [mm]	v_c [m/min]	n [min^{-1}]	f [mm/U]	$a_{p\,max}$ [mm]	i	t_c [min]	t_n [min]	t_g [min]
1	Down time	Change of part			1										
2	Turning	Hub profile	TU4		1	65	80	510	2500	0,30	1,5	1	0,15	0,016	
3	Turning	External profile / roughing	TU5		1	460	520	3500	2315	0,40	2,8	6	0,53	0,016	
4	Turning	External profile / finishing	TU6		1	460	280	3928	2400	0,4-0,75	0,75	1	0,28	0,016	
															1,008

Machining study / optimized proposal — 1. Set up — Machine 1

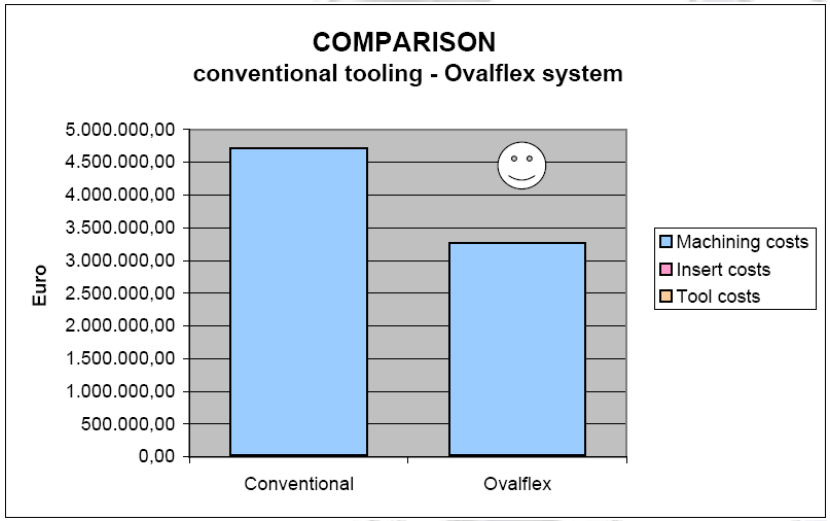
Operation			Tool			Dimensions		Cutting data					Time calculation		
Nr.	Type	Description	Nr.	Place	Spindle	D [mm]	L [mm]	v_c [m/min]	n [min^{-1}]	f [mm/U]	$a_{p\,max}$ [mm]	i	t_c [min]	t_n [min]	t_g [min]
1	Down time	Change of part			1										
2	Turning	Internal profile + location face	TU1		1	402	512	2778	2000	0,60	2,5-4,0	1-2	0,43	0,016	
3	Turning	Hub profile	TU2		1	65	150	490	2400	0,50	4,00	3	0,13	0,016	
4	Turning	External profile	TU3		1	460	190	3600	2400	0,20	4,4	1	0,40	0,016	
															1,008

Machining study / optimized proposal — 2. Set up — Machine 1

Operation			Tool			Dimensions		Cutting data					Time calculation		
Nr.	Type	Description	Nr.	Place	Spindle	D [mm]	L [mm]	v_c [m/min]	n [min^{-1}]	f [mm/U]	$a_{p\,max}$ [mm]	i	t_c [min]	t_n [min]	t_g [min]
1	Down time	Change of part													
2	Turning	Hub profile	TU4		1	65	80	510	2500	0,30	1,5	1	0,15	0,016	
3	Turning	External profile / roughing	TU5		1	460	520	2890	2000	0,55	2,8	6	0,47	0,016	
4	Turning	External profile / finishing	TU6		1	460	280	3928	2400	0,4-0,75	0,75	1	0,28	0,016	
															0,948

Time saving with optimized proposal	20,36	%

Aluminium wheel machining
Calculation of profitability



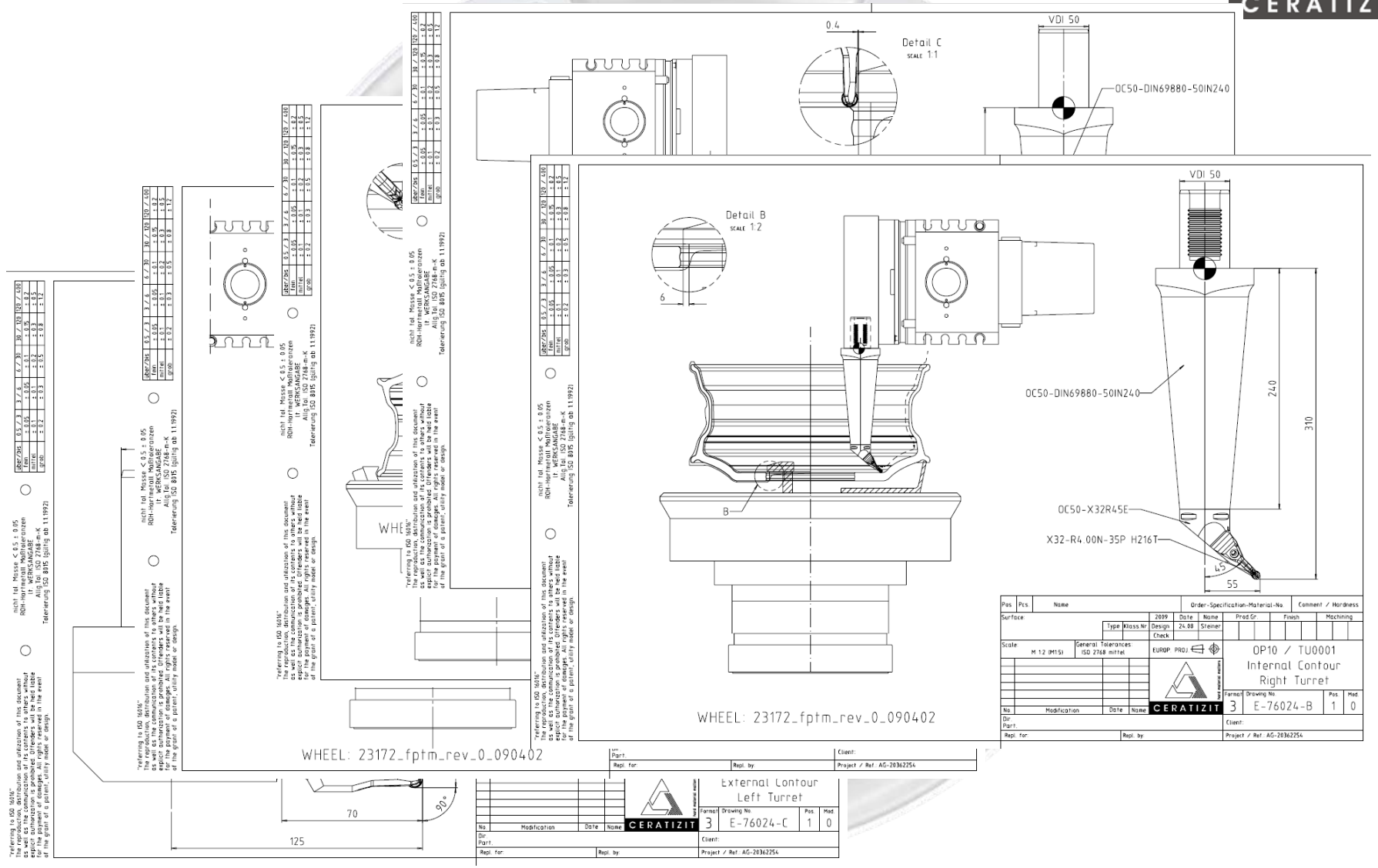
Specification of cost

Batch size 1.000.000 wheels

Tool System	Conventional		Ovalflex	
Tools				
	Pieces	Euro/piece	Pieces	Euro/piece
Nr.of basic bodys per batch size	1	300,00	1	300,00
Nr.of holders / heads per batch size	5	200,00	4	380,00
Lifetime of tip seat per tool	200		200	
Estimated Tool cost / batch size	**1.300,00 Euro**		**1.820,00 Euro**	
Inserts	X32R4.00N		X32R4.00N	
	Pieces	Euro/piece	Pieces	Euro/piece
Nr. of wheels per cutting edge	500		700	
Nr. of cutting edges per insert	1		1	
Nr. of inserts per batch size	2.000	10,00	1.429	10,00
Estimated inserts cost / batch size	**20.000,00 Euro**		**14.290,00 Euro**	
Machining data's				
Feed [f]	0,45 mm/rev.		0,65 mm/rev.	
Revolutions [n]	2200 /min		2200 /min	
Cutting length [mm]	1550 mm/piece		1550 mm/piece	
Number of passes	1		1	
Machine costs	180 Euro/h		180 Euro/h	
Macining time	93,94 s/piece		65,03 s/piece	
Machining costs / batch size	**4.696.969,70 Euro**		**3.251.748,25 Euro**	
Costs per batch size	**4.718.269,70 Euro**		**3.267.858,25 Euro**	

Reduction of Cost with Ovalflex 30,74 %
1.450.411,45 €

Aluminium wheel machining
Project work out – example Danobat-Alcoa



Aluminium wheel machining
Listing of all projects

48
project work outs in
2 ½ years

Firma	Beschreibung	Datum
Otto-Fuchs	OC50-Bearbeitungsvorschlag	Feb 07
AAG	OC50-Bearbeitungsvorschlag	Mrz 07
Ronal	OC50-Bearbeitungsvorschlag	Mrz 07
Stahlschmidt	OC50-Bearbeitungsvorschlag	Mrz 07
Canadian Autoparts Toyo	OC50-Bearbeitungsvorschlag	Mrz 07
Hayes Lemmerz	OC50-Bearbeitungsvorschlag	Mrz 07
AAG	OC50-Bearbeitungsvorschlag	Jun 07
Speedline	OC50-Bearbeitungsvorschlag	Okt 07
Chiron	OC50-Bearbeitungsvorschlag	Nov 07
Alcoa	OC50-Bearbeitungsvorschlag	Nov 07
Alcoa	OC50-Bearbeitungsvorschlag	Nov 07
Hayes Lemmerz Brasil	OC50-Bearbeitungsvorschlag	Nov 07
Stahlschmidt&Mayworm	OC50-Bearbeitungsvorschlag	Dez 07
Stahlschmidt&Mayworm	OC50-Bearbeitungsvorschlag	Dez 07
Chiron,Solomon Alsberg	OC50-Bearbeitungsvorschlag	Feb 08
Speedline	OC50-Bearbeitungsvorschlag	Mrz 08
Hayes Lemmerz	OC50-Bearbeitungsvorschlag	Apr 08
Dicastal	OC50-Bearbeitungsvorschlag	Apr 08
Dicastal	OC50-Bearbeitungsvorschlag	Apr 08
Kronprinz	OC50-Bearbeitungsvorschlag	Mai 08
Kronprinz	OC50-Bearbeitungsvorschlag	Mai 08
Hayes Lemmerz	OC50-Bearbeitungsvorschlag	Mai 08
Hayes Lemmerz	OC50-Bearbeitungsvorschlag	Mai 08
Hayes Lemmerz	OC50-Bearbeitungsvorschlag	Mai 08
Hayes Lemmerz	OC50-Bearbeitungsvorschlag	Mai 08
Borbet	OC50-Bearbeitungsvorschlag	Mai 08
Chiron	OC50-Bearbeitungsvorschlag	Jul 08
Chiron	OC50-Bearbeitungsvorschlag	Jul 08
Enkei	OC50-Bearbeitungsvorschlag	Okt 08
Enkei	OC50-Bearbeitungsvorschlag	Okt 08
Dicastal	OC50-Bearbeitungsvorschlag	Mai 09
Borbet Hesborn	OC50-Bearbeitungsvorschlag	Jun 09
ATS Polen	OC50-Bearbeitungsvorschlag	Jul 09
ATS Polen	OC50-Bearbeitungsvorschlag	Jul 09
Alcoa Ungarn	OC50-Bearbeitungsvorschlag	Aug 09
Alcoa Ungarn	OC50-Bearbeitungsvorschlag	Aug. 09
Alcoa Ungarn	OC50-Bearbeitungsvorschlag	Aug 09
Alcoa Ungarn	OC50-Bearbeitungsvorschlag	Aug 09
Alcoa Ungarn	OC50-Bearbeitungsvorschlag	Aug 09

159 machines equipped (OEM)

Aluminium wheel machining
Customer reference list

- Ronal - worldwide
- Hayes Lemmerz - worldwide
- Borbet Group
- BBS International
- AEZ Wheels
- ATS Group
- Cromodora
- Alcoa
- Otto Fuchs
- Brock Group (Jajce Alloy Wheels / Metec ...)
- Speedline
- ENKEI Wheels

Aluminium wheel machining

Aluminum wheel customers require more and more highly competent partners for solutions

1. All the conditions established for complete machining (Products, Expertise)
2. Team with technical know-how
3. Sales representative is a member of the competence-team

CERATIZIT in the automotive industry

Fascination

Challenge