

Case studies

Case studies

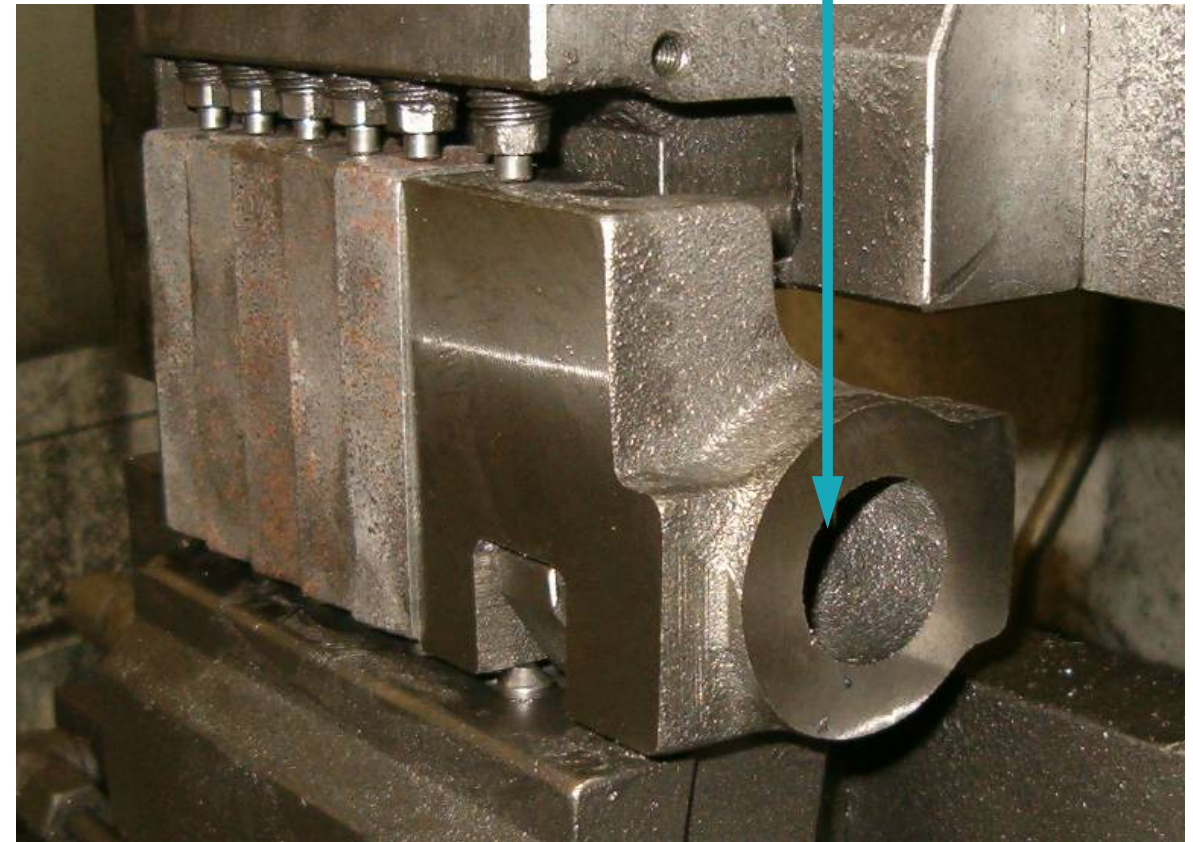
Vertical bearing GGG40 (GJS-400-15)



Machine: MC HSK63
Material: GGG 40 (EN-GJS-400-15)
Parts/Year: ca. 100'000
Pre-machining: boring
Coolant : Minimum quantity lubrication (MQL)

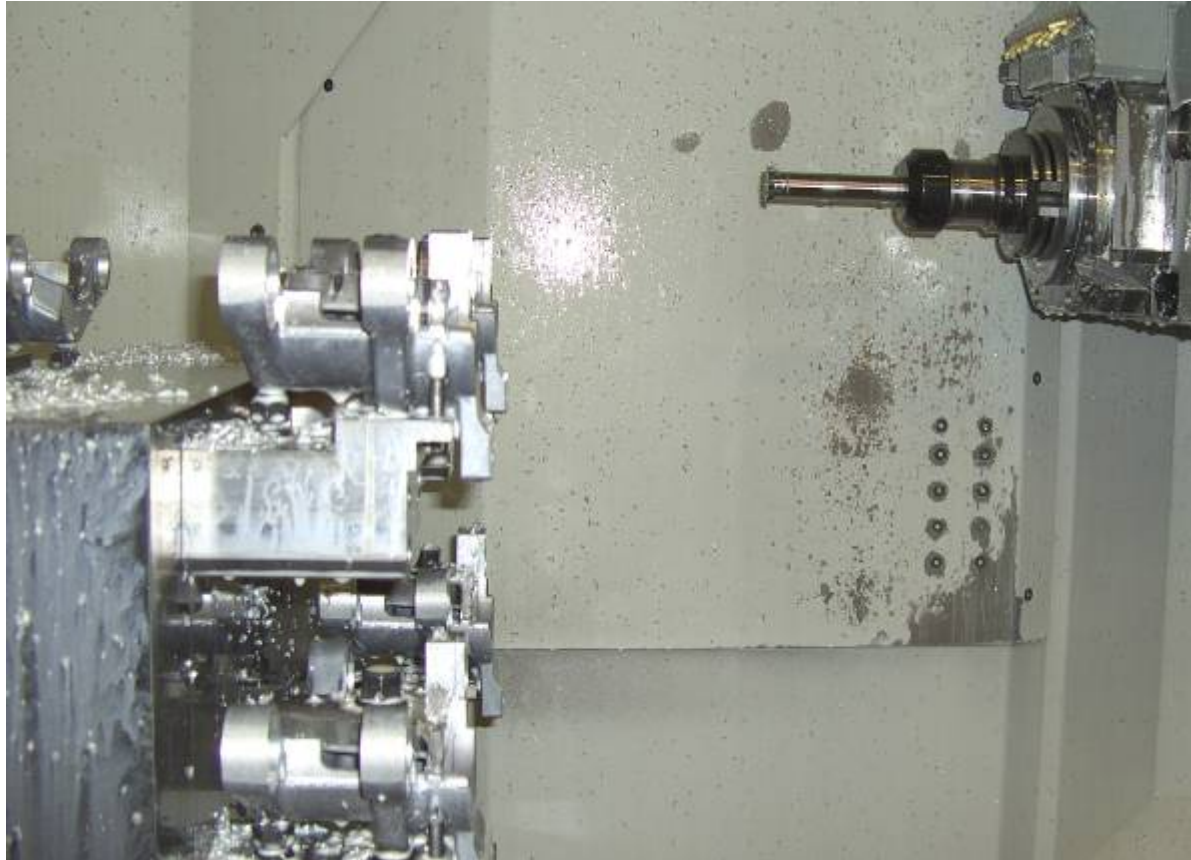
	CircoTec RX	W (RM)
v_c (m/min)	320	420
f_z (mm)	0.2	0.12
v_f (mm/min)	4941	3886
a_p (mm)	0.15	0.15
Rz (μm)	<10	<10
Results	Reliable, accurate	Bad tool life

Ø 33N5 x 142mm MQL



Case studies

Chain link MC tool magazine



2x Ø 26H6 x 21mm

GAISi12		CircoTec RX26	
v_c	(m/min)	127	
v_f	(mm/min)	1727	
a_p	(mm)	0.20	
Tool life	(min)	180	
Result		High process reliability	
Time saving		10 times faster	

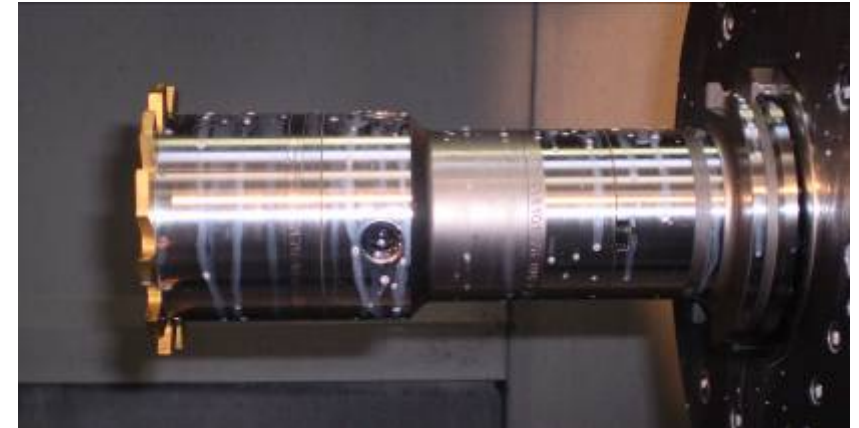
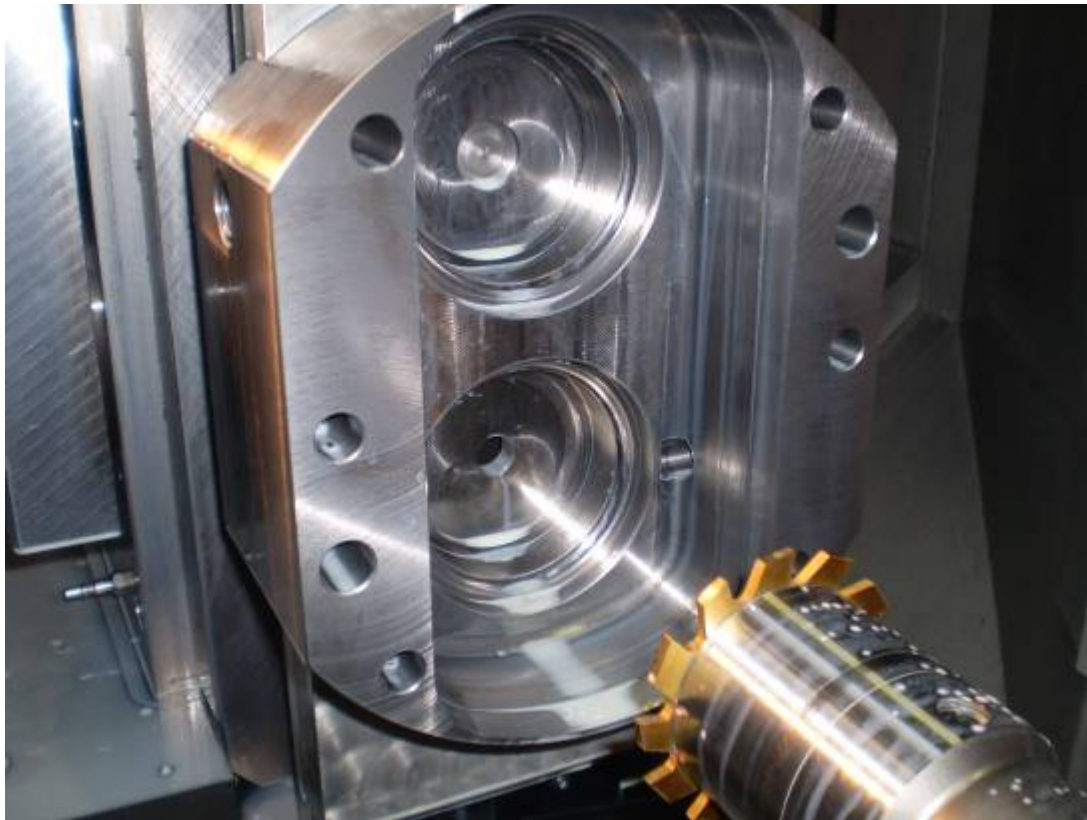
RX-geometry	A01
Cutting grade	F0510P

Case studies

Pump housing



Ø 100K7



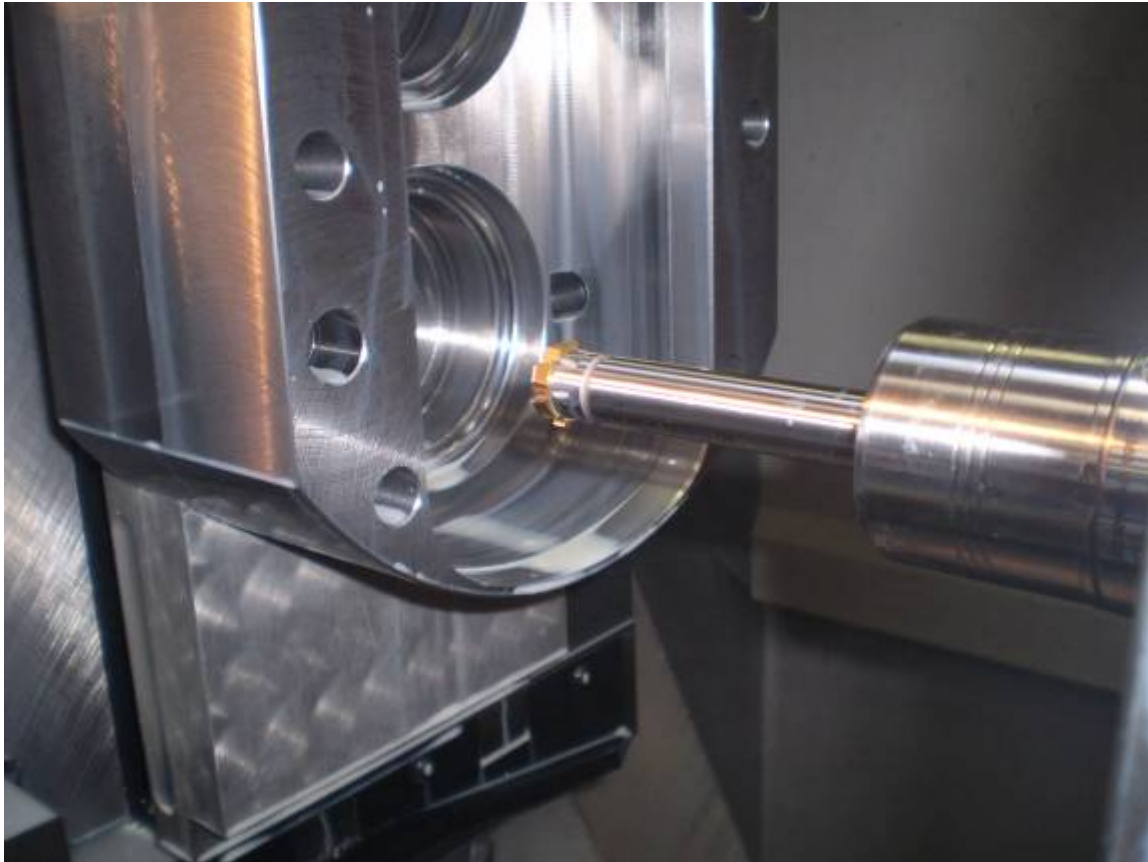
GGG50 GJS-500-7	CircoTec RX100
v_c (m/min)	207
v_f (mm/min)	768
a_p (mm)	0.20
Tool life (min)	> 1 Year
Result	High process reliability
Time saving	5 times faster

Case studies

Pump housing



Ø 20H7



RX-geometry (in both cases)	A01
Cutting grade	F0512R1

GGG50 GJS-500-7	CircoTec RX20
v_c (m/min)	200
v_f (mm/min)	3800
a_p (mm)	0.10
Tool life (min)	> 1 Year
Result	High process reliability

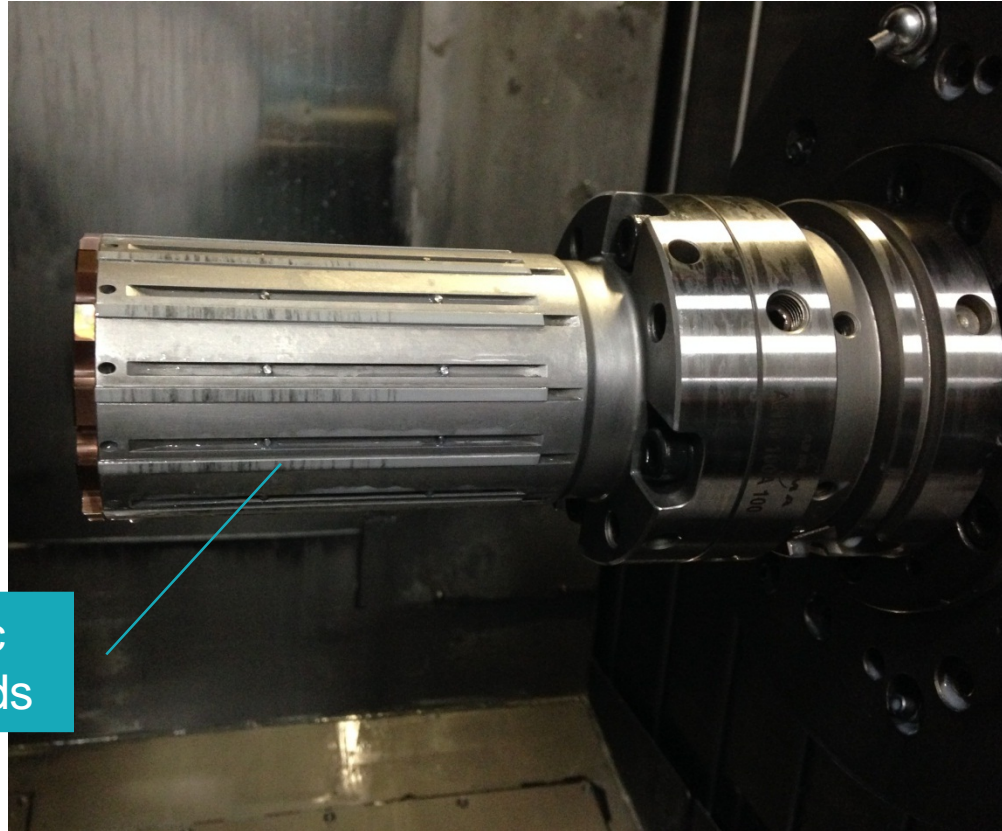
Case studies

Vacuum pump cylinder bore (Page 1/2)



Ø 68H8 x 70mm
EN-GJL-2030
0.6019

Ceramic
guide pads



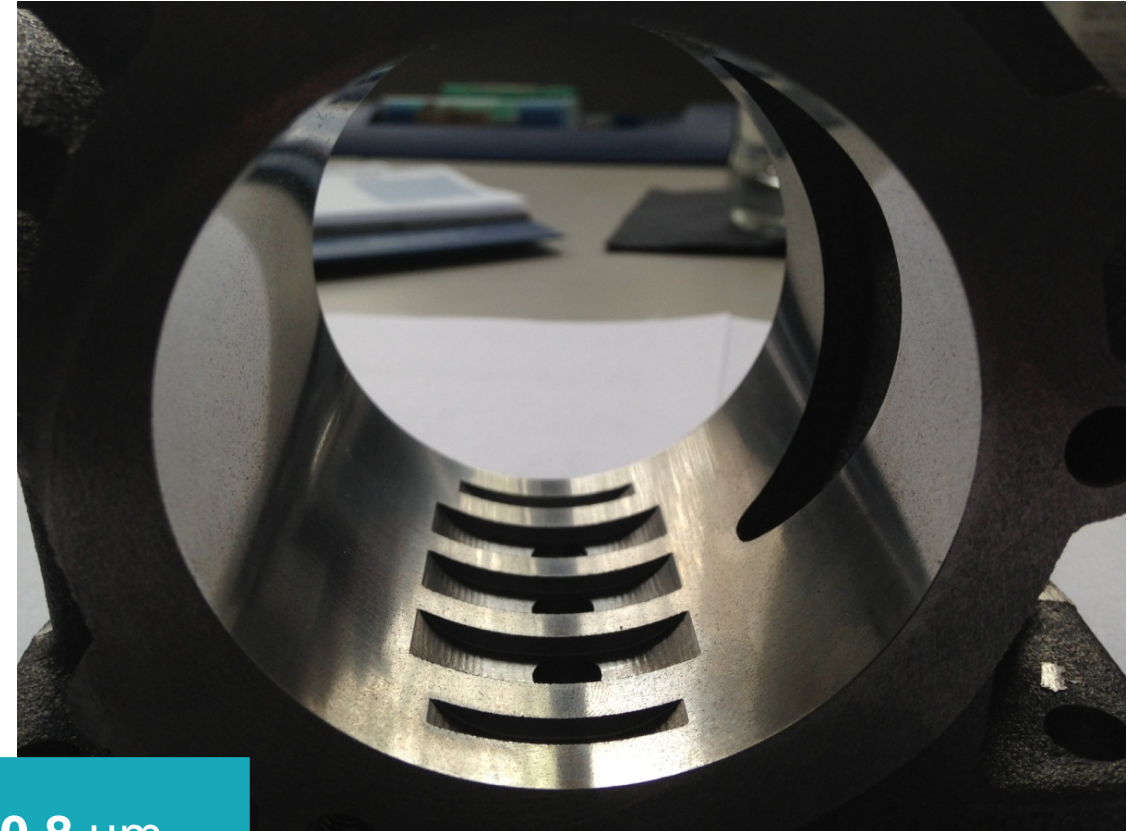
Case studies

Vacuum pump cylinder bore (Page 2/2)



Ø 68H8 x 70mm
EN-GJL-2030
0.6019

Material	EN-GJL 2030 0.6019
Insert	RXG68H8-A01 F0512R1
Coating	F0512R1
V_c (m/min)	120
n (1/min)	562
f_z (mm)	0,16
V_f (mm/min)	1079
a_p (mm)	0.09



Ra = 0.8 μ m

Case studies

Knuckle (wheel hub) (Page 1/2)



Ø 75H7 x 54mm
EN-GJS-500-7

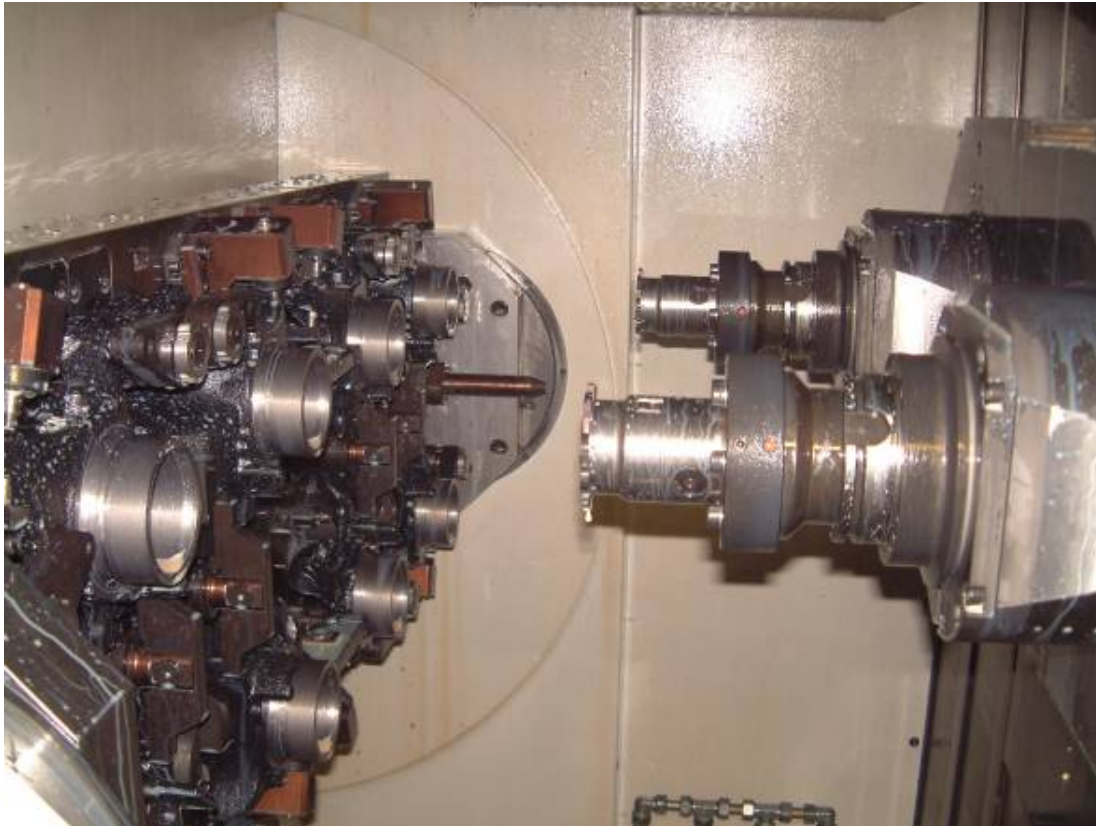


Case studies

Knuckle (wheel hub) (Page 2/2)



Ø 75H7 x 54mm
EN-GJL-500-7



EN-GJS-500-7	CircoTec RX75
v_c (m/min)	150
v_f (mm/min)	915
Rz (μm)	< 10

RX-geometry	A03
Cutting grade	F0512R1

Tool life ~540 m
Time saving 32%

Case studies

Water pump (for Trucks) (Page 1/2)



Ø 36.48 and Ø 55
EN-GJL-250



Case studies

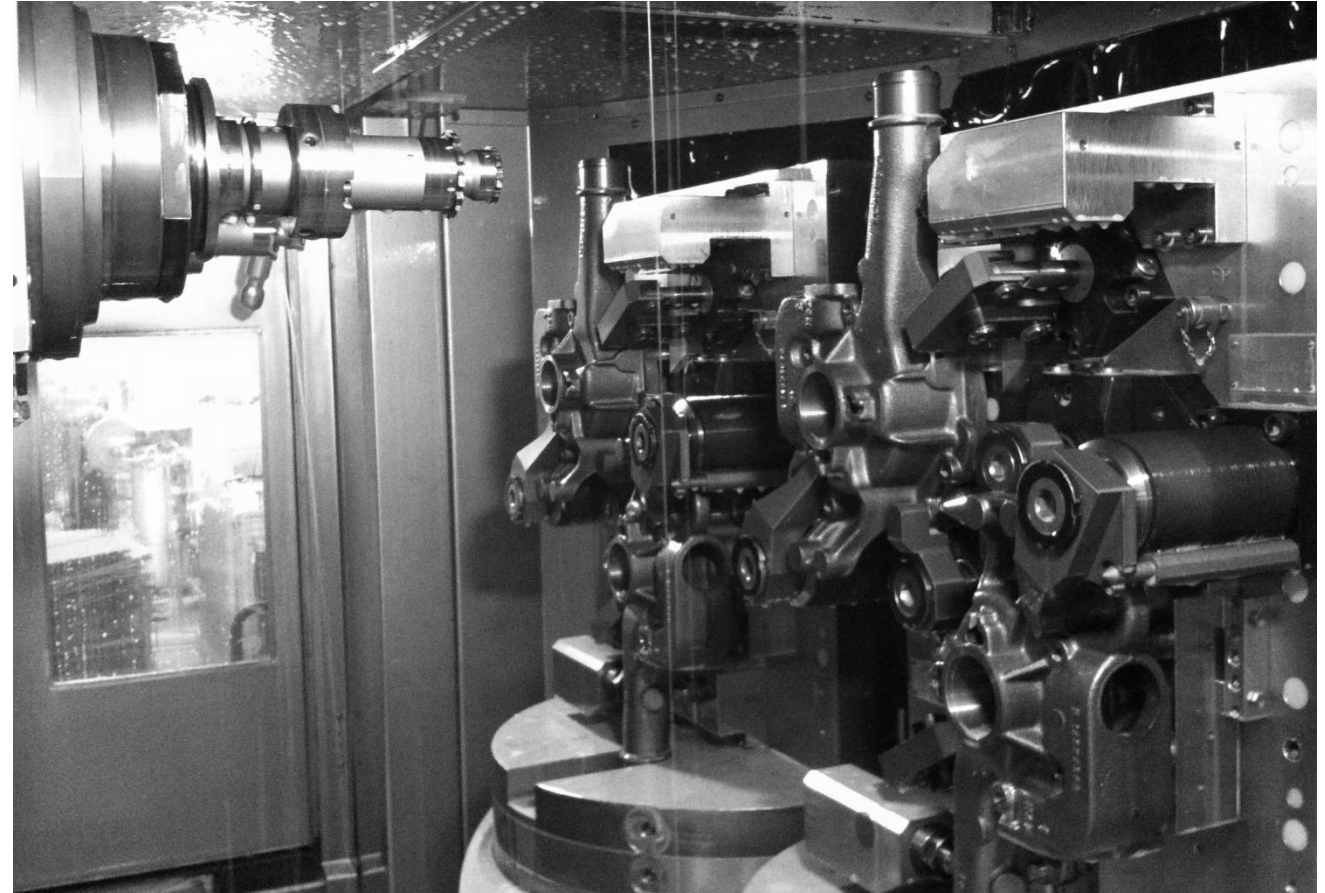
Water pump (for Trucks) (Page 2/2)



Ø 36.48 and Ø 55
EN-GJL-250

GJL-250		CircoTec RX
v_c	(m/min)	100
v_f	(mm/min)	1274
Rz	(μm)	< 10

Inserts	RXG36.48-A01 F0514R2 RXG55-G01M2 F0514R2
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Tool life 840 – 1200 parts
Time saving 75%

Case studies

Cylinderblock 2-stroke engine (Page 1/2)



Ø 47.09+/-8 x 80mm
GAISi4



Case studies

Cylinderblock 2-stroke engine (Page 2/2)



Ø 47.09+/-8 x 80mm
GAISi4

GAISi4	CircoTec RX 052
v_c (m/min)	406
f_z (mm)	0.18
v_f (mm/min)	4320
a_p (mm)	0.13
R_a (μm)	0.2

Geometry	C17
Cutting grade	F0510C
Tool life	> 10'000 parts



Advantages against PCD special tools:

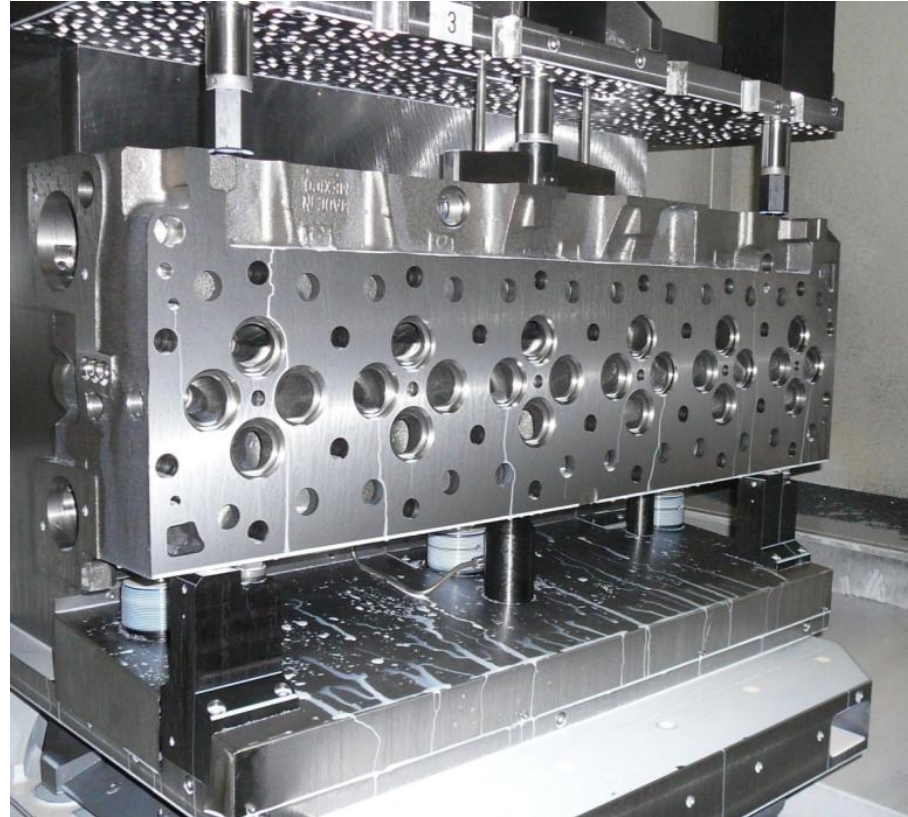
- higher feed rates
- lower tool cost (coating against PCD)
- stronger and more stable cutting edges

Case studies

Truck engine Valve bushing / ring seat (Page 1/2)



Ø 16,49 x 95 and
Ø 47,53 x 10mm
EN-GJS-400-15



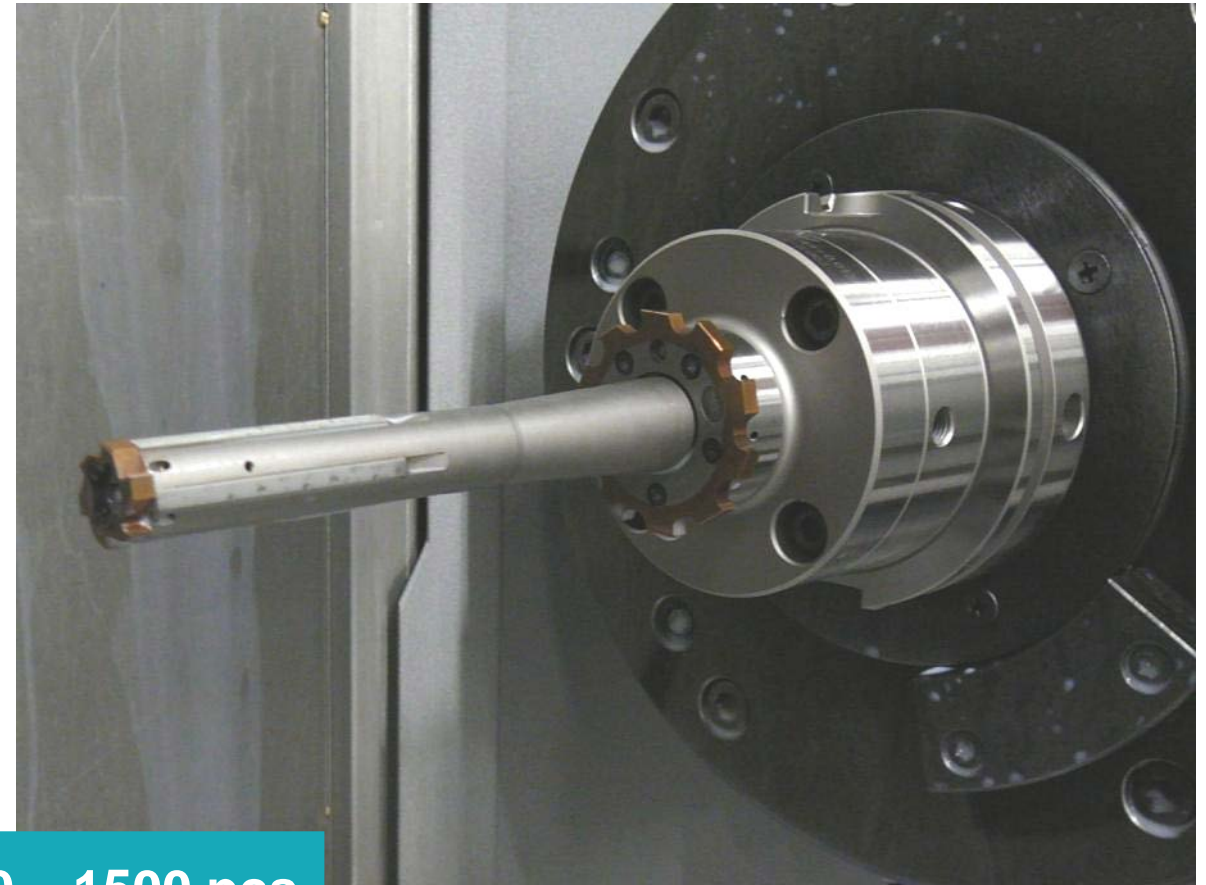
Case studies

Truck engine Valve bushing / ring seat (Page 2/2)



Ø 16,49 x 95 and
Ø 47,53 x 10mm
EN-GJS-400-15

EN-GJS-400-15		CircoTec RX 019 / 052
v_c	(m/min)	90
f_z	(mm)	0.23
v_f	(mm/min)	2400
a_p	(mm)	0.35
Geometry		S05
Cutting grade		F0508P2



Tool life 1000 – 1500 pcs

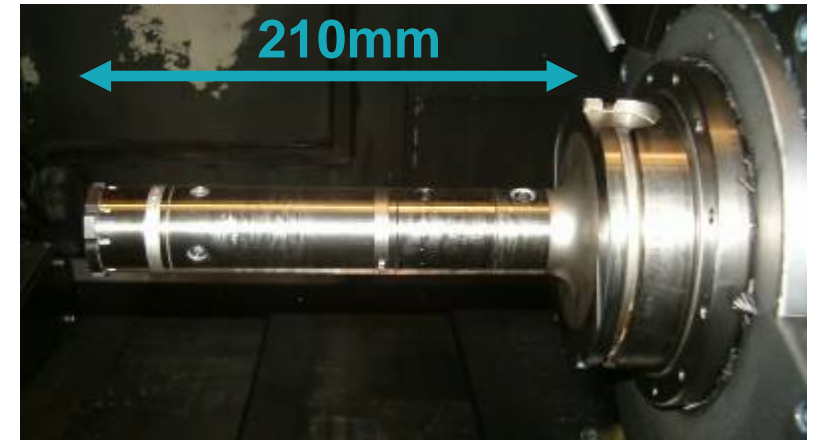
Case studies

Differential casing (Truck)



Ø 36P7 x 47mm
EN-GJS-600-3

GJS-600-3	CircoTec RX
v_c (m/min)	127
v_f (mm/min)	1727
a_p (mm)	0.20
Tool life (min)	180
Result	High process reliability
RX-geometry	A01
Coating	F0522A



Time saving
10 times faster

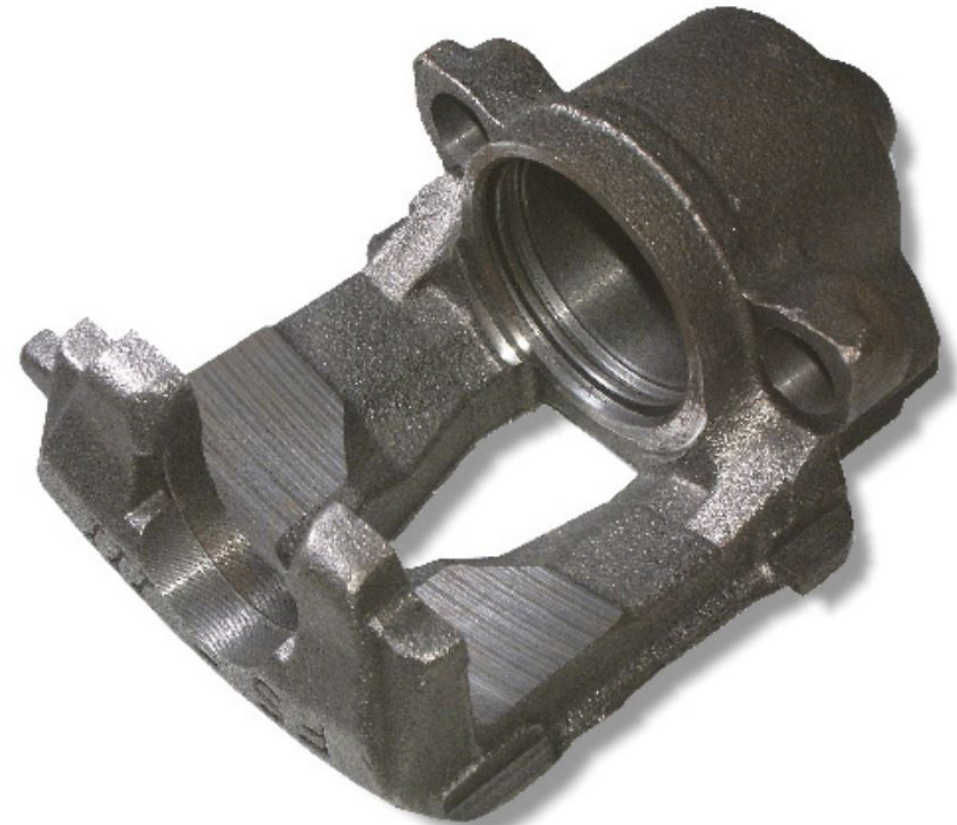
Case studies

Brake caliper (Page 1/2)



Ø 54H8 x 49mm
GGG55

GGG55	CircoTec RX
v_c (m/min)	110
f_z (mm)	0.25
v_f (mm/min)	1622
a_p (mm)	0.14
Time saving	50%
Surface R_z R_a	30 0.4-0.8
RX-geometry	A03
Insert grade	F0508P2



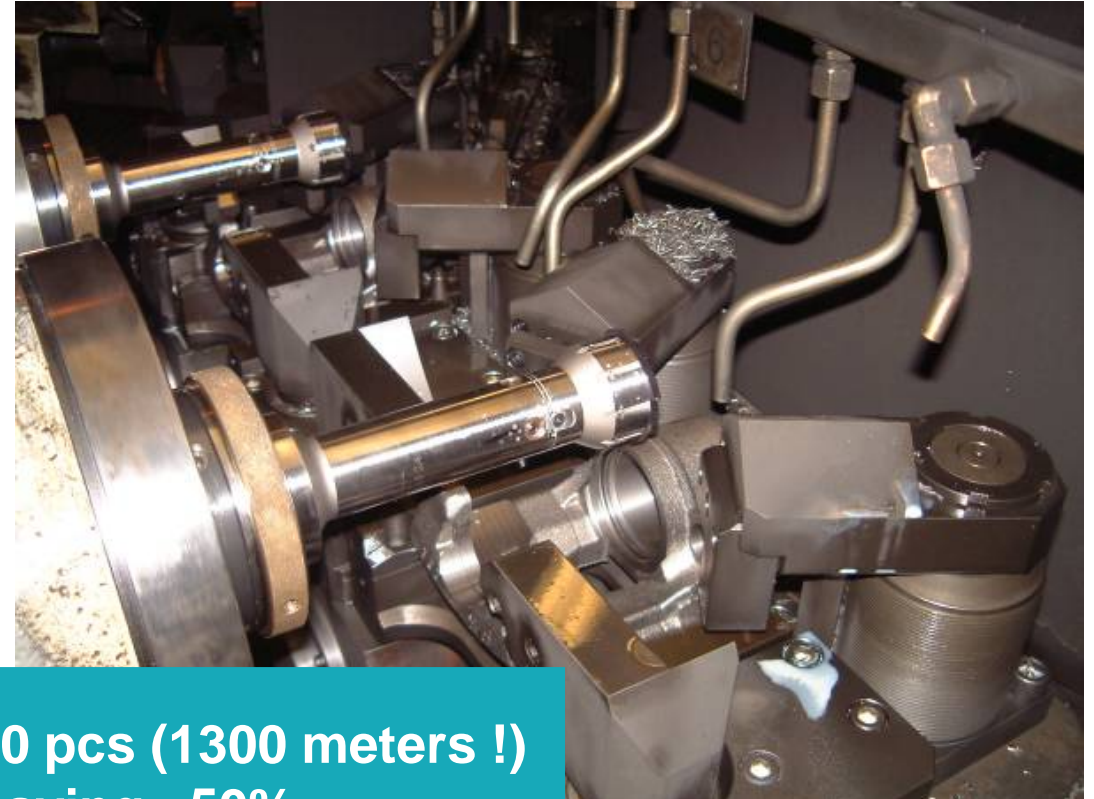
Case studies

Brake caliper (Page 2/2)



Ø 54H8 x 49mm
GGG55

GGG55	CircoTec RX
v_c (m/min)	110
f_z (mm)	0.25
v_f (mm/min)	1622
a_p (mm)	0.14
Time saving	50%
Surface R_z R_a	30 0.4-0.8
RX-geometry	A03
Insert grade	F0508P2



Tool life ~32'000 pcs (1300 meters !)
Time saving 50%
Ra 0.4 – 0.8 µm

Case studies

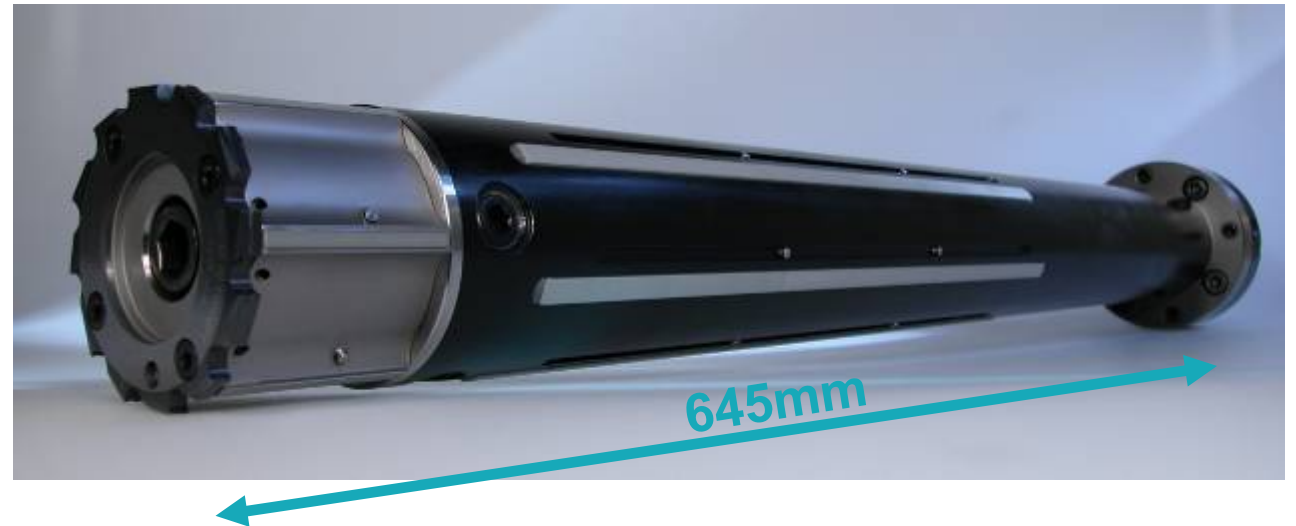
Liner bore (crank-shaft) F1-motor



6x Ø 65H6 x 26mm
EN-GJS-700-2 and AluSil17

GJS-700-2 / AluSil17	CircoTec RX81
v_c (m/min)	150
v_f (mm/min)	870
a_p (mm)	0.25
Rz (μm)	< 16
Tool life (min)	~200

RX-geometry	Special
Insert grade	F0508P1



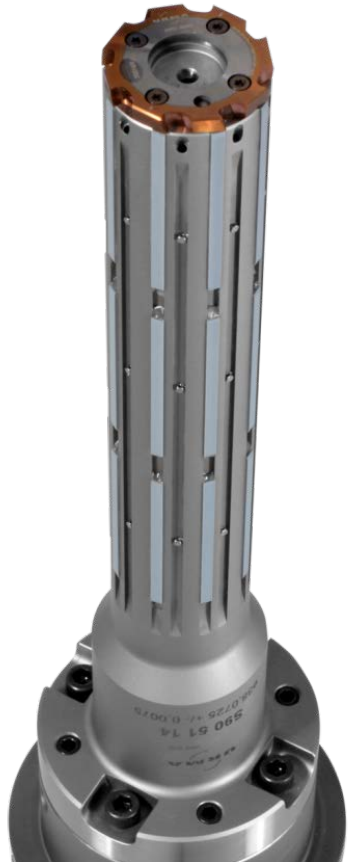
Time saving 11 times faster!

Case studies

Hydraulic directional control valve



Ø 38.07 +/- 0.007 x 90 mm
(with 5 lands)



GGG40 (QT450)	CircoTec RX
v_c (m/min)	60
v_f (mm/min)	1205
a_p (mm)	0.30
Cylindricity (μm)	<8

RX-geometry	Special
Insert grade	F0512R1

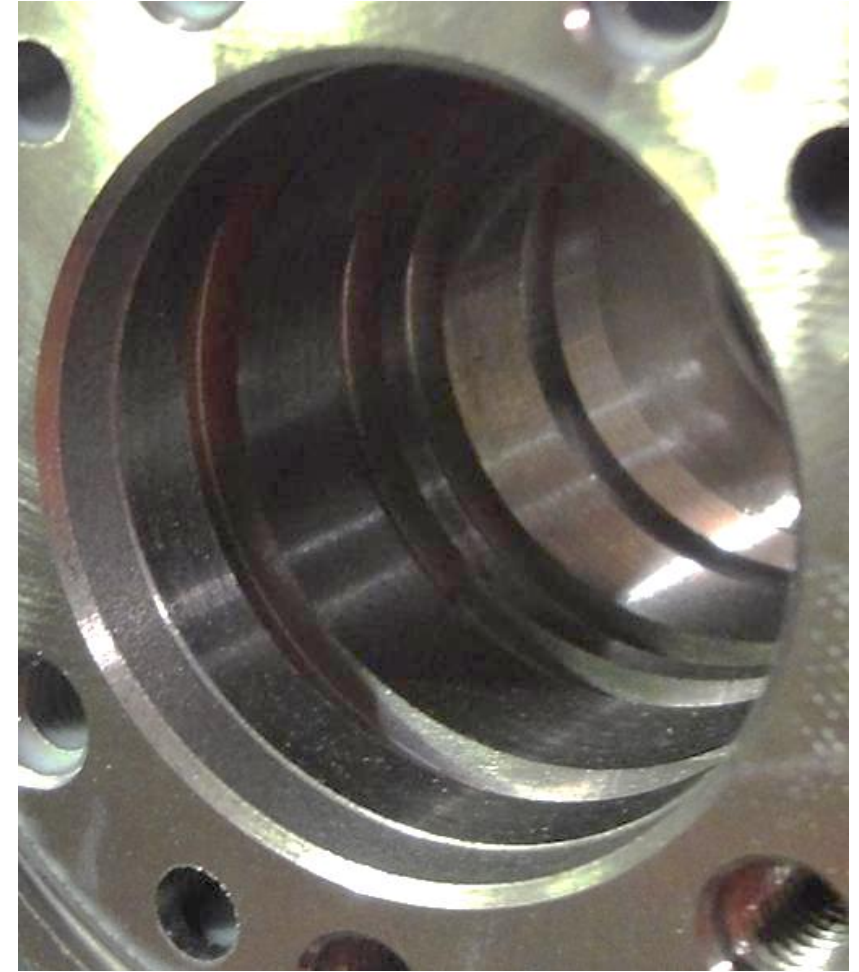
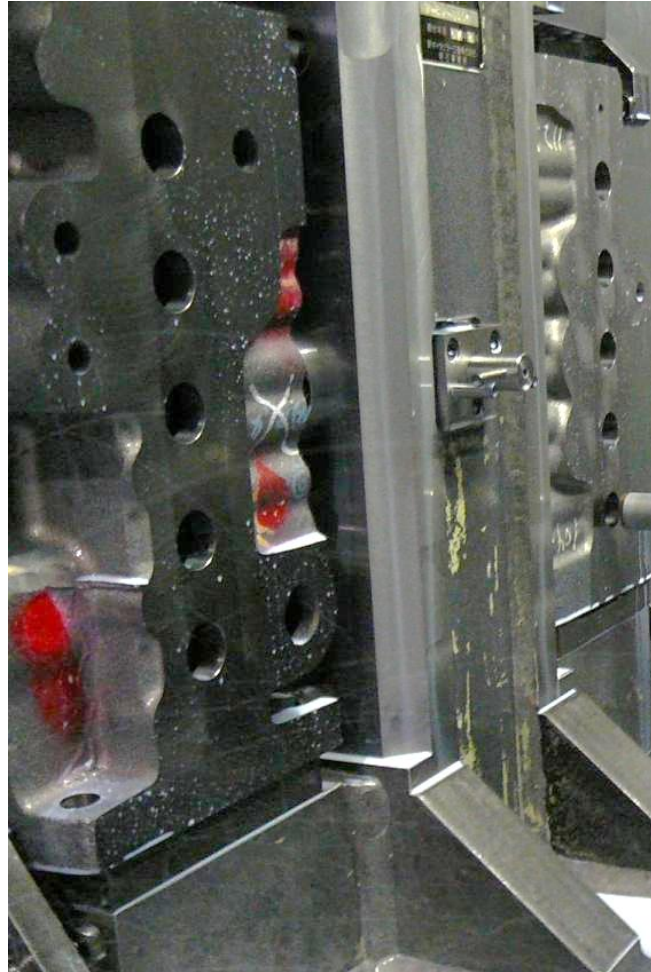
Cylindricity < 8 μm
Time saving 5 times faster!
Tool life > 5'000 parts (> 450 m)

Case studies (Page 1/2)

Hydraulic directional control valve «Spool bore»



Ø 27.950 +/-0.005
EN-GJS-400-15



Case studies (Page 2/2)

Hydraulic directional control valve «Spool bore»

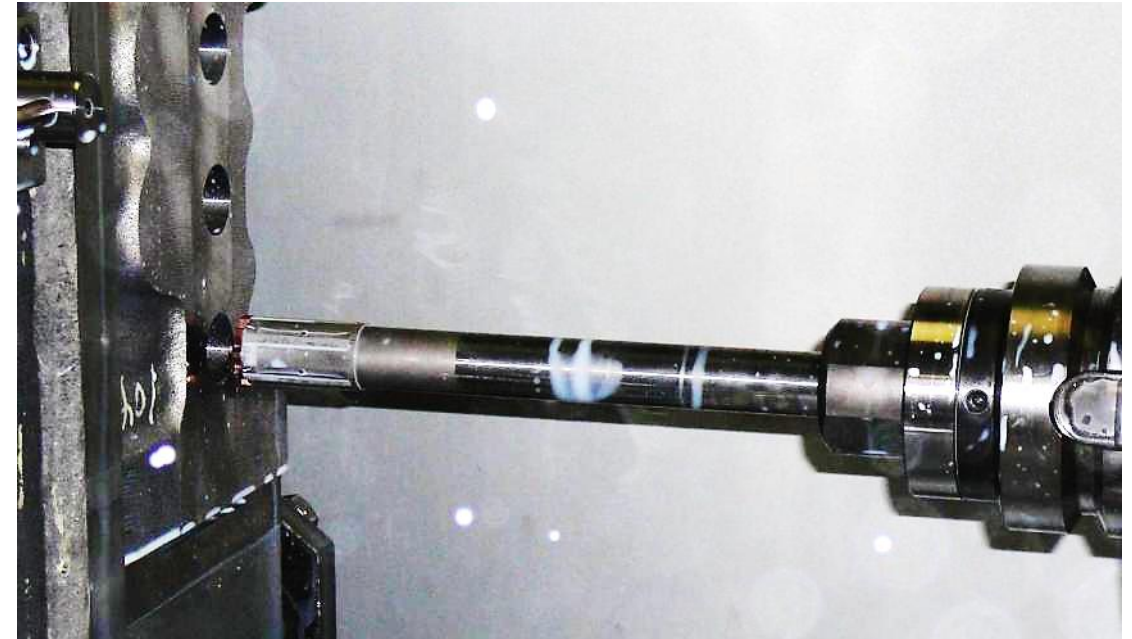


Ø 27.950 +/-0.005

EN-GJS-400-15

Nodular Cast Iron GGG40 / GJS 400	System RX29
v_c (m/min)	90
f_z (mm)	0.13
v_f (mm/min)	1065
a_p (mm)	0.15
Tool life (parts)	1200
Time saving (min/pce)	5.5 min.

Cutting geometry	C01
Insert grade	F0512R1



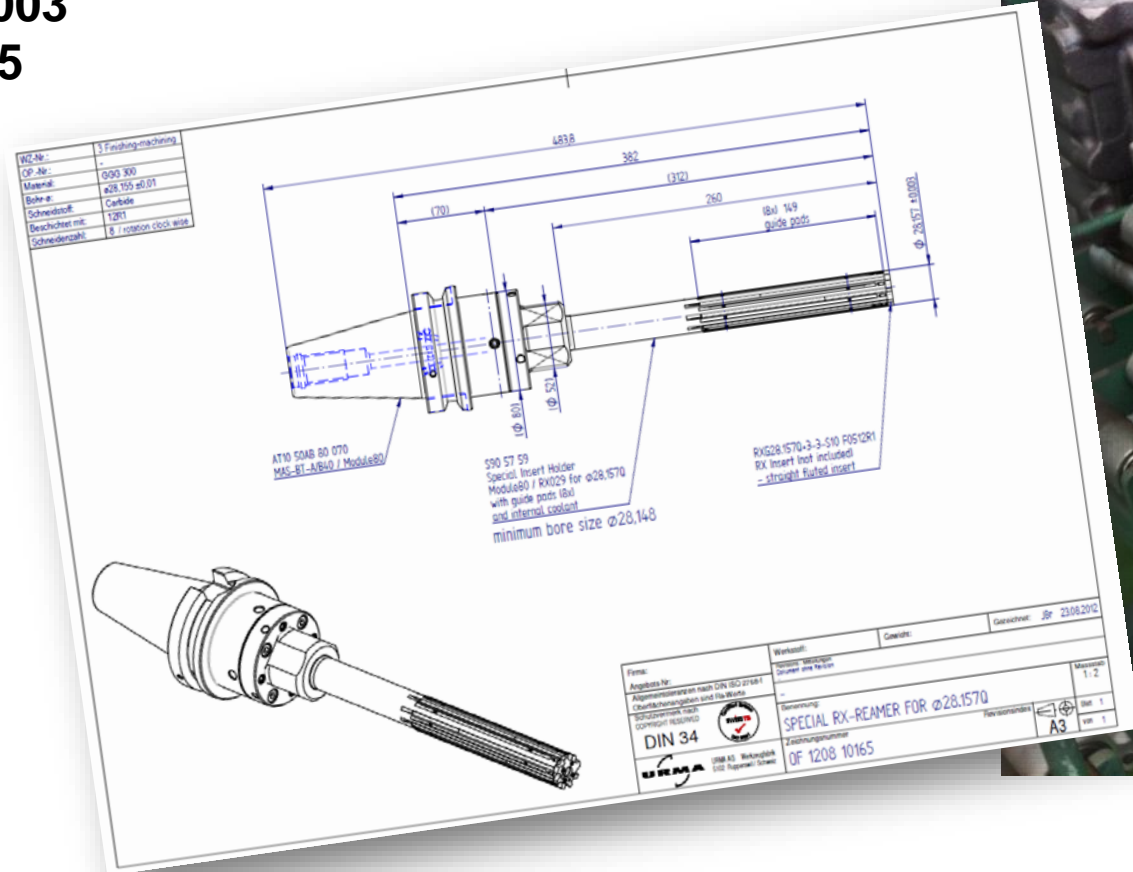
**Time saving 5.5 minutes/pce
Tool life > 1'200 parts**

Case studies

Hydraulic directional control valve «Spool bore»



Ø 28.157 +/-0.003
EN-GJS-400-15

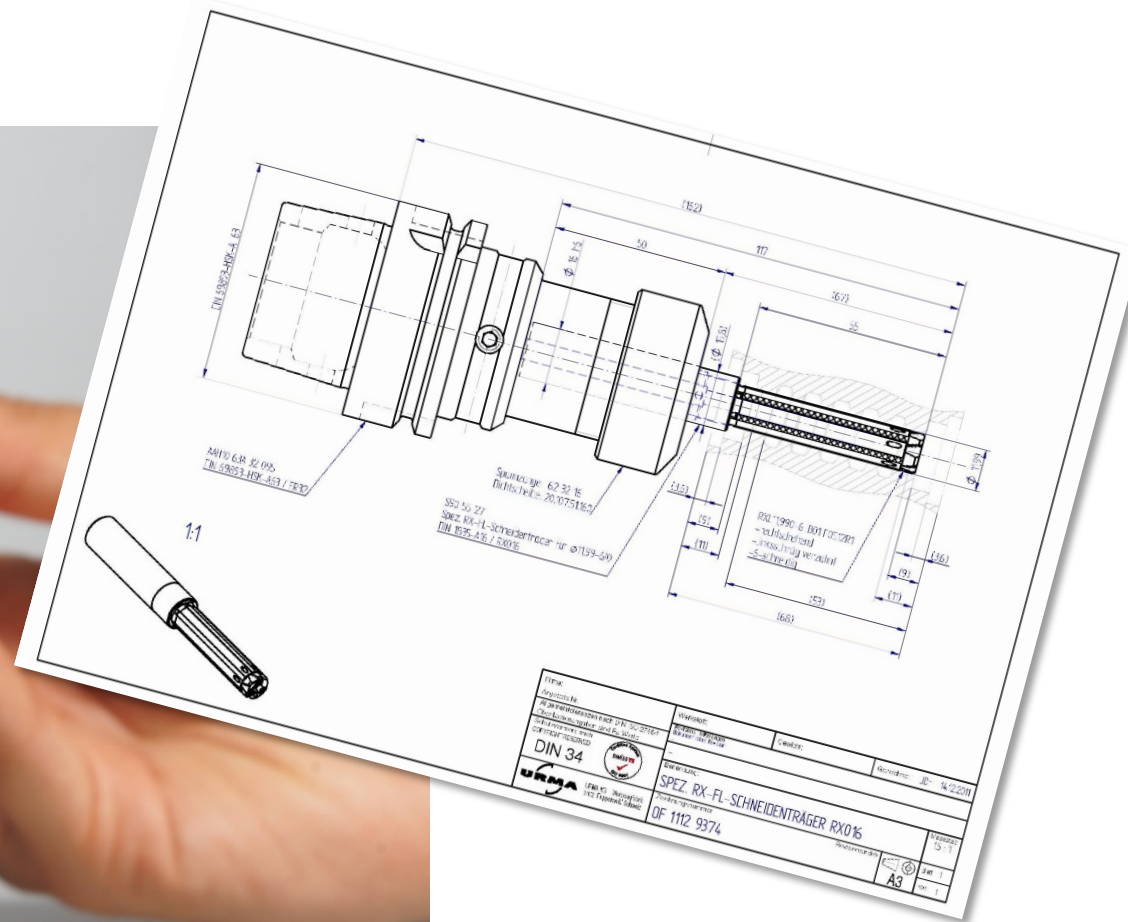


Case studies

Hydraulic directional control valve «Spool bore»



Ø 11.990
EN-GJS-400-15

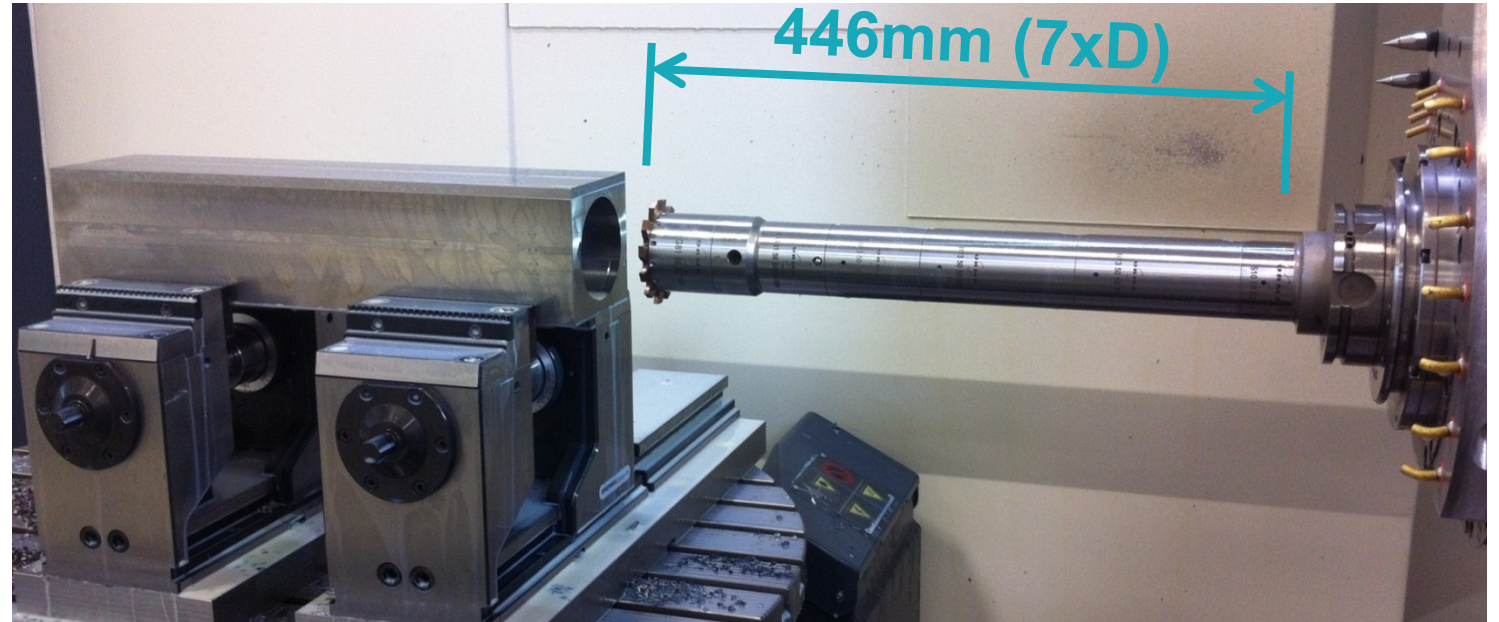


Case studies (Page 1/3)

Hydraulic directional control valve «Spool bore»



Ø 75H6 x 435 mm
EN-GJS-600-3



Targets:

- Be able to machine within the required tolerances!
- Surface finish max. tol. Ra 0.8!
- Roundness tol. max. 0.005
- Availability of tools! (quick delivery of 7 prototype parts)

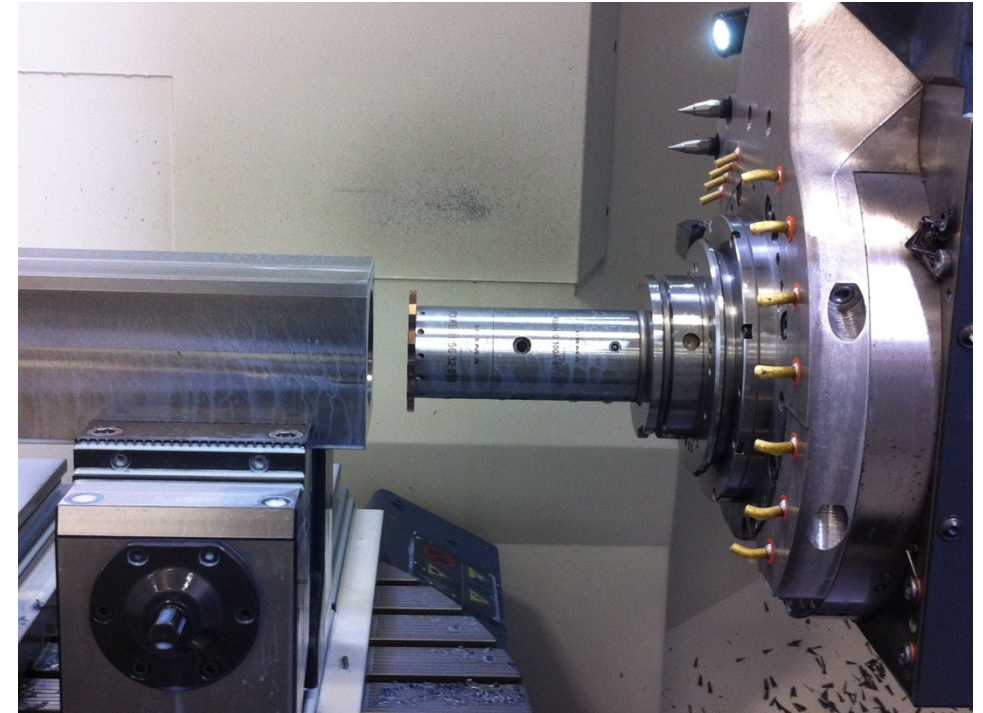
Case studies (Page 2/3)

Hydraulic directional control valve «Spool bore»



Ø 75H6 x 435 mm
EN-GJS-600-3

GJS-600-3	RXG75H6-A01
Insert grade	F0512R1
v_c (m/min)	120
n (1/min)	510
f_z (mm)	0,09
v_f (mm/min)	550
a_p (mm)	0.10



Piloting, 8mm deep

Case studies (Page 3/3)

Hydraulic directional control valve «Spool bore»



Ø 75H6 x 435 mm
EN-GJS-600-3

GJS-600-3	RXG75H6-A01
Insert	F0512R1
v_c (m/min)	120
n (1/min)	510 / 200
f_z (mm)	0,09
v_f (mm/min)	550
a_p (mm)	0.10

Ra = 0.45 μ m
Tolerance < 0.005 mm



Finishing (before honing)

Case studies

Planet gear hub (Page 1/3)

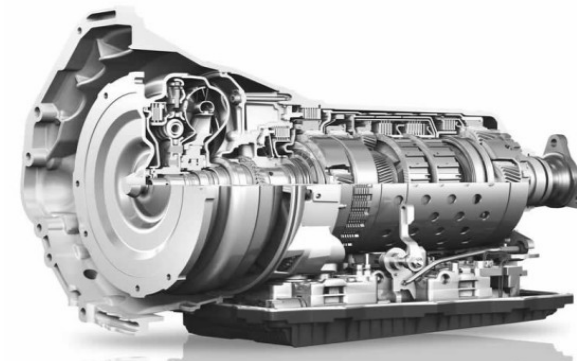


Ø 13.5N7
Steel 1.2311 and
Sheet metal



CircoTec RX configuration:

- SD-Steel shank
- Ceramic guide pads
- Integrated run-out compensation
- Internal coolant (insert and guide pads)
- Repeatability overall run-out <0.004mm



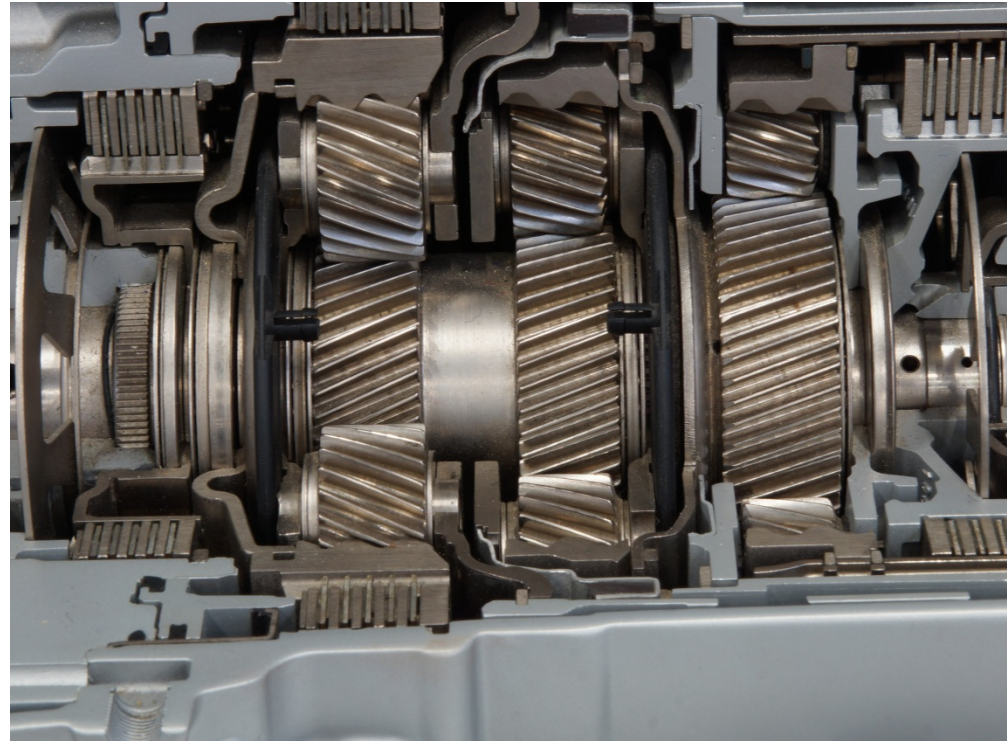
Case studies

Planet gear hub (Page 2/3)



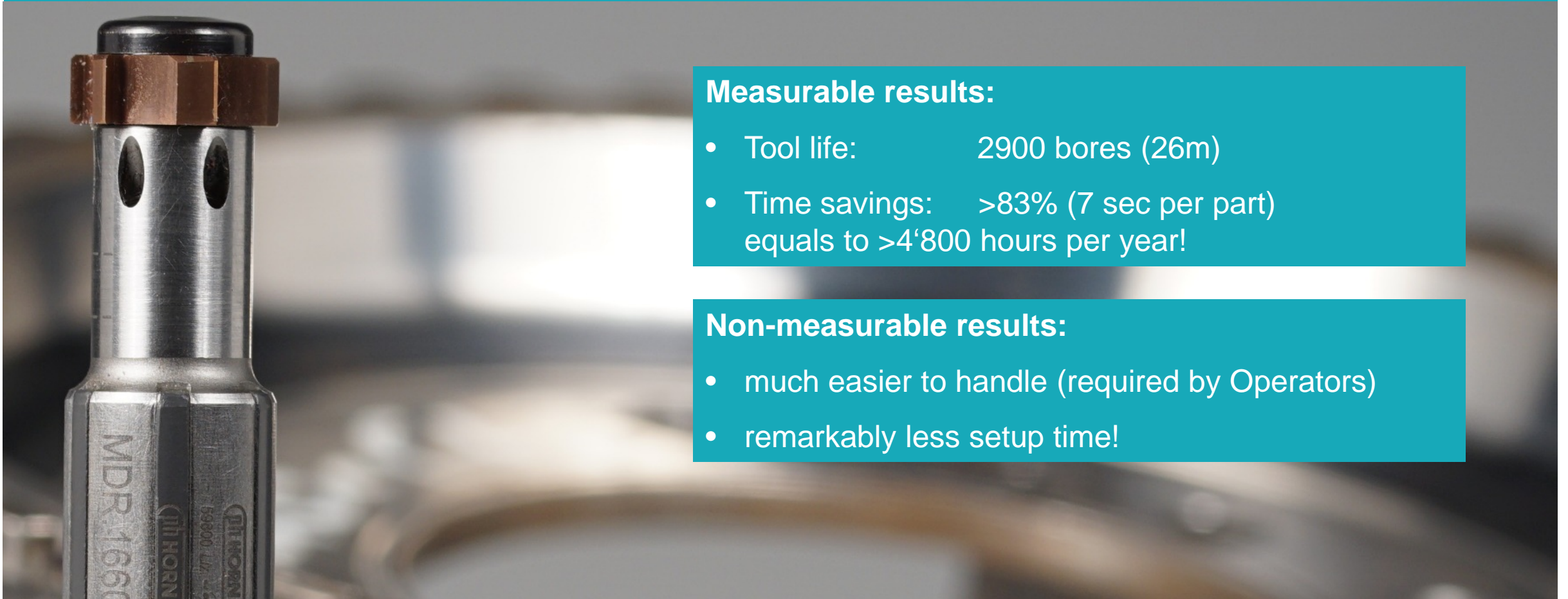
Ø 13.5N7
Steel 1.2311 and
Sheet metal

Steel 1.2311 / Sheet metal	RXG13.5N7-D01
Insert grade	F0512R1
D (mm)	13.5N7
v_c (m/min)	144
v_f (mm/min)	1020
a_p (mm)	0.12
Rz (μm)	< 16
Tool life (bores x2)	>2900
Time saving	83%



Case studies

Planet gear hub (Page 3/3)



Measurable results:

- Tool life: 2900 bores (26m)
- Time savings: >83% (7 sec per part)
equals to >4'800 hours per year!

Non-measurable results:

- much easier to handle (required by Operators)
- remarkably less setup time!

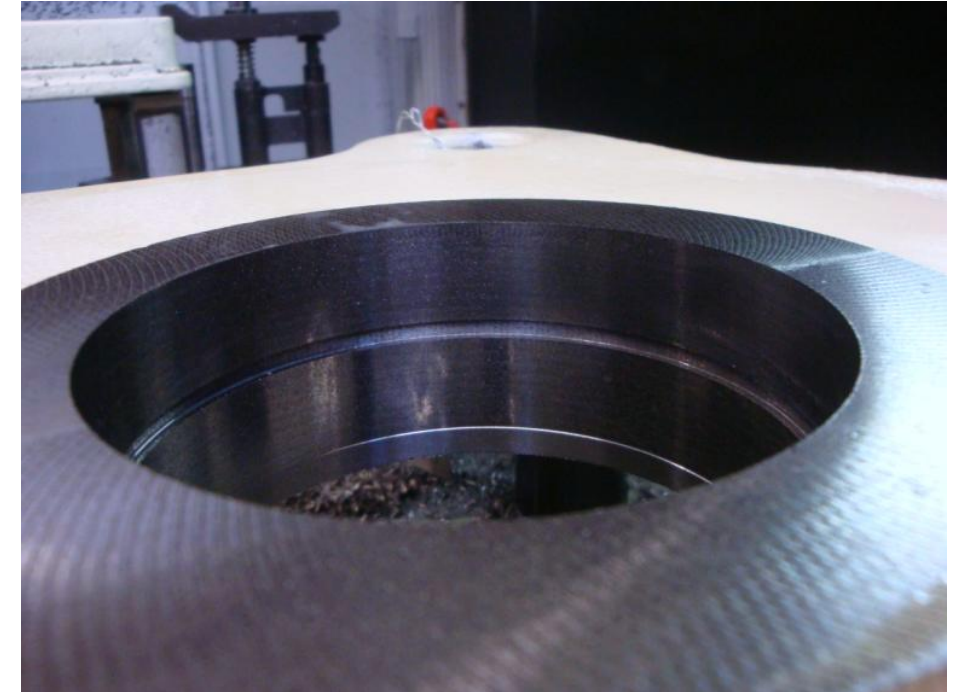
Case studies

Side wall (Textile machine)



Ø 110K6 x 100mm
EN-GJL-250

GG25 (GJL-250)		CircoTec RXG
v_c	(m/min)	140
v_f	(mm/min)	1070
a_p	(mm)	0.20
f_z	(mm)	0.22
RX-geometry		A01
Insert grade		F0514R1



10 times faster !

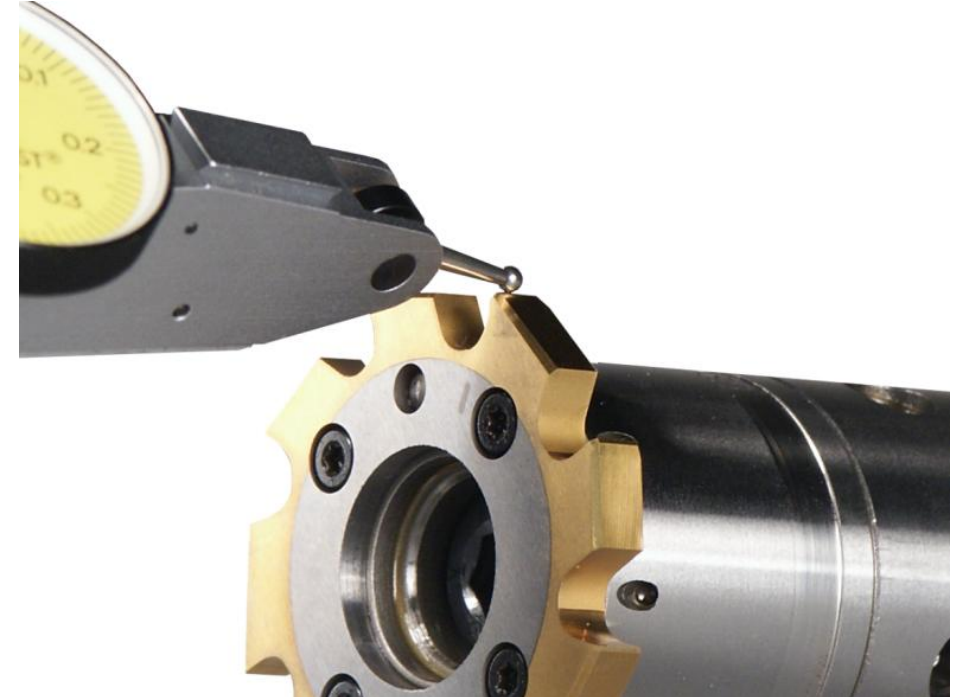
Case studies

Steering arm (Textile machine)



Ø 55K6 x 40mm
EN-GJL-250

GG25 (GJL-250)		CircoTec RXG
v_c	(m/min)	160
v_f	(mm/min)	2032
a_p	(mm)	0.10
f_z	(mm)	0.22
RX-geometry		A01
Insert grade		F0512R1



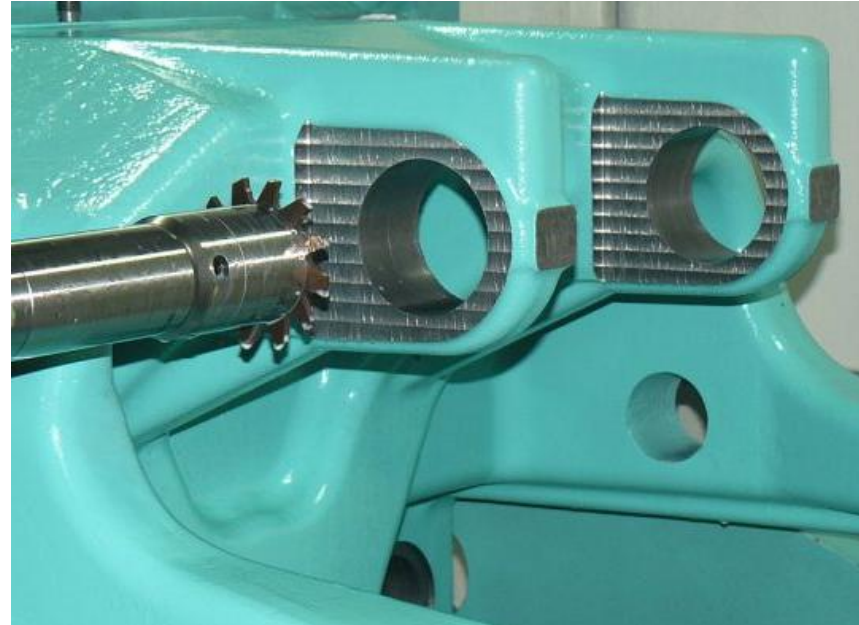
29 times faster !
(Compared to boring tools)

Case studies

Bearing case



Ø 80H7 x 77 mm
EN-GJS-400-15
Overhang (xs) 490 mm!



Ra 0.18 µm

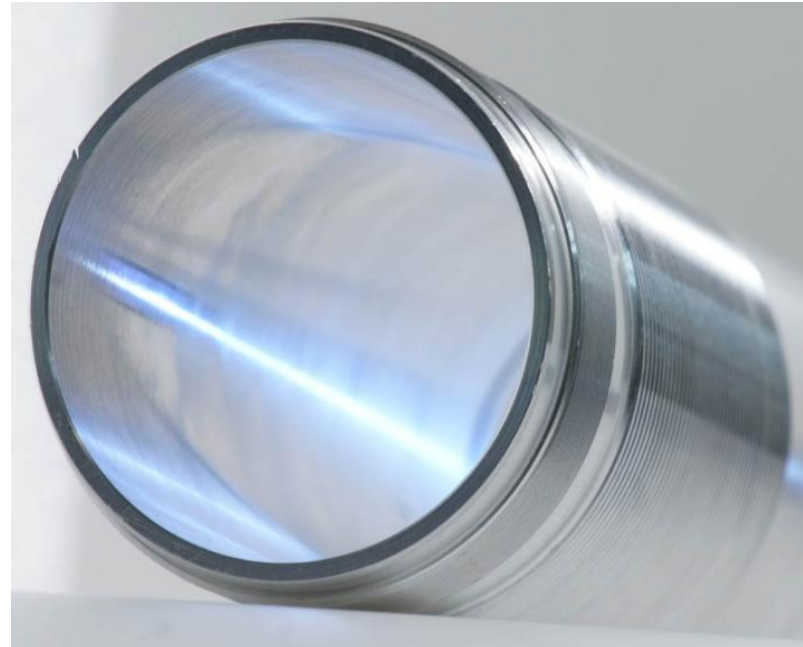
GGG40 (EN-GJS-400-15)		CircoTec RXG
v_c	(m/min)	120 (10)*
v_f	(mm/min)	459 (48)*
a_p	(mm)	0.15
f_z	(mm)	0.08
Ra	(µm)	0.18
Tool life	(min)	>137
* for 3 mm entry		
RX-geometry		B07
Insert grade		T1500

Case studies

Guide tube for Shock absorber (Motorbike)



Ø 50+0.02+0.07 x 197mm
Alu EN-AW-6082-T6



Ra 0.17 µm

Aluminium EN-AW-6082-T6	CircoTec RXG
v_c (m/min)	392
v_f (mm/min)	4989
a_p (mm)	0.10
f_z (mm)	0.20
Ra (µm)	0.17
Tool life (parts)	>1500
Machine V-Turn 16	Lathe
RX-geometry	S01
Insert grade	F0510C

Case studies

Valve plunger guidebore (Marine Diesel)



Ø 42H8 x 68 mm
EN-GJL-250
Overhang 535mm !

EN-GJL-250	CircoTec RX
v_c (m/min)	45
v_f (mm/min)	819
a_p (mm)	0.14
Rz (μm)	< 16
Tool life (pcs.)	10 x more than with the actual reamer
Time saving	95%
RX-geometry	A01
Insert grade	F0512R1



Time saving 95%
excellent tool life

Case studies

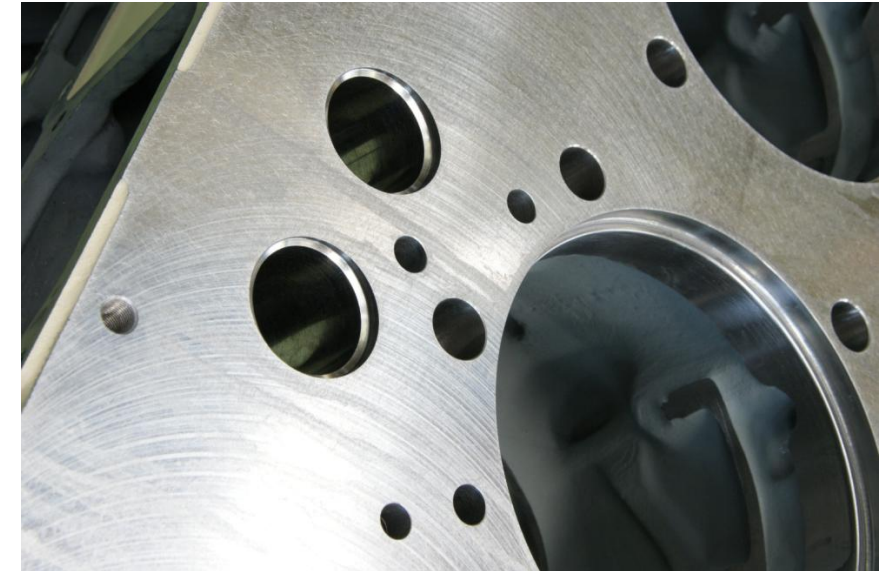
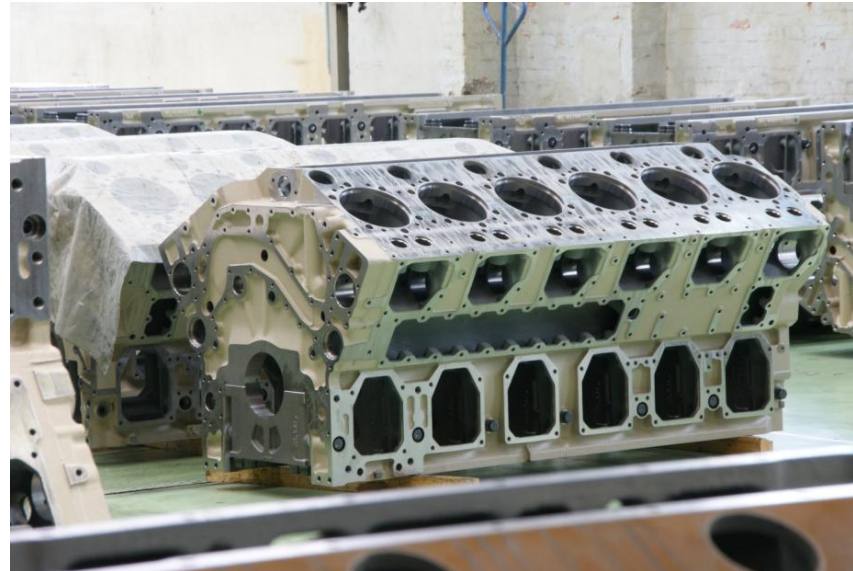
Valve bushing seat (Plunger bore)



Ø 45H7 x 73 mm
EN-GJL-250

GJL-250	CircoTec RX
v_c (m/min)	141.3
v_f (mm/min)	2200
a_p (mm)	0.15
Rz (μm)	< 6.3
Profit	59.3%

geometry	A01
Insert grade	F0512R1



Cost saving 59.3%

Case studies

Cylinder block (4-cylinder)



Ø 14H7 x 14 mm

EN-GJL-250

Double-spindle horizontal HSK-100 MC

Cast Iron 25 GJL-250	RXG12.018Q+3-3
Geometry	A01M2
Insert grade	F0512R1
v_c (m/min)	115
f_z (mm)	0.2
v_f (mm/min)	3660
a_p (mm)	0.1
Ra (μm)	Max. 3.2
Tool live (parts)	~ 3500



Case studies

Valve body



Ø 16.035+10-10 x 21 mm
Material S300
6-spindles Index MS 42-C

S300	RXG16.035+10-10
v_c (m/min)	150
v_f (mm/min)	2681
a_p (mm)	0.067
Ra (μm)	0.29
Tool life (parts)	4500
RX-geometry	A01
Coating	T1500



Case studies Cylinder block (axial piston pump)



Ø 16.035+10-10 x 21 mm
EN-GJS-600-3

GGG60 GJS-600-3	CircoTec RX
V _c (m/min)	60
V _f (mm/min)	546
a _p (mm)	0.15
Time saving	50%
RX-geometry	S08M1
Insert grade	F0514R1

구멍마디머 Test 결과

1. 일시: 2012.04.12
2. 기종: TM60VC CYLINDER BLOCK
3. SPEC: Ø28. +0.012, +0.005
4. 절삭조건: V=110 Fz=0.1~0.15 F=1800 RPM:1251
5. 현재: 인서트머머 S=100 F=160

66mm x 9= 594
594 x 2000ea = 1,188,000(1.4Km)
SPEC Ø28 +0.012, +0.005
ACT Ø28 -0.005

tool F0514R1
Insert : RXG28.012Q+3-3-S08M
Holder : RXD2920 240/165
Torque screw driver : T8
ColLer : ER40/20
SeAL Disk : ER40/20
Tool Holder : BT40/ER40
SPANNER : ER40

날짜	절삭조건	치수or형상	Spec	#1	#50	#100	#150	#200	#250
2012.04.12	start=3cm (s=227, f=300) S=1250 F=1800 Run Out: 3 (cm)	Ø28	+0.012 -0.005	-0.005(NG)					
		진원도	0.005	0.0042	0.004				
		진직도	0.005	0.003	0.0039				
		원통도	0.008	0.0054	0.0065				
		표면조도	1.6a	0.5/0.5					
2012.5.2	V=110 S=1250 F=1800 Run Out: 3 (cm)	Ø28	+0.012 +0.005	0.01	36A에서 -0.003				
		진원도	0.005						
		진직도	0.005						
		원통도	0.008						
		표면조도	1.6a						
2012.05.03	V=80 S=900 F=720 Fz=0.1 z=8	Ø28	+0.012 +0.005	0.012	0.009	0.007	0.007	0.006	200ea작업
		진원도	0.005	0.0013	0.002	0.0018		0.0067	
		진직도	0.005	0.0019	0.0023	0.0019		0.0161	
		원통도	0.008	0.0027	0.0048	0.0038		0.0188	
		표면조도	1.6a					3.5-3.6a	
2012.06.19	V=60 S=680 F=544 Fz=0.1 z=8	Ø28	+0.012 +0.005	0.006	0.006	0.005	0.003	0.004	498ea작업
		진원도	0.005	0.0045	0.0029	0.0025	0.0015	0.0017	Task off
		진직도	0.005	0.0029	0.0033	0.0025	0.0011	0.0023	
		원통도	0.008	0.0051	0.0038	0.004	0.0031	0.0038	
		표면조도	1.6a	1.1	2.2	2.3	2.2	2.1	
fz 0.15 ~		Ø28	+0.012 +0.005						
		진원도	0.005						
		진직도	0.005						
		원통도	0.008						
		표면조도	1.6a						

unt. 594. F0514R1 S08M1
alt. F0514R1



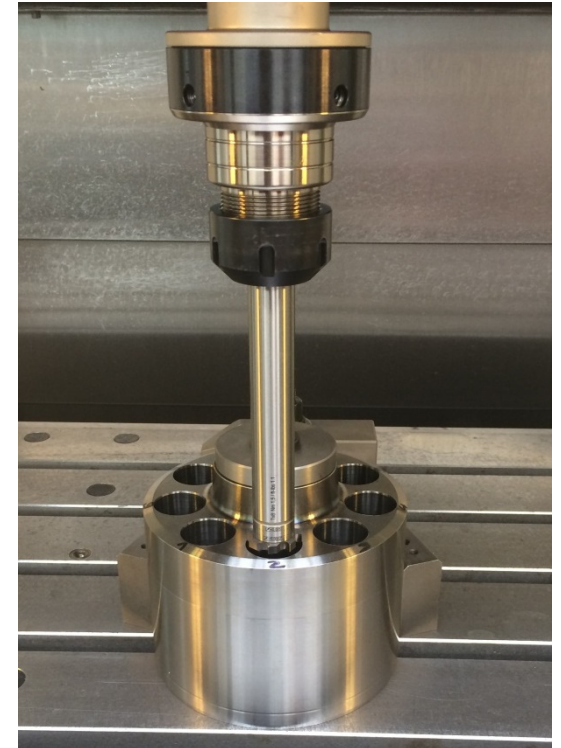
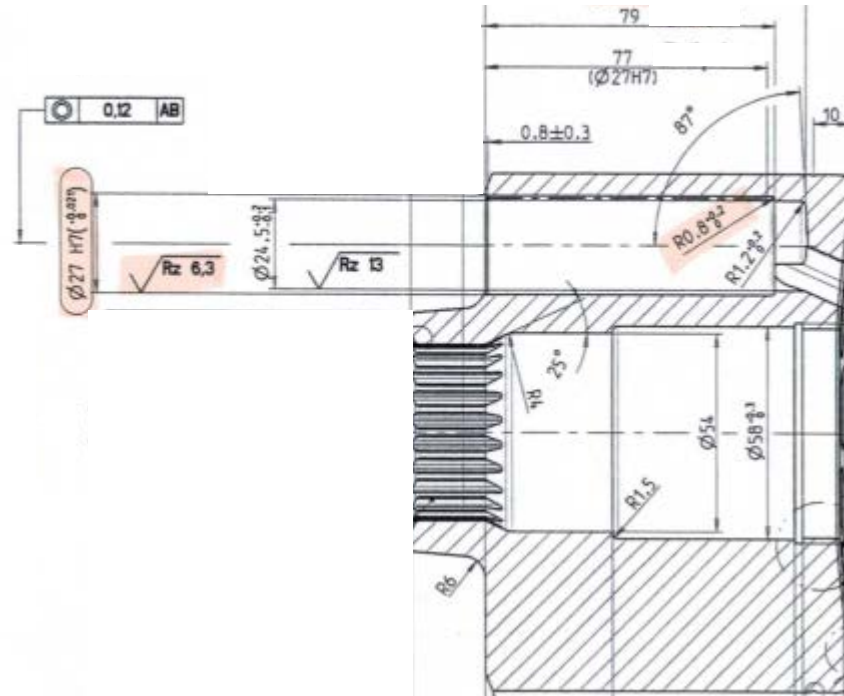
Tool life > 267 m (500 pcs)!
Ra 0.4 – 0.5 µm

Case studies

Cylinder block (axial piston pump) (Page 1/2)



(Internal chip former test)
9x Ø 27H7 x 78 mm
42CrMo4+N+QT
1.7225



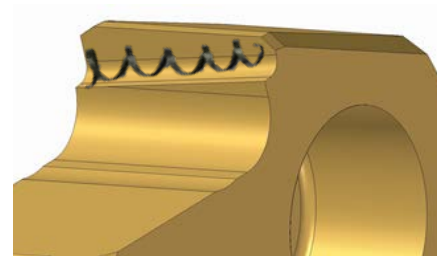
Case studies

Cylinder block (axial piston pump) (Page 2/2)



Internal chip former test
9x Ø 27H7 x 78 mm
42CrMo4+N+QT (1.7225)

42CrMo4+N+QT 1.7225	SRXG27H7-C17 0381 (chip former)
Insert grade	F0512R1
Vc (m/min)	140
n (1/min)	1650
fz (mm)	0.25
Vf (mm/min)	3301
ap (mm)	0.1
Rz (µm)	2.7



Result:
short curled chips
flowing backwards



Case studies

Con-rods (Page 1/3)



Ø 55+20 x 28 mm
34 CrMo 4 (1.7220)

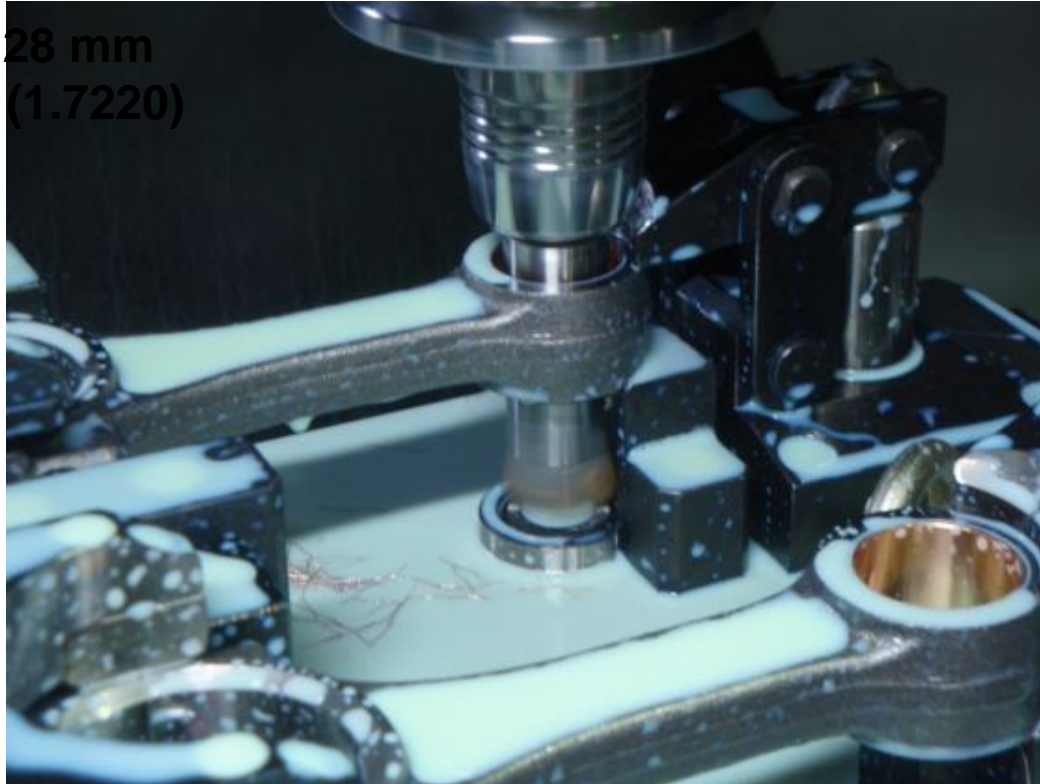


Case studies

Con-rods (Page 2/3)



Ø 55+20 x 28 mm
34 CrMo 4 (1.7220)



Case studies

Con-rods (Page 3/3)



Ø 55+20 x 28 mm
34 CrMo 4 (1.7220)

34 CrMo 4 1.7220	RXG55+20-A01
Insert grade	F0514R1
v_c (m/min)	150
f_z (mm)	0.15 (0.12)*
v_f (mm/min)	1302 (209)*
a_p (mm)	0.125
Rz (μm)	1.7 – 2.4
Roundness (μm)	0.001
* semi-finishing	



Case studies

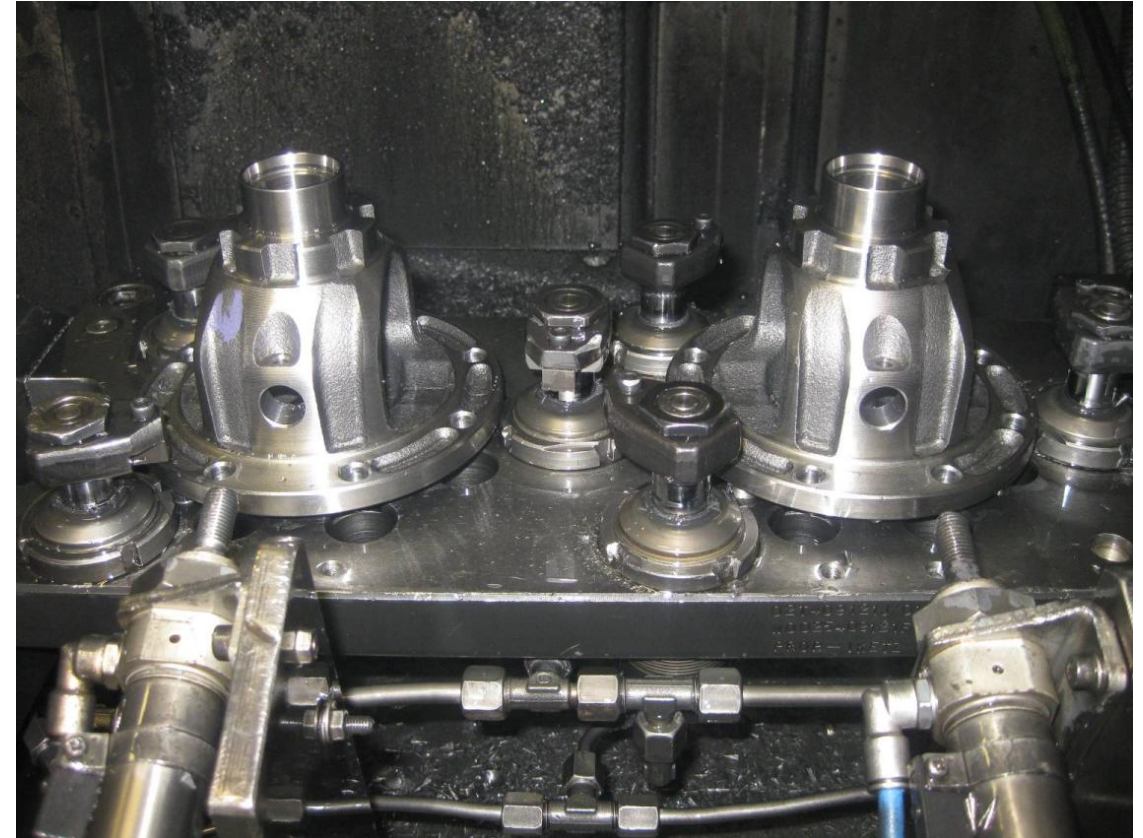
Differential housing



Ø 16.008H7 x 22 mm
EN-GJS-500-7)

GJS 500-7	RXG16.008H7-A01
Insert grade	F0512R1
v_c (m/min)	110
f_z (mm)	0.19
v_f (mm/min)	2496
a_p (mm)	0.1
R_z max 25 μ m	

Tool life > 6000 parts



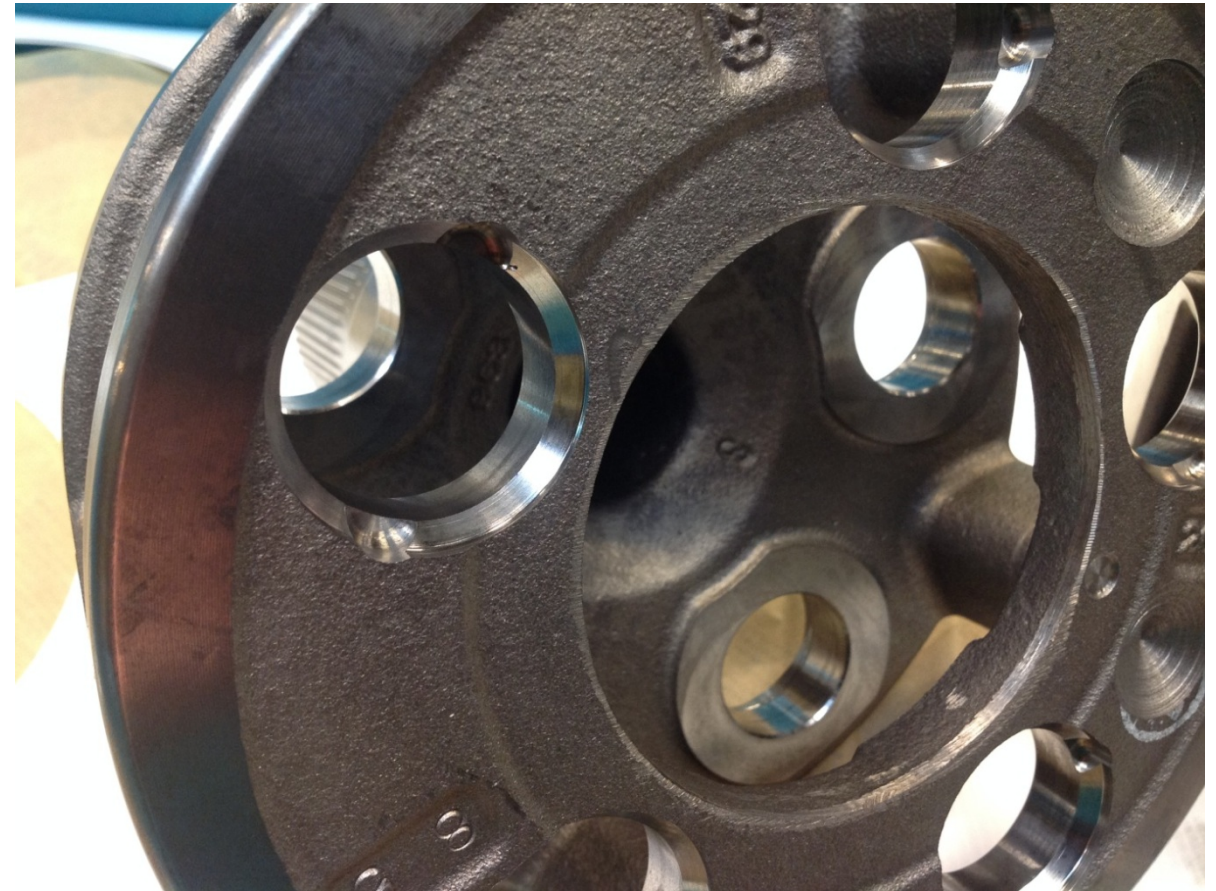
Case studies

Planet gear body



Ø 32.292JS7, 2 x 26 mm
EN-GJS-400-15)

Spheroidal graphite iron (ADI) VISG600/5	RXG36.3JS6
Geometry	A01
Insert grade	F0508P
v_c (m/min)	140
f_z (mm)	0.25
v_f (mm/min)	2455
a_p (mm)	0.15
Ra (µm) max.	1.2



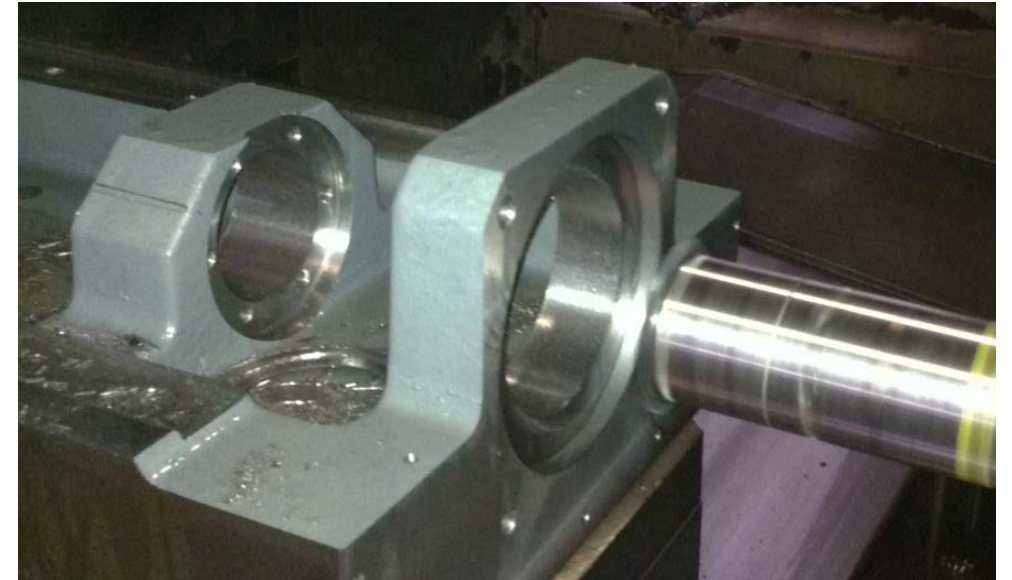
Case studies

Machine tool table (bearing positions)



Ø 51.968 +0.025
EN-GJL-250)

Cast Iron 25 / GJL 250	RXG51.968+25-A01
Geometry	A01
Insert grade	F0514R2
v_c (m/min)	125
f_z (mm)	0.15
v_f (mm/min)	1150
a_p (mm)	0.20
Tool life (parts)	3500
Time saving/part	1.5 min.



Tool life > 3500 parts
Time saving 1.5 min/part

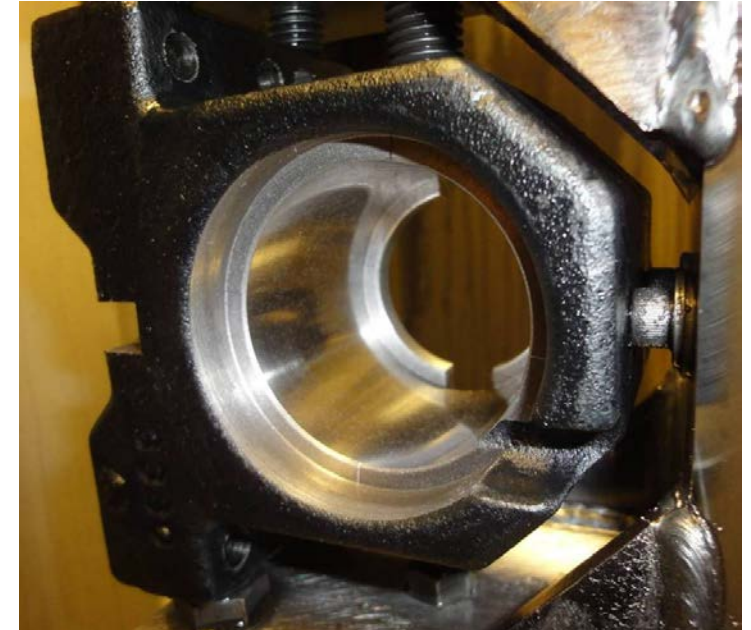
Case studies

Bearing housing (Machine tool part)



Ø 55.011 +0.018
EN-GJL-250

Cast Iron GG25 / GLS 250	System RX61
Geometry	A01
Insert grade	F0514R2
v_c (m/min)	125
f_z (mm)	0.13
v_f (mm/min)	1065
a_p (mm)	0.15
Tool life (parts)	1200
Time saving (1 tower, 6 parts)	4.8 min.



Tool life > 1200 parts
Time saving > 50 sec/part

Case studies

Universal yoke



Ø 24F7 x 15
Ck45 NHJ DBL 4028.10 (forged)
Run-out of special tool: 3-5 µm

	RXG24F7-S02	HFS
Insert grade	T2000	
v_c (m/min)	150	150
f_z (mm/rev)	0.16	0.18
v_f (mm/min)	1990	1820
a_p (mm)	0.13	0.13
Tool life (pcs)	8800	<5500
Remarks		Chipflow problems



Consistant tool life
Easy handling