



Gear and power skiving on standard machines

LM
Processes
Direct Drive

2024

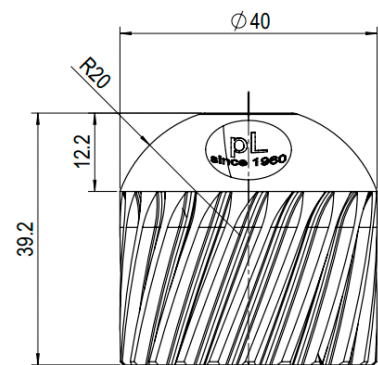
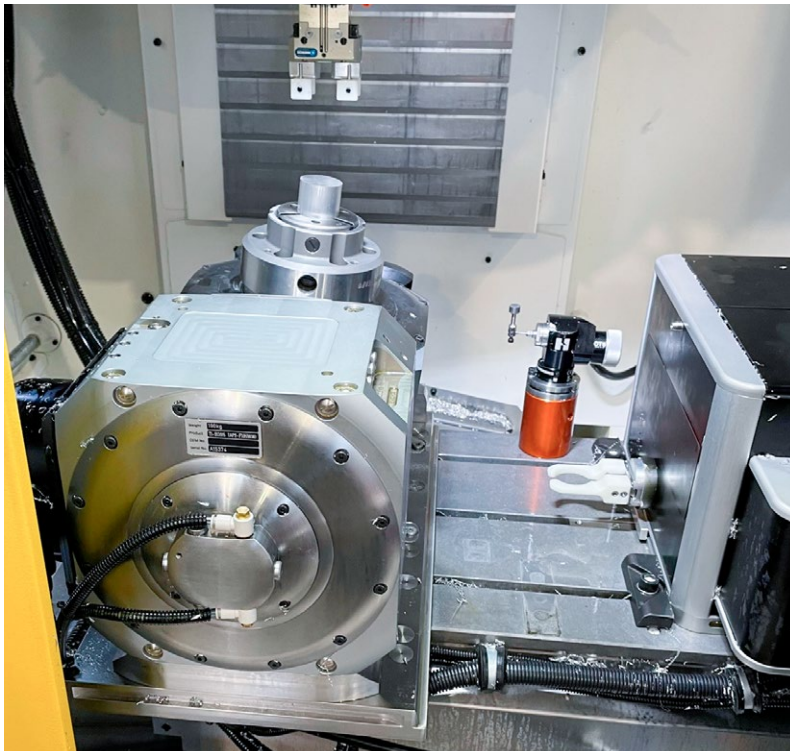
Skiving

6-2024 | EN

- Quality 5–7
- energy-efficient
- 50% lower manufacturing costs



Skiving application with pL LEHMANN DD rotary table T1-913915 TAP9



Material

- AlMg4.5Mn0.7

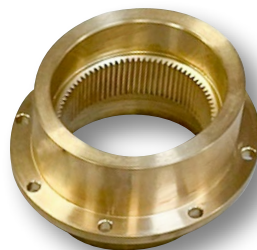
Gearing data (external gearing)

- Module 1.5
- Number of teeth 22
- Pressure angle 30°
- Tip circle Ø 39.6 mm
- Root circle Ø 36.6 mm
- Length approx. 15 mm

Machining data

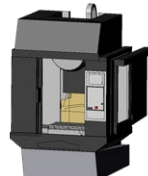
- Tool spindle speed n 1750 rpm
- Workpiece speed n 1100 rpm
- Roughing feed rate f 550 mm/min
- Smoothing feed rate f 50 mm/min
- Number of roughing chips 4
- Number of smoothing chips 1
- Cutting depth for roughing 0.38 mm
- Cutting depth for smoothing 0.149 mm
- Machining time for gearing 50 sec

Typical workpieces from Ø 20 to 150 mm,
whether steel, aluminum, brass or plastic



Real-world experience of a satisfied German customer

What are the advantages of a skiving application on a vertical machining center with T1-913915 TAP compared to a conventional turning/milling center?



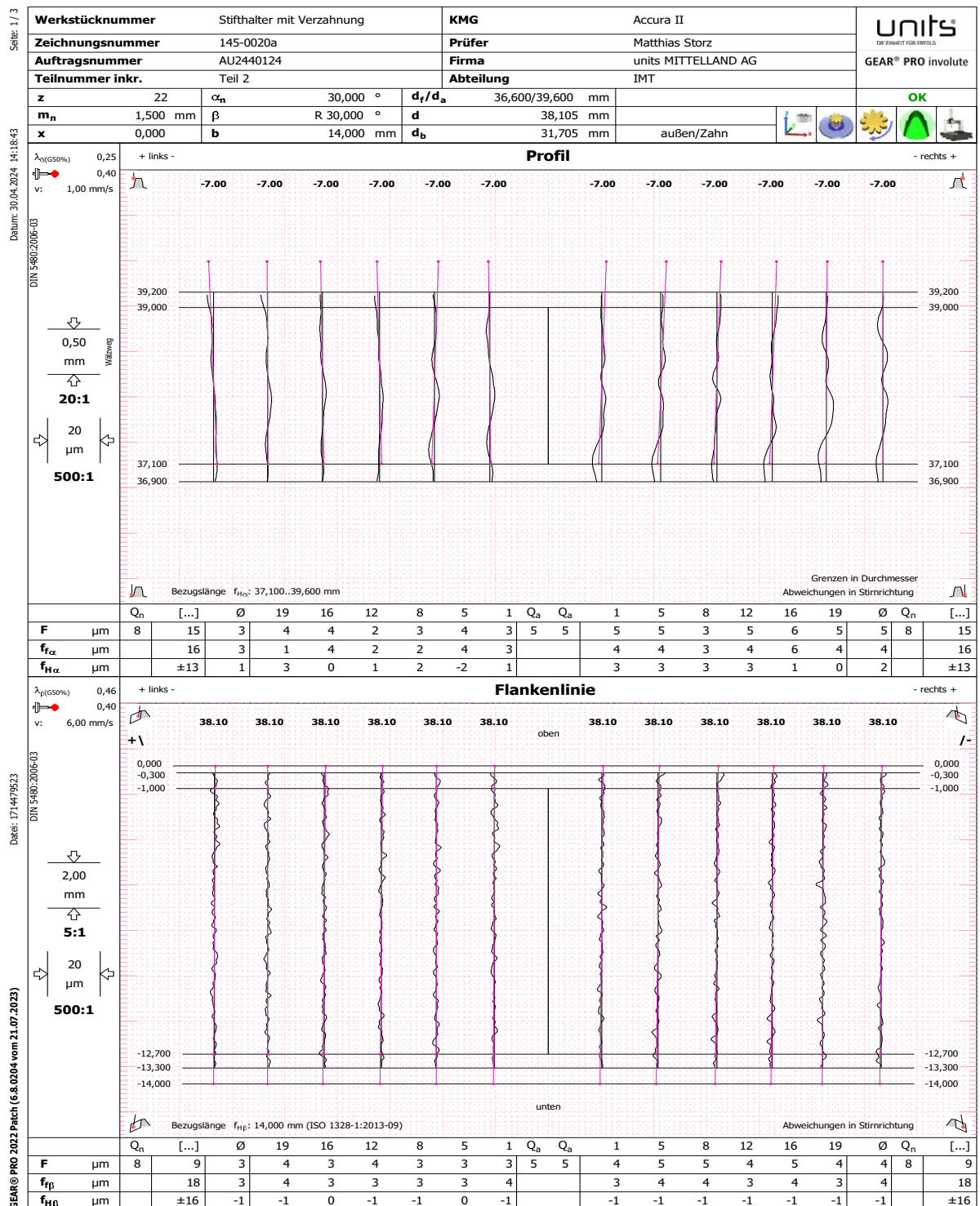
- Investment: **100 %**
- Space: **100 %**
- Quality: **5-7**
- Power consumption: **100 %**
- Tool service life: **approx. 300 pieces**

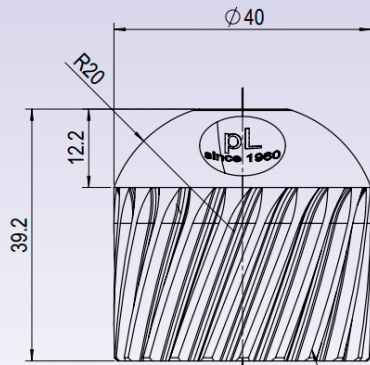
- Investment: **33 %**
- Space: **approx. 50 %**
- Quality: **5-7**
- Power consumption: **approx. 17%**
- Tool service life: **approx. 850 pieces**

- **- 67 %**
- **-50 %**
- **equivalent**
- **6x less**
- **2.8x more**

Customer statement:

«Same quality, 1/3 total investment, power consumption still 17% (downtime) and tool life 2.8 times longer compared to the previous turning-milling center.»





Gearing data	
Normal module	1.5 mm
Number of teeth	22
Pressure angle	30°
Bevel angle	30°
Flanking device	Right
Root circle diameter	36.6
Tip circle diameter	39.6
Tooth width finished	25.6

Seite: 2 / 3
Datum: 30.04.2024 14:18:43
DIN 5480:2006-03 8h - Benutzer def.

↓
20
μm
↑

500:1

Werkstücknummer

Stifthalter mit Verzahnung

Zeichnungsnummer

145-0020a

Auftragsnummer

AU2440124

Teilnummer inkr.

Teil 2

KMG

Accura II

Prüfer

Matthias Storz

Firma

units MITTELLAND AG

Abteilung

IMT

units®

ONE EQUIPMENT FOR EVERYTHING

GEAR® PRO involute

OK

z

22

α_n

30,000 °

d_f/d_a

36,600/39,600 mm

m_n

1,500 mm

β

R 30,000 °

d

38,105 mm

x

0,000

b

14,000 mm

d_b

31,705 mm

außen/Zahn

links

0,40

rechts

0,40

Teilung

Abweichungen in Stirrichtung

Teilung ohne Berücksichtigung der Flankenauwertung

pos: 38.10 -7.00

pos: 38.10 -7.00

f_p

- 1-flankig -

Q_a [...] Q_n

f_p 3 5 ±12 8 f_p 2 5 ±12 8

pos: 38.10 -7.00

pos: 38.10 -7.00

Q_a [...] Q_n

F_p 5 5 28 8 F_p 6 5 28 8

pos: 38.10 -7.00

pos: 38.10 -7.00

Q_a [...] Q_n

f_u 3 23 f_u 3 23

pos: 38.10 -7.00

pos: 38.10 -7.00

Rundlauf

Messkugeldurchmesser: 2,794 mm

Q_a [...] Q_n

F_r 4 5 40 8 f_c 1 12 0 f_r 2 12 0

E_{st} d: 38,105 mm [...] E_{et} d: 38,105 mm [...]

E_{st} -0,001 0,000 E_{et} 0,001 0,000

max 0,002 0,020 max 0,003 0,010

min -0,004 -0,010 min -0,002 -0,020

s_t DIN 5480:2006-03 h [...] e_t [...] M_{rk}

s_t 2,720 2,721 e_t 2,722 2,721 M_{rk}

max 2,723 0,020 max 2,724

min 2,717 -0,010 min 2,719

w_k [...] D LSQ (Gauß) [...] M_{dk}

w_k D M_{dk}

$D_{f,mean}$ 36,597 36,600 0,000 -0,689

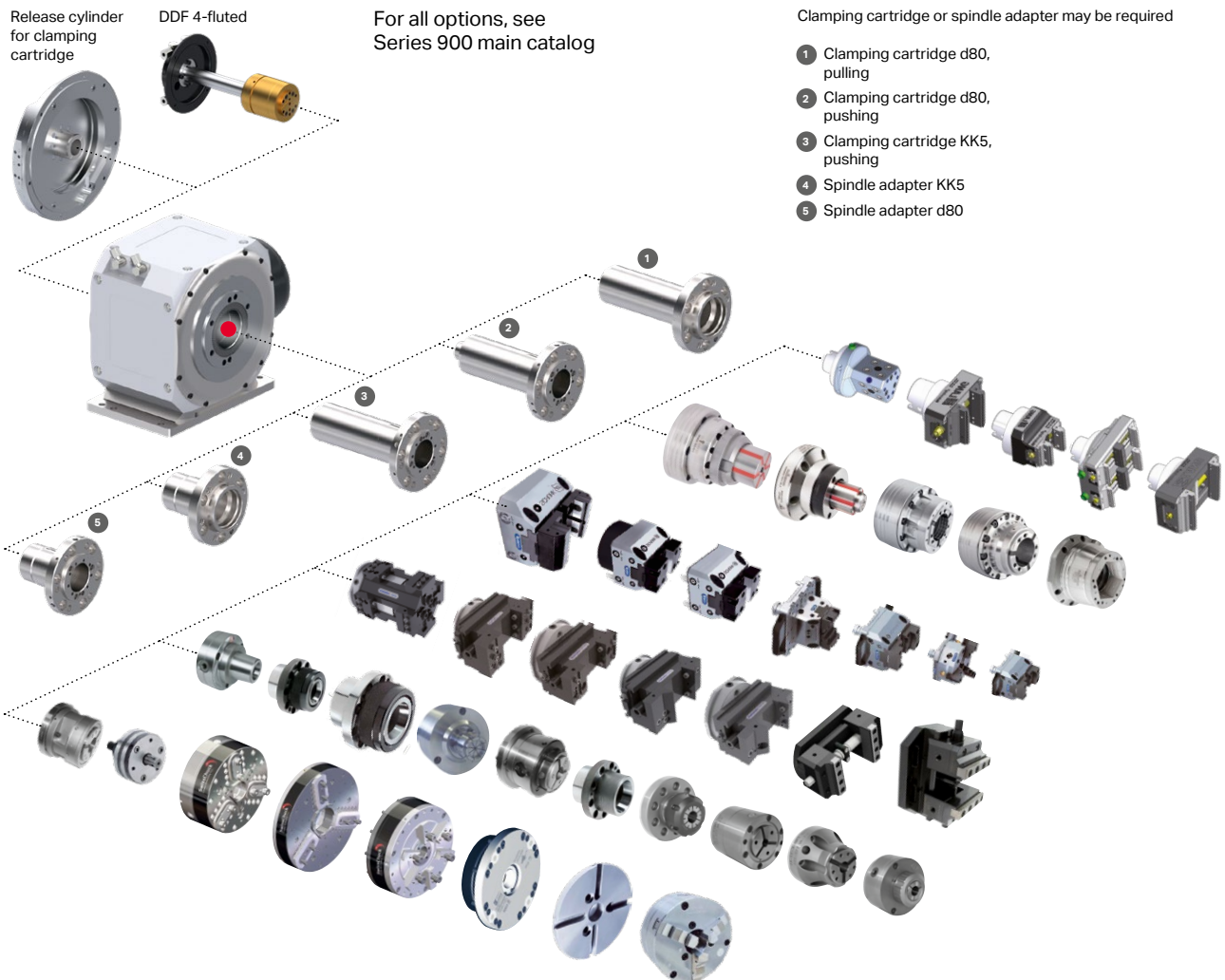
GEAR® PRO 2022 Patch (6.8.0204 vom 21.07.2023)

Auswertemodus: 6.8.2302.1 (gear) / Formelmodus: 6.8.2302.1 / Involute standard 6 diagrams

Extremely wide assortment for workpiece clamping.
Standardized interface at front and rear:
Maximum universality



Tap or medium interface

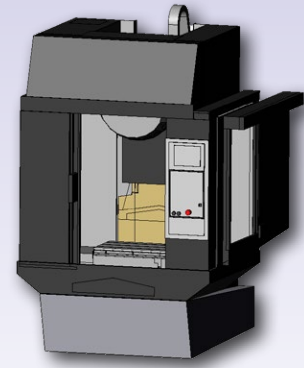


Depending on the clamping device, only reduced speeds are allowed for safety reasons. Please check with manufacturer.



Skiving instead of today's gear cutting method: which limit values can be achieved on which machine?

Here is an example with Tapping Center and a 2-axis T1-913915 TAP9 DD rotary table



When to choose skiving

- Internal gearing straight, helical, curved
- External e.g. if close to the shoulder, complete machining is required or no hobbing machine is yet available
- Limits: Length, diameter, module
- Smaller allowance possible, e.g. for post-machining gear honing
- Inaccurate gear run-in can be corrected

Benchmark for internal gearing

- Skiving 5–8 x faster than pushing
- Somewhat slower than broaching, but
 - with much greater flexibility and adaptability (higher precision)
 - no super-expensive tool (€ 15,000 to 100,000)
 - 6 months regrinding, not sure if still good ...

Skiving on Tapping Center with TAP9

- Module 0.2 to approx. 1.5 mm
- From inner Ø 20 to 150 mm
- Materials:
Brass, CrMo42T with 1200 kg/mm², titanium
- Chip separation: initially ae 0.35 mm, finally 0.03 mm + blank cut 0.02 mm retracted (from example workpiece)
- Cutting speed approx. 150 m/min, titanium feed rate reduced by approx. 20%
- Max. speed
 - up to approx. 2000 rpm (Fanuc 200V)
 - up to approx. 3000 rpm (Siemens, Heidenhain, Fanuc 400V)

6 investment reasons that count

➤ High-precision & fast rotary table ...
Excellent accuracy & surface

➤ Standard machine in stock ...
Quick availability

➤ Independent of machine brand ...
Wide product range for best results

➤ Quickly sold as a used machine ...
High value retention

➤ Manual or automated ...
No specialists necessary

➤ Easily scalable ...
Can be expanded in small steps

Give us a call. We will create a profitability analysis for you.



ROTARY SOLUTIONS › MACHINE TOOLS & METROLOGY

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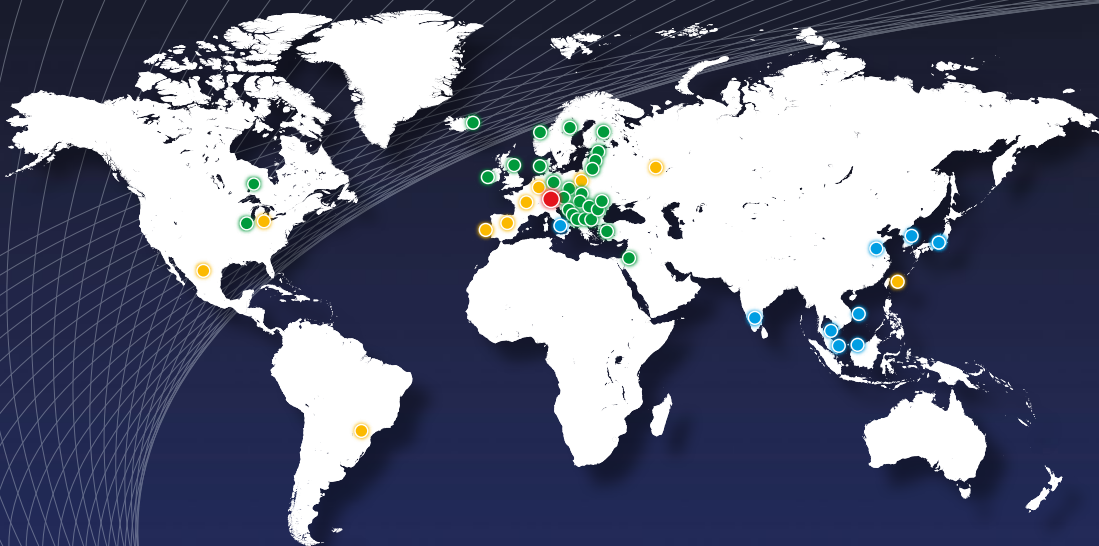
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