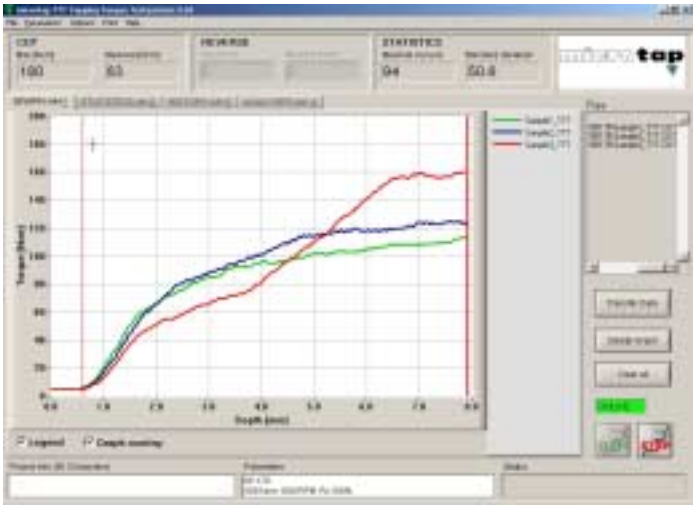
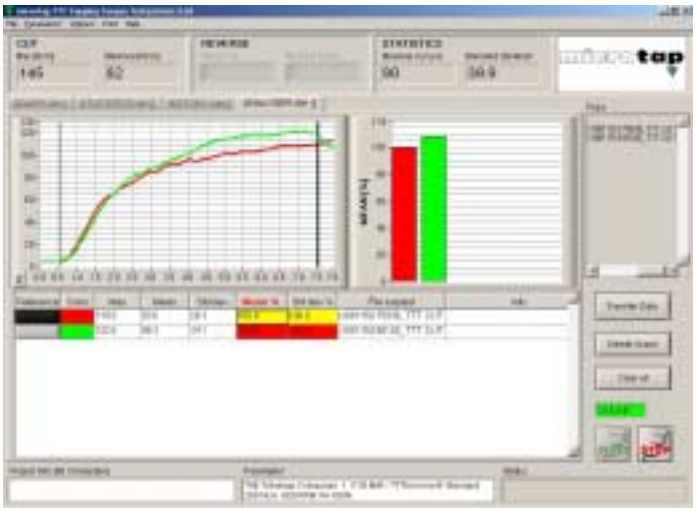
TTT Tapping-Torque-Testsystem
New development for the request
of the Lubricant-Industry

Win**PCA3** - „Screening & Analysis Software"

Measurement process



Analyser



Comparable measurements are monitored (quality control) and documented by displaying applied torque as a bar chart of values, plus mean value and standard deviation (Gauss). Purpose computes the standard deviation and the mean (average) values of the input array. The formulas used to find the mean & the standard deviation are as follows

Average (meanvale) = $\sum_{i=0}^{n-1} x_i / n$ sDev = $\sqrt{\sum_{i=0}^{n-1} [x,-ave]^2 / n}$

Mean value / Arithmetic method
The expression is called arithmetic methods of n sizes $a_1, a_2 \ldots\ldots, a_n$

$$\chi_A = \frac{a_1 + a_2 + \ldots\ldots + a_n}{n} = \frac{1}{n} \sum_{k=1}^{n} a_k$$

For two sizes a and b emerges $\chi_A = \frac{a+b}{2}$

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An example by the practical use

Your customer is testing a new or existing tool to improve productivity with higher cutting speeds and a similar or longer tool life. This may lead to the conclusion that your water miscible fluid (emulsion) or „neat oil" is no longer helpful because the additives may not affect its power!! Lower friction for example, caused by the new tool (coating!), lowers operating temperature

Results, possibilities and exercises

Your lubricant may not impact the results, or - ***worse*** - in a negative way. And if it is the other way around, your additives, caused by higher temperatures (resistance), may be exhausted (burnt up)

What can we reflect in this example?

The ***green*** graph displays the torque with the uncoated tool. The ***blue*** graph displays the coated new tool

Now let us try to construct the following hypothesis: Regarding the lower resistance caused by the coating, the additives miss temperature. The negative effect is that your lubricant works on half power and therefore the torque becomes higher because the coating effects less than the effect caused by a good working additive

The ***red*** graph maybe displays, that's the other assumption or possibility, that the coating and additives are working well in the beginning – but in the end the additives are burnt up due to higher temperature, caused by "high speed"

Please note that each graph is the result out of ten measurements – we call it „summary.cut" – and for each product, shown in the graph – we used a new measurement tool

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Laboratory "screening- and analysis" measurement system

New Software Development „Win**PCA3**"

The expanded "**screening & analysis software**" Win**PCA3** has specially been developed for the demands of the lubricant industry as well as for the tapping tool- and coating-manufacturers

Due to the torque coverage the TTTsystem is also used for screening and monitoring optimized process parameters with automatic recording of production processing and quality assessment

Win**PCA 3**	**Options / Features**	
Level "0"	Win**VIEW**	PC-display software. Only cut-, torque- and progress in depth at processing (threads) is diagrammed. Software is available for delivery of „microtap" & "megatap" thread tapping units
Level "1"	**PCA**	PC-Lab Software for comparative value observation with allocated storage of definable series of measurements
Level "2"	Win**PCA**	PC-screening & analysis software for comparative value observation with allocated storage of definable series of measurements plus an analyser for individual analysis including flexible differentiations of various single- and series of measurement results
Test version	WinTRIAL	This Win**PCA3** is operative for a period of 30 days

Upgrades / Versions	Win**PCA3**	(including 12 month update service)
V2.7 – 3.34V6	2.000 €	
V2.5 – 2.6V3	2.500 €	
Currently Updates / Versions	Win**PCA3**	
V3.0 – V3.4	12 month update service free of charge	
Instruction & training on-site service	500 € / foreign countries plus expenses	
Win**PCA3** SW for several PC's	800 € for each PC / work station	

Conditions	Terms of delivery of **micro**tap GmbH
Prices **€**	Net ex works, without packing material
Payment	14 days net / for customers abroad prepayment
Time of delivery	1 - 2 weeks after order
Delivery & briefing	as agreed upon
Alterations	Reserved

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TTT_WinPCA3_Upgrade.doc

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February 2010

TTT Tapping-Torque-Test
Laboratory Analysis System

Measuring tools & test bars

Conditions and tolerances

The following test materials and test tools will be delivered in consistent quality every time or will be used for customer specific laboratory examinations / requirements. **Further complementary test-methods** and -materials are in treatment

TTT_Laboratory Testbars

Aluminium

AlMgSi1 / 3.2315 / EN 6082 (AiSi/SAE/ASTM)
Hardness R_m 420-450 N/mm² / $R_{p0,2}$ 340-370 N/mm²
Ultimate elongation A 5 > 5-7% / 140 HB / $R_{p0,2}$ min. 340 N/mm²

AlZnMgCu0,5 / 3.4345 / EN 7022 (AiSi/SAE/ASTM)
Hardness R_m 420-450 N/mm² / $R_{p0,2}$ 340-370 N/mm²
Ultimate elongation A 5 > 5-7% / HB 140 / density 2.78 Kg/dm³

AlZnMgCu01,5 / 3.4365 / EN 7075 (AiSi/SAE/ASTM)
Hardness 420-450 N/mm² / $R_{p0,2}$ = 420 N/mm²
Ultimate elongation A 5 > 5-7% / HB 140 / density 2.78 Kg/dm³

G-AlSi12cu / 3.2583 / GD-3-2983
Hardness R_m 150-290 N/mm² / $R_{p0,2}$ 80-130 N/mm²
Ultimate elongation A 5 (1-3,5%) / HB 50 / density 2,65 Kg/dm³

Price each test bar **€ 300,-- / pcs.**
Price for delivery 5 resemble pieces **€ 250,-- / pcs.**

Dimensions & Methods

Test bar sizes: 125 x 47 x 18 mm with counter sinking
140 drilled array at 6 mm for TTT StandardTools – M4F and M4S
- Diameter 3,7mm / 15 mm depth for TTT-Tool M4F
- Diameter 3,3mm / 15 mm depth for TTT-Tool M4S

TTT_Tools / microtap measuring tools

TTT-Tool M4F Standard (vaporised / nitrated forming)
TTT-Tool M4S Standard (blank or nitrated cutting)
TTT-Tolerance-gauge M4F and/or M4S

Price for delivery 10 pieces **€ 500,-- / total**
Single price **€ 60,-- / pcs.**

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TTT Tapping-Torque-Test
Laboratory Analysis System

Measuring tools & test bars

"When monitoring lubricants"

TTT_Laboratory Testbars — Steel / Titan

Carbon steel

C45N/C45E / 1.1730 (Ck45 /_1.1191) / AiSi/SAE/ASTM -1045
Hardness R_m 600N/mm² / 175 HB / 85 PSIx1000
Ultimate elongation A 5 (%) > 14 / R_e>355N/mm²

Price each test bar **€ 400,-- / pcs.**
Price for delivery 5 resemble pieces **€ 320,-- / pcs.**

Stainless Steel

X6CrNiMoTi17-12-2 / 1.4571 (V4A) / AiSi/SAE/ASTM - 316Ti
Hardness 725N/mm² / 225 HB / 112 PSIx1000
Ultimate elongation A 5 (%) > 40 / R_m = 775N/mm²

Price each test bar **€ 460,-- / pcs.**
Price for delivery 5 resemble pieces **€ 370,-- / pcs.**

Heat treated steel

42CrMo4V -/ 1.7225 (CrMo4) / AiSi/SAE/ASTM - 4140
Hardness R_m 1100N/mm² / 300 HB / 145 PSIx1000
Ultimate elongation A 5 (%)

Price each test bar **€ 500,-- / pcs.**
Price for delivery 5 resemble pieces **€ 400,-- / pcs.**

Titan Grad 5

TiAl6V4 / 3.7164 (T-A6V) 49-11/-28/-35/-54-/-65/-67 (AiSi/SAE/ASTM)
Hardness R_m 1150N/mm² / 340 HB / 163 PSIx1000 / 36 HRC
Ultimate elongation / R_em²

Price each test bar **€ 600,-- / pcs.**
Price for delivery 5 resemble pieces **€ 500,-- / pcs.**

Dimensions & Methods

Testbar sizes: 125 x 47 x 18 mm with counter sinking
140 drilled array at 6 mm for TTT-Tools – M4F and M4S
- Diameter 3,7mm / 15 mm (3xD) measurement range for TTT-Tool M4F
- Diameter 3,3mm / 15 mm (3xD) measurement range for TTT-Tool M4S

TTT_Tools / microtap measuring tools

TTT-Tool M4F Standard (vaporised / nitrated forming)
TTT-Tool M4S Standard (blank or nitrated cutting)
TTT-Tolerance-gauge M4F and/or M4S

Price for delivery 10 pieces **€ 500,-- / total**
Single price **€ 60,-- / pcs.**

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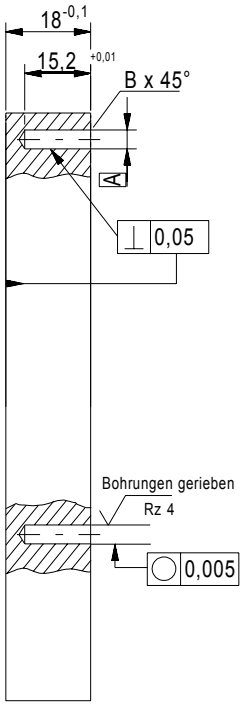
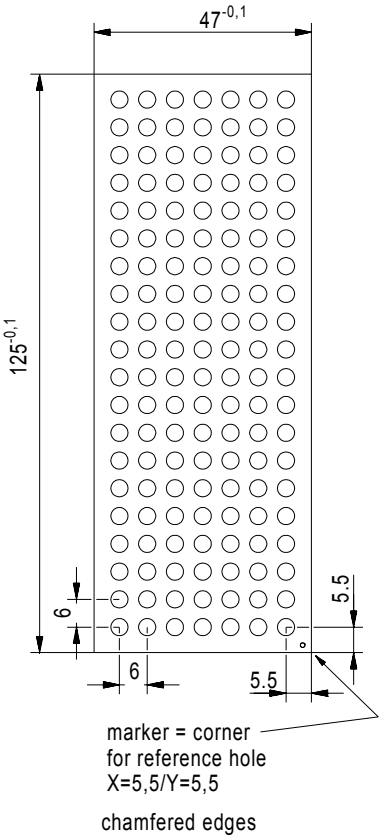
Measuring test bars

Material conditions / tolerances
for Standard TTT-tool M4F & M4S





Dimensions & Methods

Test bars size 125 x 47 x 18 mm / 140 holes – M4

TTT-Methodology
Forming
special
Counterbore

Forming, cutting and special applications
A = 3.70 mm / +0.03 - for standard TTT-Tool M4F
A = 3.65 mm / +0.03 - for special TTT-Tool M4FX
B = 0.2 mm

Cutting
Counterbore

A = 3.3 mm / +0.03 for standard TTT-Tool M4S
B = 0.4 mm

Conditions
Pricing
Payment
Delivery time

Terms of delivery of **micro**tap GmbH
€ ex work, excl. packaging
14 days net / Foreign countries payment in advance
Approximately 2-4 weeks after order

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Legend

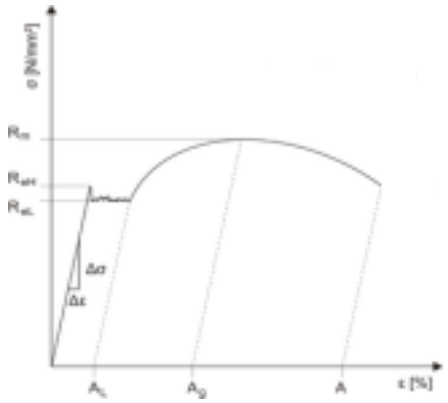
R_m Hardness
Indicates the tension at the peak of the stress-strain-chart.

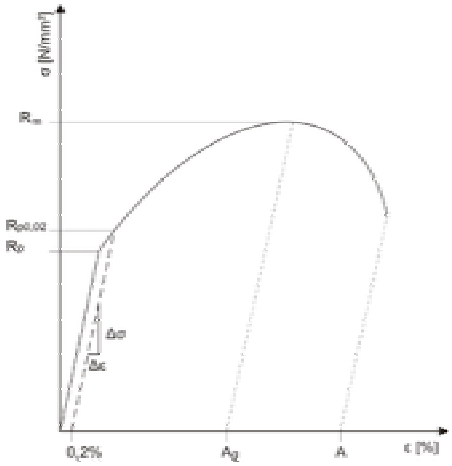
A Fracture strain
Indicates the remaining distension when breaking. This is the measure for the utmost distension of a material.

R_e Yield strength
Indicates the tension prevailing in material immediately before stretching.

$R_{p0,2}$ 0,2% Yield point
Indicates the tension at which tension test displays a yield point of 0,2 % of plastic deformation after release. $R_{p0,2}$ value is only used with materials lacking a yield strength.

Stress-Strain-Chart





R_{eH} Upper yield strength
R_{eL} Lower yield strength
E Flexibility module
A_g Symmetry distension / start of necking
ε Distension [%]
σ Tension [N/mm²]
A Fracture

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Laboratory “screening- and analysis” measurement system

References

Lubricant - Industry

Additives International	USA
Afton	USA
American Saw	USA
AMCOL	USA
Blaser	Switzerland
Bechem	Germany
BP / Castrol / ARAL	Germany / Italy / USA
Benz Oil	USA
Belgin Madenie Yaglar	Türkei
Binol Filium	Sweden
Blaser Swisslube	Switzerland
Blue Chip Metallworking Fluids	USA
Buhmwoo Chemicals	Korea
Chai	Israel
Chemetall Oakite	USA
Century Oils (Fuchs)	Canada / GB
Coral Chemical	USA
Cincinnati Vulcan Oil Company	USA
Cimcool	Netherlands / USA
Clariant Corp.	Germany / Japan / USA
Customs Synthetics	USA
D.A. Stuart (Houghton)	USA / Canada / GB
Degussa (Evonik) Goldschmidt Chemical	USA
DOG	Germany
Diversified Chemical	USA
DNR / University Illinois	USA
Dover Chemical	USA
Exon / MOBIL	USA
Eng. Lubricants	USA
Fuchs Lubricants	Germany / USA / CDN / Great Britain / Spain
Fuchs Lubricant ASIA	China / India / Korea / Japan
Ferro (Dover) / Keil Chemical	USA
Georgia-Pacific / Actrachem	USA
Georgia-Pacific / Resins / Actrachem	USA
General Motors / R&D	USA
Guangzhou Research Institute	China
Henkel	USA / Germany / China
Hangsterfer’s Laboratories	USA
Hoechst Celanese	Germany / USA
Houghton International	USA / Germany / GB
Innovative Machining Technologies	USA
Kao Chemicals	Germany

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Laboratory “screening- and analysis” measurement system

References

Lubricant - Industry

LubeRos	USA
Loctite	USA
Lubrizol	Germany / USA / China
Lube Ros	USA
Master Chemical	USA
Milacron	USA
MSI	USA
Mineralölwerk Osnabrück / TOTAL	Germany / Switzerland
Nalco Chemical	USA
Nippon Grease	Japan
Nicotech Oilservice	Japan
Oemate	Germany
Olistore	Switzerland / GB
PCC Chemax	USA
Petrofer	Germany
Polartec Additives	USA
Process Solutions (US Fluids)	USA
PTT Research & Technology Institue / Oil-House	Thailand
Quaker	China
Rhenus	Germany
Rhein Chemie	Germany / China
Rocol	Great Britain
Rock Valley Oil & Chemical	USA
Ruetgers Organics (Sunbelt Lub.)	USA
Shell Global Solutions	USA
SINOL / Shell	Italy / USA
Solutia Inc.	USA
Spartan Chemical	USA
Sunbelt Lubricants	USA
Tapmatic do Brazil	Brazil
Total	USA / France / Germany
Tower Oil	USA
Uniqema / Croda / ICI	USA
University of Michigan	USA
University of Illinois	USA
Yuma Industries	USA/ Japan
Yushiro Chemical	Japan / China
ZET Chemie	Germany

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References

Tap manufacturers / Coatings

Boss Jakob	Germany / Ungarn
Blaser	Switzerland
CD Tech	Switzerland
DC Daniel Charpilloz	Switzerland
DNR / University Illinos	Germany
EMUGE	Germany
Fraisa	Switzerland
FANAR	Poland
General Motors / R&D	USA
GMERI	USA
Gühring	Germany
GWG Gabrovo	Bulgaria
Hanson Whitney	USA
Hoffmann	Germany
Jarvis Cutting Tools	USA
Kennametal	Germany
Linig	Germany
Link / JEL	Germany
Manigley	Switzerland
Narex	Tschechien
Prototyp PWZ (Titex)	Germany
PWA	Germany
Schäublin / Eso	Switzerland
Sutton Tools	Australia
Vökel	Germany
Unaxis Balzers	Lichtenstein
Werkö	Germany
Yamawa	Japan
Yangzhou Jiangyu Cutting Tools	China

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microtap

Thread Tapping Technology

Machines / Options / SW

Price list 2010

Type / Thread-Size Stainless steel	microtap II megatap II	jobtap	labtap	TTTsystem
G2 / M0,5 - M2	9.600	-	16.600	-
G5 / M1 - M5	8.100	6.900	15.100	-
G8 / M2,5 - M8	11.800	9.500	22.500	29.000
G14 / M3,5 - M12	12.600	10.500	24.600	-
G16 / M4 - M14	12.800	10.700	24.700	-

Options / Accessories	microtap II megatap II	jobtap	labtap	TTTsystem
ZAP pneumatic "balanced" spindle feeding system	1.250	1.250	1.250	+
MMS controlled minimal lubricant fluid dispenser system	890	890	890 890	
SWS & **SZS** tool holder systems	on request	on request	on request	+ (SZS1/2)
QND recording serial printer for quality reports	500	-	500	500
DSK adjustable double spindle head incl. adapter	3.700	3.700	3.700	3.700
SHV & **HVS** column specials & horizontal adjustment	on request	on request	on request	on request
LSM air seal for motor spindle	350 - 475	350 - 475	350 - 475	350 - 475
MLM machine light magnetic	150	150	150 150	
SSB security key or **ASL** audible signal light	250	250	250	250
MPT integrated manual positioning XY-table	5.500	-	-	+
APT controlled automatic positioning XY-table	13.900	-	-	13.900
SSW customer specific special software for automation	on request	-	on request	on request
RS232 serial interface / V24	+	-	+	+
I/Oport parallel interface / 4 x I/O	+	-	+	+
WinView PC-display software. Only cut-, torque- and progress in depth at processing (threads) is diagrammed	+	-	+	+
WinPCA3 "screening & analysis software" for comparative value observation with allocated storage of definable series of measurement plus an analyser for individual analysis including flexible differentiations of various single-and series of measurement results (see WinPCA_Upgrade data-sheet)	-	-	2.000 Upgrade 30 days test free of charge	+
SWPrograms for screws & inserts incl. continue motor running for counter sinking and secondary drilling	+ Not G2	-	+ Not G2	+

Alterations reservations

Price € / + = included / - = not available

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Pricelist_2010.doc

February 2010