Email - Offer

TTT Tapping-Torque-Testsystem

For customers of the lubricant industry

Offer TTT Tapping-Torque-Testsystem

Dear Sirs

Thank you very much for your email and interest in our Tapping-Torque-Testsystem.
Please find here our offer for the complete Tapping Torque Testsystem incl. the integrated manual X-Y-positioning system MPT, the TSE Temperature Measurement Equipment and WinPCA evaluation software for measurement laboratory applications.

The TTT System is equipped with all needed components to produce measurements without faults based to the new microtap TTT Standard and methodology.

TTT Tapping-Torque-Testsystem		**TTT System**	
labtap G8 incl. Win**PCA**, ZAP and MPT technical specifications see encl. datasheets	€	on request	
TTT Measurement-Equipment-Starter-Set 7 Testbars: 3 x Aluminium (2 x 3.4365 M4F, 20 mm; 1 x M4C 12 mm), 4 x Steel (3 x 1.4571 M4F, 20 mm, 1 x M4C, 12 mm)) and 24 Standard-measurement tools (10 x M4F-N, 6 x M4F-NT, 8 x M4C) for approx. 800 laboratory measurements	€		M4F = M4 Forming M4C = M4 Cutting
TSE Temperature Measurement Equipment One/Two day schooling**,** handling and method	€		Flight and hotel expenses extra
Total	**€**		

Conditions	Alterations reservations
Packing	4 multiple special boxes / 300,-- EUR
Pricing in Euro	ex works, exc. packing, without sales tax, each unit
Payment terms	In advance
Warranty	24 month
Delivery terms	approx. 2-3 weeks after order
Validity of this offer	4 weeks

If you have any further questions, please do not hesitate to contact us again.

Sincerely Yours

i. V. Rosemarie Golly

microtap **GmbH**
Rotwandweg 4 / 82024 Taufkirchen / Muenchen - GERMANY
Tel +49-89-6128051 / Fax +49-89-6127488
info@microtap.de
http://www.tapping-torque-test.com/

7. Juli 2014

TTT Tapping-Torque-Testsystem

Laboratory “evaluation- & analysis” measurement system

TTTsystem - When monitoring lubricants

Torque controlled „Laboratory-Complete-System”

Easy laboratory system in method, handling and software. Designed with automatic feeding system, integrated manual X-Y-positioning table for aligned positioning as well as for recording of series of measurements plus analysis of results

Performance

TTTsystem - **lab**tap G8
With smart measurement-methodology and -equipment

ZAP

Z-axis balanced and smooth feeding system with special start-function for easy and faultless operations in laboratories

MPT

Integrated manual X-Y-positioning table for exactly controlled handling and TTTsystem-start for faultless measurements

TSE Temperatur-Sensor-Equipment

The **TSE E**quipment is furnished with a temperature measurement unit incl. optics, fixation handle for evaluation the temperature Delta **T** and calculation / analysis with WinPCA3.7 (Option)

TTT Software Win**PCA3**

PC-evaluation & analysis software for comparative value observation with allocated storage of definable series of measurements plus an analyser for individual automatic analysis including flexible differentiations of various single- and series of measurement results

TTT Measurement-Equipment

Please see separate information sheet

Application / Features

- For lubricants evaluation & development:
  - of cooling lubricants (WMF), metal processing lubricants and neat and soluble oils (Multiple Evaluation System MES)
  - of sales and distribution arguments (acquisition) and honest customer-support (screening) for best production results & customer’s benefit (added value)
  - of quality control procedures for the lubricant production (final-control)
- For evaluation & development of optimized tap tool geometries and tool coatings
- For achievement of optimized production parameters and for analysis of errors and influences (FMEA)
- For process-controlled and safe production regarding quality standard ISO 9000 with quality assessment including protocol

Characters / Advantages / Benefits

- Easy and fast handling for faultless measurement results
- With flexible analyser for direct evaluations and interpretations
- Multiple Evaluation System (MES)

microtap GmbH / **TTT**system - when monitoring lubricants
D - 82024 Taufkirchen / Muenchen (Munich) - GERMANY
Tel +49-89-61279213 (6128051) / Fax +49-89-6127488
info@microtap.de
http://www.tapping-torque-test.com/

TTT Tapping-Torque-Testsystem

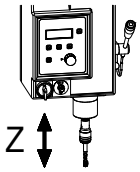
Laboratory “screening- & analysis” measurement system

Technical data

labtap G8 / **ZAP** / MPT / WinPCA3-Software

Measurement capacity lab**tap G8**	50 – 700 Ncm / Range for TTT_M4 Forming/Cutting and different threading and special thread measurement tools
Testbars-Material / Forming and Cutting	Aluminium / Carbon and Stainless Steel / INOX / Titan grade 5
TTT Method	Recommended TTT_Tools M4F (forming) and M4S (cutting)
Spindle speed range RPM	300 - 3000 RPM / infinitely variable / from 470 Ncm max. 2060
Measurement depth depends on request	6 – 8 – 12 mm
Column with hand crank	750 mm adjustable
Spindle/worktable distance max.	0 - 400 mm distance
Width / depth / height	320 / 475 / 1290 mm
Mains voltage / power consumption	230 Volt / 50 - 60Hz / 2900 Watt

ZAP pneumatic “counter balance” feeding system	Pneumatic **Z-Axis** **-** manual controlled floating spindle feeding system
Start functions	AutoStart**:** **- new automatic** auto start functions - cutting force sense to start - part location tolerance setting (ΔDelta-SZ)
Mounting	At microtap or authorized agency
Air pressure	2-5 bar
Air connection	Hose4 / 6 mm / without service unit 4/6 mm



Free Floating Spindle

Drive unit is in hover situation	**-** Mechanical **counter-balance compensation** (floating system) - low axial power
No lead screw / guidance cartridges	**- Faultless results** and correct positioning - low wear - earns real torque realisation on spindle - no pitch errors through mechanical play - no broken tools, especially during running, measurements
Controlled spindle approach	- In Z- aproach. FZ- controlled power - FZ & SZ- distance-controll (ΔDelta-SZ)

microtap **GmbH**, Rotwandweg 4
D - 82024 Taufkirchen / München - GERMANY
http://www.tapping-torque-test.com/
info@microtap.de

TTT Tapping-Torque-Testsystem

Integrated Manual X-Y-Positioning Table

Application	**MPT** matrixtap Integrated manual positioning table with four tee slots Electro-magnetic locks and integrated control of measurement tapping unit
Recommendation	Automatic floating feeding system
Table size	250 x 600 mm with 8 mm T-nut
Range	200 x 400 mm with laptap
Connection	230 Volt / 50-60 Hz
Adjustable holding	2 clamps / 1 locator
Control	I/O-interface
Measurement-tool-holder system	Collet chuck incl. collet for TTT Measurement-tool Range 5-4 mm (SZS1)
Feature	- Electromagnetic clamping applied after the start of the cut - Friction free roller guides ensure exact centering of the tool
Advantage	- Precise and rapid positioning of the workpiece with optimised cantering
Benefit	- All components designed to produce measurements without faults based to the microtap TTT method - No positioning errors / misaligned or stretched threads are avoided - Measuring faults from positioning errors are avoided - Efficient production of high quality threads / laboratory results

TTTsystem with integrated manual controlled floating X-Y-table **MPT**

microtap GmbH / **TTT** Systems
Rotwandweg 4 / D - 82024 Taufkirchen / Munich - GERMANY
info@microtap.de
http://www.tapping-torque-test.com/

TTT Tapping-Torque-Testsystem

Laboratory Evaluation & Analysis System

The Temperature-Sensor-Equipment TSE collects Temperature Data for Application of Temperature Delta T

Terms of Reference / Approach

At the time of the greatest heat build-up the exact temperature at the tip of the tool can be measured only with an enormous effort

Solution / DeltaT Method

When determining the temperature at the tip of the tool right before measurement and again right after measurement however, and compare both data, the difference results in the temperature value Delta T (∆**T**)

Realisation

The **T**emperature-**S**ensor-**E**quipment **TSE** is furnished with a temperature measurement device incl. optics, fixation handle and accessories

Features

The ∆**T** data are fed into the Analyser of the **„Evaluation & Analysis Software“** and directed towards a parameterisation (graphic and numerical display of the temperature value ∆**T**) and subsequently amalgamated and evaluated with the torque data of the work spindle

The **TSE** in combination with the **TTT** System has specially been developed for laboratory requirements of the Water-Mixable-Fluids (MWFs) industry and manufacturers of threading tools and tool coatings

Temperature Assessment

...right before and right after measurement

From „∆**T** “ we gain meaningful evidence for the interpretation of temperature influences. The computed ΔT mean value of a series of measurement, interacting with the torque values, is able to deliver plausible conclusions in regard of the effective power of an additive respectively EPs in dependence on temperatures occurring in a work process

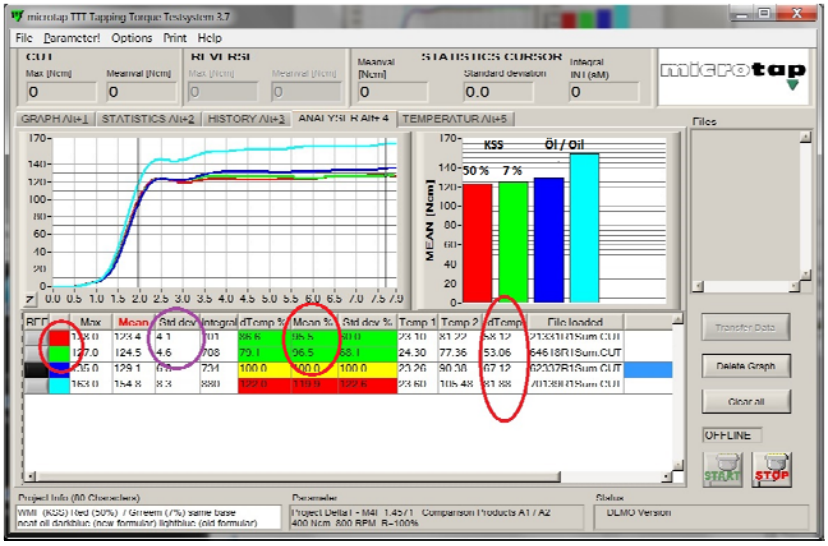
TTT Tapping-Torque-Testsystem

Laboratory Evaluation & Analysis System

Retrofitting TSE Temperatur-Sensor-Equipment and WinPCA3.7 Upgrade

Benefit / Advantage

Temperature, which has a decisive influence on the activity and functionality – in other words: the potency and limitation of tribologic performance of lubricants and their additives, is a factor for friction with essential effects on a durable existence and the quality of a factually operative lubrication film, and its limits as well



Analyser / Bar Chart

Price Retrofitting	2.300 € Incl. Firmware-Update at microtap GmbH / authorised partner excluding shipping costs
Requirement	The **TSE**_System is available and applicable only in junction with Win**PCA**3.7, Firmware > V.4.99
Upgrades V2.5 – 2.6V3 V2.7 – 2.7V6	Win**PCA**3.7 3.000 € 2.500 €
Updates V3.0 – V3.36	Win**PCA**3.7 1.000 €
TTT Support / Schooling on site / day Win**PCA** SW for further PCs	1.200 € / foreign countries plus expenses 300 € per workstation / computer

microtap **GmbH**
Rotwandweg 4
82024 Taufkirchen / München (Munich – GERMANY)
Tel +49-89-6128051 / Fax +49-89 -6127488
http://www.tapping-torque-test.com

January 2014

info@microtap.de

microtap

A window into Tribology

Visualise the effectiveness of lubricants and their formulations with the TTT Tapping-Torque-Testsystem

EFFICIENCY THROUGH NEW TTT-STANDARDS AND -METHODS

The TTT Tapping-Torque-Testsystem

The TTT Tapping-Torque-Testsystem is a multiple development system which with the help of torque and temperature measurement visualises real evidence of decisive process-parameters during forming and machining. This submits a reliable predication, according to IQ, PQ and OQ, about the performance ability of lubrication media, tool geometries and coatings.

Hereby the microtap Infrared-Temperature Measurement-Method determines the starting temperature at the tip of the measurement tool, which right after process is compared with the determined end temperature. The difference shows the temperature value Delta T (ΔT). The interaction between the basic measurement values of torque coverage and ΔT value provides the possibility to analyse the influencing factors in a mechanical work process with "interacting surfaces in relative motion". The collected values allow to evaluate performance and effective power of lubricants (e.g. slippage, cooling, friction, homogeneity, and work load on tool resp. tool wear). The TTT Tapping-Torque-Testsystem determines the following values:

1. Torque (Mz in Ncm) as a value for the afforded work load
2. Mean Value (Mean) as a value for the afforded work load in average
3. Standard Deviation (Std. Dev.) as a value for the mean deviation of torque around the Mean Value
4. Gaussian Distribution (frequency distribution) of torques occurred, as histogram (Statistics)
5. Integral (INT) as a value for total load on measurement tool
6. Temperature Delta T (ΔT) as a value for thermal influences on the work process through ingredients like e.g. water, additives and also coatings, for the interpretation of tribological procedures

Target Audience:

As an evidencing device for performance, quality, functionality and effectiveness the TTT Tapping-Torque-Testsystem is qualified for:

1. Lubricant and additive manufacturers
2. Metal-working respectively tapping tool manufacturers and coating industry
3. Decision makers / users of process secured production acc. to IQ, PQ and OQ

Benefits:

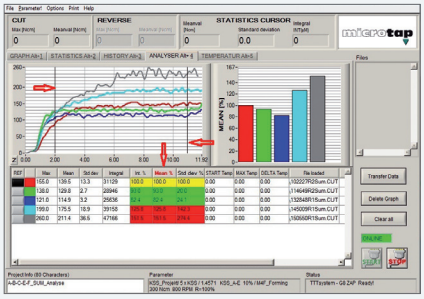
- Practical multi-development laboratory system
- Smart handling and method for faultless measurement results
- Significant results for the evaluation of lubricants, tools and coatings
- Increase of added value, e.g. by raising process speed
- Prolongation of tool life / controllable tool wear

The System:

Das TTT Tapping-Torque-Testsystem consists of the following components:

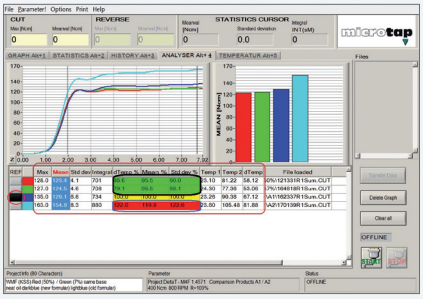
- microtap threading machine "labtap"
- TTT Evaluation- & Analysis-Software
- X-Y positioning table MPT
- Temperature-Sensor-Equipment TSE
- Standard- and specified measuring equipment

Examples:



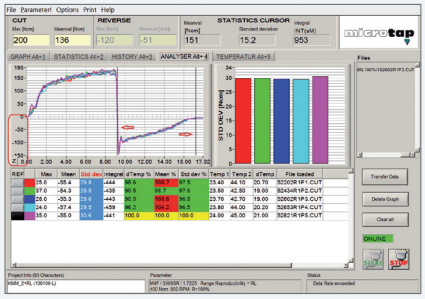
Analyser and comparison method

The max. torque, the mean value torque, the standard deviation, statistics (Gauss) the integral and ΔT-value, are depicted according to cursor by means of graphic curves and bar charts. The tabular evaluation shows the differences within the range of the dual-cursor according to five measurements, proportional to selectable lubricant reference (here e.g. the Mean Value).



Results und Analysis

Red and green in the bar chart are two water mixable MWFs: Red 50% , green 7%. Dark- and light-blue are neat oils for stainless steel (Nirosta / V4A), where dark-blue is an optimisation, which according to customer's demand was refined from light-blue. Quite impressively we can recognise the differences respectively the improvement of the optimised neat oil. In this example dark blue is the reference product. The development of water mixable MWFs significantly makes progress; the cooling factor of water is fundamental.



Return-travel-torque values and analysis

Via friction values of interacting surfaces in relative motion, the return travel offers insight – especially with jamming materials – whether the lubricant or the additives applied provide good or poor slippage.

The Difference:

- The TTT standards and methods realise specified comparable and repeatable results
- The identified TTT results are comparable, both internally and within different laboratory groups
- The TTT improves transparency of complex properties of tribological systems and provides insights which have proven their worth in practice
- The TTT method creates the possibility to counteract the "carry over effect" and simultaneously utilise it for valuable conclusions

References:

Additives International | Afton/Polartech | Allweier | American Saw | AMCOL | Anga | Astrium | Bantleon | Bechem | BP/CASTROL/ARAL | Benz Oil Belgin Madenie Yaglar | Binol Filium | Blaser Swisslube | Blue Chip Metallworking Fluids | BMW | Bosch | Boss Jakob | Buhmwoo Chemicals | CD Tech Century Oils (Fuchs) | Chai | Chemetall Oakite | Chemetall (Australasia) | Chemical House | Chemizol Additives | Chengliang Tools | Croda (Uniquema) Coral Chemical | Condat | Cincinnati/ Vulcan Oil Company | Cimcool/Milacron | CLARIANT | Customs Synthetics | D.A. Stuart (Houghton) | DC Daniel Charpilloz | Degussa (Evonik) Goldschmidt Chemical | Diversified Chemical | DOG | DNR/University of Illinois | Dover Chemical | Duncan McDonald EADS | EHA | Ejot | EMUGE | Exon/MOBIL | Eng. Lubricants | FANAR | Feix | Frauenhofer Institute | Fuchs Lubricants | Fuchs Lubricant ASIA | Ferro (Dover)/ Keil Chemical | Francool Shenzhen | General Motors R&D | Georgia-Pacific/Resins/Actrachem | GMERI | Gühring | Guangzhou Research Institute GWG Gabrovo | Hangsterfer's Laboratories | Hanson Whitney | Hebro Chemie | Henkel | Hoechst Celanese | Hoffmann | Holzhauer | Houghton International | Innovative Machining Technologies | IOC Indian Oil Corporation | IPT | Italmatch | Jarvis Cutting Tools | Kao Chemicals | Kennametal Kerun | Kukdong Oil and Chemicals | Leitat | Linig | Link/JEL | Loctite | Lube Ros | Lubricor | Lubrizol | Manigley | Master Chemical | Milacron/Cimcool Minebea | MIT Massechusetts Institute of Technology | MSI | Mineralölwerk Osnabrück/TOTAL/Mobil | Motul | Nalco Chemical | Narex | Neoboss | Nippon Grease | Nicotech Oilservice | Oemeta | Olistore | OPEL-GM/R&D | PCC Chemax | Petrofer | Polartec Additives | Priority Techniks | Process Solutions (US Fluids) | Prototyp PWZ/Titex/Walter Tools | PTT Research & Technology Institute | PT Utama/Sadikum/Liqtro/Whizol | Productos Quimicos y Derivados PWA | Quaker | REIME | Reys | Rhenus | Rhein Chemie | Rocol | Rock Valley Oil & Chemical | Ruetgers Organics (Sunbelt Lub.) | Samhwa | Schäublin/Eso Shell Global Solutions | Shur-Lok Corporation | SINOL/Houghton | Skoda | SIEMENS | Solutia Inc. | Spartan Chemical | Sunbelt Lubricants | Sutton Tools | Talent | Tapmatic do Brazil | TEL (Unaxis/Balzers) | University of Michigan | Vökel | VW | Werkö | Yamawa | Yangzhou Jiangyu Cutting Tools Yangzhou Three Tops Prescious Thread Tools | TOTAL | Tower Oil | Uniqema/Croda/ICI | Wieds | Yuma Industries | Yushiro Chemical | ZET Chemie | ZICOS

Contact:

microtap GmbH
Rotwandweg 4
82024 Taufkirchen / München
Germany
Tel.: +49 89 6128051
Fax: +49 89 6127488
Mail: info@microtap.de
Info: www.microtap.de

Since 25 years microtap GmbH is specialised in process secured and quality controlled threading. From the features of these therefore developed machine-tools arose the TTT Tapping-Torque-Testsystem.

TTT Tapping-Torque-Testsystem

TTT Standard-Equipment

Conditions and Quality

The latest microtap **TTT Standard** for measurement requests offers a new solution for TTT customers with a demand for measurement applications, structural connectivity & tribological comparability of lubricants. All Measurement-Equipment (testbars materials & measurement-tools) will be delivered in consistently precise quality.
Every testbar is **manually proofed** and has max. 7 marked faulty holes.
The new TTT Standard test-bars has a ferifide homogenous structure.This equipment is also used for customer specific laboratory examinations and requirements for laboratory-directions.

TTT Standard-Testbars

Measurement-Equipment / M4F Forming

Stainless Steel

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

Depth **20 mm** (max. Measurement-Depth 5 x D*)
Price € 400,-- / pc

Aluminium

AlZnMgCu01,5 / 3.4365 / 7075
Hardness R_m 420-450 N/mm² / $R_{p0,2}$ = 420 N/mm²
Ultimate elongation A5 > 5-7% / HB 140 / density 2.78 Kg/dm³
Aircraft - CarEngine standard/classic

Depth **20 mm** (max. Measurement-Depth 5 x D*)
Price € 390, -- / pc

TTT Standard-Tools

Specially Gauged M4F Tools

Selected Forming Tools M4F (e.g. pitch-diameter 3.642 mm)

TTT_M4F-NT Forming vaporised/nitrated with gauged pitch-diameter 60 €
TTT_M4F-TIN-T Forming TIN coated with gauged pitch-diameter **70 €**

* At determination of the friction coefficient the physical load parameters in a wear process are defined:

- Normal Force FN (Spindle Torque)
- Velocity V (Cutting Speed)
- Time of Load tB** (Depth of thread* & speed)
- Temperature T (Delta T)

TTT Tapping-Torque-Testsystem

Additional Reference Aluminium Testbars

M4F **Forming** and M4C **Cutting**

AlMgSi1 / 3.2315 / 6082
Hardness R_m 295 N/mm² / $R_{p0,2}$ 240 N/mm²
Ultimate elongation A5 > 8% / 89 HB

AlZnMgCu0,5 / 3.4345 / 7022 (also with 20 mm depth available)
Hardness R_m 420-450 N/mm² / $R_{p0,2}$ 340-370 N/mm²
Ultimate elongation A5 > 5-7% / HB 140 / density 2.78 Kg/dm³
Machinery standard/classic - good for "Duktilitaet"

G-AlSi12Cu / 3.2583 / GD-3-298 / SAE 413.1 / JIS ADC1)
Hardness R_m 150-290 N/mm² / $R_{p0,2}$ 80-130 N/mm²
Ultimate elongation A5 (1-3,5%) / HB 50 / density 2,65 Kg/dm³

AlZnMgCu01,5 / 3.4365 / 7075

Depth of all testbars: **12 mm** Forming / Cutting (max. Measurement-Depth 3 x D*)
Price: € 320,-- / pc

Additional Reference Steel Testbars

Stainless Steel

X6CrNiMoTi17-12-2 / 1.4571 (V4A) / 316Ti
Hardness R_m 725N/mm² / 225 HB / 112 PSIx1000
Ultimate elongation A 5 (%) > 40 / R_m = 775N/mm²
Price: € 360,-- / pc

Carbon steel

C45N/C45E / 1.1730 (1.1191) 1045 / JIS S48C
Hardness R_m 600N/mm² / 175 HB / 85 PSIx1000
Ultimate elongation A 5 (%) > 14 / R_e>355N/mm²
Price: € 320,-- / pc

Heat treated steel

42CrMo4V / 1.7225 / 4140 / JIS SNB7 (SCM440(H)
Hardness R_m 1100N/mm² / 300 HB / 145 PSIx1000
Ultimate elongation A 5 (%)
Price: € 450,-- / pc

Titan Grad 5
(No steel)

TiAl6V4 / 3.7164 / TiAl6V4 / 49-11-28-35-54-65-67
Hardness R_m 1150N/mm² / 340 HB / 163 PSIx1000 / 36 HRC
Ultimate elongation / $R_em^{2'}$
Price: € 500,-- / pc

Depth of all testbars: **12 mm** Forming / Cutting (max. Measurement-Depth 3 x D*)

Laboratory Measuring Tools

TTT_M4F-N Forming Standard / vaporised – nitrated / **50 €**
TTT_M4F-NT Forming with gauged pitch-diameter / **60 €**
TTT_M4F-NS Forming with lubrication groove / **60 €**
TTT_M4F-TIN TIN coated) / **60 €**
TTT_M4F-TIN-T TIN coated with gauged pitch-diameter) / **70 €**
TTT_M4F-T for Titan applications / **70 €**
TTT_M4C Cutting-Standard / blank for cutting / **50 €**
TTT_M4C-T Cutting-Standard / with gauged pitch-diameter / **50 €**
TTT_M4C-TIN TIN coated / **60 €**
TTT_M4C-TIN-T TIN coated with gauged pitch-diameter / **70 €**
TTT_M4C-NI Cutting for nickel-based alloys / **60 €**
TTT_G 6 Tolerance-proof-gauge M4F & M4S (green/yellow/red) / **60 €**

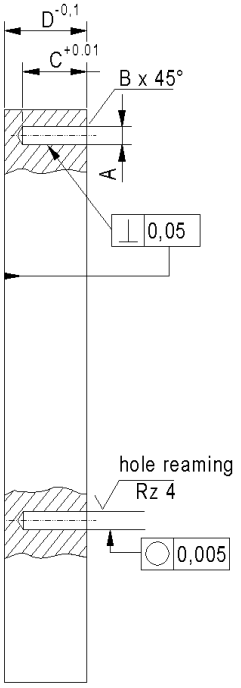
TTT Tapping-Torque-Testsystem

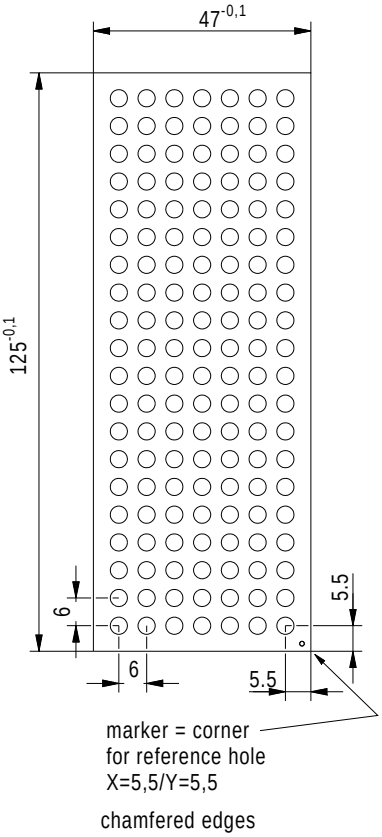
Laboratory
Measurement Equipment

Material Conditions & Tolerances
for TTT Measurement-Tools M4 Forming & Cutting

Measuring TTT Testbars with 12 and 20 mm Thread Depth

Test bar sizes: 125 x 47 x 18 / 30mm (D - with counter sinking)
140 drilled array at 6 mm for TTT Measurement Tools – M4F and M4C





New TTT Standard

20 mm ➔ Mechanical load time **tB** ** - depending on depth / speed
➔ **M4F Thread** with 5 x Diameter* **NEW 20 mm** thread depth **!**
Test bars size 125 x 47 x 30 mm / 140 holes – M4

Forming
Counterbore
Depth

Thread Forming and Cutting (12 mm / 20 mm thread depth)
A = 3.70 mm + 0.01 mm
B = 0.2 mm
C = 12 mm

Cutting
Counterbore
Depth

A = 3.30 mm + 0.01 mm (12 mm thread depth)
B = 0.4 mm
C = 12 mm

TTT Tapping-Torque-Testsystem

Laboratory
Measurement Equipment

Legend

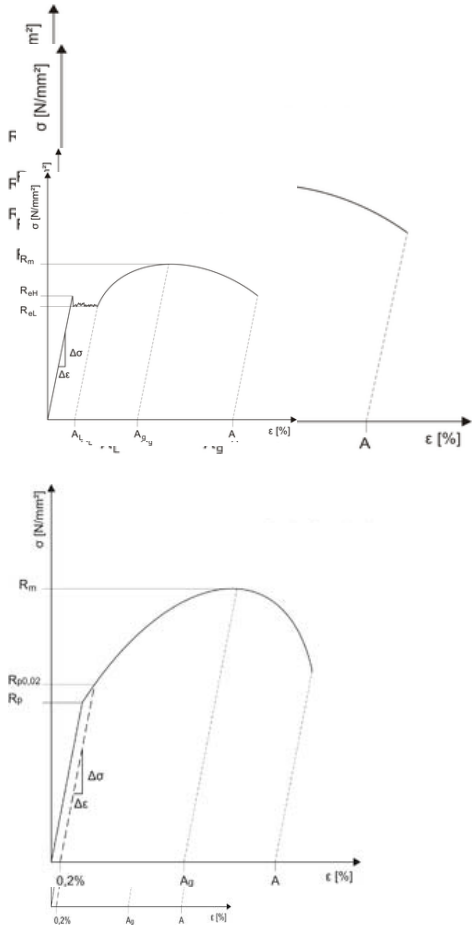
R_m Hardness
Indicates the tension at the peak of the stress-strain-chart.

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

Conditions
Pricing: Terms of delivery of micro**tap** GmbH
Payment: **€ /** ex work / excl. packaging
Delivery time: 14 days net / Foreign countries payment in advance
Approximately 1 week after order

info@microtap.de