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:

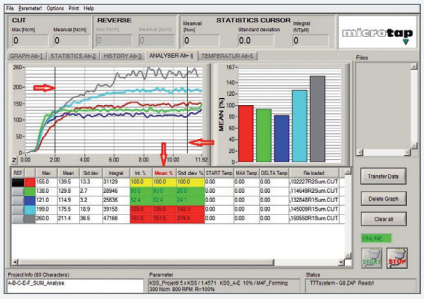
- Practical multi-development laboratory system
- Smart handling and method for faultless measurement results
- Significant results for the evaluation of lubricants, tools and coatings
- Increase of added value, e.g. by raising process speed
- Prolongation of tool life / controllable tool wear

The System:

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

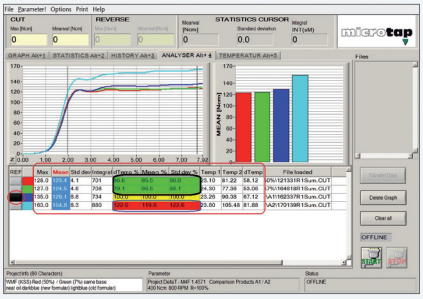
- microtap threading machine "labtap"
- TTT Evaluation- & Analysis-Software
- X-Y positioning table MPT
- Temperature-Sensor-Equipment TSE
- Standard- and specified measuring equipment

Examples:



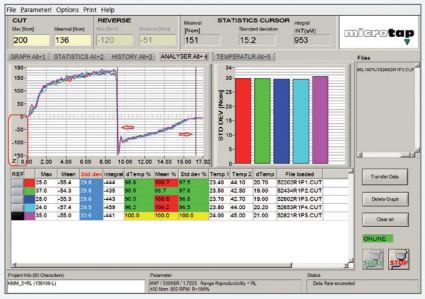
Analyser and comparison method

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

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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.