MAPAL HiTECO

MH-EN-01

We Make it **Simple**

MAPAL HiTECO

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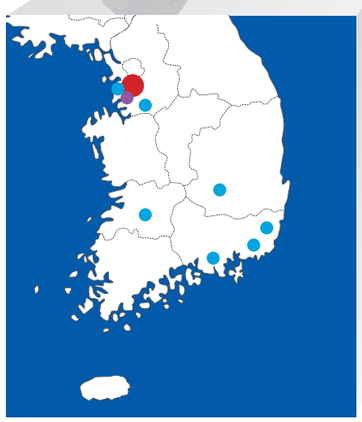
# Contents



# Networks

## CORPORATION

| | |
|---|---|
| Headquarters | 1 |
| TMS Site Overseas | 8 |
| Sales Office Overseas | 2 |

## DOMESTIC

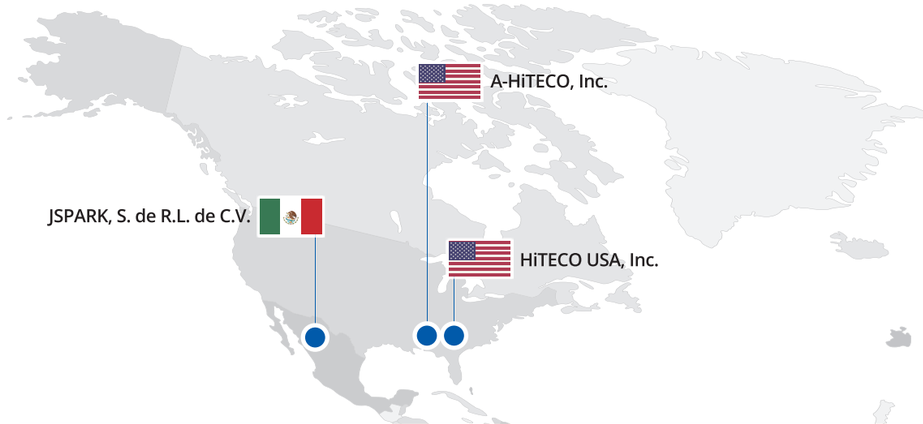
| | |
|---|---|
| Headquarters | Gyeonggi Siheung-si |
| R&D Center | Gyeonggi Siheung-si |
| Gyeongin office | Gyeonggi Siheung-si |
| Joongbu office | Gyeonggi Pyeongtaek-si |
| Jeonju office | Jeonbuk Jeonju-si |
| Ulsan office | Ulsan |
| Daegu office | Daegu |
| Changwon office | Kyungnam Changwon |
| Busan office | Busan |





## MAPAL HiTECO pioneers a new world.

MAPAL HiTECO, centered around our Korean headquarters completes a global service network through overseas corporations in the United States, Europe, India, China, Thailand, Vietnam, Mexico and other countries around the world. We provide innovations for optimized service and success through the customized service of MAPAL HiTECO to meet the needs of the world market.




## GLOBAL

### the Americas

**HiTECO USA, Inc.**
In Georgia, USA

**A-HiTECO, Inc.**
In Alabama, USA

**JSPARK, S. de R.L. de C.V.**
In Monterrey, Mexico

### EUROPE

**HiTECO CZECH s.r.o**
In Nosovice, Czech

**HiTECO SLOVAKIA s.r.o**
In Zilina, Slovakia

### ASIA

**HiTECO TMS CHINA Co., Ltd.**
In Beijing, China

**HiTECO TMS INDIA PVT., Ltd.**
In Chennai, India

**HiTECO TMS Thailand Co., Ltd.**
In Rayong, Thailand

**MAPAL HiTECO China Co., Ltd.**
In Beijing, China

**MAPAL HITECO VIETNAM CO., LTD**
In Hanoi, Vietnam



*We are ONE*

*New challenge!*

# Family Company

**MAPAL HiTECO and our family companies always pursue the best technology.**

MAPAL HiTECO have established specialized family companies to provide the best products and optimal precision machining of metal cutting. MAPAL HiTECO, HiTECO, NLT, TAMS and Elumisoft are leading precision machining of metal cutting through our advanced technologies and experience.

Support your future
HiTECO

## Introduction

HiTECO was founded to provide TMS and MMS business in 2011. HiTECO provide TMS (Tool Management Service) that manages the whole process from tool planning to disposal resulting in a more cost-effective solution. Also, we provide MMS (Maintenance Management Service) that includes spindle repair, component supply, rapid A/S and a total service system.


## Business

### Tool Management Service

Support for all problems related to tooling.

**Tool** + **Tool Inventory** + **Improvement** = **TMS**

| Tool | Tool Inventory | Improvement |
|---|---|---|
| • Setting | • Information records | • Planning |
| • Tool life | • Purchasing | • Discussion and progress |
| • Breakage | • Warehoused stock | • Apply to mass-production |
| • Re-grinding | • Release and withdraw | |

### Maintenance Management Service

MMS provides integrated management of spindle repair, component supply, rapid A/S and a total service system.

**Repair** + **Component management** + **Service** = **MMS**

**The scope of repair**
- Spindle
- Gear box
- Sliding cover
- Machine for overhaul

**A/S and sales**
- Quality assurance
- Design and produce
- Support purchasing

**Before Service**
- Prevention and examining activity for equipment and units
  - ▶ Improve equipment performance and life
- Suggest customized solutions

**After Service**
- Equipment repair, remodeling, improvement

Next Level Technology NLT

# Introduction

NLT was founded in 2005 and grew at a rapid pace as an automotive parts manufacturing company with the philosophy of "Next Level Technology". NLT strives to provide the best quality and products by using specialized cutting solutions and customized cutting tools of MAPAL HiTECO.
In addition, NLT thoroughly manages quality control through our own quality assurance network for mass production. By minimizing quality deviation through SPC, we prevent quality problems and stabilize processes to further strengthen customer satisfaction and trust. NLT meets the needs of various customers through differentiated technologies and promises the best productivity and quality that will surpass customer's trust and expectations.

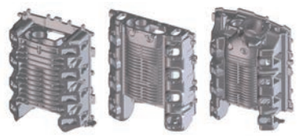




# Products

The main products are cylinder heads, TGCC, super charger housings, converter housings, transmission cases and rear axles which are the main components of automobiles.

## Super charger housing

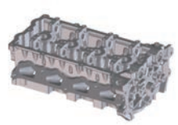


- GM

- JAGUAR

- FORD

## Cylinder head



- SSANGYONG MOTOR COMPANY

## TGCC

- SSANGYONG MOTOR COMPANY

## Converter housing

- HYUNDAI POWERTECH

## Transmission case

- EATON

## Rear axle cover

- SSANGYONG MOTOR COMPANY

Surpass All Imagination TAMS

## Introduction

TAMS was founded as a specialized engine production company in 2016. TAMS is operating consignment of the whole factory process including production management, engine material processing, engine assembly, quality control and facility maintenance. Especially, we are realizing factory operation management services to meet customer needs through quality control systems, SPC and HIPIS, and specialized training for maintenance staff on all equipment.

## Major Production Process

### Manufacturing

- Cylinder head and block
  - CNC MCT and Robot
- Crank shaft
  - CNC grinding, lapping and auto measuring

### Assembly

- Engine
  - Engines completed by assembling about over 200 types of parts excluding head, block and crank.

### Shipping

- Engine
  - Customer Shipping
  - Hyundai Motor Company
  - Kia Motors Corporation

## Products

| Engine Type | Diesel Engine | | | Gasoline Engine |
|---|---|---|---|---|
| | Model A | Model B | Model C | Model A |
| Customer | Hyundai Motor Company<br>Kia Motors Corporation | Kia Motors Corporation | Kia Motors Corporation | Hyundai Motor Company |





Elumisoft

## Introduction

Elumisoft was established in 2011 as a partner for the computer system development of MAPAL HiTECO and family companies. We provide the best solutions and e-service through HOS, TMS Software and SSS. HOS (Hiteco One System) is the integrated system of MAPAL HiTECO and HiTECO. TMS software is designed to optimize the TMS business of HITECO. Recently, Elumisoft launched SSS (Smart Storage Solution) that improves work efficiency through easy inventory management.

## Business

### **HOS** Hiteco One System

Enterprise resource manage and analysis system through an internet portal site.


**ERP**
Enterprise Resource Planning

**Groupware**
Electronic Payment Service

**SFA**
Sales Force Automation

**EIS**
Executive Information System

**EMS**
EIP Mobile Service

### Software Tool Management Service

A solution to reduce costs by proper ordering of tools, tool life management, regrinding and quality improvement.

Features : Release for tool setting, Automatic order, LOT management, monthly stock status report, BOM, supplier data management.

### **SSS** Smart Storage Solution

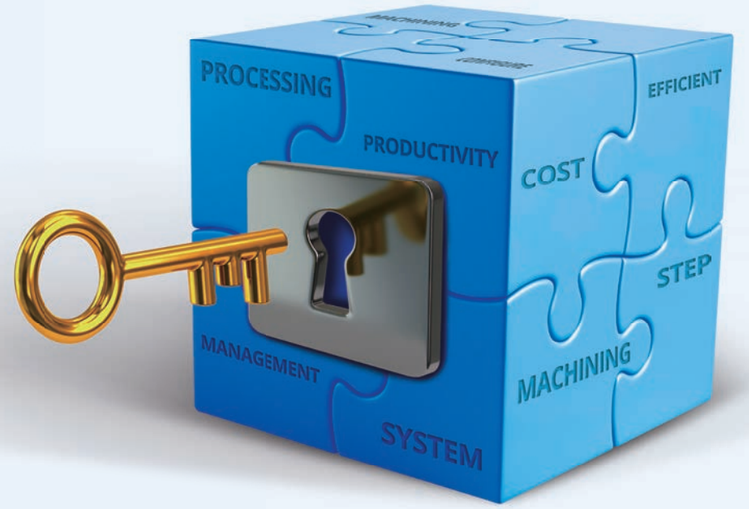
SSS possible to operate simple inventory management in real-time through use of modulized ES-100 on existing shelves.

# Business

## Only one KEY to success

We have everything our customers need from the purchasing of tools, to production line design, to after service.
MAPAL HiTECO promises to strive and develop continuously to become the best choice for our customers.

1. How to maximize productivity and minimize cost?
2. How to manage tools and the cost systematically?
3. How to design equipment & jigs?
4. How to purchase the latest tooling systems for cutting machining?
5. How to lay out an efficient machining process?




## Your concern becomes ‘Simple’

MAPAL HiTECO presents an optimized answer through perfect technology and a spirit of devoted service.

**CTS** — **Complete Tooling System** — Provides total tooling and optimized cutting conditions

+

**TES** — **Turnkey Engineering Solution** — Total production line design to optimize processes

+

**TMS** — **Tool Management Service** — Total tooling management service

+

**MMS** — **Maintenance Management Service** — Provides spindle repair, component supply and maintenance

+

**TAMS** — **Total Administration & Management System** — Total management system of factory operation

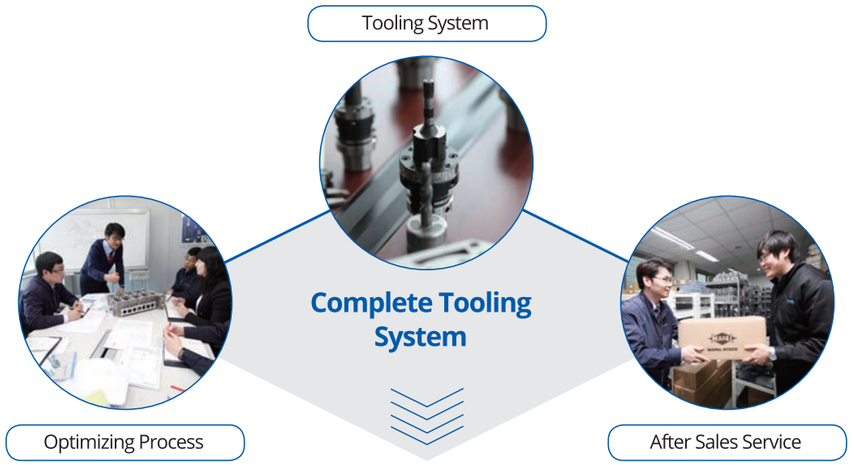
# CTS

## Complete Tooling System

### CTS beyond customer's expectations.

We provide efficient and suitable total tooling by analyzing the machining process for new projects to meet customer needs. Also, CTS provides cost reduction and stable production by offering optimal cutting conditions.

- Various experience and know-how accumulated over 20 years
- High quality products
- Continuous after sales service through specialized engineers




## Advantages

### We provide all the tooling services that customers need based on the advanced technology of Europe that is continually updated.

- Provide all kinds of tooling systems for production
- Optimized cutting conditions
- After sales service

By solving all the problems that may arise due to tool through MAPAL HiTECO's CTS, customers can secure optimal production lines that maximize productivity.





### Fundamental element of CTS is the preparation of all the systems related to metal cutting.

MAPAL HiTECO provides all systems of the superior quality required for metal cutting machining such as solid carbide and PCD tools that are produced in our manufacturing factory, as well as holders, tool presettesr and coolant systems that are imported from our German business partners.


**TOOL**

**Drill**
- TTD Drill
- Carbide Drill
- PCD Drill

**Reamer**
- HPR Reamer
- Carbide Reamer
- PCD Reamer

**Milling**
- PCD Milling Cutter
- Carbide Endmill

**Tap**
- Machine Tap
- Roll Tap
- Thread Mill

**Boring**
- Fine Boring Tool
- Line Boring Bar
- PCD, Cermet, Carbide, PcBN Boring Tool

**OTHERS**

**Holder**
- TRIBOS Chuck
- Collet Chuck
- Heat Shrinking Chuck
- Hydraulic Chuck
- Milling Chuck

**Tool Pre-setter**
- MAPAL Setting Fixture
- ZOLLER Pre-setter

**Insert**
- Carbide Insert
- Cermet Insert
- PCD Insert
- PcBN Insert

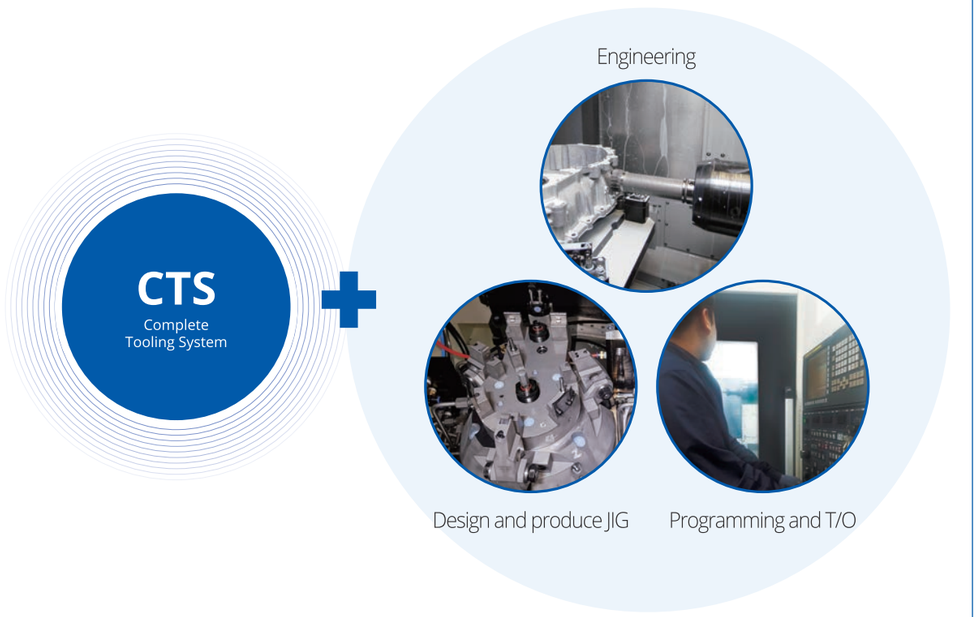
# TES

## Turnkey Engineering Solution

### TES is a service that includes all the benefits of CTS and designs entire production lines.

TES provides software and hardware solutions needed for tooling systems and machining of metal cutting (machines, jigs, tools, setting and measuring equipment).

TES Turnkey Engineering Solution

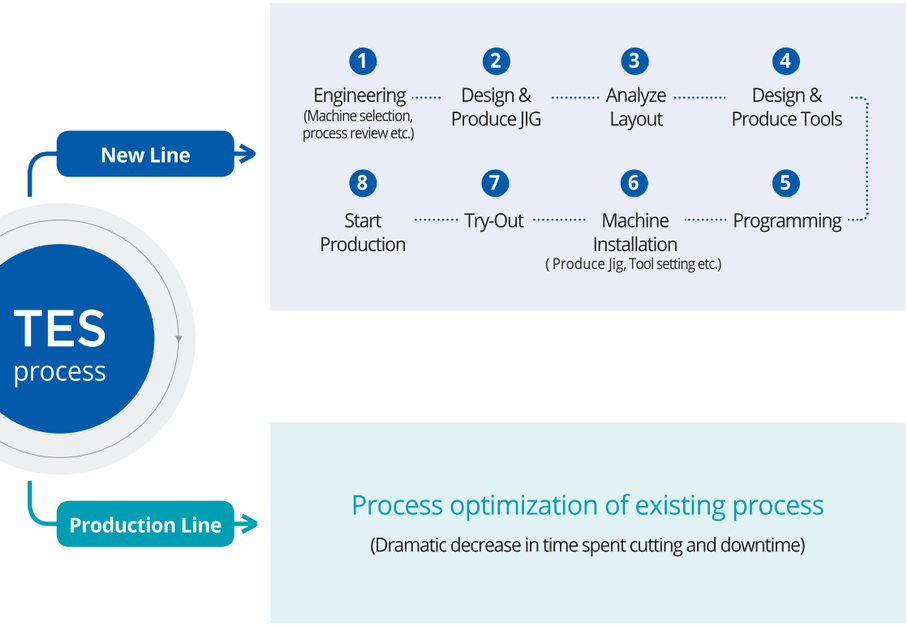



If MAPAL HiTECO's CTS provides comprehensive tooling systems, TES goes one step further and provides complete turnkey engineering solutions to meet customer's needs.

## Advantages

### TES can be applied not only to newly installed machining lines but also projects that optimize process for existing lines.

With TES, customers can expect amazing levels of productivity and quality with minimum cost.




Our experienced engineers analyze customer's machining process needs and suggest optimal engineering solutions. Customers can now resolve every element from business feasibility review to mass production approval in one go.

# TMS

## Tool Management Service

### TMS provides a specialized high quality tool management service at real production sites.

TMS provides complete tooling management to the customer during production, from tool analysis and planning to tool re-grinding and improvement. Therefore, customers can get quick responses related to any tooling problems from the production site by MAPAL HiTECO and attain an optimized production environment.


## Advantages

### We resolve customer's concerns about tool management on production sites using our years of accumulated tooling experience and competitive engineering know-how.

- Operated by a one point contact system
- Provide superior production conditions through specialized engineers
- Improve productivity and reduce costs
- Continuous tool improvement
- Update with latest technology and optimal processes
- Improvement of processing skills through regular tool seminars

### We can help reduce costs and improve productivity.

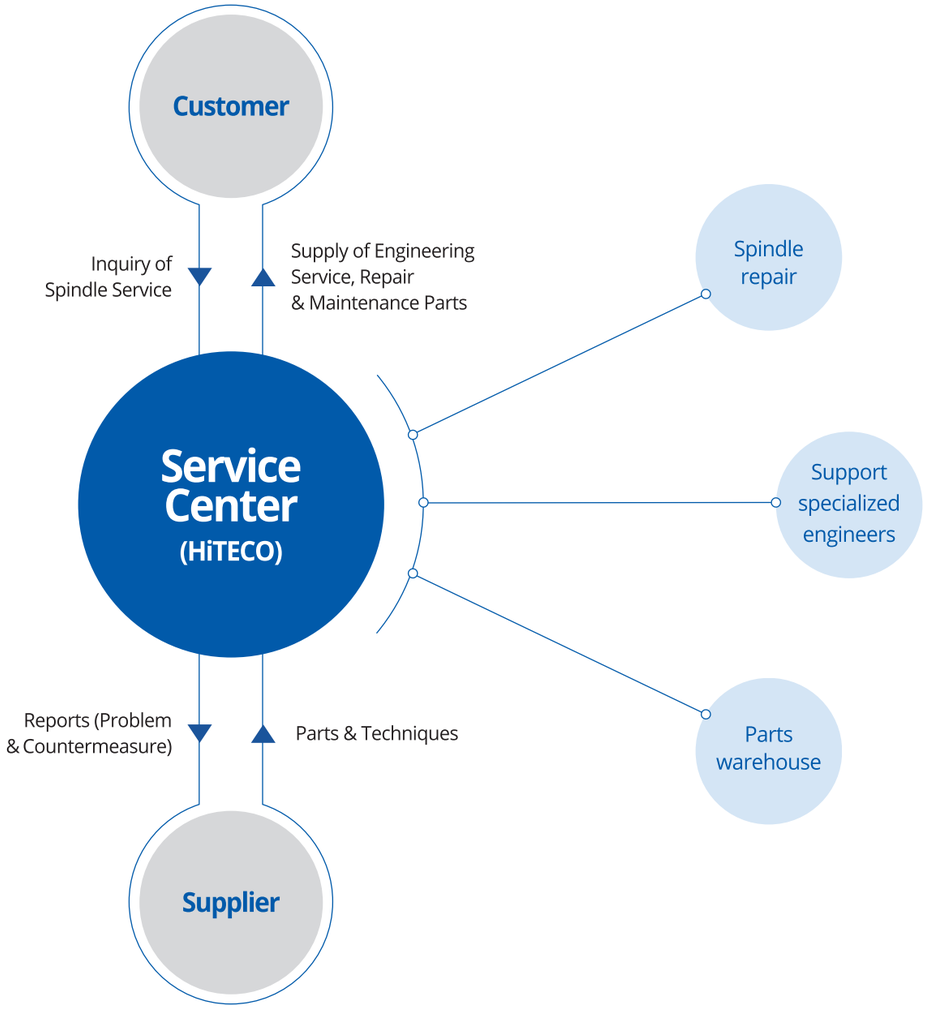
- Quick response in emergencies
- Tool life management
- Quick application of new technologies
- Constant communication with customers
- Sharing of technical skills

# MMS

## Maintenance Management Service

We can take a step further to improve the quality of products by providing a more stable production environment through spindle repair, component supply, installation and maintenance of machines.

- Support maintenance of machines and automated equipment.
- Provide a stable production environment through before and after maintenance
- Support total tooling management service for production
- Manage equipment with specialized engineers and latest technology



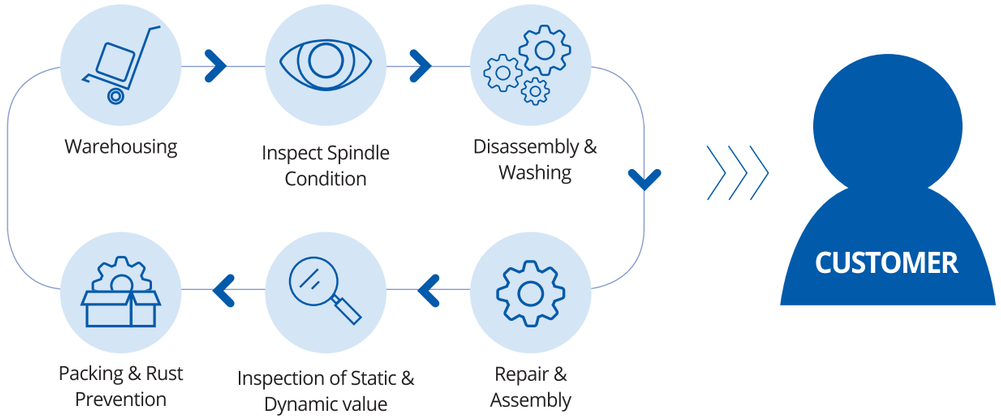





## Advantages

- Quality assurance using original components
- Support for a total service system (component supply, installation, T/O, repair, maintenance etc.)
- Reduce maintenance and inventory costs for customers
- Regular maintenance
- Service available for emergency responses
- Service support through specialized engineers

[MMS spindle repair process]



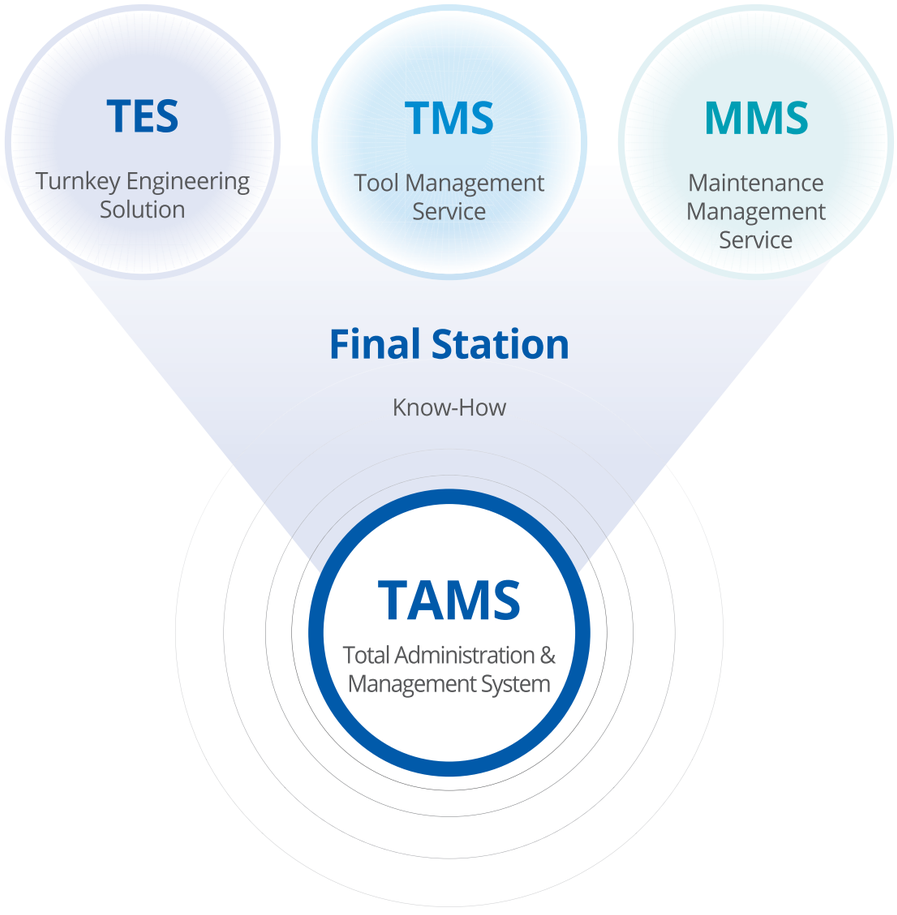

## Networks

# TAMS Total Administration & Management System

## TAMS is a total management system for factory operation, providing for all the work of a production factory.

We provide our customers with total solutions of engine production based on MAPAL HiTECO's 27 years of corporate operation know-how and superior engineering technology.

- Total management system of factory operation (Production Management, Machining, Assembly, Quality, Maintenance, Etc.)
- Outsourcing production technology is possible
- 'H' Company engine plant → Operated for the first time domestically and overseas
- Production system of various models and mixd-flow engines (Diesel and Gasoline Engines)






## Process

### Production management

- Production plan (yearly, monthly)
- Optimal inventory management of engine parts and rapid shipment
- Support production departments by planning efficient production schedules

### Production

- Manufacturing of 3C (Cylinder block, Crank shaft, Cylinder head)
- Produce engines by assembling manufactured 3C and various LP parts

### Quality control

- Quality control of finished product
- Quality control of LP parts
- Field quality problems prevented by residing staff

### Maintenance

- Maintenance of machines, automated equipment and conveyors
- Stabilization of production line through before and after maintenance
- Energy saving through demand forecasts

### Others

- Operate computing system of production automated lines (MES, power management system)
- Safety, Medical and environment management
- Improve worker skill through education and HR management systems
- Support cleaning for production environment

# Smart Factory

MAPAL HiTECO is continuing to grow together with the cutting tool industry through the building of a smart factory for manufacturing precision cutting tools.

Based on information exchange of the IoT (internet of things) for industry 4.0 implementation, we have built an integrated manufacturing management system that is available to monitor and manage in real-time.

## HiTECO ONE System

ERP
SYSTEM

### Realization of a Smart Factory!

Efficient equipment management is possible by checking machine conditions in real-time.

### Necessity of a smart logistics center!

Effective inventory management is possible by using QR code scans for input and output.

**MES**
Manufacturing Execution System

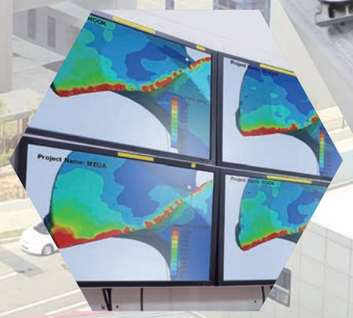
**LMS**
Line Monitoring System

**SSS**
Smart Storage Solution

**QMS**
Quality Management System

### The 20th century is the age of productivity, The 21st century is the quality age!

Measured values automatically transfer through installed devices per process.



**R&D**
Research & Development

**SMART FACTORY**

# LMS

## Line Monitoring System

MAPAL HiTECO maintains a high quality and stable production environment through collecting and analyzing various production information on the production site in real time.

Based on LMS, we are improving productivity by maximizing work efficiency by checking the operation status of equipment and maintenance necessity in real time.



### Advantages

- Check the production performance and facility status in real-time (Hourly / Daily)
- Possible to manage the data accumulated from the system
- Possible to enact efficient equipment management by setting target operation time for each piece of equipment
- Improve productivity by reducing hours of work

# QMS

## Quality Management System

We make perfect products using quality control from the material input process to the final product inspection.

We have built a QMS system that automatically transfers measured values to reduce productivity and reliability problems caused by manual measurement.

### Advantages

- Improve quality reliability
  - Easy to manage history and data of quality
  - Inspection of base on digital meters
- Pre-activity of quality control
  - Minimize defects by pre-testing
  - Saving of quality cost
- Improve work efficiency
  - Analysis & aggregate of quality data in real-time
  - Reduced hours of inspecting operation
  - Reduced lead-time





# SSS

## Smart Storage Solution

With smart logistics system of MAPAL HiTECO, it's possible to operate simple inventory management and logistics center.

Provides familiar usability, can be equipped on existing shelves and can be operated regardless of product type, size and quantity.

### Advantages

- Simple mounting on existing rack shelves
- Update of inventory data in real-time
  - Input and output by using QR code scanning
  - Possible to locate items using LED attached to ESL (Electronic Label Indicator)
- Simplified work and cost reduction



Products

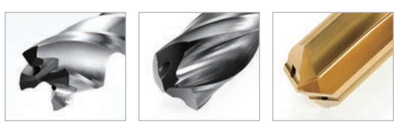
# Solid Carbide Tool

MAPAL HiTECO

## Solid Carbide Tool

### Drill

- High speed and precision machining are possible.
- Can be used for a wide range of materials such as aluminum, casting, steel and CFRP.
- Incorporates excellent machining position accuracy and maintains high performance.
- Incorporates a special coating technology to improve heat resistance, abrasion resistance and save costs.



### Reamer

- Excellent surface finish and high precision is possible.
- Cutting speed and tool life increased by high-quality coating.
- High-precision cutting with optimized design.

### Endmill

- Based on various types of endmills designed differently for machining materials, we provide customers with solutions for machining steel, aluminum, stainless and plastic, as well as hard milling and deburring.

Products

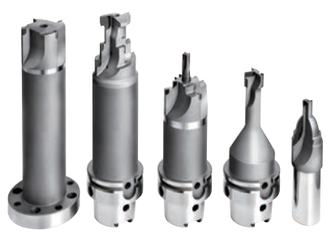
# PCD Tool

MAPAL HiTECO

## PCD Tool

### Drill

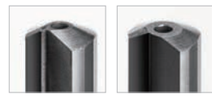
- Higher cutting speed and quality than carbide drills are achieved by using PCD, which has excellent hardness and abrasion resistance.
- Based on precise design, we offer a variety of solutions from complex drills to ISO tools.
- PCD drills increase tool life and have outstanding abrasion resistance.



### Boring tool

- Optimized tooling through process analysis can shorten lead time and achieve high quality.
- Can be machined with precise roundness and concentricity.

### Reamer



- Based on standardized design and accumulated experience, achieve high dimensional accuracy of IT7 class or more and an excellent surface finish is possible.
- Excellent roundness and concentricity are possible, even in intermittent cutting and multi cutting.
- Longer tool life and higher cutting speeds than solid carbide reamers dramatically shorten lead times and increase productivity.

### Milling tool

- Mass volume cutting is made easier thanks to the optimized design that allows for high speed.
- Face milling and side milling reduce the cutting resistance and provide an excellent surface finish.
- Dramatically shorten processing time due to increased cutting edge.

# Products

## MAPAL HiTECO pursues only the best technology.

For a long term reliable relationship in the global industrial market,
you need to have specific knowledge of products and customer service.
Partnered with leading companies with the best technologies and competitiveness
in the field of cutting manufacturing, MAPAL HiTECO provides trust in our
products through superior product quality and total service to satisfy all customers.

MAPAL — High Precision Cutting Tools

SCHUNK — Clamping & Gripping

ZOLLER expect great measures — Tool Pre-setter

diebold Goldring-Werkzeuge Spindeltechnologie — Tool Holding System

orlieb The Precision Company — Automatic Clamping System

taso — Brush

KNOLL .It works — Pump & Filtering System

SHOWA TOOL — Milling Chuck

JEL® — Tap

THELEICO® — Grinding Wheel

A.L.M.T. Corp. — Diamond Dresser

OMATIVE — Monitoring system of cutting process

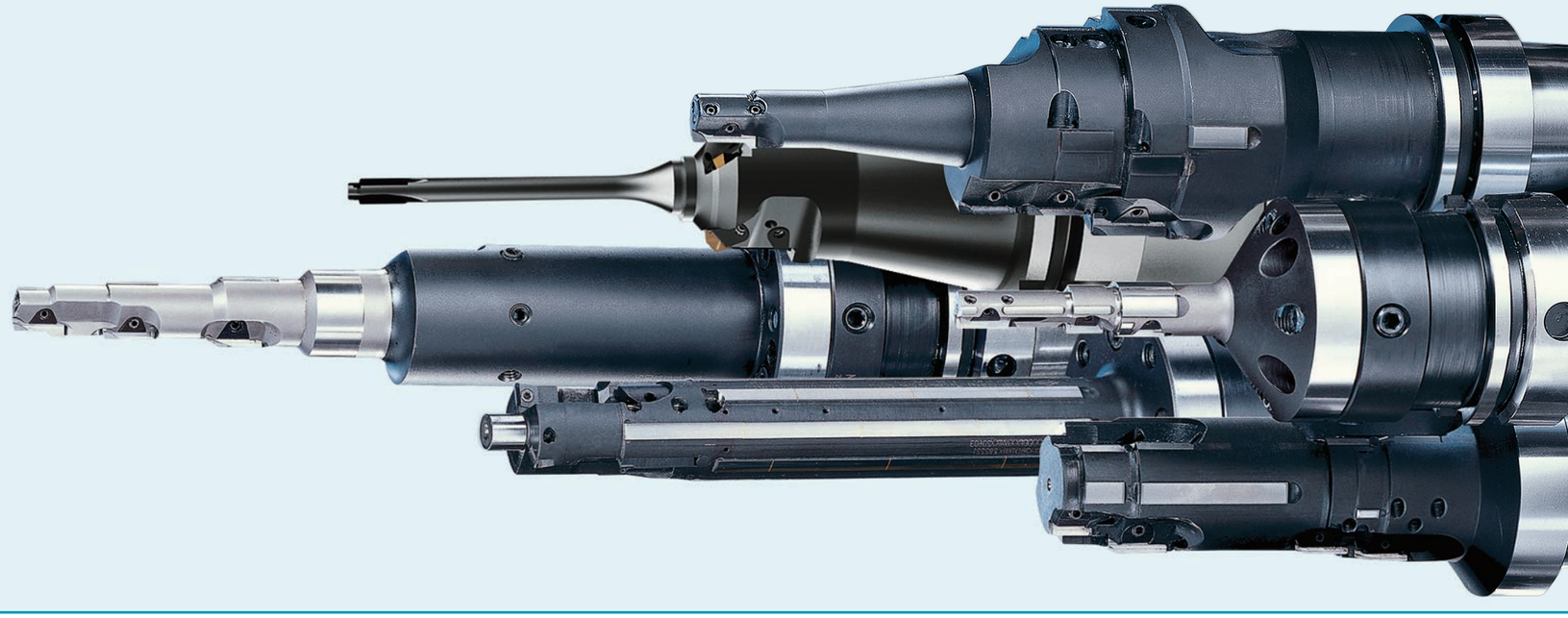
# INNOVATION TECHNOLOGY

## Innovative Technology

MAPAL introduced the fine boring tool as a first in the world cutting tool market and is continuously developing it. Despite the challenges of many similar competitive products, MAPAL has continuously provided superior solutions with an innovative and creative spirit. Now MAPAL will grow to become a world standard that can solve impossible challenges in high precision cutting through constant innovation.

## MAPAL Products

# Reaming/ Fine Boring



## Tools with guide pads

### Single-bladed reamers

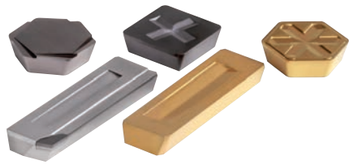
- One blade and several guide pad structures
- The highest accuracy due to exact setting to 0.001mm
- Indexable insert technology for highest flexibility during cutting material selection
- Achieve the best geometric tolerance
- Ø5 to 80mm standard specifications

### Twin-bladed reamers

- Two blade structure for Semi-finishing & Finishing
- Improved machining conditions and tool life compared to single bade
- Ø14 to 48mm standard specifications

### EasyAdjust System

- Improve productivity through decreased setting time
- High reliability of precise guide pin



### Indexable inserts

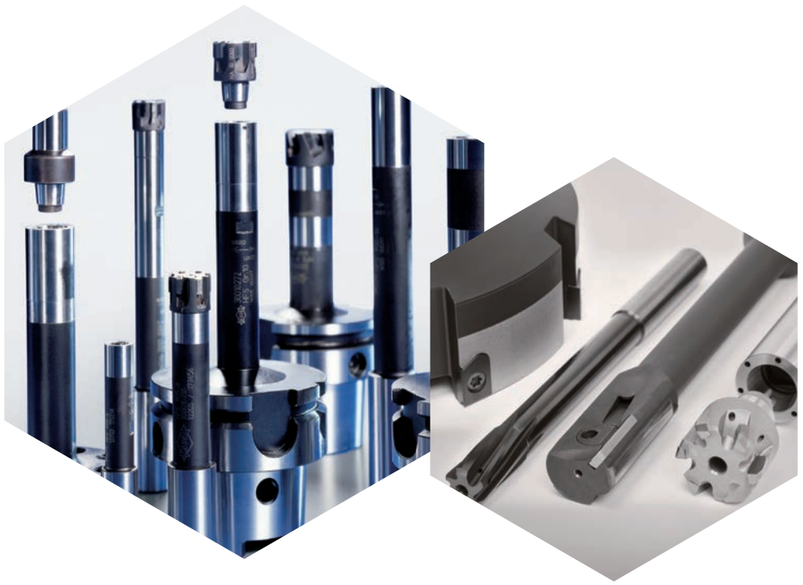
- Blade mounted on MAPAL guide pad reamers
- Solid-carbide, Cermet, PCD, PcBN Reamer according to the workpiece
- Chip breaker available

### External and taper reamers

- Reamer for outer diameter or tapering
- The highest accuracy due to exact setting to 0.001mm
- High quality by absorbing and dispersing the cutting force through guide pad

### Custom solutions

- Possible to make custom shaped MAPAL blade reamers
- Reduction of the number of tools and cycle time
- Improvement of machining efficiency



# Fixed multi-bladed reamers

## High-performance reamers with cylindrical shank

- Multi-blade reamer for high productivity
- Solid-carbide, Cermet, PCD, PcBN Reamer according to the workpiece
- Increase feed and reduce machining time with multi-blades
- Achieve H7 tolerance
- Ø3 to 40mm standard specifications

## Replaceable head reamers

- HFS and CFS connection type according to purpose and environment
- Various head configuration for various materials
- Achieve repeatability of up to 0.003mm
- Easy and convenient operation
- Achieve H7 tolerance
- Ø7 to 65mm standard specifications



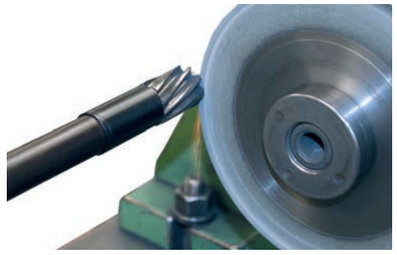


## Solutions for large diameters

- Ø21.60 to 400mm standard specifications
- Achieve H7 tolerance
- HSK or modular type machine connection
- HPR400 Plus, MultiCut ring

## Custom solutions

- Step-shaped reamers are possible
- Reduction of the number of tools and cycle time
- Improvement of machining efficiency



## Reconditioning

- Reduction of tool cost through regrinding

## Machine reamers in accordance with DIN and similar to DIN

- Tools that can machine precisely and economically
- Various products according to standard specifications
- Easy and convenient operation

# Floating holders

## Floating holders

- A system that compensates for the position of tool-workpiece-machine in the axis and radial
- Flexible positioning method through floating structure
- Improved machining quality and tool life when reamer is used with a turning machine

## Self-adjusting floating holders

- Holders for increased efficiency of turning and multi spindle machines
- Error correction of the tool adaptor in the holder
- Run-out compensation without vibration
- Spindle error compensation



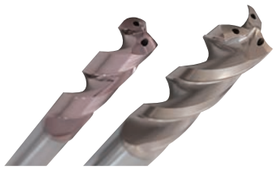


## Floating holders for multi-bladed reamers

- Achieve high precision and cutting speed at initial entry

# Drilling/ Boring/ Countersinking

## Drilling



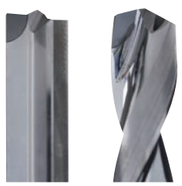
### Solid carbide drills

- Provide solid-carbide drills with 2~3 cutting edges according to customer's needs
- Various shape specifications for the machining of different materials

### Replaceable head drills

It is a head replaceable solid carbide drill for saving cost.

- TTD (Torque Transfer Drill) or QTD (insert type)
- Reduce tool cost with head replacement system
- High torque transmission and accuracy



### Custom solutions

- Possible to manufacture step-shaped drills
- Reduction of the number of tools and cycle time
- Improvement of machining efficiency





## Boring

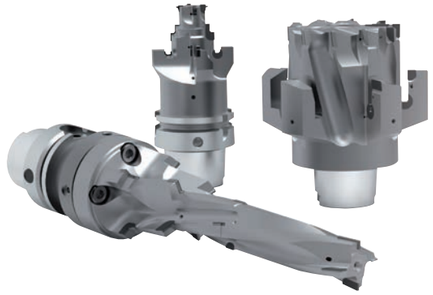
### Custom solutions

PCD boring tool

- Individual solutions according to machining condition
- Best dimensions, surface roughness and shape accuracy and quality
- Extreme rake and helix angle for complex cutting geometry
- Less than 0.003mm tool outer diameter tolerance
- Modular method for high run-out accuracy
- PCD boring tool to ensure concentricity of step machining
- Reduction of down-time

ISO insert boring tool

- Reduction of the number of tools and cycle time through multi step-shape designs
- High efficiency using ISO inserts
- High position accuracy with guide pads
- Hybrid tool with different kinds of tools
- Improvement of machining quality and tool life by installing dampers when machining conditions are unstable



### TSW boring tools with ISO indexable inserts

- Roughing boring tools (TSW) with tangential inserts
- Uses 6-corner tangential inserts
- Ensuring machining stability through arc-land
- Mono block or Modular design possible depending on processing conditions
- 6-8 times faster feed rate compared with single cutting-edge boring tool
- Ap. 5mm/Max, Machining length 300mm/Max
- Ø37 to 280mm standard specifications

# Boring

## ModulBore

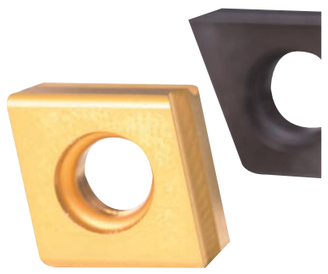
- Large diameter boring tool that combines insert and cartridge
- Various ISO cartridges for different diameter machining
- Internal coolant supply for chip removal
- Improves machining stability with a serrated contact surface
- Ø6 to 1,000mm standard specifications

## Cartridges

- Provides high compatibility and flexibility
- Compatible with standard ISO inserts
- Various shapes available
- Compact length cartridges available

## ISO indexable inserts

- Provides grinding H grade to press M grade
- Various insert grades and geometry depending on workpiece



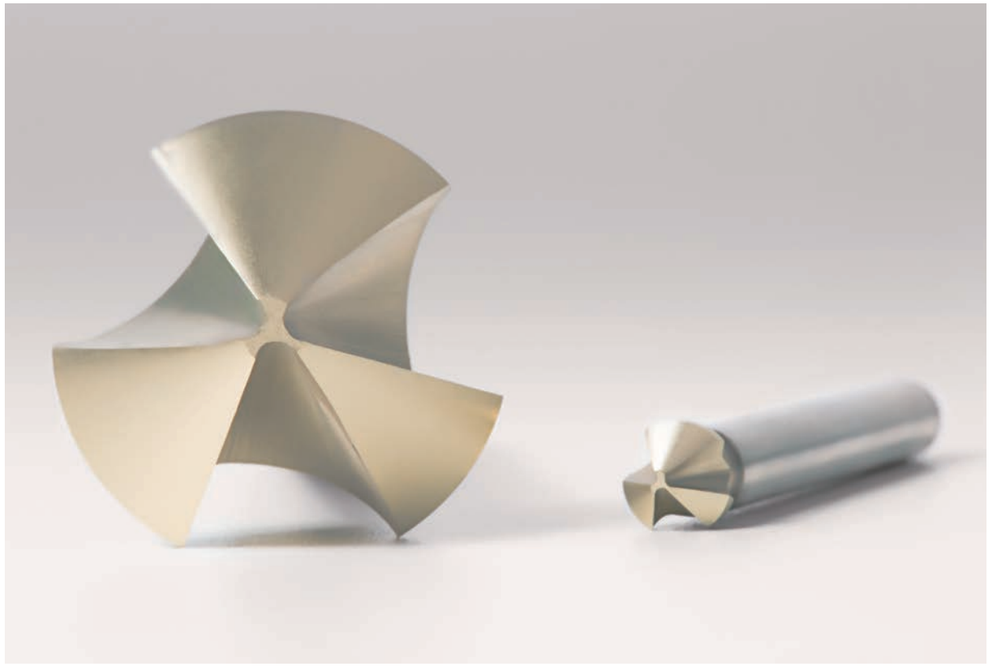
# Countersinking

## HSS counter-sinker

- 3 cutting edge HSS Counter-sinker
- Reduced axial load with unequally divided structures
- High tool life and work convenience
- Ø4.3 to 31mm standard specifications

## Solid carbide counter-sinker

- Solid-carbide counter-sinker with 3 cutting edges
- Reduced axial load with unequally divided structures
- High tool life and work convenience
- Ø4.3 to 31mm standard specifications



# Milling

## End milling cutters with fixed cutting edges

### Groove milling and general applications

End mill cutters from MAPAL achieve excellent tool life and cutting conditions using high-grade materials and coatings.

### Shoulder milling – roughing

- Suitable for Roughing and Semi-finishing volume machining
- Unequal spacing for low vibration running
- Ø1 to 20mm standard specifications





### Shoulder milling – finishing

- Multiple cutting edge structure improves surface quality, roughness and tool life
- Unequal spacing for low vibration running
- Ø4 to 32mm standard specifications

### Trochoidal milling

- Use optimal CAM program
- Protect the equipment spindle and increase tool life with optimized unequal and balanced structure tools
- Optimized chip discharge capability
- Suitable for volume machining
- Ø4 to 25mm standard specifications

### High feed milling cutters

- High feeds up to 1.35mm per tooth at diameter 20mm
- Long cutting edge allows slope and pocket milling
- Internal coolant supply for chip removal
- Reduction of tool cost with CFS type (Head replacement)
- Ø8 to 25mm standard specifications

### Profile milling cutters

- High shape accuracy for imitation and contour machining
- Precision Corner R tolerance
- Optimized chip discharge
- Ø2 to 25mm standard specifications

### Chamfering, drill and deburring milling cutters

- Low-loading machining with optimized geometry
- Multiple cutting edges for long tool life and high feed rate
- Ø4 to 25mm standard specifications

# Milling cutters with replaceable inserts

## Face milling cutter with PCD milling cartridges

- PCD milling cutter for aluminum face milling
- Achieve Rz 5µm
- Ø32 to 500mm standard specifications
- Innovative chip guide geometry for high machining reliability
- Height adjustment with an adjustable wedge (0.001mm)
- HSC milling cutter in lightweight design for machines with limited spindle power

## Face milling cutters with indexable inserts

- ISO Milling cutter for Roughing & Semi-finishing
- Maximum cutting depth up to 10mm
- Ø63 to 200mm standard specifications
- Use ISO inserts
- 4 or 8 corners insert
- Contact angle 45° or 75°

## Shoulder milling cutters with indexable inserts

- ISO Insert milling cutter for side machining
- Maximum cutting depth up to 14mm
- Ø16 to 200mm standard specifications
- Use ISO inserts
- 4 or 8 corners insert
- Axial adjustment for highest surface quality
- Contact angle 88° or 90°

## Shell end face milling cutters with indexable inserts

- MAPAL Shell ISO milling cutter for face milling with large cutting depth
- Maximum cutting depth up to 75mm
- Ø25 to 200mm standard specifications
- Suitable for heavy cutting or slotting
- Contact angle 90°

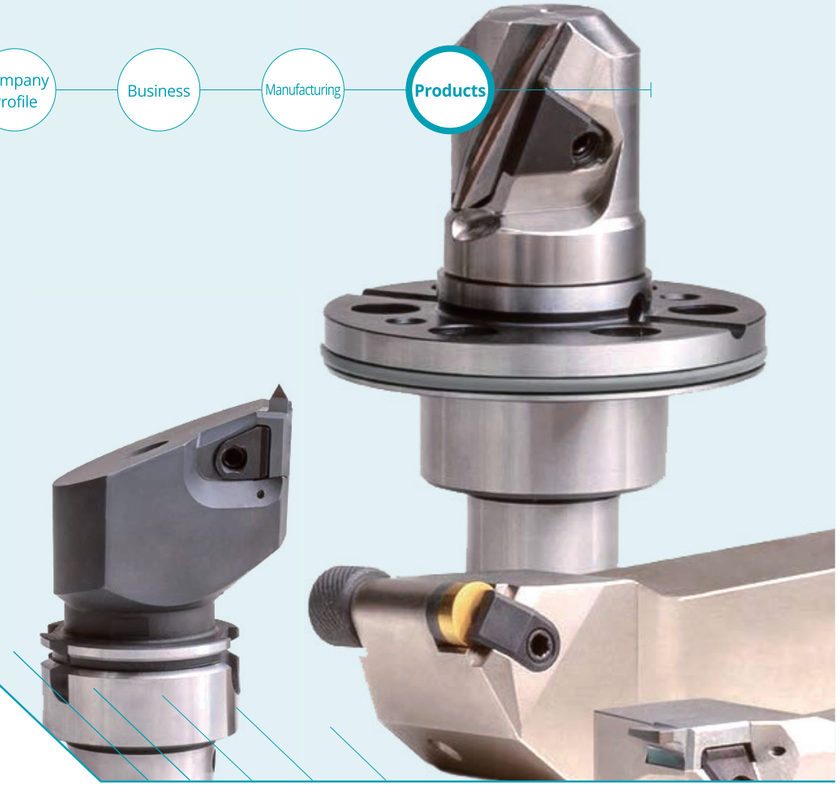
## Helix milling cutters with indexable inserts

- MAPAL Helix ISO insert milling cutter for large diameter hole machining
- Maximum cutting depth up to 35mm
- Ø80 to 160mm standard specifications
- Plunging and ramping possible
- Optional vibration damper
- Ideal type for MCT
- Contact angle 90°

## Disc milling cutters with indexable inserts

- MAPAL Disc ISO milling cutter, suitable for deep face milling or slotting
- Ø100 to 200mm standard specifications
- Can be adjusted axially for finishing
- Contact angle 88° or 90°

# Turning



## Hard turning innovations

### PcBN round inserts with indexing

- Suitable for hard turning
- Provide a bite for round inserts
- Economical due to use of all corners of the insert

### Scroll-free turning

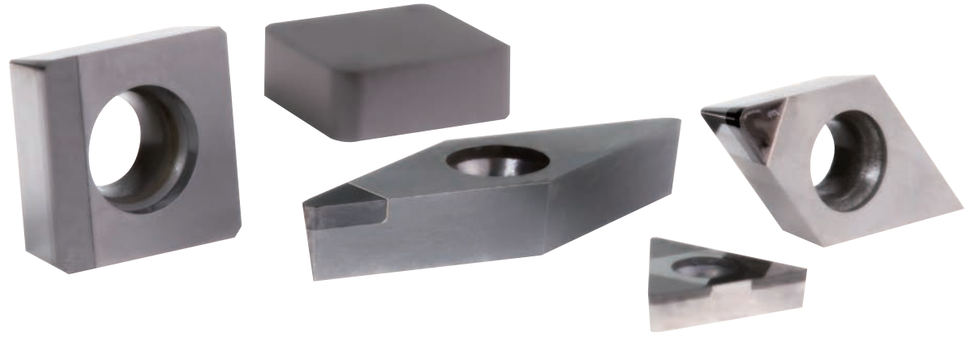
- Scroll-free turning that does not require scrolling
- Improved process reliability and tool life compared to existing methods
- Reduction of machining time by up to 70%

### VersaCut grooving and turning system

- VersaCut for hard turning in extreme conditions
- Optimized chip discharge capability due to built in clamping plate, tool holder and insert clearance
- Ultimate grip and stability
- Minimize bite damage in case of insert failure







## Extremely hard cutting materials

### PcBN, PCD indexable inserts

- Effective machining with excellent cutting condition
- High precision cutting edge and shape
- PCD : Suitable for non-ferrous metals
- PcBN : Suitable for steel and cast iron

## HSK-T

### Tools with HSK-T connection

- HSK with excellent accuracy and repeatability
- Excellent location tolerance
- Applicable to existing HSK connections

### Conversion systems and adapters to HSK-T

- HSK-T switchable without machine modification
- High precision

# Clamping

## Chucks

### Hydraulic chuck

- Provide standard specification for various uses
- Optimum radial run-out accuracy of 0.003mm
- Holding force even at high rotation speed
- Available with BT/SK/HSK specifications
- Suitable balancing grade for high speed machining with G2.5 at 25,000 rpm

### 3° Slim Hydraulic Chuck

- Hydraulic chucks similar to heat shrink chuck
- Made with 3-D metal printing technology
- Optimum radial run-out accuracy of 0.003mm
- Operates at high temperatures, up to 120°C
- Holding force : 260Nm for Ø20
- Available with BT/SK/HSK specifications
- Suitable balancing grade for high speed machining with G2.5 at 25,000 rpm





### High Torque Chuck

- High holding force (550Nm wetness based on Ø20)
- Optimum radial run-out accuracy of 0.003mm
- High temperature stability (up to 120°C)
- Available with BT/SK/HSK specifications
- Suitable balancing grade for high speed machining with G2.5 at 25,000 rpm

### Shrink chucks ThermoChuck

- Thin-walled chucks provided by MAPAL
- Provide standard specifications for various uses
- Optimum radial run-out accuracy of 0.003mm
- Use high heat resistance material
- Available with BT/SK/HSK specifications
- Suitable balancing grade for high speed machining with G2.5 at 25,000 rpm

### Mechanical Chuck

- Mechanical chucks that are easy to handle
- Drill chuck, collet chuck, side lock, synchronous chuck
- Retain grip regardless of direction of rotation and speed
- Available with BT/SK/HSK specifications
- Suitable balancing grade for high speed machining with G2.5 at 16,000 rpm

## Manual HSK clamping technology

### KS clamping cartridges

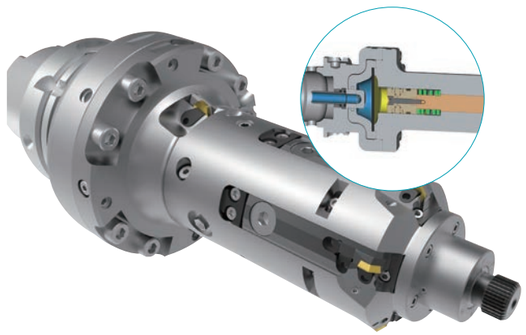
- Solid construction with a simple design
- 100% torque transfer through ideal face contact
- High stiffness regardless of machining direction

# Actuating

## Combination of input and output

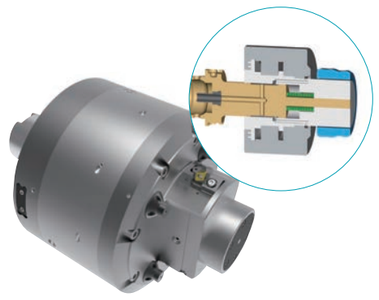
### Coolant pressure

This system adjusts the slide operation and position of the insert through coolant pressure. Applicable to most equipment, the feed rate is determined manually by means of an add / drop valve. Slides and inserts are returned to their origin via internal spring.



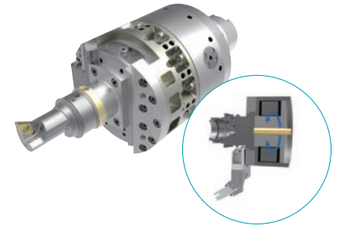
### Contact stop principle

The ‘Contact-stop’ principle works when contacted with a jig or workpiece. As a result, the tool adapter is pressed into the tool and the slide operates. The feed rate is determined by the axis of the machine. The slide returns through the inner spring.



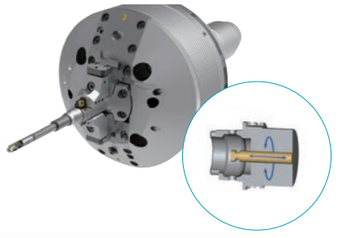
### TOOLTRONIC® U axis

As a self-contained drive module, Tool-Tronic is driven by transmitted information through NC control.
It can be applied over a wide range using bidirectional data transmission through electromagnetic induction.



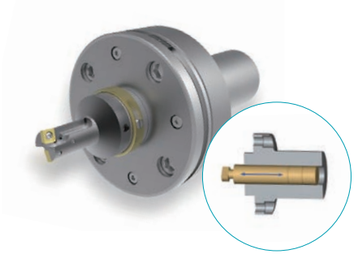
### U axis on the machine

The slide is operated via the machine tool’s U-axis. The feed rate is determined by the U axis. This axis rotates and is the complete NC axis.

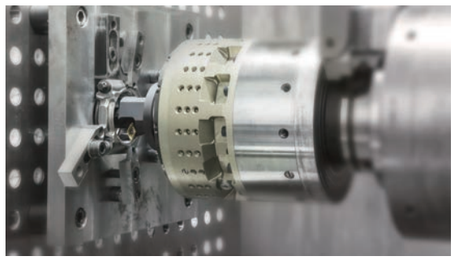


### Drawbar/push rod

On specially designed equipment, the drawbar and push rod can be used to actuate the slide or place the insert. The feed rate is set by the U axis, which provides the NC retraction function.



# Standard program



## TOOLTRONIC® U axis

TOOLTRONIC is a universal input device for multipurpose manufacturing and flexibility enhancement of general purpose and special purpose equipment. TOOLTRONIC for machining centres is a full interchangeable tool axis that permits a broad spectrum of applications.

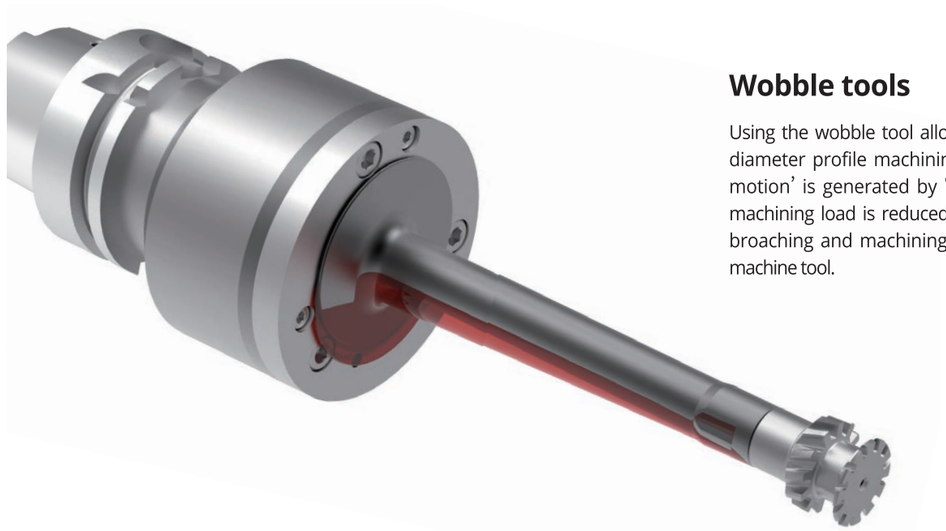
## Facing heads

Facing-heads are used for turning, grooving and contour machining. The operation of this slide tool and the actuation of the tool holder and inserts is via an NC-controlled crossfeed device that is on the spindle drive or on the rear of the feed unit.

# Line boring bars

Line boring bars are a special tool for Crank bore machining of cylinder blocks. During machining, the tool is supported by at least one guide. Multiple inserts in this tool can process multiple journals simultaneously.

# Other applications



## Wobble tools

Using the wobble tool allows you to process in/outer diameter profile machining cost-effectively. ‘Wobble motion’ is generated by ‘Wobble bar’ rotation. The machining load is reduced compared to conventional broaching and machining, reducing the load on the machine tool.

## Interpolation turning

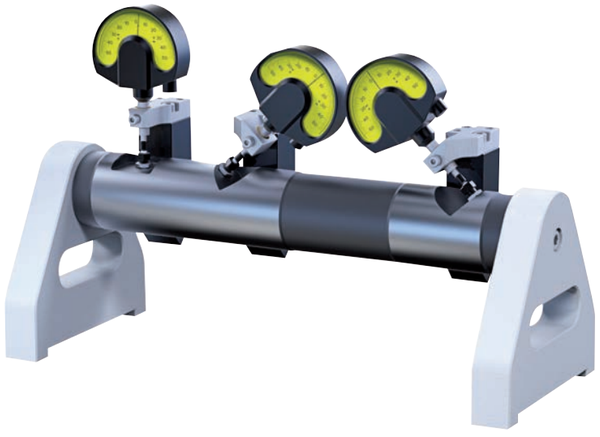
Interpolation turning tools allow continuous machining in a machining center. To use this tool, a position-controllable spindle is required.

# Setting/ Measuring/ Dispensing

## Setting

### Caliper gauges

This gauge is used for setting tools such as line boring bars that are not easy to attach and detach in the machine. It is designed according to various settings such as tool characteristics, diameter, length and angle.







### MASTERSET

The MASTERSET is a precision manual setter for the setting of MAPAL Fine Boring Tools. Tool clamping through the hand lever and adjustment in the axial direction in microns. It is designed to be simple in structure and easy to use.

### UNISET-V basic

UNISET V Basic is a manual setting device in a vertical format.

- Standard spindle specification : SK50
- Maximum measuring range : Ø400mm, height 700mm
- Setting accuracy : Less than 0.002mm
- Run-out : Less than 0.002mm

### UNISET-H

UNISET-H is an electronic horizontal precision setter that can be set easily.

- Minimize heat distortion with granite base
- Maximum measurement range : Ø190mm, length 600mm
- Standard spindle specification : SK50 (Roller bearing type)
- Setting accuracy : Less than 0.002mm

# Setting

## UNISET-V standard/vision

The UNISET V series is a CNC-controlled measuring instrument capable of optical and contact measurement.

- High usability with touch screen and joystick
- Full automatic CNC control
- Maximum measurement range : Ø400mm, height 800mm
- Standard spindle specification : SK50 (Roller bearing type)
- Setting accuracy : Less than 0.002mm



## UNISET-P

UNISET-P is a CNC-controlled optical measuring instrument based on ergonomic design.

- High usability with touch screen and joystick
- Full automatic CNC control
- Maximum measurement range : Ø500mm, height 600mm
- Standard spindle specification : SK50
- Setting accuracy : Less than 0.002mm


# Measuring

## UNISCALE-M

UNISCALE-M is an optical measuring instrument for tool geometry and dimension measurement.

- Optical / electronic zoom possible
- Enough light source for measurement with LED light
- Minimize heat distortion with granite base
- Maximum measuring range : X axis ± 425mm
  Y axis ± 60mm


# Dispensing

## UNIBASE-M

The automatic tool distribution system keeps and manages tools, semi-tools or accessories.

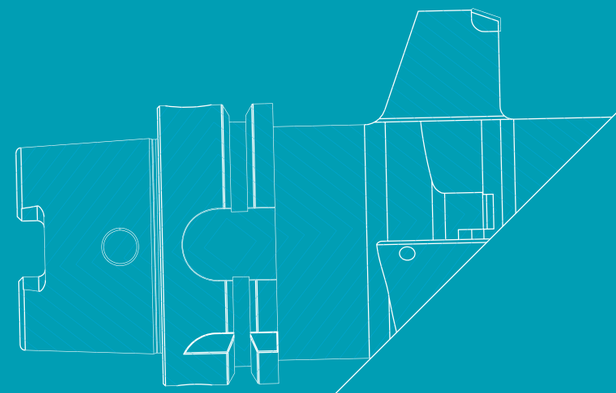
- Connected with the ERP system and can be manage by computer
- Automatic tool export
- Easy-to-use and intuitive interface
- Easy maintenance with a simple structure


## Software UNIBASE

It is software for MAPAL UNIBASE-M.

- Supports various languages
- Compatible with your ERP system
- Can be managed separately by customer or supplier

# OPTIMAL SOLUTION

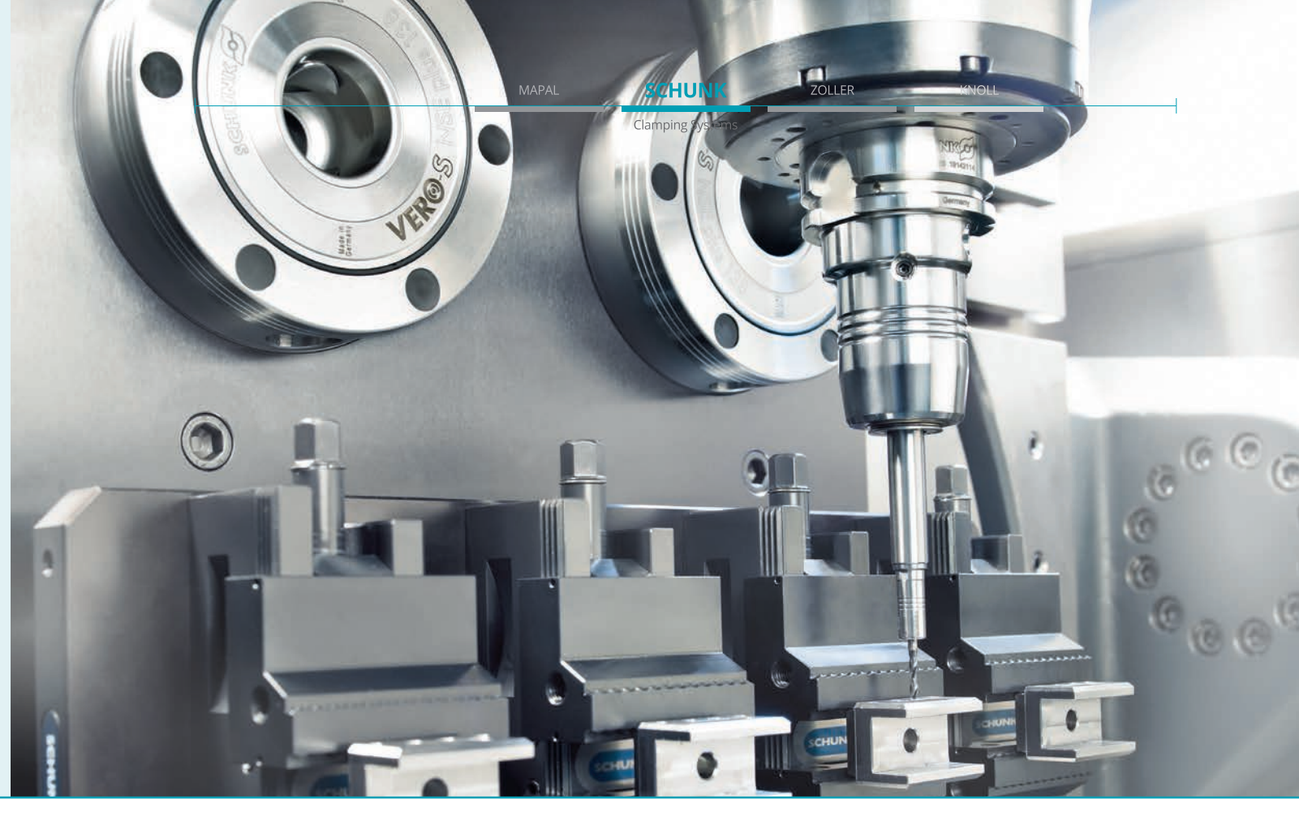


## Optimal solution

MAPAL HiTECO cooperates with leading partners in the world market with advanced technologies. In every field of precision cutting manufacturing from automotive to the aerospace industry, we'll always work together with our partners.

## Other Products

# Clamping Systems

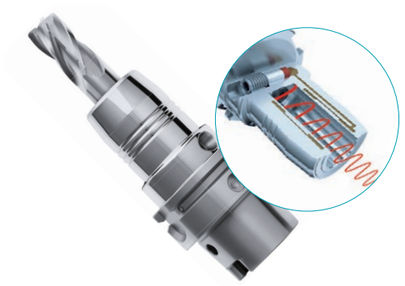


## Clamping Systems

### TENDO

TENDO is the hydraulic expansion toolholder from SCHUNK.

- Suitable for high speed machining (Max. 50,000rpm)
- Tool changes in seconds without peripheral equipment
- Maximum run-out and repeat accuracy of < 0.003mm
- Excellent vibration damping



### TENDO E-COMPACT

- Highest torques (up to 900Nm with Ø20mm under dry clamping conditions, 520Nm with oily tool shanks)
- The all-rounder for milling, drilling, reaming and tapping
- Maximum run-out and repeat accuracy of < 0.003mm

### TENDO Slim 4ax

TENDO Slim 4ax is the world's first hydraulic expansion toolholder with standardized heat shrinking contour.

- Replaces a heat shrinking toolholder 1:1 with easy handling and perfect vibration damping
- Maximum run-out and repeat accuracy of < 0.003mm
- Suitable for high speeds with a balancing grade of G2.5 at 25,000rpm

### CELSIO

CELSIO is a top-quality SCHUNK heat shrink toolholder.

- Transmission of higher torques ensured by secure and frictional clamping
- Good ratio between radial rigidity and interfering contour
- Maximum run-out and repeat accuracy of < 0.003mm
- For the use of HSS and HM tools



## SVL
## (TENDO · TRIBOS · CELSIO)

SVL tool extensions are designed and suitable for precise machining of hard-to-reach areas.

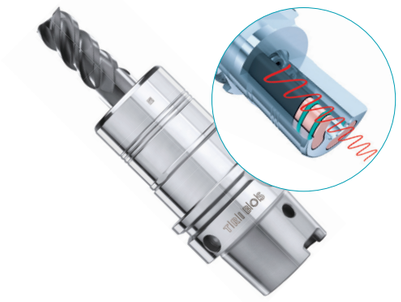
- Reduces set-up time and costs
- Can be used in combination with different standard tools and using intermediate sleeves removes the need for expensive special tools

# Clamping Systems

## TRIBOS

TRIBOS is the patented toolholder based on polygonal clamping technology with its honeycomb and anchor structure.

- Suitable for high speed machining
- Maximum run-out and repeat accuracy of < 0.003mm
- Improved machining quality by excellent vibration damping
- Tool changes within 20 seconds via SVP clamping devices



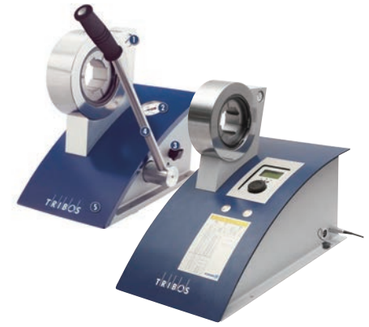

## TRIBOS-Mini

- TRIBOS-Mini is setting standards in micromachining
- Suitable for housings, molds, electrodes and engravings in medical technology and electro technology, as well as in the watch and clock making industry, or in the precision die construction industry
- Maximum run-out and repeat accuracy of < 0.003mm
- For the smallest diameters starting from 0.3mm


## SVP 2 · SVP 4
## (TRIBOS Clamping Device)

TRIBOS SVP clamping devices can be used to clamp tools into TRIBOS toolholders quickly and evenly.

- SVP-2: Manual clamping device for a safe and quick tool change
- SVP-4: Automatic clamping device for a fast, user-friendly and reliable tool clamping




## VERO-S Zero point system

VERO-S is the modular quick-change pallet system for very fast and extremely precise resetting of workpieces, clamping devices or other equipment on modern 3, 4 or 5-axis machining centers.

- Reduces set-up times by up to 90%
- Ensured repeat accuracy < 0.005mm

# Gripping Systems

## Grippers

### Universal Gripper PGN-plus

The world-proven best Gripper on the market - now new with permanent lubrication in the multi-tooth guidance.

- Highest gripping force from 123N to 21,800N
- Stroke per finger from 2.5mm to 45mm
- 11 sizes from 40 to 380
- Robust multi-tooth guidance with high maximum moments possible for applications with long gripper fingers

Multi-tooth Guidance & Lubrication Pockets

- Longest life span due to lubrication pockets in the durable multi-tooth guidance


## Rotary Modules

### SRU-plus Universal Swivel Unit

Universal pneumatic unit for rotary and turning movements in both clean and dirty areas.

- Axial force from 255N to 11,000N
- High torque from 0.2Nm to 115Nm
- 12 sizes from 8 to 63
- Swivel angle 90° or 180°
- Locked middle position possible

### Swivel Head SRH-plus

SRH-plus universal swivel head for fast loading and unloading tasks.

- Torque from 3Nm to 69.9Nm
- Integrated media supply and possibility to transmit digital signals
- 7 sizes from 20 to 60 with swivel angle 180°
- Modular design with many options

## Robot Accessories

[Changing]

### Tool Quick-Change System SWS

Fast effector change for high flexibility in production, handling and assembly.

- Handling weight of up to 4,080kg
- 20 sizes from 1 to 1,510
- Manifold electric energy and liquid transmission options
- Easy assembly via ISO flange or adapter plate


No-Touch-Locking™

### Manual Gripper Change System HWS

- Handling weight of up to 54kg
- Integrated air feed-through
- Manifold electrical and pneumatic options
- Easy assembly via ISO flange (HWS)
- Direct assembly to PGN-plus and JPG interface (CWS)

[Feeding through]

### Rotary Feed-through DDF 2

- 14 sizes from 31 to 160
- From 2 to 4 feed-throughs
- Up to 10 electric feed-throughs
- Easy assembly via ISO flange

[Machining]

### Flexible deburring Spindle FDB

- 4 sizes from 150 to 1,040
- Speed up to 65,000rpm
- Power consumption from 150W to 1,040W
- Flexible and robot-controlled deburring of workpieces

[Monitoring]

### Anti-Collision and Overload Protection Sensor OPS and OPR

- OPS with manual, OPR with automatic reset
- Triggering force and moment via operating adjustable pressure
- Anti-collision control via integrated sensor system

[Compensating]

### Compensation Unit AGE

- Variety of sizes for compensation in Z-, XY- or XYZ-direction
- Compensation distance XY up to ±14mm, compensation distance Z up to ±14mm
- With centric locking and position storage
- Easy assembly via ISO-flange

### Tolerance Compensation Unit TCU

- 8 sizes from 50 to 240
- Direct mounting to PGN-plus and PZN-plus
- Rotary and lateral compensation tolerance around all axes
- Centric locking and monitoring

# Tool Pre-setter

## Tool Presetting & Measuring

### »venturion«

The premium presetting and measuring machine for tools of all kinds. For an operator-independent, CNC-driven axis drive of the X, Z and C-axis and automatic focusing of the tool cutting edge, resulting in fully automatic measuring cycles.

- ZOLLER »pilot« image processing
- Adjustable control unit increases the ergonomics for the user
- »eQ« one-hand control handle
- Extreme longevity thanks to the best brand-name components and careful processing
- ZOLLER »ace« high-precision spindle, power operated tool clamping for steep taper/ANSI/CAT/MAS-BT/HSK/Capto/KM/ and many more

venturion 450

venturion 600 & 800

### »tribos«

»tribos« is a presetting, measuring and shrink-clamping system equipped with the SCHUNK TRIBOS clamping system.

- Swiveling clamping unit for measuring and presetting larger tools without the TRIBOS system
- Automatic positioning of the SCHUNK TRIBOS clamping unit to shrinking position
- Unique ergonomics applied by minimum hydraulic pressure for clamping device

## »smile«

»smile« is a standard presetter easy to operate and equipped with all standard measuring functions for the professional presetting and measuring of metal cutting tools. The latest ZOLLER myTouch operating technology »pilot 2mT« continues the course of innovative image processing and quick and easy operation without intensive training.

- High-precision spindle with integrated calibration edge to accept ISO 50 tools
- Self-explanatory user interface with touch-screen operating technology
- Automatic focusing of the tool cutting edge and vacuum clamping is available as an option

# Tool Presetting & Measuring

## »redomatic«

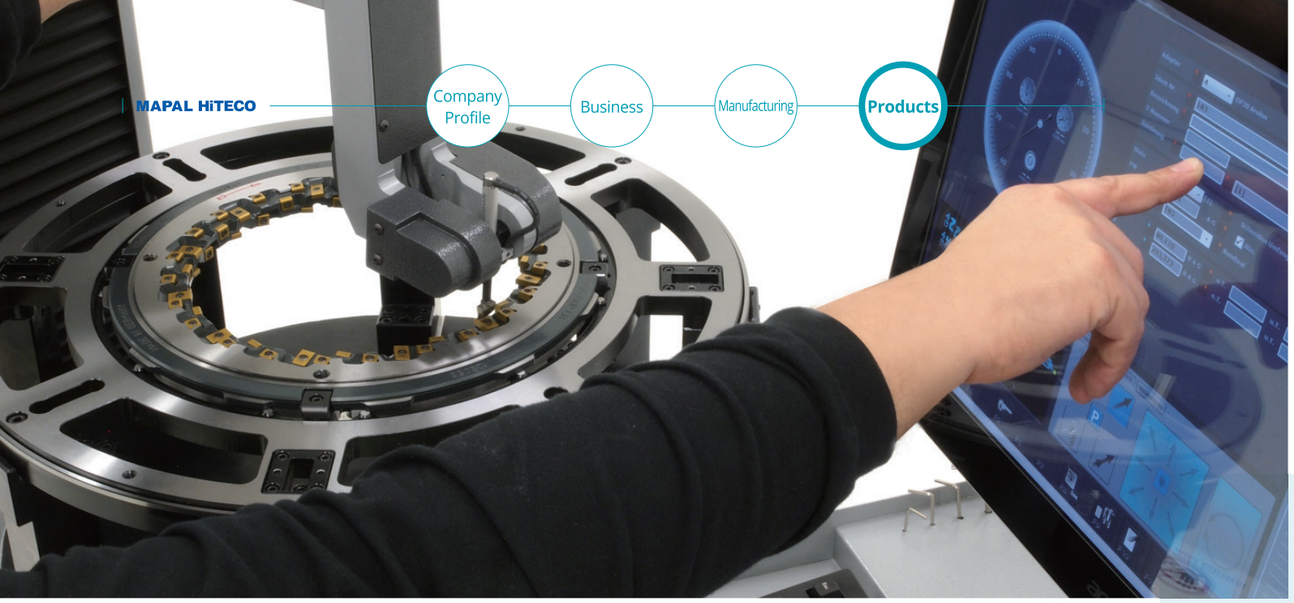
»redomatic« has been especially designed for heat-shrinking of tools to nominal length while at the same time presetting and measuring tools of all kinds.

- With the automatic length adjustment device »asza« tools can be shrunk to at least ±10µm accuracy
- This unique combination of a presetting, measuring and shrinking machine has a modular structure and is equipped with ZOLLER »pilot 3.0« image processing technology
- Convenient and quick setting

## »smileCompact«

»smileCompact« presetting and measuring machine offers all measuring programs for fast and manual presetting and measuring of standard tools.

- High-precision spindle with integrated calibration edge to accept ISO 50 tools
- Self-explanatory user interface with touch-screen operating technology
- Vacuum clamping is available as an option





# Tool Presetting & Measuring

## »smartCheck«

High-precision camera has swiveling device for axial and radial measurement with incident light.

- Swiveling incident light camera allows you to check, measure and document the axial or radial geometries of your tools simply by using the mouse

## »gemini 2«

»gemini 2« provides you extremely easy presetting, automatic measurement and inspection of crankshaft cutters and turn broaching tools. Crankshaft cutters, correctly set to target specifications, result in a longer service life of the tools and high precision of the crankshafts.

- Measures 120 cutting edges in only 80 seconds
- Checks the axial run-out of the crankshaft cutter
- High-precision spindle with power clamping 20,000N and loading safety
- Customized adapter with integrated calibration spheres for micro precise and fully automatic calibration

## »aralon«

The measuring machine for crankshaft cutters with internal tool cutting edges. It is possible to record the concentricity and run-out errors of the cutter body and to compensate for this during the measurement of the cutting inserts.

- Four CNC-driven axes
- The crankshaft cutter is automatically positioned accurately via the quick-change holding fixture
- Fully automated calibration of the measuring probe at the zero point of the tool post, no longer requires separate zero gauges
- »pilot 3.0« graphic user interface with a clear, analog display dial gauge

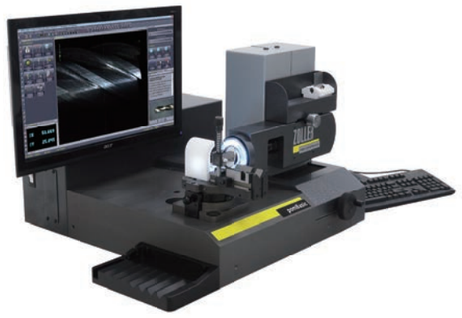
## »powerShrink«

»powerShrink« is the inductive shrink-clamping unit for HSS and carbide tools. Fast and easy shrinking to nominal length reduces the setup times in your production facility.

- Clamping range : D3- D32
- Time for shrink-clamping : 6 - 10 seconds
- Time for un-clamping and cooling : approx. 40 seconds
- Optional equipment : Length adjustment unit

※ Time for shrink-clamping and cooling may vary depending on the tool size

# Tool Inspection & Measuring


## »genius 3«

»genius 3« is the universal measuring machine for metal cutting tools with a 5-axis CNC control unit. All measurement sequences adapted as required and repeated for each tool with a high level of reliable measuring accuracy, 0.002mm. Ergonomic operating elements, robust design, maintenance-free drives and guides, encapsulated measuring systems, computer ventilation, automatic monitoring and control of lighting as well as operating elements ensure operation under shop floor conditions.

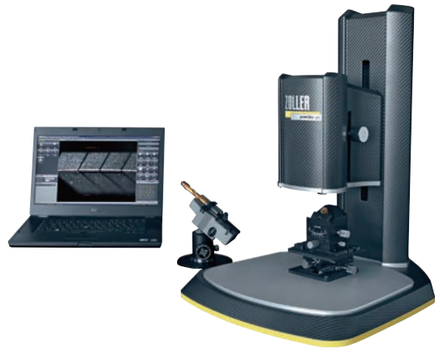
- Automatic hydraulic expansion for tools
- Intelligent calibration, automatic search runs and interactive configuration wizard for easy operation
- CNC-driven, swiveling camera : magnification 50 fold
- 3D CCD camera : magnification 200 fold
  (* Camera/lighting »micro« : magnification 500 fold, suitable for micro tools)

## »pomBasic«

»pomBasic« is the compact and universal designed inspection machine for process-oriented measurement and inspection of drills, milling cutters, grinding wheels and countersinks in the shop-floor next to the machine or in the measuring room. Easy and intuitive to operate and offers numerous measuring and evaluation algorithms with automatic cutting edge detection for high accuracy.

- Universal tool holding fixture for shank tools with a diameter of 2-40mm
- For axial and radial measurement the V-block can be rotated by 180 degrees
- The high-contrast and sharp image of the camera is displayed in 6 calibrated zoom stages and allows analysis of even the finest surface details
- The user interface can be adapted by the operator via individually positionable windows and icons
- Full documentation of measurements
  -The language can also be selected prior to output of the results as a PDF or printed inspection report

# Software





## »pomSkpGo«

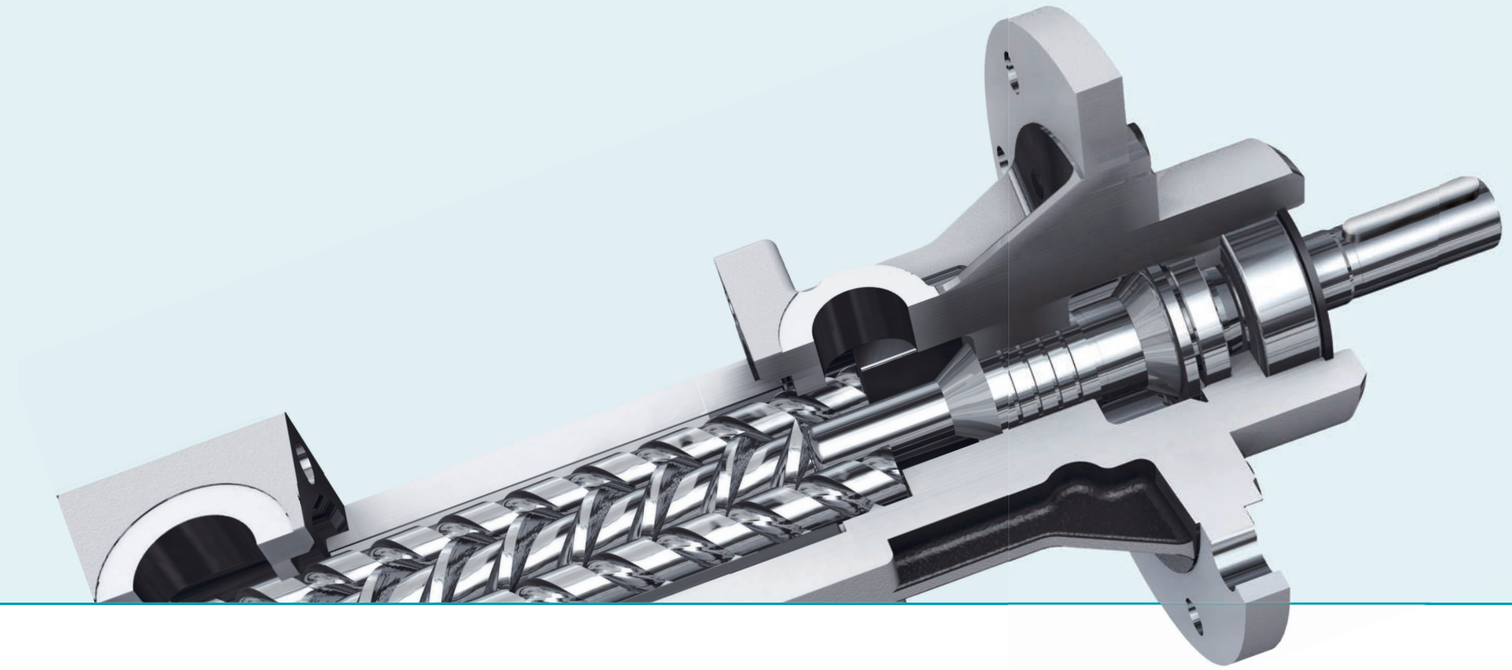
»pomSkpGo« is the measuring machine for cutting edge preparation. The basic construction is of carbon, facilitates mobile use and enables high precision according to the high level of stiffness. Even higher levels of reliable measuring accuracy, 0.0015mm and the cutting edge can be displayed in 3D.

- Ensures fast and accurate positioning of the cutting edge in front of the high resolution sensor
- Clamping range : D3 – D32
- The smallest measurable radius
  - Lite sensor : 5µm
  - Premium sensor model : 3µm

## Tool Management

ONE data base for everything from design to the finished parts: all stations of the manufacturing process are linked via the central database with all data : CAD/CAM, warehouse, purchasing, machines and, of course, the ZOLLER tool pre-setter and measuring machine.

# Pump & Filtering System



KNOLL
.It works

## Pumps

### KTS Screw Pump

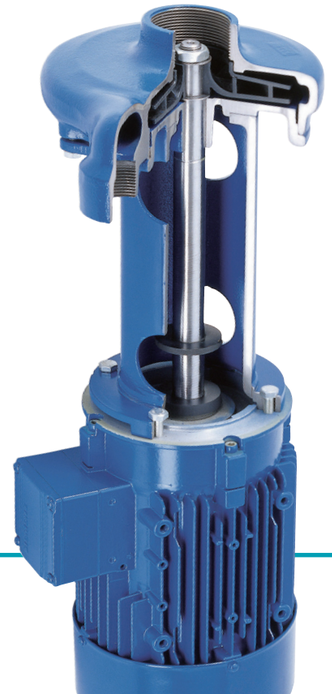
KTS screw pumps are self-priming positive displacement pumps suitable for lubricating and non-abrasive materials. The pump has three primary components:

- Suction housing
- Bearing housing with a drive spindle and two concurrently rotating running spindles
  (bearing housing consists of two steel-embedded ceramic shells)
- Pressure housing with throttling point, sealed shaft bushing and external main bearing

### Centrifugal Pump T

Centrifugal pumps are used primarily on machine tools to convey cooling lubricants and available as submersible or block pumps. Thanks to their solid and robust design, KNOLL coolant pumps have a high load capacity and a long durability.

- TG with closed impeller
- TF with free-flow impeller
- TS with helical impeller
- TSK semi-open radial impeller
- TSC semi-open radial impeller
- BS with semi-open radial impeller



# Pumps

## Shredder Pump TSC

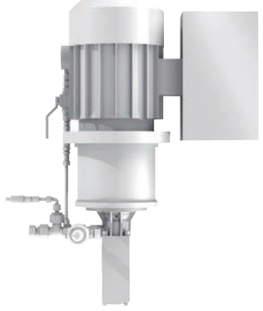
Shredder pumps TSC are cooling lubricant pumps with an integrated shredder for aluminum chips.

- Removes the need for an additional chip reducer by cutting long aluminum chips into a pump-appropriate size and conveying them to the central preparation station
- Durable and long service life due to solid and robust construction

## PQ–Tronic

PQ-Tronic allows to specify desired pressures within a range of 0 ~ 150. With this system, pump performance is regulated automatically.

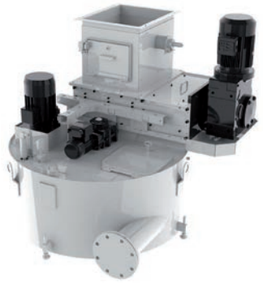
- By changing the drive motor from 10Hz –75Hz, the rotational speed of the pump unit changes (500 – 4,500rpm) and therefore the performance characteristics change as well
- A pressure sensor together with an electronic PI control ensures the specified pressure (target value) independent of the amount used



## Pump Back Station

Pump Back Station transports chips/cooling lubricant mixture to central filter system.

- Can be integrated into a machine bed or installed under a chip conveyor
- A compact disposal and delivery unit allows unmanned transfer of chips to a central seperator/filter by means of a coolant or air suction



## Progressing Cavity Pump MX

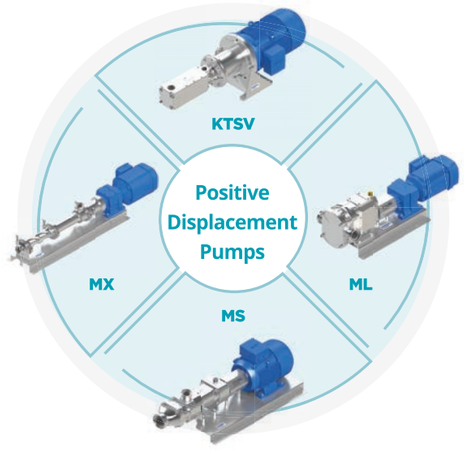
MX Pump are suitable for use in hygiene applications and in the chemical, paint, lacquer and paper industries and also suitable for other industrial applications where gentle and low-pulsation delivery is important.

- The choice of materials, structural arrangement of the O-rings and surface quality are in accordance with EHEDG
- MX pump uses Even Wall® technology. The stator jacket that is adapted to the inside contour of the elastomer has a standard elastomer layer 4 to 12mm thick. This provides for significantly higher stability under pressure

## Positive Displacement Pumps

Positive displacement pumps have been used for demanding conveying tasks in the food, pharma and chemical industries.

- MX Mono pumps: suitable for where gentle and low-pulsation delivery is important
- ML Rotary lobe pumps: suitable for volumetric and viscous dosing tasks
- MS, KTSV screw pumps: suitable for conveying of viscous products especially in the food sector



# Filter

## KF Compact Filter

The KF compact filter is a band filter for cleaning coolant lubricants of machining processes.

- Can be installed as an independent cleaning unit (e.g. in grinding machines)
- Installed in combination with chip conveyors (e.g. in machining centers)
- A central application (for several machine tools) is also possible

## MicroPur® Superfine Filter

The MicroPur® is a backflush filter for separating superfine impurities from oils. The ideal area of application is tool grinding of hard metal and HSS.

- High filter fineness (1-3 µm)
- Easy to maintain thanks to good accessibility and fast replacement of filter cartridges
- Flexible modular system requiring minimal space

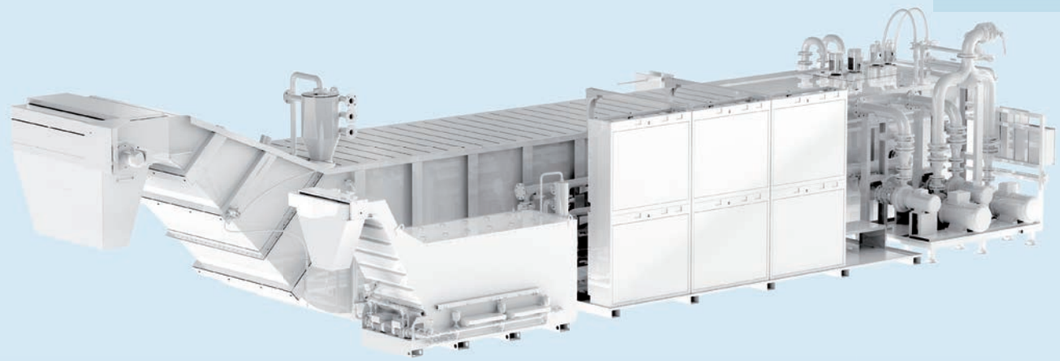


# MQL system


## ControLube

ControLube-MQL is a supply system which is applied to the automobile fuel combination and control technology of spraying MQL aerosol (oil+compressed air gas mixture).

- 1channel type : supplies aerosol made by external equipment to avoid changing the spindle structure of existing equipment
- Constructed with the combination ratio for making compressed air and oil mixer within the mixer chamber, control panel for monitoring and adjusting pressure and supply



MicroPur® central filtering system for several tool grinding machines

# Milling Chuck

SHOWA TOOL

## Milling Chuck

### MICRON Chuck

Micron Chucks were developed utilizing an original direct clamping mechanism and assembling technology acquired from Showa's vast experience manufacturing high quality machine spindles.

- Run-out : 0.001mm (chuck nose) / 0.002 (3 x D)
- Clamping power of Ø32 = 2,450Nm (Ø6/49Nm)

## Accelerator

Power of the traction drive is transmitted by the rolling contact mechanism via an oil film of traction grease characterized by high viscosity at high pressures. This unit is a speed increasing device where the revolution of the planetary roller is used for the input side and the rotation of the sun roller is used for the output side.

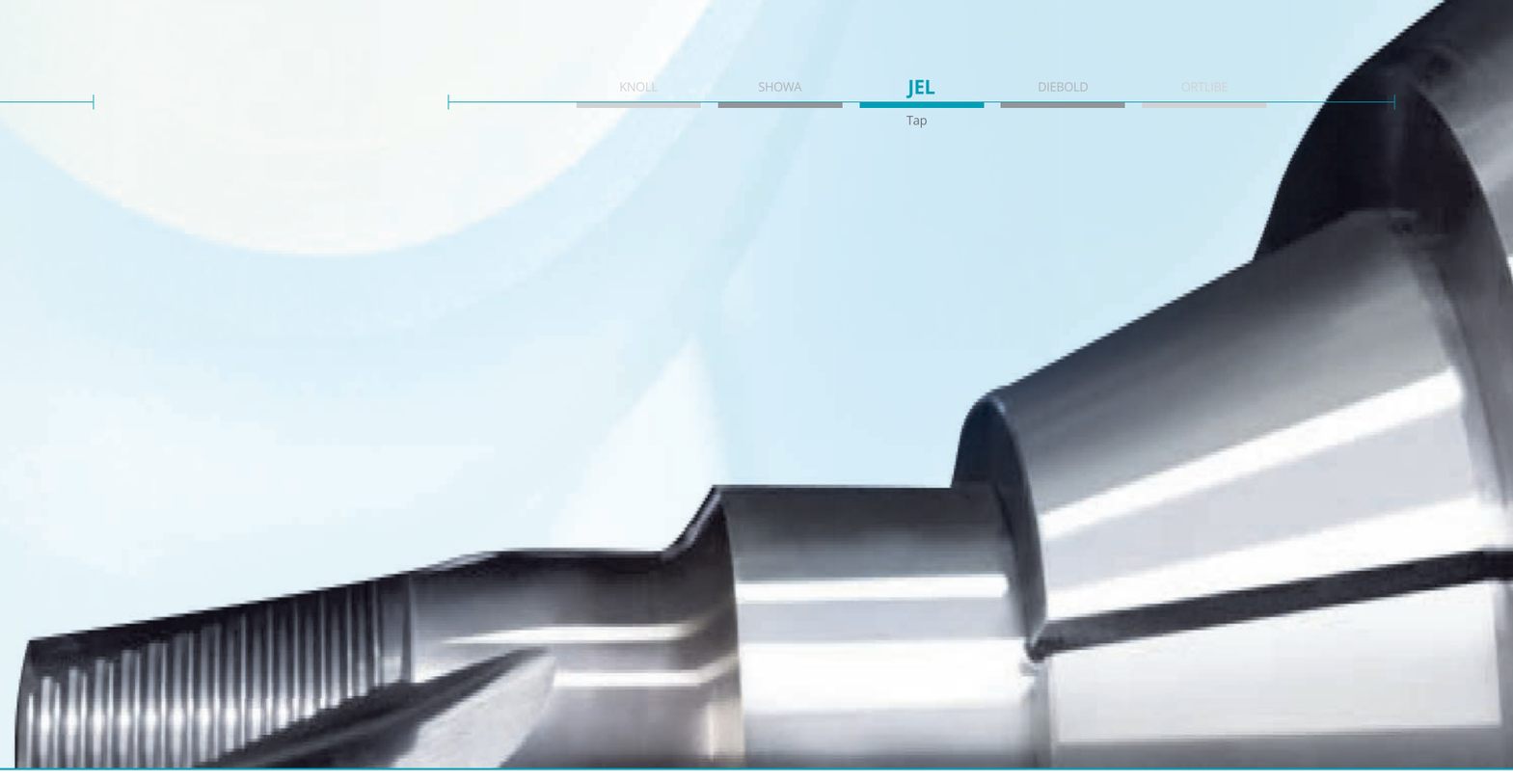
### TDU40

- Speed increasing ratio : 3.4x
- Max. rpm : 12,000
- Tool grip diameter : Ø1.5~20mm

### TDU17

- Speed increasing ratio : 6x
- Max. rpm : 30,000
- Tool grip diameter : Ø1.5~10mm

# Tap



JEL®

## Thread Mill · Drill Thread Mill

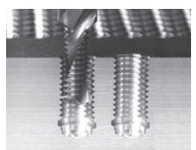
### MGF

Thread milling cutter MGF is a spiral fluted solid carbide tool with profile correction and rear chamfer. MGF XH Micro is suitable for thread milling and 90˚ countersinking of M1 – M2.5 and threads can be made directly in hardened components between 45-60 HRC.
e.g. indexable bodies, aviation components, implants, etc.

### BGF

One pass : drill + thread milling cutter + chamfer → shorter cycle times, blind bore or through hole

- Achievable thread depth of up to 3.0×D
- Suitable for steel materials for cylinder heads, converter housings and transmission cases



## Tapping chuck

### Synchro Tapping Chuck

Modern CNC machines allow synchronous thread tapping without a compensating chuck, also called “rigid tapping“. JEL synchro tapping chucks compensate for the length errors caused by the backlash and creates the prerequisites for achieving optimum performance from your tapping tools.

- Optimum tool performance
- Can be used with internal coolant supply or MQL 1 channel system

## Vabos

### VABOS Tool System

JEL® VABOS, the variable boring and countersinking system, is a modular tool system which is particularly notable for its extremely high flexibility.

A broad based range of machining tasks can be carried out with just a few components –a central tool combined with inserts for universal shaping. When machining bores and threads on CNC machines significant time savings and improvements in quality can be achieved.

## Roll Form Taps

### JEL Roll Form Taps

Roll form tap MOREX HML has been refined by JEL to the brand new type MOREX R. Based on the combination of flexible shank and a hard thread profile, the unique tool outmatches conventional carbide roll form taps particularly in steel materials.

- Longest tool life
- Reduces tool costs : Continuous regrinding is possible

# Tool Holding System

diebold
Goldring-Werkzeuge
Spindeltechnologie

## ThermoGrip – Shrink Technology

### ThermoGrip

The Heat Shrink Chuck is manufactured by using high quality and high rigidity materials through precise process and quality control.

- 5,000 shrink cycles with no geometric or physical changes
- Patented relieved bore facilitates automatic shrink process

### JetSleevee

Jetsleeve is a special Heat Shrink Chuck with an aluminum sleeve on the chuck nose. The sleeve is provided with a series of calibrated holes around the tool opening to ensure a constant supply of the desired amount of coolant or air to the cutting tool. The small size of these holes forces the air or coolant to accelerate to a very high velocity, ensuring that any chips or fines created by the machining process are flushed out immediately.

### TUS Slim Chuck

Slim nose configuration, minimum weight and volume balanced to very low levels at high speed. All TUS chucks have an anti-corrosion coating.

### TER-Flyer

As a new concept of ER collet chuck combining Heat Shrink Technology, it resolves run-out problems and maintains high clamping force, an advantage of shrink chucks.

- Fully applicable to collect specifications
- Run-out < 0.003mm
- Improved tool life over 300%

### Device for Heat Shrinking

DIEBOLD started its ShrinkFit technology when presenting the first contact shrink unit, a milestone in modern ShrinkFit technology. Another very popular product is our patented chiller unit FKS 03, for flexible cool-down of hot tools after the inductive shrink process.

- Tool change in seconds
- Minimal run-out levels guarantee accuracy and promote tool-life

# Collet Chuck

## CentroGrip®

Centro Grip collet chuck line is designed for best possible concentric run-out combined with the flexibility of micro run-out MR collets with the contour of ER collets. Up to 12 different tool diameters can be clamped in one adapter with high precision collets.

- Best possible run-out ≤ 3µm
- Clamping Range : Ø1~20mm
- 50% more clamping force compared to standard ER collet chucks

## Standard Collet Chuck

Collet Chuck is manufactured by a master bar with a high-rigidity material of over 800N/mm² and repeat accuracy of 1µm.

- Taper roughness Ra≤0.4
- Excellent chuck for balancing 8,000rpm

# Spindle

## High Speed·Power·Modular Line

DIEBOLD supplies spindle shafts to machine manufacurers in Europe and has spindle products and components suitable for high precision and high speed machining. Diameter 650mm, length up to 2,500mm spindle shaft is standard and special customiztions are also available.



# Gauging

## Taper Inspection Gauge

Diebold gauges will economically verify the accuracy of your tool holders, spindles and other precision equipment.

- Tool holder taper diameters and angles
- Location and run-out of the taper in relation to the flange
- Other dimensions compliant with DIN/ISO and taper values
- High precision gauge masters are manufactured at Diebold (optional)

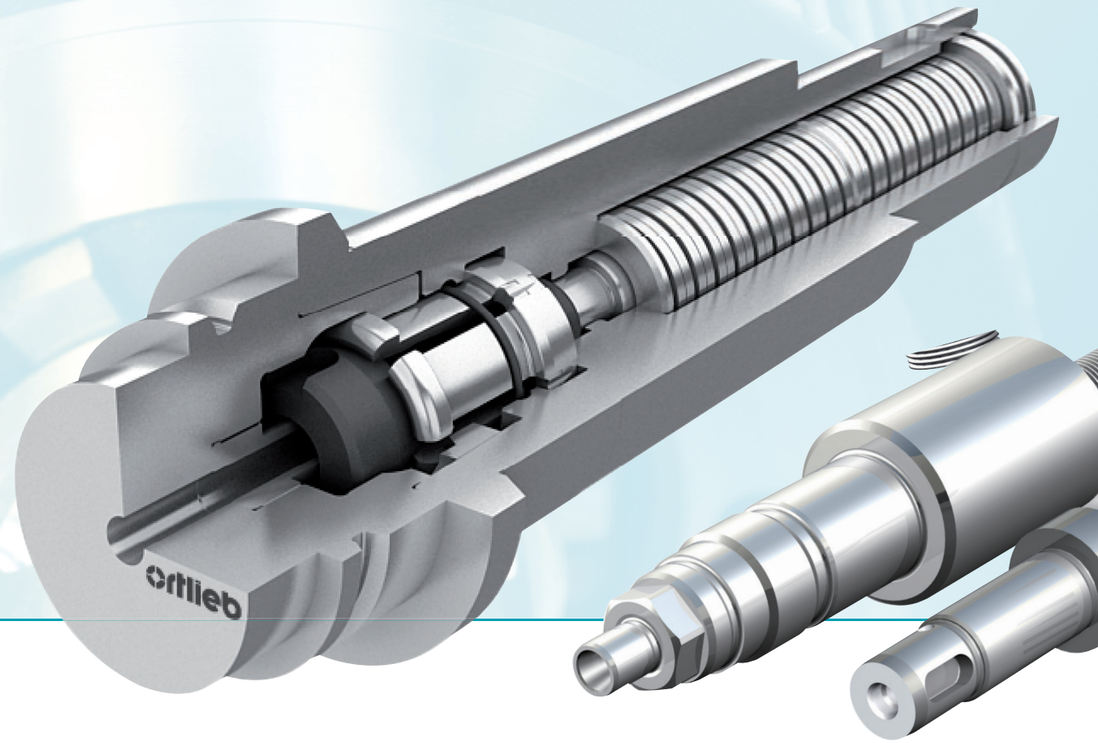
## Edge Finder 3D pro • eco

Edge Finder is designed to find and set reference points in all 3axes (X, Y and Z) in vertical or horizontal directions. Ultra compact design allows the use of bigger components and probes with a carbide ball guarantees the accuracy to 10µm.

※ The 3D pro has a fully waterproof housing. Even on machines where coolant water is dripping, indicator and probe mechanics are completely sealed

※ The 3D eco is designed for use on machines in a dry surrounding

# Automatic Clamping System




ortlieb
The Precision Company

## Automatic Tool Clamping

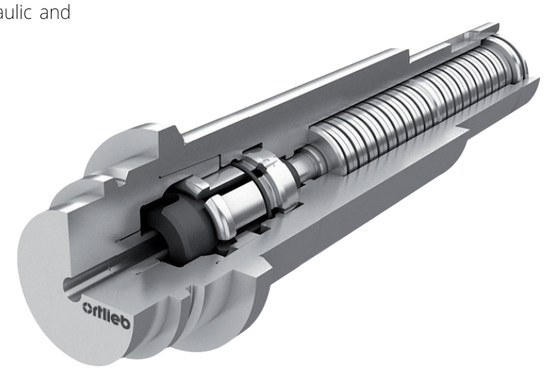
### Clamping Unit (HSK/BT)

The Ortlieb HSK-tool grippers are the basis for safe and reliable clamping of HSK-tools. For the first time it is possible to offer maintenance-free tool grippers by the use of ceramic on the functional surfaces in connection with a wear-resistant hard coating. The six-piece clamping segments have an optimal load balancing.



### Drawbar System

- Highest reliability by usage of Röhrs coil springs with high break resistance and high endurance strength
- A flexible solution, as mounting of standard hydraulic and pneumatic cylinders are possible



# Workpiece Automation

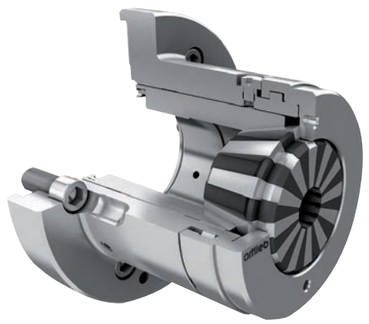
## Standard Type

QUADRO®

- No axial movement of workpieces due to clamping pressure
- Short changeover time for collet change due to bayonet cap

SPANNAX®

- High clamping force
- Spindle preservation via low centrifugal force
- Various designs (round, square and hexagonal)
- High run-out ≤ 0,01mm (stationary)
- Clamping tolerance nominal diameter ± 0,5mm by using SPANNAX® GT clamping heads
- Higher revolution speed up to 8,000rpm



## Special Type

- Efficient machine operation with short workpiece change time
- Automatic change of the WSA-clamping device using known interfaces like HSK
- As an option the WSA-clamping devices can be changed on dividing heads

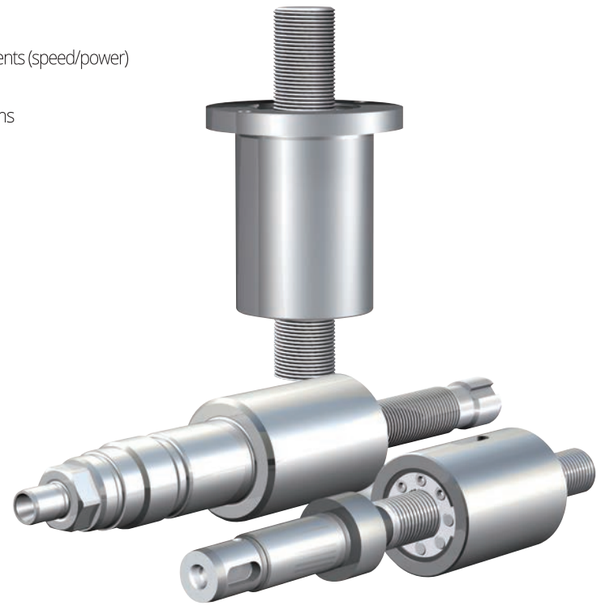


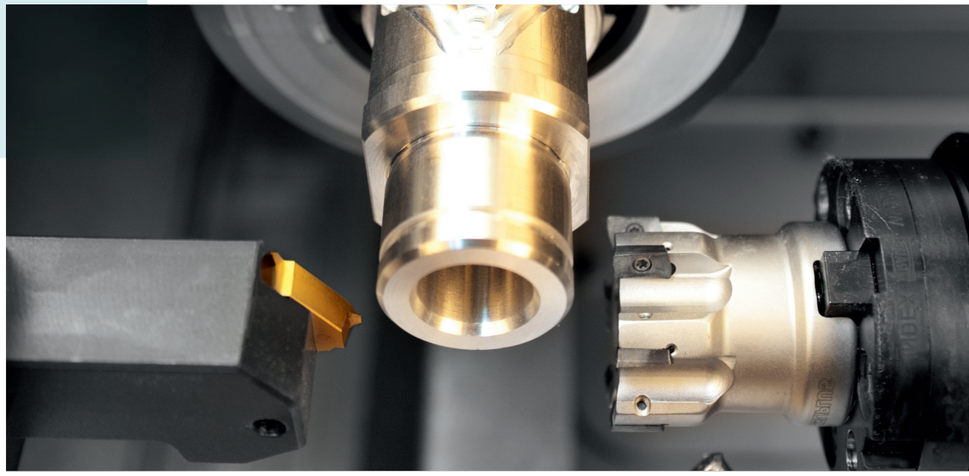


# Drive Technology

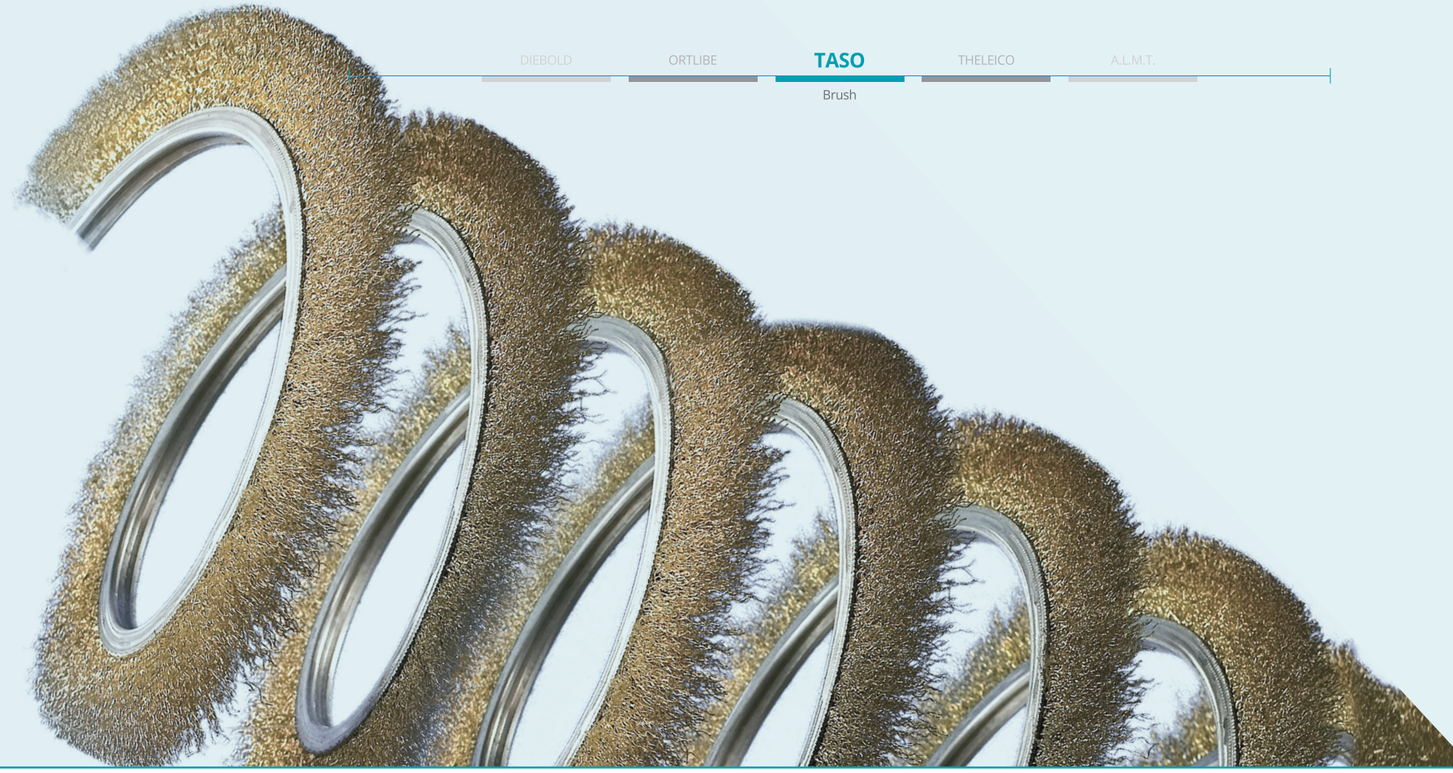
## ASCA Servo Screw

- Operating spindle by Planetary roller screw
- Can be designed according to a customer's requirements (speed/power)
- Can create 10KN power through 3.5Nm torque
- Less noise, No leakage, No environmental problems
- No additional reduction gear
- High durability





# Brush



## Brush

### Cup Brush

The working surface is shaped like a clover leaf. This tool features feed speeds for the same deburring quality. This enables the cycle time to be reduced.

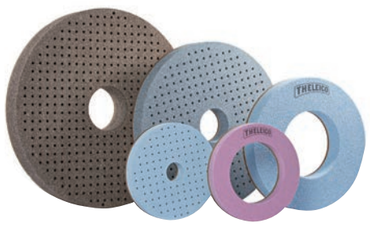
### Special Brush

TASO produces its own tools and machines and is very flexible in the range of its production. High quality is reached due to the implementation of a quality management system ISO 9001 and also to the workmanship of the very experienced staff members.

# Grinding Wheel


THELEICO®

## Grinding Wheel



### Springs

THELEICO manufactures the grinding wheels for single-sided and double-sided face grinding of spring ends.

- 80% market share of spring grinding market in Europe
- Shorter grinding time, longer dressing interval and tool life
- Industries : Heavy spring, industrial and agricultural machinery

### Gearbox/Engine Construction

The worm wheel is a tool that makes the gears inside automobile transmissions.

- Tailor-made according to customer's requirements
- Diameter range : Ø3~1,100mm
- Width range : 1mm ~ 660mm
- Maximum grinding speed : 125m/sec
- Industries : Automotive gear and reducer manufacturing

### Rollers

THELEICO provides grinding solutions for processing rollers in hot-rolling and cold-rolling mills.

- For all types of steel rollers, cast rollers, synthetic rollers and granite rollers
- For pre-grinding, intermediate grinding, finish grinding and fine grinding (polishing)
- Industries : Paper roll, steel roll and aluminum roll manufacturing

### Rails

THELEICO manufactures special tools for rail grinding applications both stationary grinding machinery and mobile equipment.

- Suitable for a wide variety of rail grinding machinery so-called high-speed grinding
- Industry : Rail manufacturing

# Diamond Dresser

A.L.M.T. Corp.



## Gear Dresser

Gears are a key element of the powertrain of automobiles. The gear dresser dresses the worm-shaped grinding wheels.

- Capable of high-precision shape using electroplated technology
- Maintain high quality performance and reproducibility
- Industries : Automotive gear and reducer manufacturing

## Rotary Dresser

Suitable for dressing grinding wheels in the process of LM Guides and bearings for high-precision shape.

- Maximized performance through use of plating, sintering and electroplating
- Shape accuracy and maintainability, excellent dressing ability
- Industries : LM guide, bearing, shaft manufacturing and centerless process industry

## ACE Dresser

Suitable for dressing grinding wheels in the surface grinding process.

- By using CVD diamonds, wear resistance is similar to single crystal diamonds
- Uses square type diamonds to keep dressing area constant and maintain stable performance
- Industries : Surface, section grinding process and shaft manufacturing

## Vitmate (cBN Grinding Wheel)

A precise cBN wheel that grinds CAMs and Crankshafts.

- Can improve productivity through a self dressing process
- Uses a bond with excellent particle holding power, maximizing the characteristics of cBN grains
- Industies : Automotive engine, bearing and ball screw manufacturing

## BL-PCD DRILL

Drill with BinderLess PolyCrystalline Diamond.

- Excellent wear and fracture resistance compared to tools made with previous polycrystalline diamond
- Helical drill shape possible
- Small diameter of Ø1~3mm possible
- Industries : Machining brittle materials (ceramics) and semiconductor parts manufacturing

# Monitoring system of cutting process


## ACM (Adaptive Control Monitoring)

Real-time adaptive control based on learned actual spindle load data and special algorithms from each tool.

- Adaptive Control : ACM optimizes the programmed feed rate - speeding up cutting when the path is obstacle-free and slowing down when geometry, material hardness, or tool conditions demand caution
- Monitoring : Tools, spindles and parts are monitored for breakage, overload, missing tools, repeated runs of the same part, etc. Dangerous conditions are detected and corrected before damage occurs

## VCM (Vibration Control Monitoring)

The only system that successfully monitors machine vibration, avoids tool breakage and catastrophic collision-related damage.

- Machine tool and spindle are monitored continuously for vibration
- Tools are individually monitored for vibration

## AVCM (Adaptive Vibration Control Monitoring)

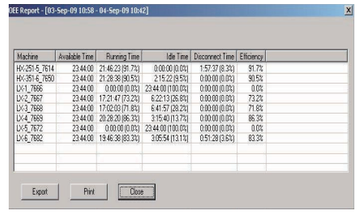
Adaptive and Vibration Control and Monitoring (AVCM) is a state-of-the-art application combining both ACM and VCM features.

- Real-time adaptive control by learned load data and the special algorithms from each tool
- The only system that successfully monitors machine vibration, avoids tool breakage and catastrophic collision-related damage

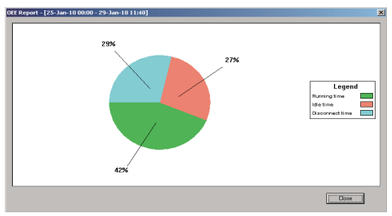
## OMATIVE-Pro

OMATIVE-Pro extracts the crucial machine information your managers need to run tight operations. Real-time event data from machine tools continuously stream to OMATIVE-Pro. OMATIVE-Pro monitors production, machine condition and performance in real time. This provides an objective measurement of machine and operator efficiency and machine maintenance status. It provides statistics for all these parameters and includes summaries of utilization, downtime, productivity, number of manufactured parts, machine condition and more.

> Real-time data




> Machine Performance




> Machine Production Efficiency


> Machine Production Efficiency

MAPAL HiTECO

## MAPAL HiTECO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