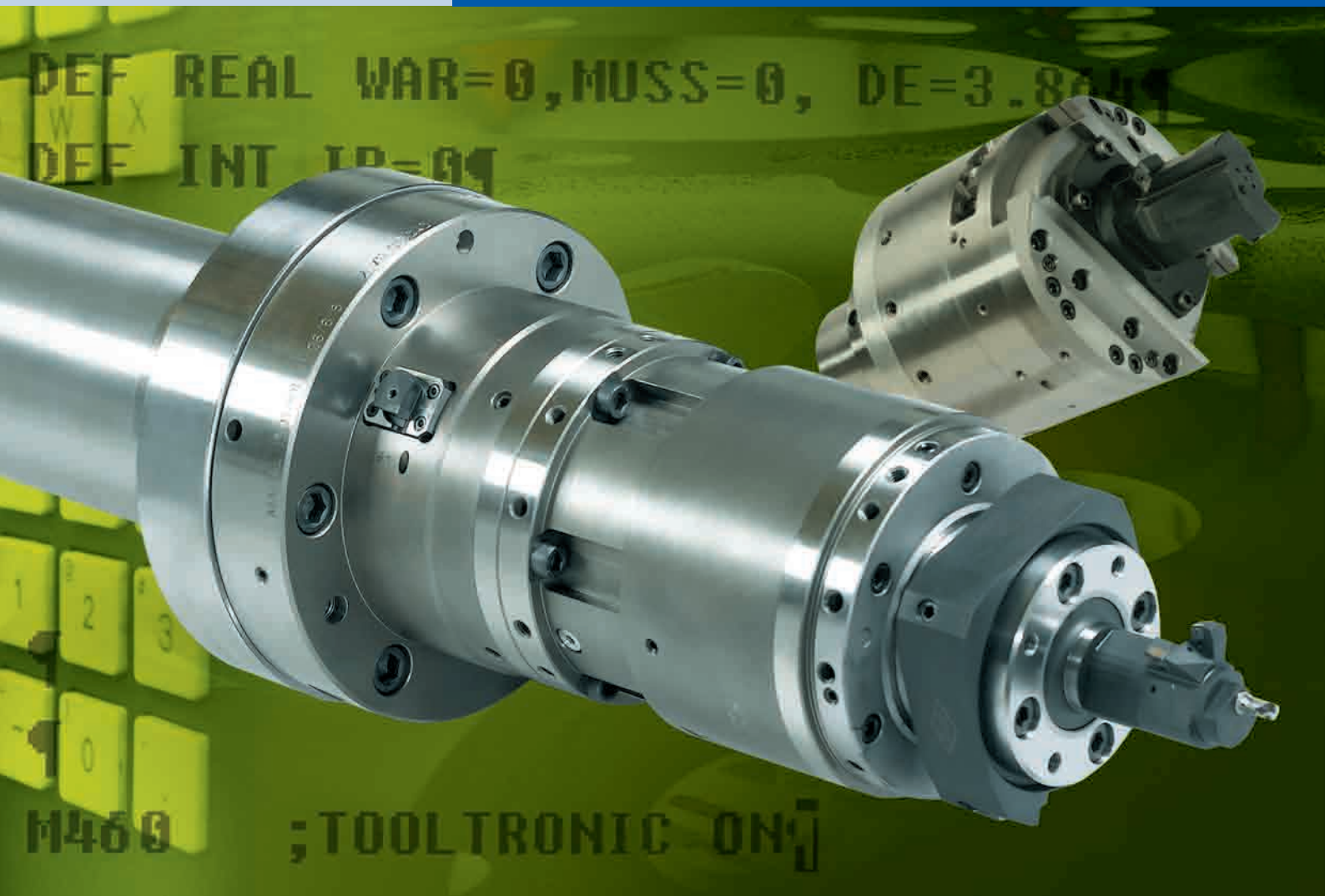




Perfectly yours.

The driving force  
for precision machining

MAPAL TOOLTRONIC®

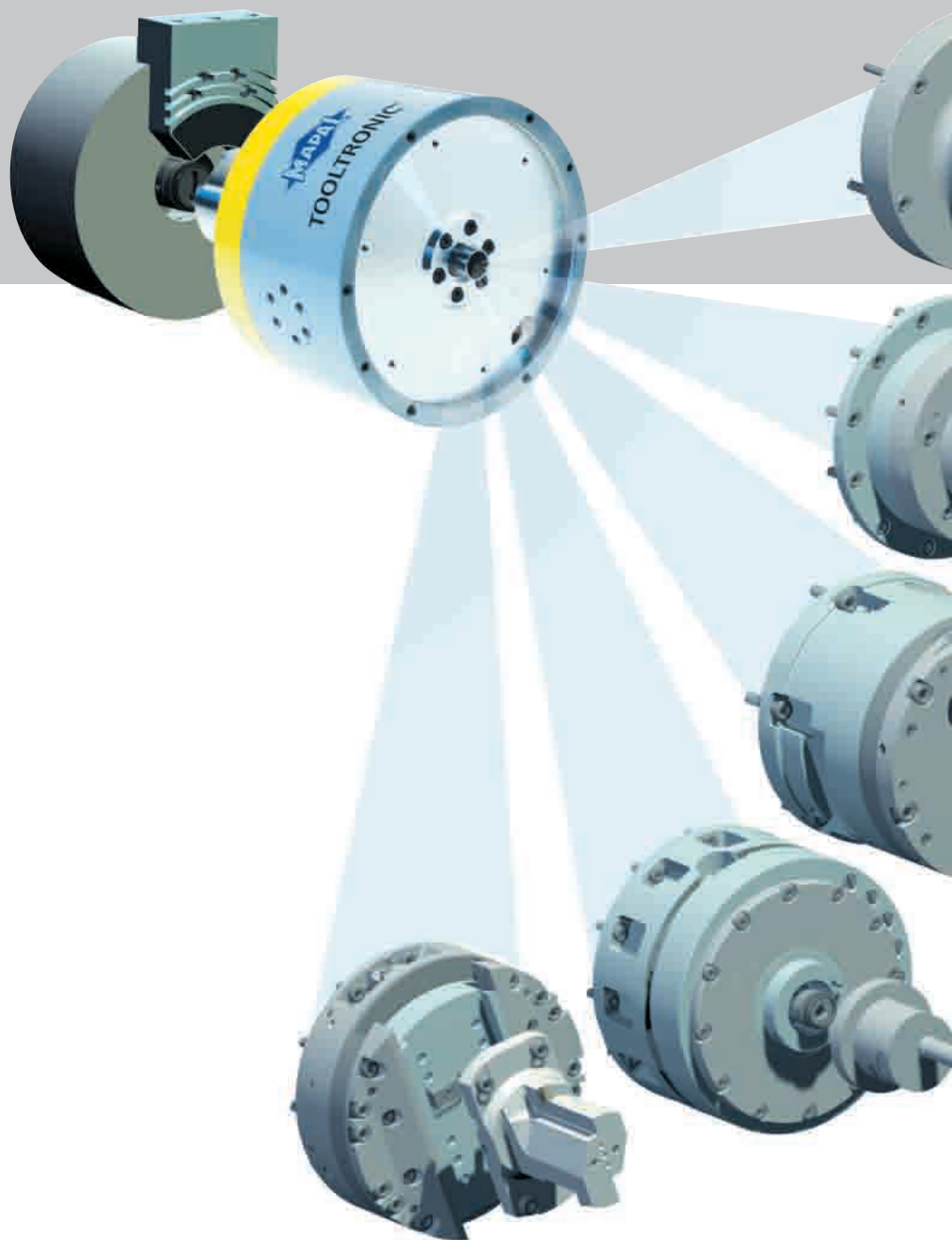


TOOLTRONIC® – The mechatronic tool system from MAPAL for machining any contours, recesses and non-cylindrical bores.



Perfectly yours.

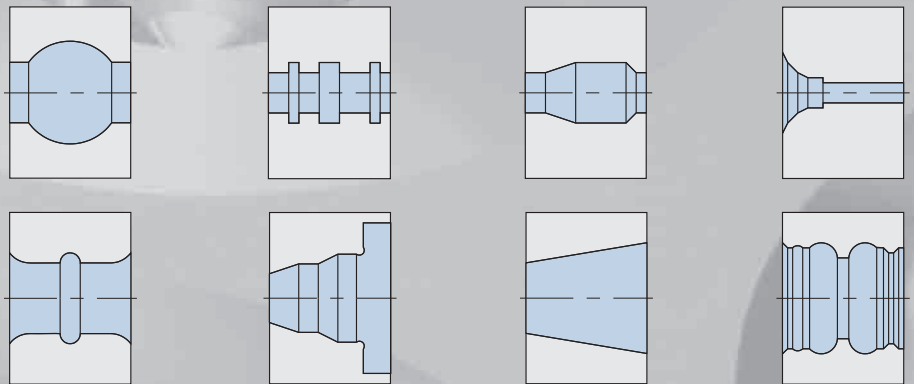
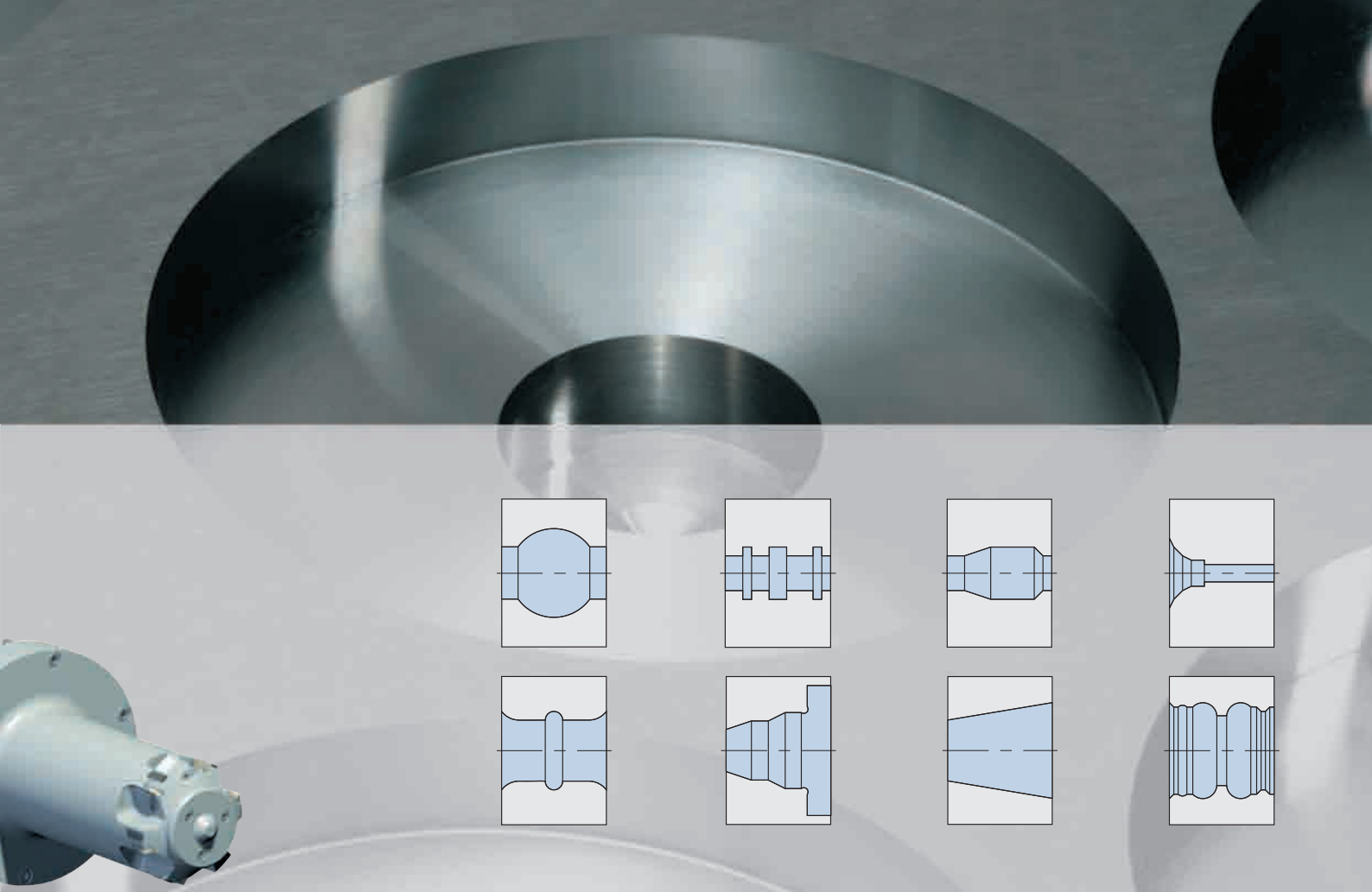
## Standard systems for numerous uses MAPAL TOOLTRONIC®



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Valid from 04/2011



**TOOLTRONIC® –  
the driving force for precision machining**

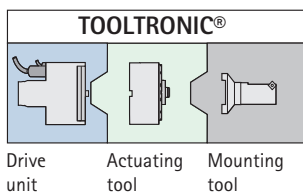
Actuating movements can be carried out easily and reliably with TOOLTRONIC® both on machining centres and on special machines. This means machining contours, recesses and non-cylindrical bores is just as viable as closed loop systems for blade adjustment or the simple manufacture of families of parts with numerous variations.

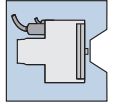
TOOLTRONIC® has been specifically developed as a self-contained drive system. By inductive and bi-directional data transmission, TOOLTRONIC® provides a full NC-axis which is incorporated into the machine control system. This means that the full functions of modern CNC control systems, such as interpolation of various axes and adjustment for wear and for blade radius, can also be utilised in conjunction with TOOLTRONIC®.

Bi-directional data transmission also allows any sensor data to be transferred from TOOLTRONIC® to the machine control, opening up new concepts for machining and regulation.

Which mounting tool is to be used with TOOLTRONIC® depends on the machining task in question. In principle self-generating tools from MAPAL which have previously been operated by coolant pressure, centrifugal force or draw bar can be driven and controlled by TOOLTRONIC®.

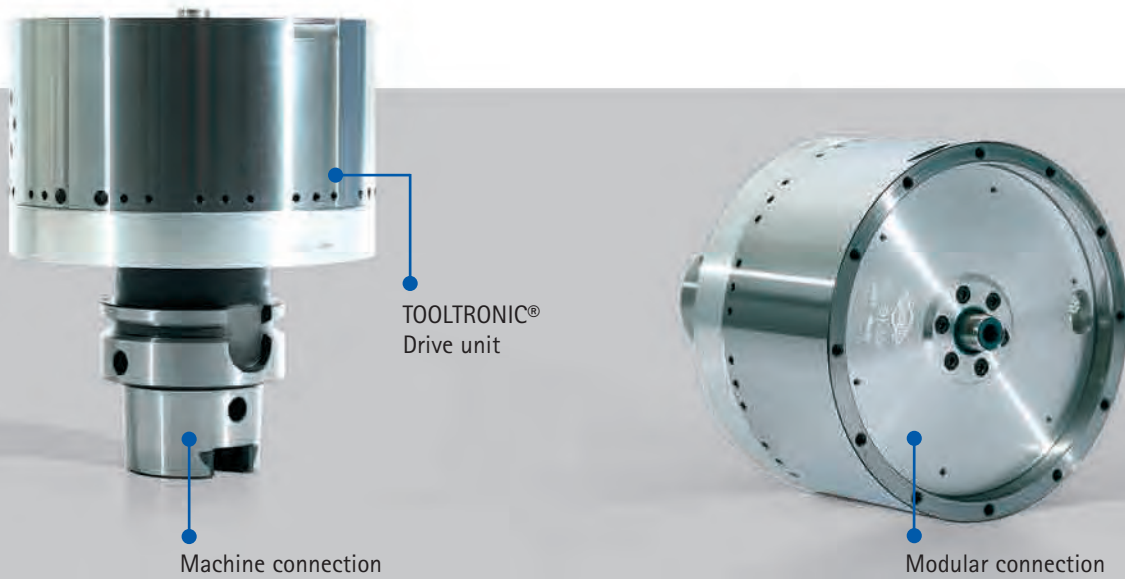
However, possible applications are not just limited to pure cutting operations with a geometrically defined cutting edge. A honing tool with self-generating honing pads for wear adjustment and dimensional corrections can also be applied as a mounting tool when used with TOOLTRONIC®.





Drive unit

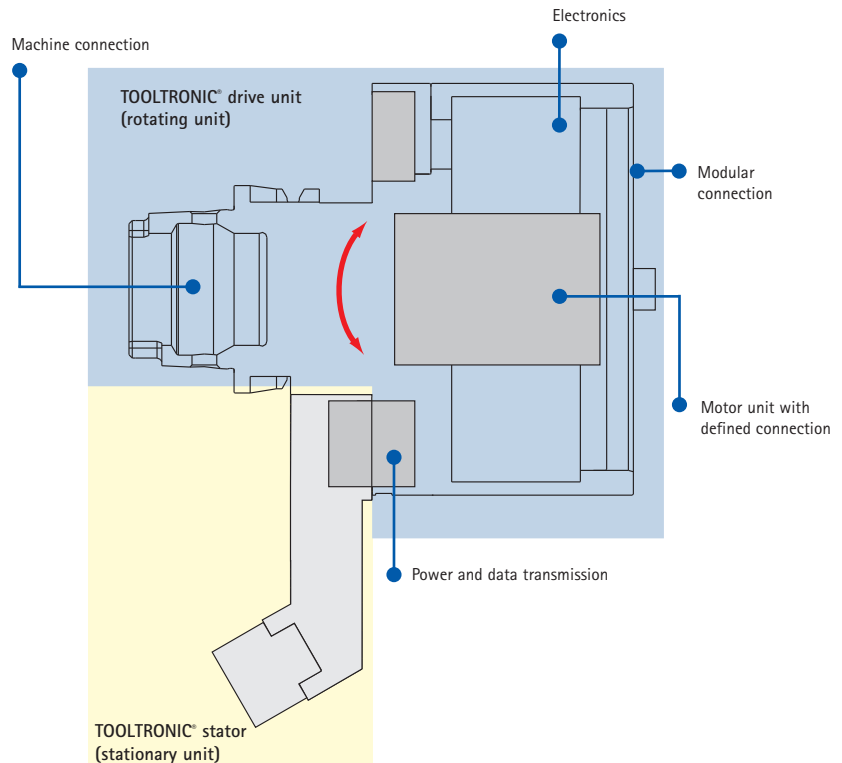
# For machining centres



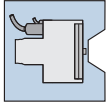
TOOLTRONIC® for machining centres is a full, interchangeable tool axis which offers a broad range of applications. Machining operations on parts are now possible which could only previously be carried out on special machines or with very specific tools. TOOLTRONIC® provides the flexibility for this and can also be adapted to different component variations by simple programming. The number of different tools is reduced and production and throughput times shortened.

The TOOLTRONIC® drive unit can be supplied as a standard component with different machine connections. Different versions of actuating tools can be flanged to the drive unit which contain the appropriate actuating principle and the right gear components for the specific machining task.

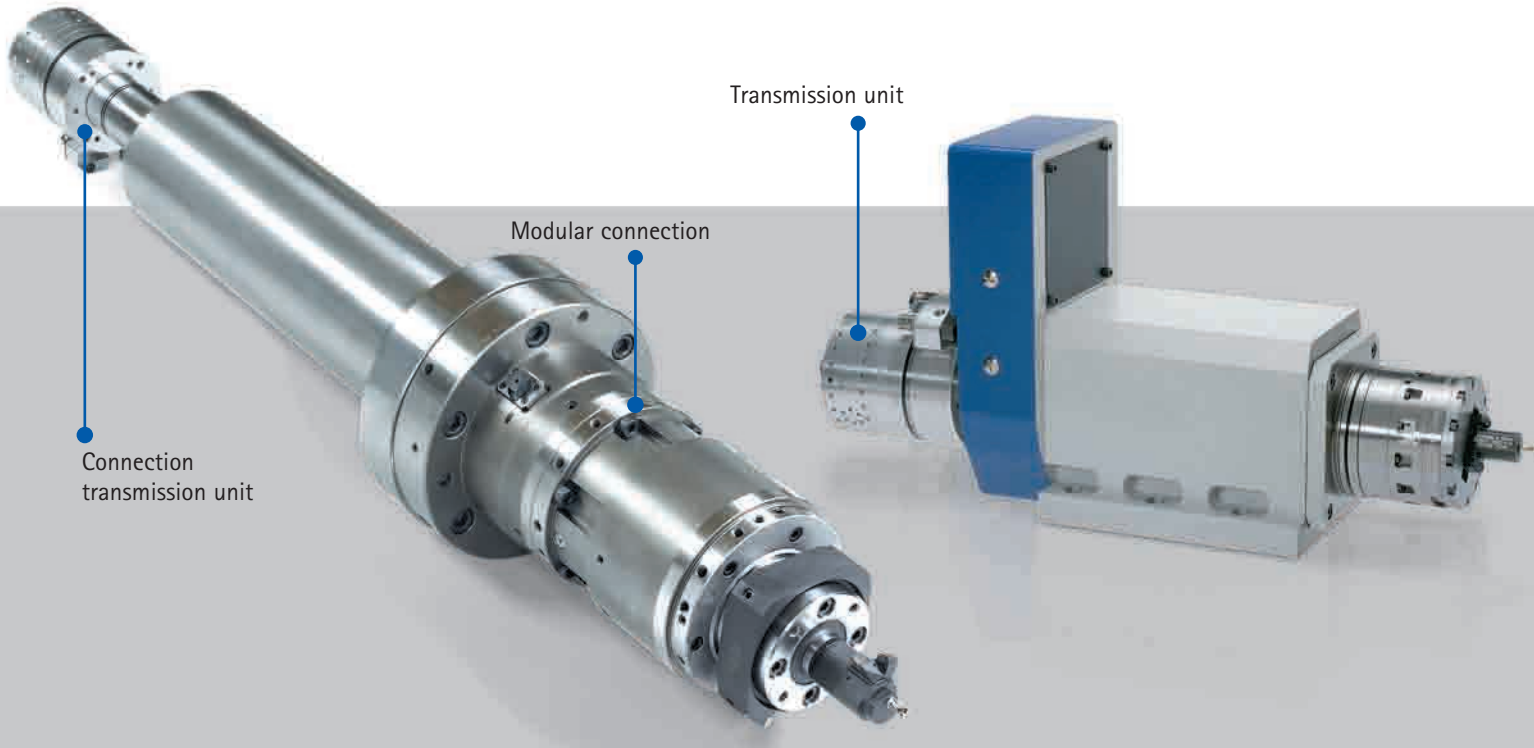
With internal coolant supply, the different tool connections which can be applied and with automatic tool change, TOOLTRONIC® represents an interchangeable drive system for numerous application areas.



# For special machines



Drive unit

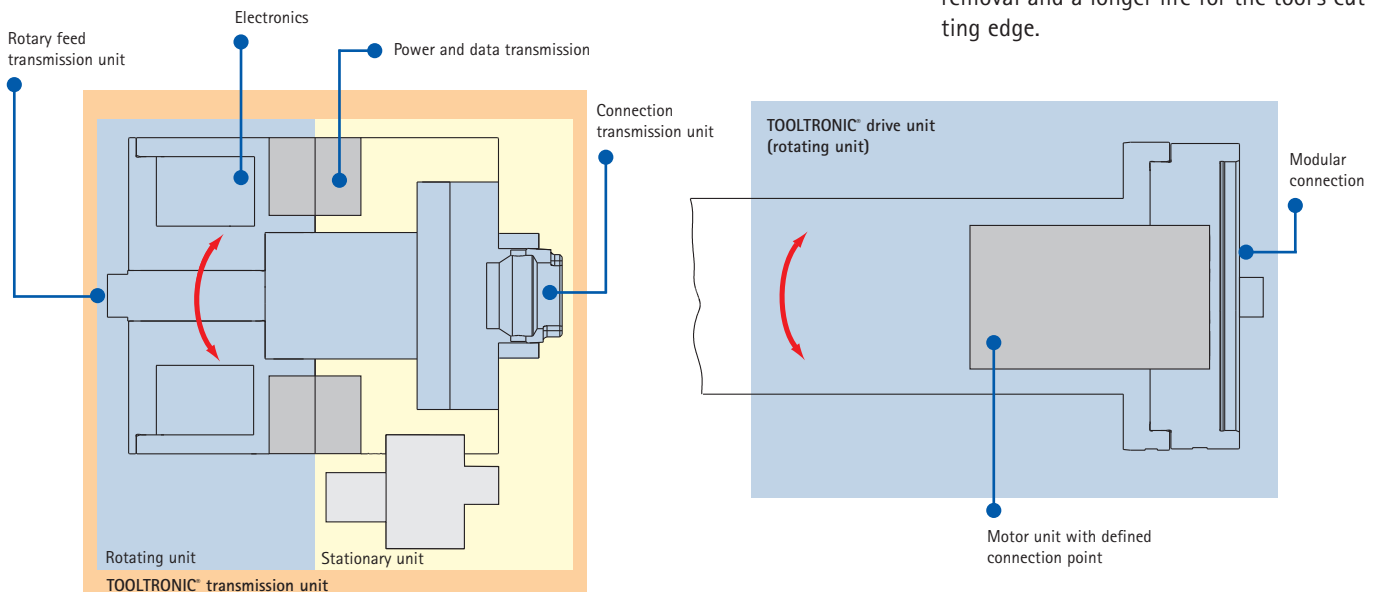


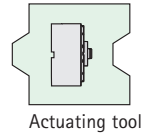
TOOLTRONIC® is used as a spindle mounted unit both on production lines and also on rotary transfer machines. Costly production operations can be reduced to one machine tool or machining station. This means throughput times and costs are also reduced to a minimum.

Adapted to special machines, individual solutions can be easily, rapidly and reliably introduced. Despite the "special solution" aspect, the modular design allows short reaction times and standard components which are easy to fit and service.

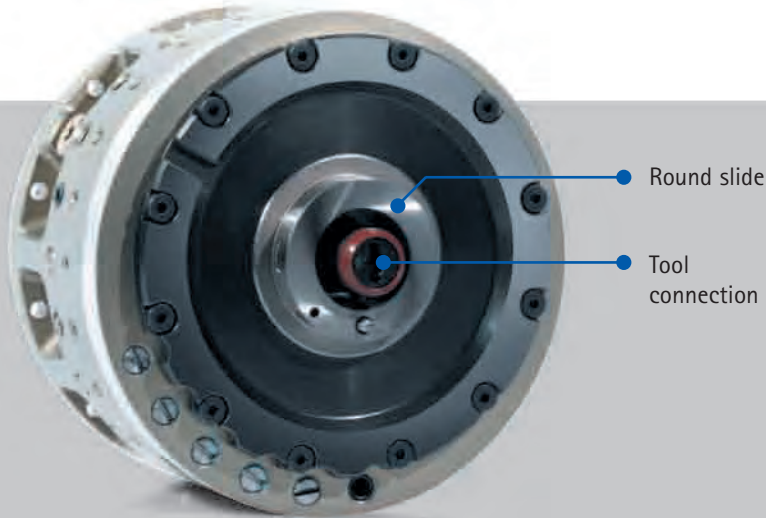
Transfer of the inductive power and bi-directional data transmission systems away from the machine tool's working area means the structure can be short. This in turn ensures maximum rigidity in the TOOLTRONIC® system.

A further standard element is the internal coolant supply which ensures optimum chip removal and a longer life for the tool's cutting edge.

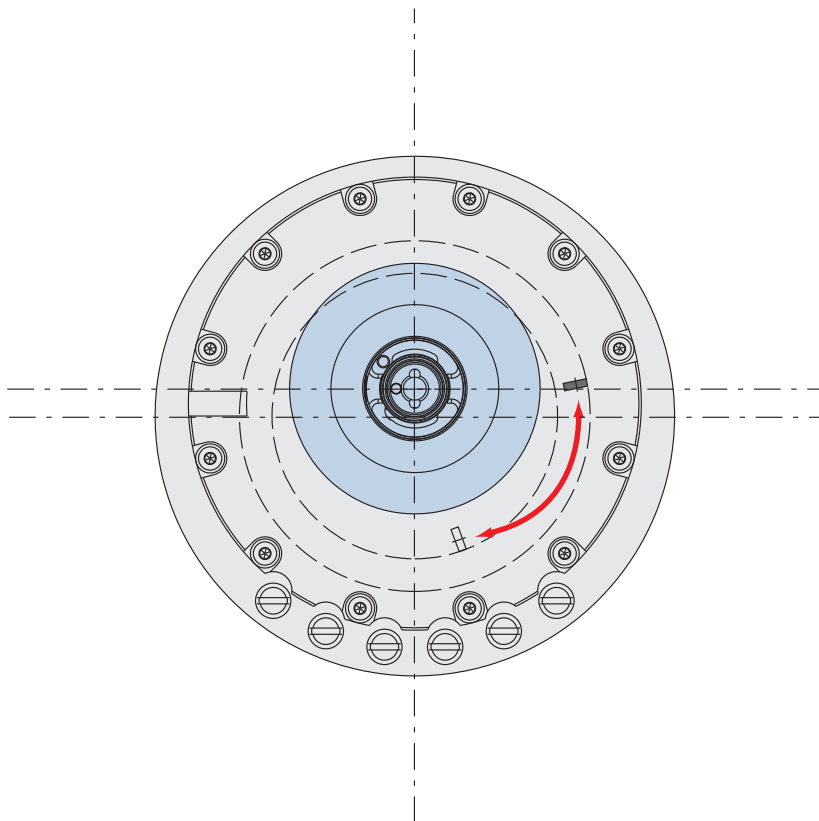




## Eccentric actuating tool



- Depending on the application, spindle speeds of up to 8,000 rpm can be reached.
- Possible radial stroke to max. 11.0 mm.
- Flexible connections for mounting tools.
- Internal coolant supply.



### Eccentric actuating tool for high spindle speeds

Depending on the machining task, various self-generating actuating tools from MAPAL are used on the modular TOOLTRONIC® connection. Eccentric actuating tools (EAT) are used as standard tools.

#### Application area:

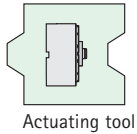
For fine machining with maximum accuracy with small strokes.

#### Advantages:

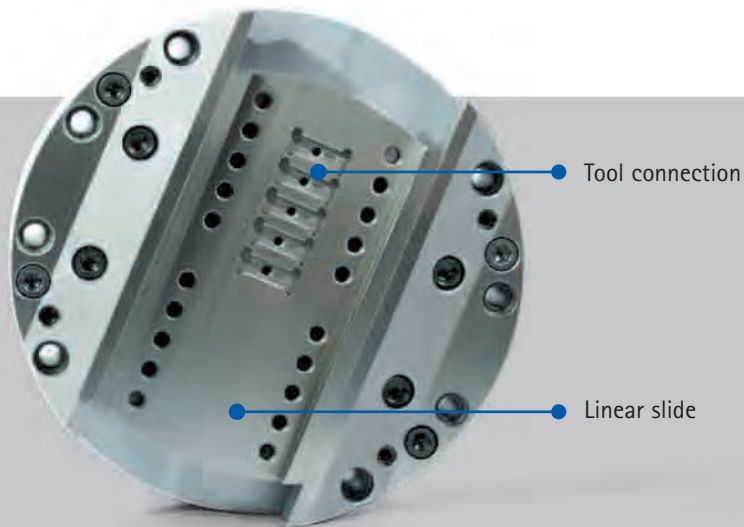
High accuracy at maximum spindle speeds. Static unbalance is compensated by eccentric principle.

#### Properties:

Supported in roller bearings, sealed and low maintenance round slide. Adjustment and spindle speed with almost no effect on static unbalance.



## Linear actuating tool



- Depending on the application, spindle speeds are achievable of up to 4,000 rpm.
- Possible radial stroke to max. 56 mm.
- Flexible connection for mounting tools.
- Internal coolant supply.

### Linear actuating tool for large strokes

Applications which require a large stroke with appropriate spindle speed are covered by linear actuating tools (LAT) as standards.

As with the eccentric actuating tools, linear actuating tools can be used in modular form for machining centres or as a special solution on the TOOLTRONIC® system.

#### Application areas:

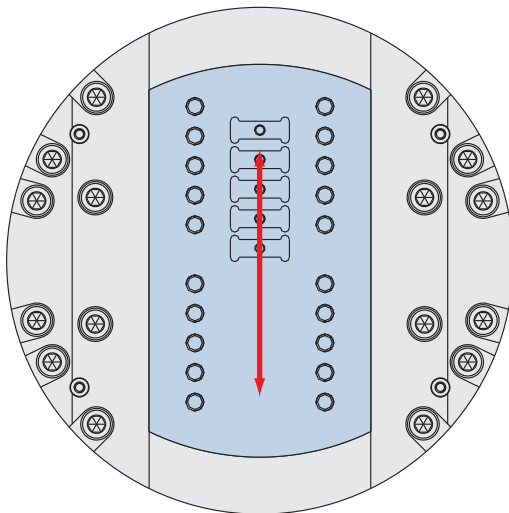
For fine machining with maximum accuracy with large strokes.

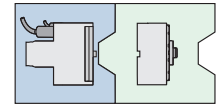
#### Advantage:

Large strokes possible with appropriate spindle speed.

#### Properties:

Low maintenance linear slide.  
Unbalance partially compensated by weight compensation slide.

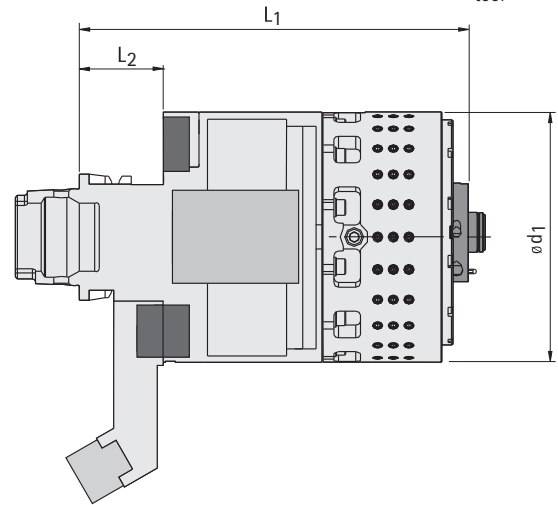




Drive unit    Actuating tool

# Systems for machining centres

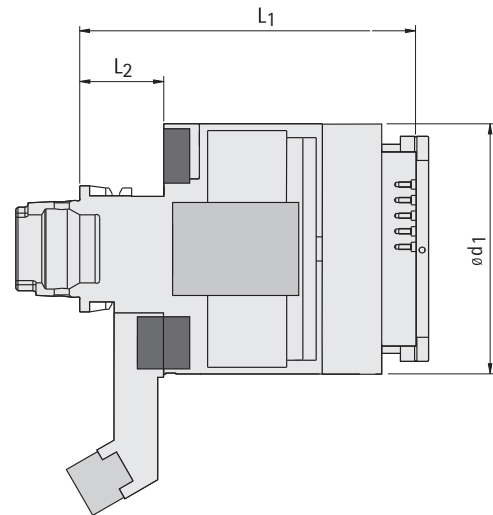
## Eccentric actuating tools



Connecting transmission unit	ød <sub>1</sub> [mm]	L <sub>1</sub> [mm]	L <sub>2</sub> [mm]	Tool connection	Weight [kg]	Specification	Excentricity	<sup>2</sup> max. radial stroke [mm]	Delta D [mm]	<sup>2</sup> max. perm spindle speed [min <sup>-1</sup> ]	<sup>3</sup> max. adjustment speed [mm/min]	max. pressure IC [bar]
HSK-A63	125	204	42	HSK-C32	7	TT-MC-EAT125-A63-C32-3.0	3	5	10	8.000	180	40
HSK-A63	125	204	42	HSK-C32	7	TT-MC-EAT125-A63-C32-6.0	6	11	22	7.000	350	40
HSK-A100	160	214	45	HSK-C50	15	TT-MC-EAT160-A100-C50-3.0	3	5	10	8.000	180	40
HSK-A100	160	214	45	HSK-C50	15	TT-MC-EAT160-A100-C50-6.0	6	11	22	7.000	350	40

<sup>1</sup> Additional connections on request. | <sup>2</sup> Subject to application. | <sup>3</sup> Subject to mounting tool.

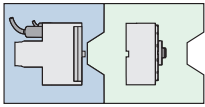
## Linear actuating tools



Machine connection	ød <sub>1</sub> [mm]	L <sub>1</sub> [mm]	L <sub>2</sub> [mm]	Tool connection	Weight [kg]	Specification	<sup>2</sup> max. radial stroke [mm]	Delta D [mm]	<sup>2</sup> max. perm spindle speed [min <sup>-1</sup> ]	<sup>3</sup> max. adjustment speed [mm/min]	max. pressure IC [bar]
HSK-A63	125	183	42	Flange connection	8	TT-MC-LAT125-A63-FLA-H-28	28 (+/- 14)	56	4.000	540	40
HSK-A63	125	187	42	Flange connection	7	TT-MC-LAT125-A63-FLA-Z-40	40 (+/- 20)	80	4.000	1.000	40
HSK-A100	160	182	45	Flange connection	16	TT-MC-LAT160-A100-FLA-H-36	36 (+/- 18)	72	4.000	600	40
HSK-A100	160	200	45	Flange connection	17	TT-MC-LAT160-A100-FLA-Z-56	56 (+/- 28)	112	4.000	1.000	40

<sup>1</sup> Additional connections on request. | <sup>2</sup> Subject to application. | <sup>3</sup> Subject to mounting tool.

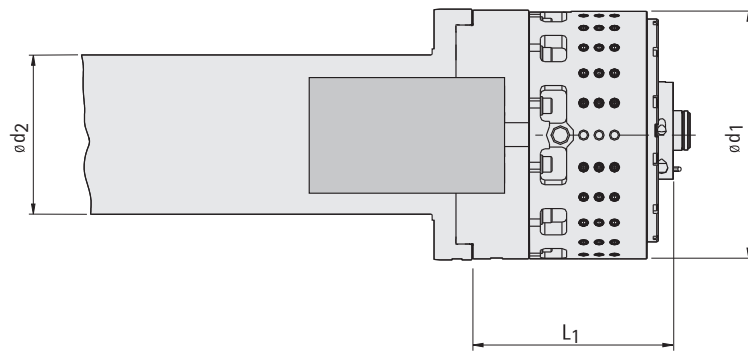
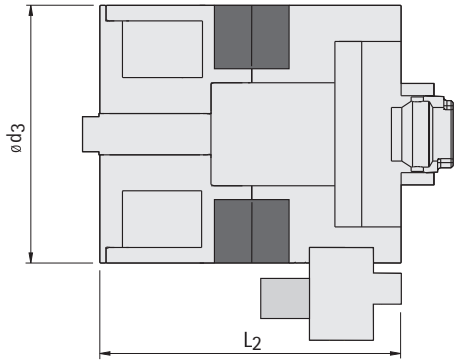




Drive unit Actuating tool

# Systems for special machines

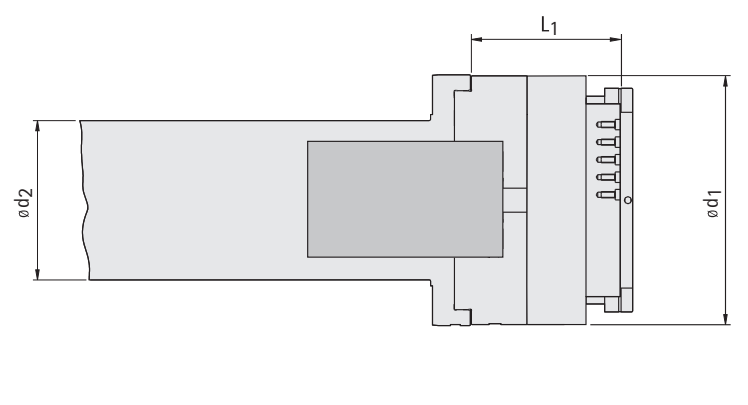
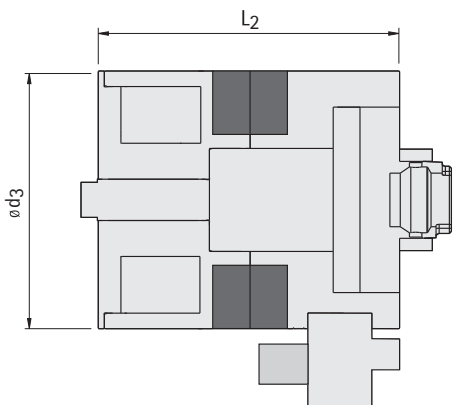
## Eccentric actuating tools



<sup>1</sup> Connecting transmission	ød <sub>1</sub> [mm]	L <sub>1</sub> [mm]	L <sub>2</sub> [mm]	ød <sub>2</sub> [mm]	ød <sub>3</sub> [mm]	<sup>3</sup> Connection rotating	<sup>1</sup> Tool connection	Specification	Excentricity	<sup>2</sup> max. radial stroke	Delta D [mm]	<sup>2</sup> max. spindle speed	<sup>4</sup> max. adjustment speed	max. pressure IC
HSK-A50	125	111	155	80	125	M16x1,5LH	HSK-C32	TT-SU-EAT125-C32-3.0	3	5	10	8.000	180	40
HSK-A50	125	111	155	80	125	M16x1,5LH	HSK-C32	TT-SU-EAT125-C32-6.0	6	11	22	7.000	350	40
HSK-A50	160	121	155	80	125	M16x1,5LH	HSK-C50	TT-SU-EAT160-C50-3.0	3	5	10	8.000	180	40
HSK-A50	160	121	155	80	125	M16x1,5LH	HSK-C50	TT-SU-EAT160-C50-6.0	6	11	22	7.000	350	40

<sup>1</sup> Additional connections available on request. | <sup>2</sup> Subject to application. | <sup>3</sup> Connecting element as required. | <sup>4</sup> Subject to mounting tool.

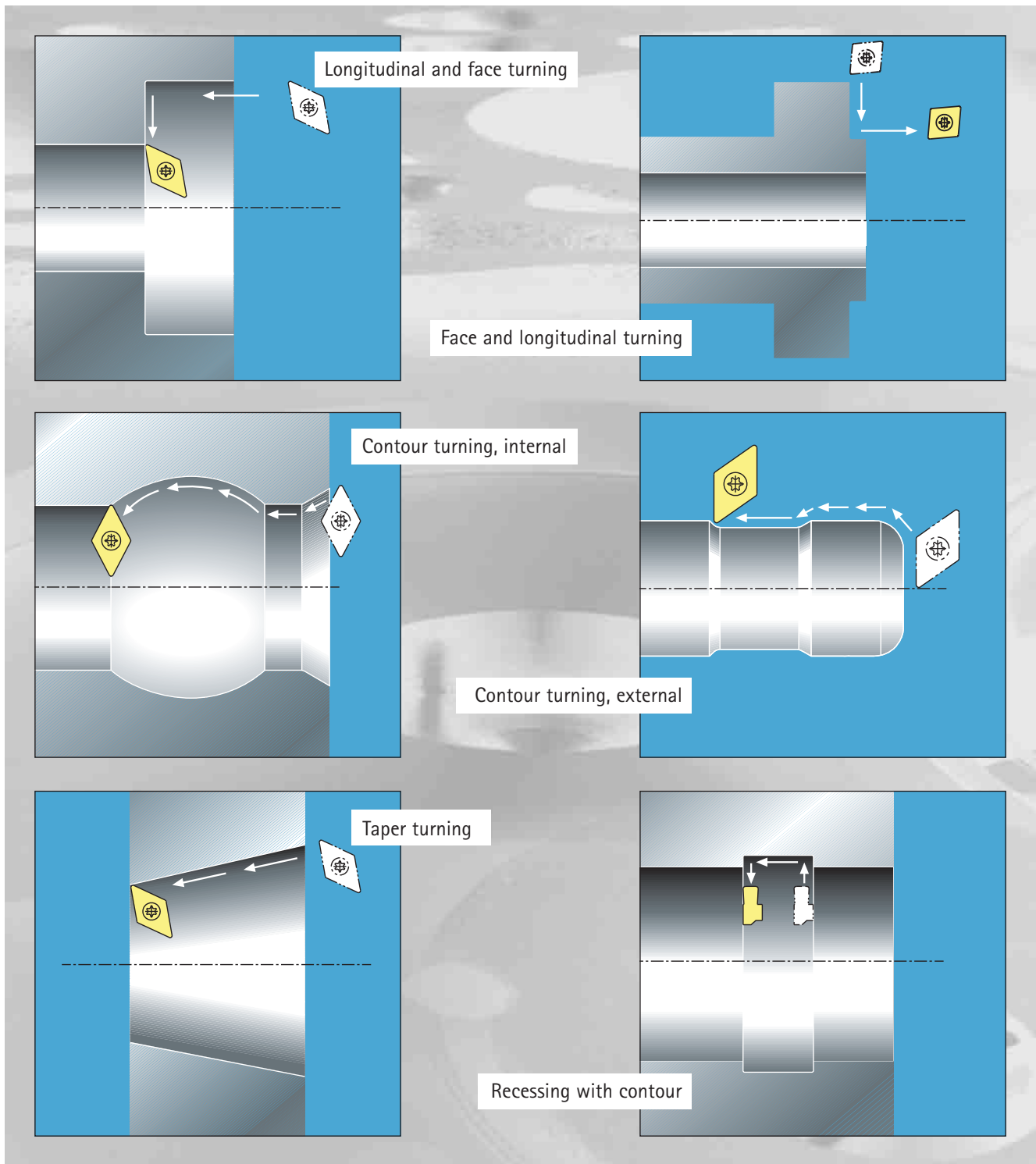
## Linear actuating tools



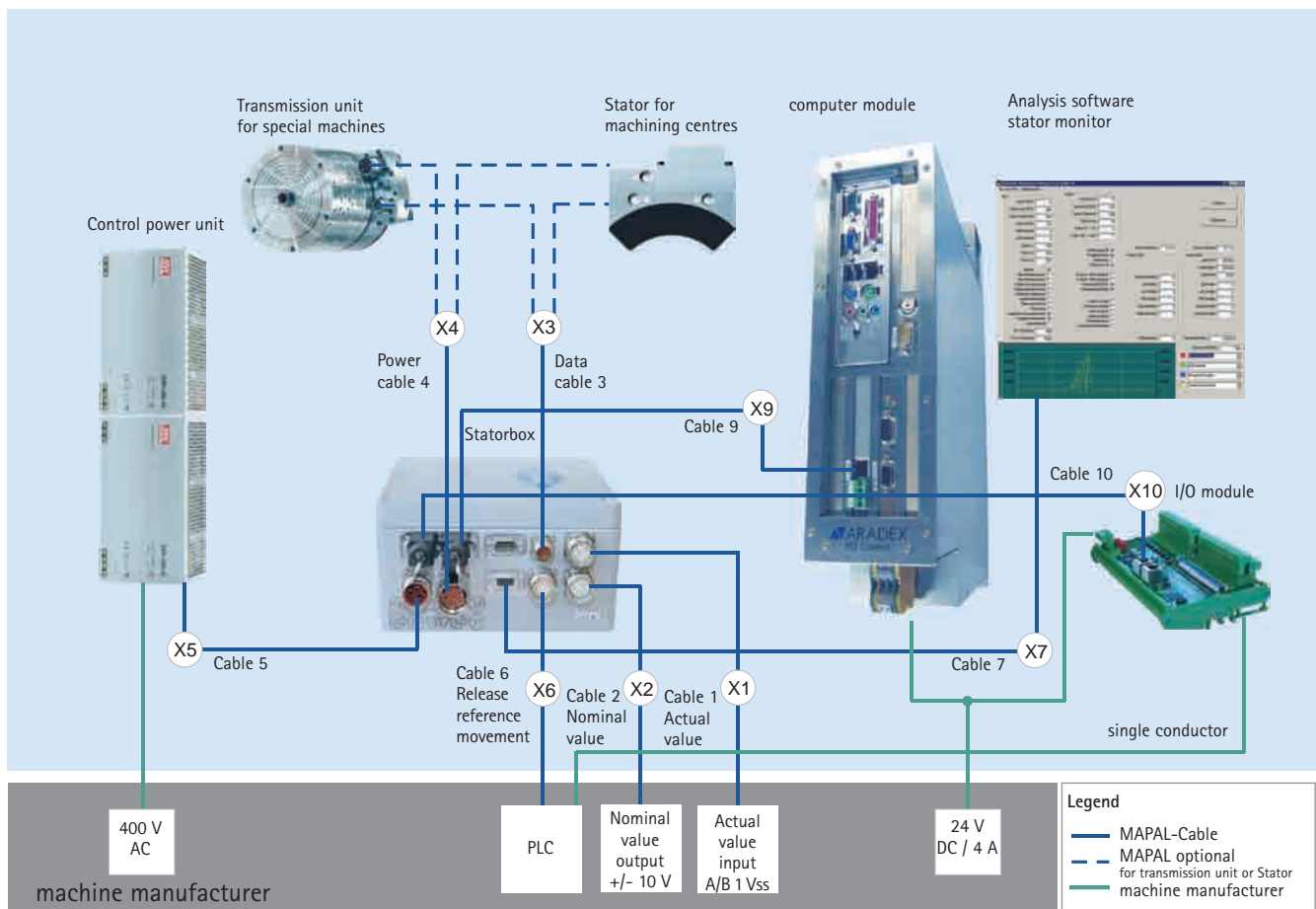
<sup>1</sup> Connecting transmission unit	ød <sub>1</sub> [mm]	L <sub>1</sub> [mm]	L <sub>2</sub> [mm]	ød <sub>2</sub> [mm]	ød <sub>3</sub> [mm]	<sup>3</sup> Connction rotating unit	<sup>1</sup> Tool connection	Specification	<sup>2</sup> max. radial stroke [mm]	Delta D [mm]	<sup>2</sup> max. perm. spindle speed [min <sup>-1</sup> ]	<sup>4</sup> max. adjustment speed [mm/min]	max. pressure IC [bar]
HSK-A50	125	89	155	80	125	M16x1,5LH	Flange connection	TT-SU-LAT125-FLA-H-28	28 (+/-14)	56	4.000	540	40
HSK-A50	125	89	155	80	125	M16x1,5LH	Flange connection	TT-SU-LAT125-FLA-Z-40	40 (+/-20)	80	4.000	1.000	40
HSK-A50	160	88	155	80	125	M16x1,5LH	Flange connection	TT-SU-LAT160-FLA-H-36	36 (+/-18)	72	4.000	600	40
HSK-A50	160	106	155	80	125	M16x1,5LH	Flange connection	TT-SU-LAT160-FLA-Z-56	56 (+/-28)	112	4.000	1.000	40

<sup>1</sup> Additional connections available on request. | <sup>2</sup> Subject to application. | <sup>3</sup> Connecting element as required. | <sup>4</sup> Subject to mounting tool.

# Application examples



# Control system components



All cables with DESINA Colour code.

TOOLTRONIC® is incorporated into the control system as an analogue axis and is therefore controlled like any other axes.

The actual regulation and programming is carried out in the machine control system. This means that programming can be carried out as normal and axis options (wear/blade radius adjustment, etc.) can be used.

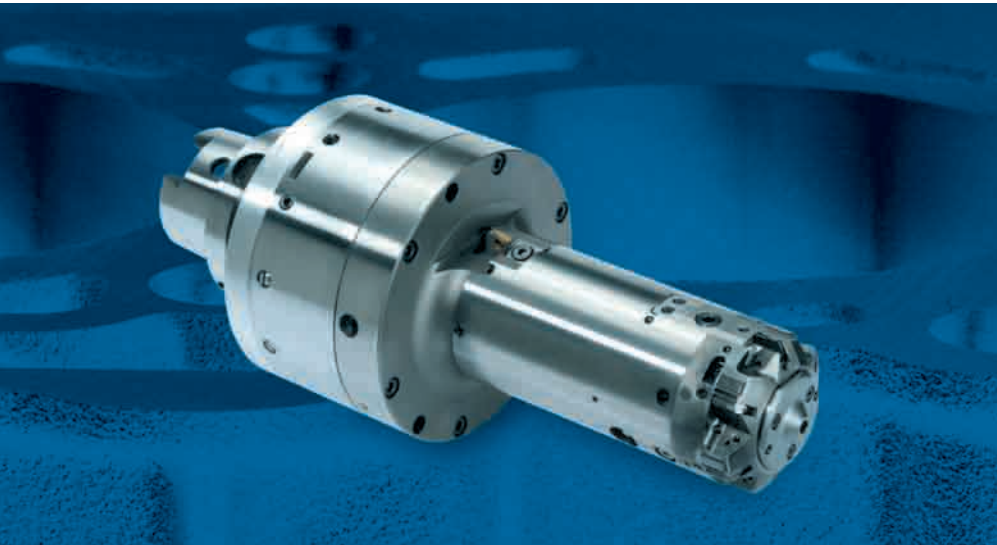
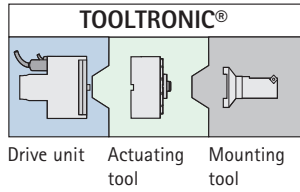
Coordination and adjustment of signals and performance is carried out in the TOOLTRONIC® stator box, which forms the connection between the machine tool control and the TOOLTRONIC® system.

The nominal value setting for speed is carried out by means of a +/- 10 V-Signal.

The control loop is closed by a message indicating the actual position using an incremental signal.

The potential ways of optimising the TOOLTRONIC® system specific to the application are indicated with the aid of the analysis software for the stator monitor and the integral service connection.

# Machining examples from use in practice



**Machining cylinder bores. Measurement controlled compensation on machining centres.**

- Principle  $Z = 4 + 2$ , Feed 1.5 mm/rev.
- Two blades for  $\varnothing$  compensation.
- Cutting edge lift on withdrawal.

**Machining values in CGI:**

$n = 500 \text{ min}^{-1}$   
 $v_c = 130 \text{ m/min}$   
 $f = 0.9 \text{ mm/rev.}$

**Machining values in GG25:**

$n = 1530 \text{ min}^{-1}$   
 $v_c = 400 \text{ m/min}$   
 $f = 1.5 \text{ mm/rev.}$



**Machining for internal fits and ball bearing surfaces on machining centres.**

- Machining both sides and complete internal contour with one tool.
- Contour freely programmable.

**Machining values for hardened steel (60 HRC):**

$n = 500 \text{ min}^{-1}$   
 $v_c = 120 \text{ m/min}$   
 $f = 0.1 \text{ mm/rev.}$

**Summary of advantages:**

- Easy manufacture of families of parts
- Reduction in variety of tools
- Flexible complete machining
- Broad range of applications



**Machining transmission housings using TOOLTRONIC® for special machines**

- Precise repeatable accuracy of slide movement ( $< 3 \mu\text{m}$ ).
- Inductive power and data transmission away from the machining area.

**Machining values in CGI:**

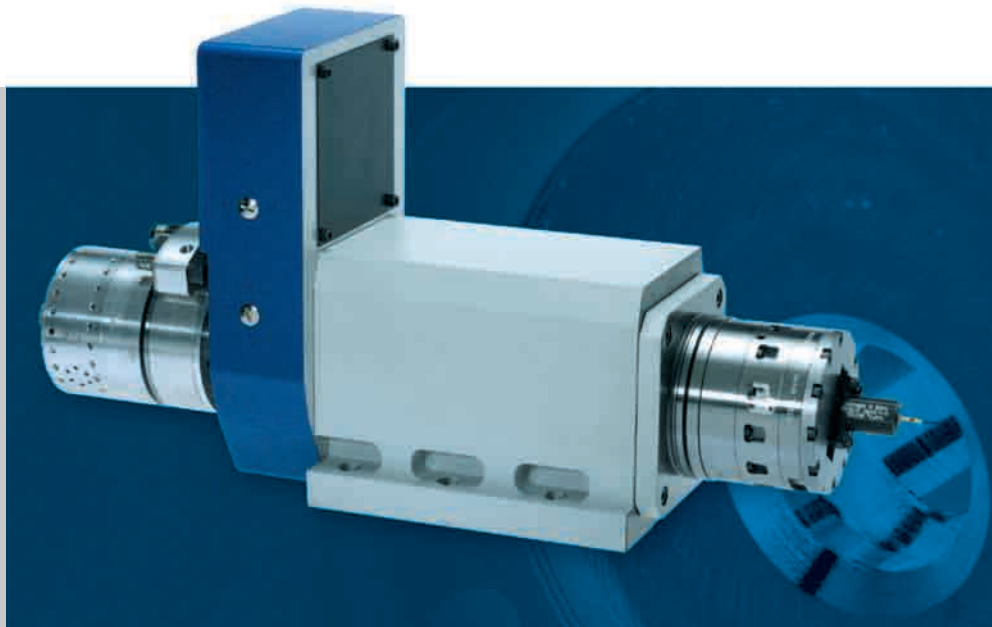
$n = 2500 \text{ min}^{-1}$   
 $v_{c1} = 487 \text{ m/min}$   
 $v_{c2} = 1600 \text{ m/min}$   
 $f = 0.14 \text{ mm/rev}$ .

**Machining internal contours and recesses on a rotary transfer machine using TOOLTRONIC® for special machines.**

- Compact design of the whole unit.
- Motor unit as a standard component.
- Inductive power and data transmission outside the working area.

**Machining values in 15 NiCrMo 16-5:**

$n = 5000 \text{ min}^{-1}$   
 $v_c = 100 \text{ m/min}$   
 $f = 0.03 \text{ mm/rev}$ .



- Facility for wear adjustment
- Support for all machine control systems currently available
- User-friendly for maintenance and assembly
- Comprehensive customer services

## Connection

TOOLTRONIC® – The universal drive system for greater production options and flexibility on machining centres and special machines

; TOOL

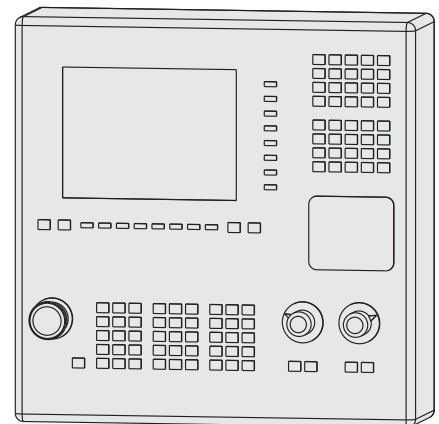
### The solution for all control systems currently available

The advantage of eccentric actuating tools lies in machining at maximum spindle speeds since the balance remains unchanged, irrespective of the cutting edge position. However, using this actuating principle there is no linearity between the required blade adjustment path and the rotation of the round slide. Previously additional components and special adjustments were required during the installation process to control an eccentric actuating tool.

In the newly developed electronics system for MAPAL TOOLTRONIC® data processing and conversion is carried out directly within the system. This means the connection is made easier for the customer irrespective of the control unit on the machine tool and the actuating tool. As a result a compatible solution has been found for all machine control systems currently available.

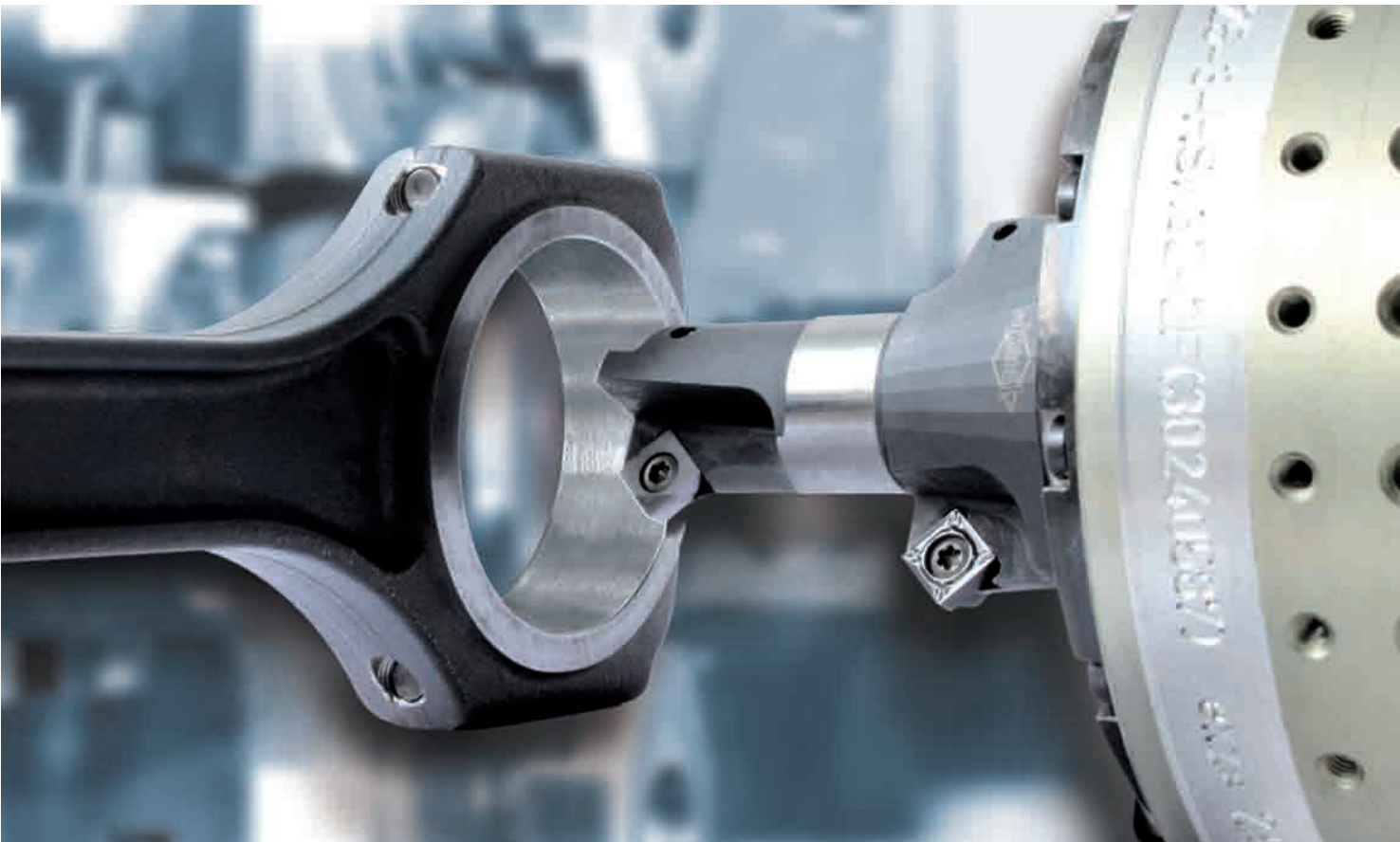
Additional programming time is not needed and the required machining diameters are accurately passed to the tool cutting edge.

This means the TOOLTRONIC® system is easily incorporated on the required machining centres or special machines, irrespective of the control system's manufacturer, type and version.



- SIEMENS
- BOSCH REXROTH
- HEIDENHAIN
- FANUC
- ...

TRONIC ON



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