Coromant Capto®

Three systems in one

- Coromant Capto® was introduced in 1990.
- Coromant Capto® was adopted as an ISO Standard during 2008.
- Coromant Capto® is a true universal tooling system for use in:
  - Turning centers
  - Machining centers
  - Multi-task machines

The history of the Coromant Capto® system

- Machining center / Rotating tools


Solid holders


Varilock


Coromant Capto®/ Basic holders

1980 1990

Today

Modularity

- Turning center / Turning tools

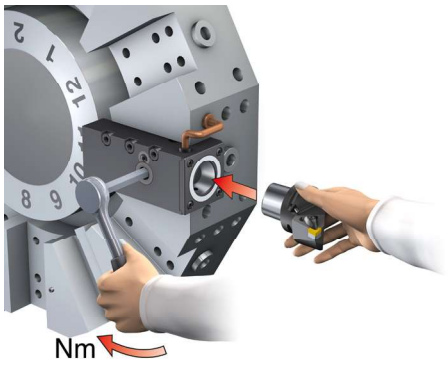

Shank holders


Block Tool System


Coromant Capto®/ Clamping units

The history of the Coromant Capto® system

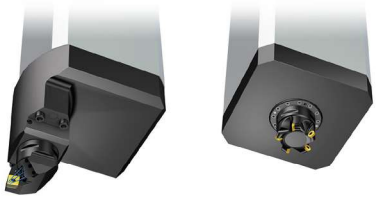
Quick change



- Turning Centers
- Vertical Lathes

Increased machine utilization

Integrated spindle



- Multi-Task Machines
- Vertical Lathes
- Machining Centers with Turning

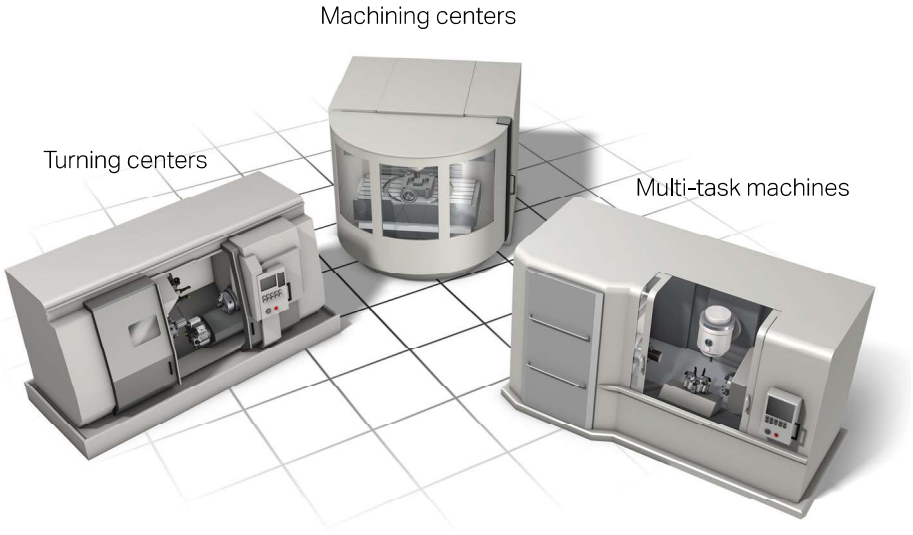
Increased stability and versatility

Modular systems

- Machining Centers
- Multi-Task Machines
- Vertical Lathes

Increased flexibility

A dramatic development of the machines

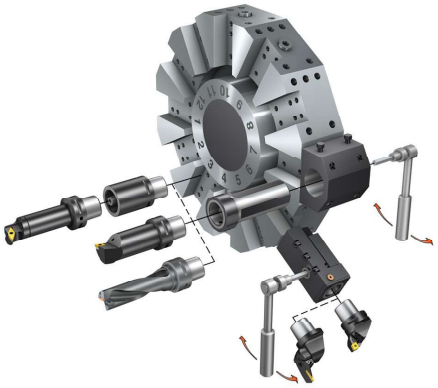


Trends

Machines and machining methods

- Multi-task machines requiring one holder system for both spindle and turrets.
- Several turrets on multi-task machines and turning centers.
- More multi-function tools for multi-task machines.
- Driven tools in turning centers.
- Powerful interfaces in the machine control system for higher degrees of automation.
- 3-D models of tools and holders to virtually check the machine process.
- Integration of various manufacturing technologies into fewer machine types.
- High pressure coolant.

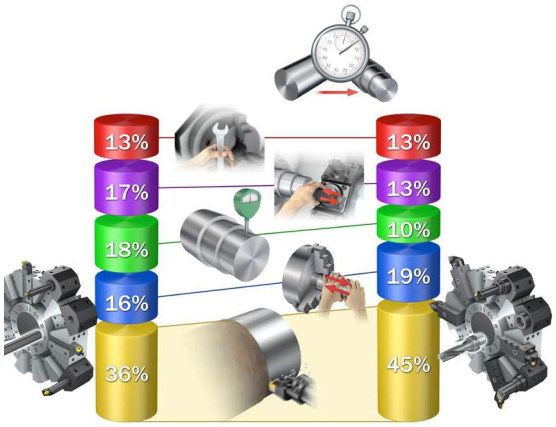
When to use quick change tooling



- Machine requires frequent setup changes.
- Measuring cuts are necessary to get correct size.
- Machining is performed with high cutting data and relatively short tool life.
- One operator services more than one machine.

Reduce down time in your machines

Only 36% of the machine time is used for metal cutting



Conventional shank tools

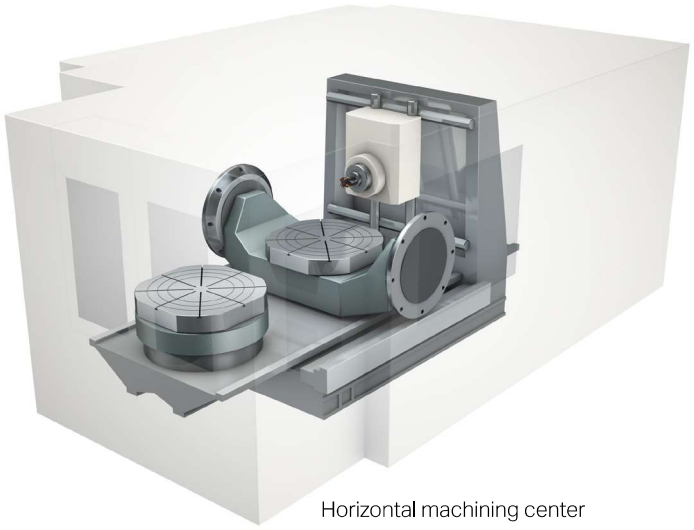
Coromant Capto® quick- change system

- Service and maintenance
- Insert change and tool change
- Measuring of the tool and workpiece
- Change of workpiece
- Effective cutting time

Quick change tooling offers a productivity increase of 25%

Coromant Capto® system

In which machine types and sizes do we need a modular system?



Horizontal machining center

Machining Center with:

- Coromant Capto® size C6 and bigger
- 7/24 tapers in size 40 and bigger
- HSK63 and bigger.

- Multi-task machine with need of long overhangs
- Vertical Turning Center
- Turning Center together with SL*.

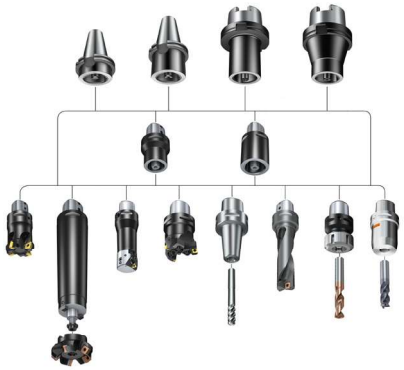
*SL is a universal modular system of adaptors with exchangeable cutting heads.

Minimize tool holder inventory

By combining basic holders, adapters and (when needed) extensions or reductions, many different assemblies for different machines can be built.

Modular

ISO 40 ISO 50 HSK 100 HSK 63



Number of items with modular tools:
4 + 2 + 8 = 14 items

Solid

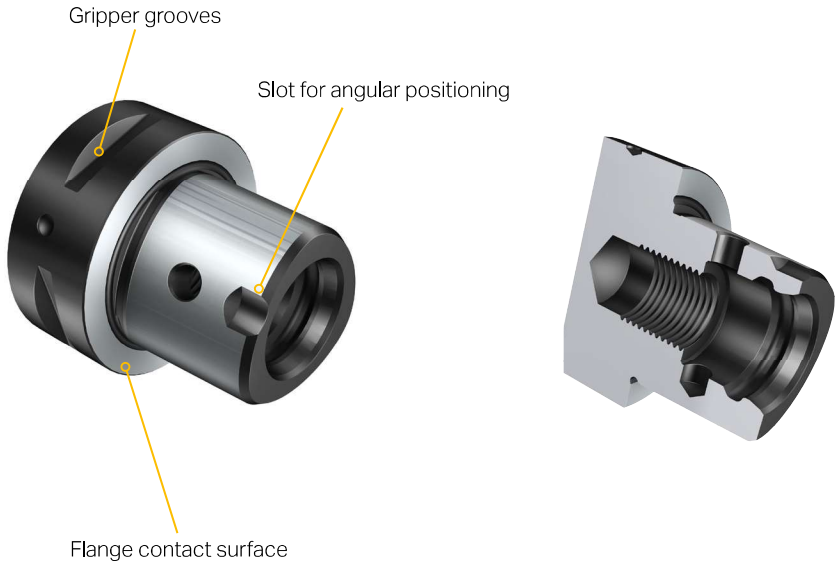
Total 64 items

Modular tools give access to very large number of tooling solutions, with very few items.

The Coromant Capto® coupling

The unique Coromant Capto® coupling has som very specific features:

- The good flange contact face in relation to the ground taper polygon gives maximum stability due to two-face contact and interference fit.
- There are four gripper grooves for the automatic tool change.
- There is one slot for angular positioning of the cutting tool.



The only universal coupling that can be used in all applications without compromise.

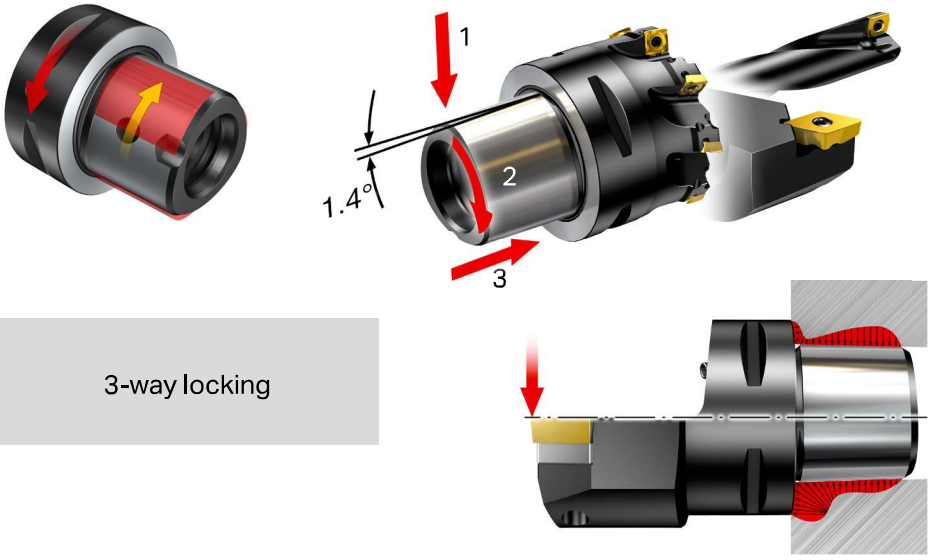
Coupling features and benefits

The main feature of the coupling is the positive 3-way locking

1. The radial centering is taken care of by the conical part of the polygon.
2. The low taper angle makes it possible to transmit the full force into the flange contact. The strength of the polygon coupling makes it possible to clamp with higher force than other systems. This is very important for the bending stiffness.
3. A polygon shape is self centering and takes care of the orientation without the need for a driving slot, therefore there is no play in the coupling. The polygon shape is also unique due to its capability to transmit high torque due to three contact areas.

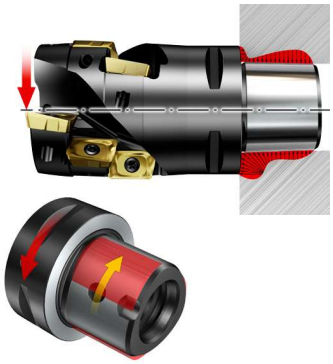
Due to the above features - radial and axial contact and self centering ability - the coupling has extremely good repeatability, within 2 microns (.00008 inch).

The gripper grooves are designed to give maximum bending stiffness and a higher clamping force, due to the fact that the Capto polygon has a greater surface area.



3-way locking

Transmission of torque



The polygon shape transmits torque without any loose parts such as pins or keys.

- No pins, keys, etc.
- No play in the coupling
- Symmetrical loads
- Two face contact/high clamping force.

Six different coupling sizes

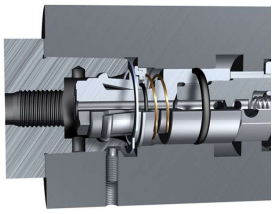
C3 C4 C5 C6 C8 C10

C3 = D 32 mm (1.260 inch)
C4 = D 40 mm (1.575 inch)
C5 = D 50 mm (1.969 inch)
C6 = D 63 mm (2.480 inch)
C8 = D 80 mm (3.150 inch)
C10 = D 100 mm (3.937 inch)

Different methods of clamping

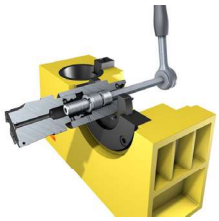
One coupling offers two methods of clamping.

Segment clamping



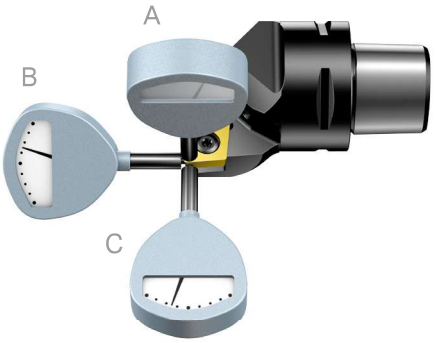
Clamping method for quick-change and automatic tool changing.

Center bolt clamping



For modular clamping solutions, e.g., when using extensions and basic holders.

Excellent repetitive accuracy and guaranteed center height



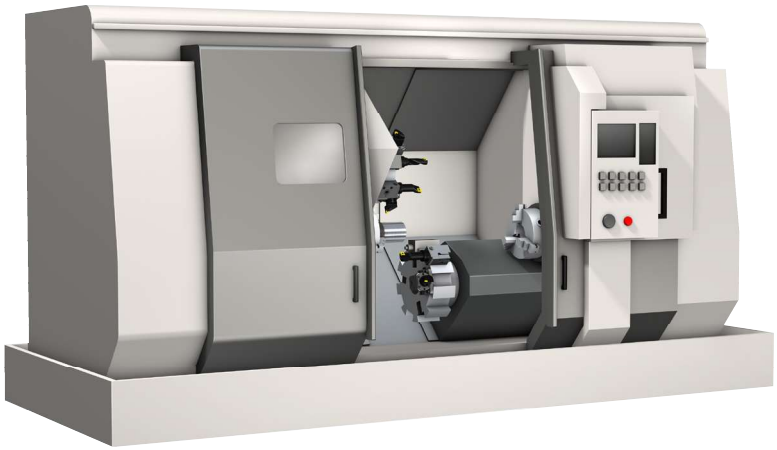
- The repeatable accuracy is ±2 microns [µm] (±.00008 inch) of the center height, length and the radial measurement (A),(B),(C).
- Few or no measuring cuts needed if pre-measuring is used (first component right).

Less vibration with stable coupling

In internal machining the Coromant Capto® coupling is an outstanding solution to clamp the boring bar, with a firm secure grip around the entire polygon.

The boring bar is very often clamped with 2-3 screws. This causes problems with vibration, bad surface finish, inserts worn out quickly and production disturbances, with downtime spent on adjusting cutting data and measuring the component.

Quick change tooling for turning centers



What is a turning center?

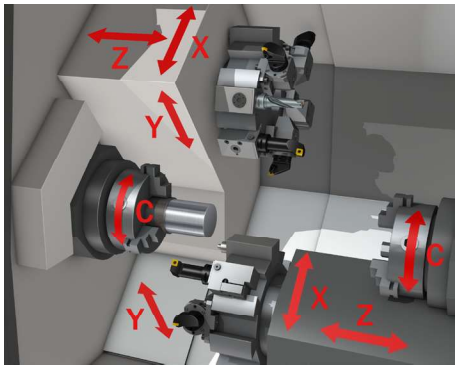
- The principle of lathes and turning centers is to cut a rotating component with a stationary cutting tool.
- The cutting tool moves parallel and perpendicular to the workpiece axis to provide the desired finished shape.
- When a cutting tool is applied to the workpiece, it can be shaped to produce a component which has rotational symmetry.

The turning center has a choice of configurations

- Horizontal and vertical design
- Sub-spindle for two-sided machining
- Driven tools
- Y-axis for eccentric boring and milling.

Configuration of a turning center

Spindle rotation and definitions of axis



- Several multi-axis machine tool programs can provide turning results from roughing and grooving to threading and finishing.

Quick change tooling for turning centers

A quick-change system offers:

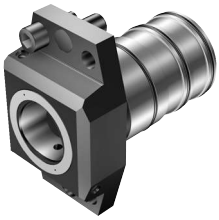
- faster and efficient tool changing
- inserts which can be changed outside the machine
- pre-setting possibilities.

The most economical system for:

- small batch production, quicker setup times
- operations with frequent insert changes.

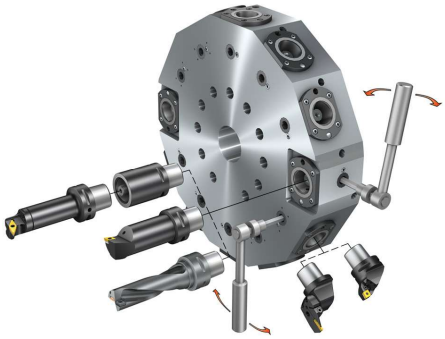
Less than 180° for clamp and unclamp

Typical clamping units for turning centers

VDI angled Camshaft activated	Square shank Camshaft activated	Automatic unit Hydraulically operated
		
VDI straight Camshaft activated	**Round shank** Segment clamping	**Special applications** Camshaft activated
		

Different methods how to install quick change

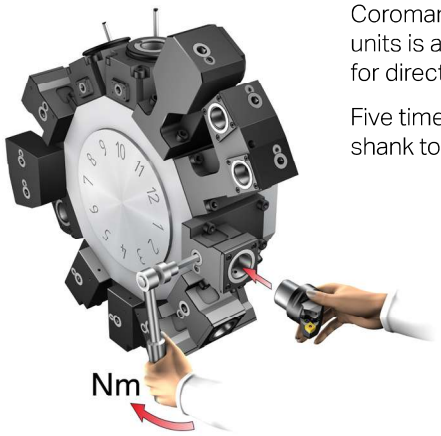
Directly integrated into the turret



Coromant Capto® directly integrated in turrets is the best solution to get maximum performance out of the Coromant Capto® coupling.

Different methods how to install quick change

Converted by using standard clamping units

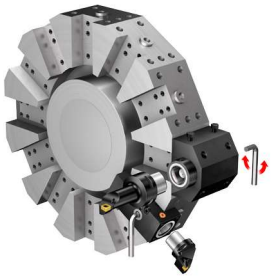


Coromant Capto® as a machine interface via clamping units is a good alternative when it's not possible to go for direct integration, (existing machines etc).

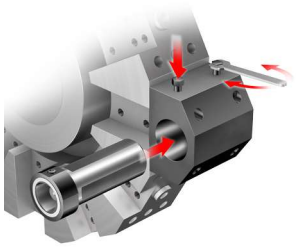
Five times faster tool change than with conventional shank tools.

Turning lathes can easily be converted to Coromant Capto® quick change tools using standard clamping units. No modifications to the turret, and no special adaptors required.

Internal tools



External tools



Machine adapted clamping units

Coromant Disc Interface (CDI)

- Flexible and symmetrical interface, 180° mountable.
- Same interface for static and driven tool holders. Static and driven tool holders can be used in all positions.
- Higher cutting performance.
- Longer cutting tool life.
- Better workpiece quality.
- More available tool length for radial drilling operations.
- Increased production.
- Rationalized tooling.
- Reduction in tooling costs.

Static clamping unit, straight

Driven drill/milling unit, straight

Static clamping unit, right angle

Driven drill/milling unit, right angle

Coromant Bolt-on Interface (CBI)

- Flexible and symmetric interface, 180° mountable.
- Same interface for static and driven tool holders.
- Static and driven tool holders can be used in all positions.
- Higher cutting performance.
- Longer cutting tool life.
- Better workpiece quality.
- More available tool length for radial drilling operations.
- Increased production.
- Rationalized tooling.
- Reduction in tooling costs.

Driven tool holder

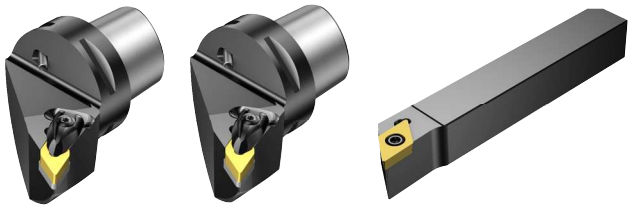
Clamping unit for external turning

Clamping unit for internal turning

Double clamping unit for external turning for tool change with Y-axis

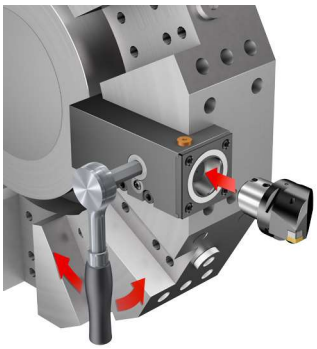
A quick change system

Insert change by using sister tools

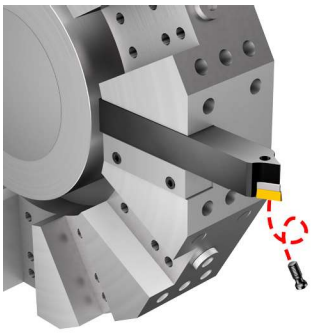


- Less downtime
- Few or no measuring cuts. Improved profitability
- No risk of losing insert screws in the chip conveyer
- Ergonomic
- Easy to clean the tip seat outside the machine.

0.5 min



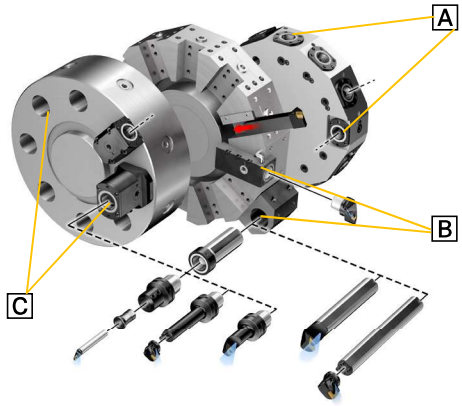
1.5 min



Changing to a sister tool with a quick change system is faster than changing the insert inside the machine.

Different ways how to install quick change

Tooling alternatives in conventional turrets



A Hydraulically operated clamping units

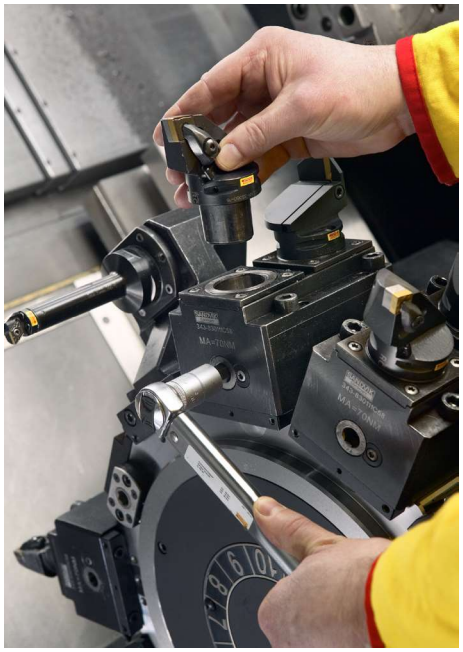
- Manual push-button tool changing
- Fully automatic tool changing possibilities.

B Shank type clamping units

- Square and round shank tools as well as cutting units for external and internal operations.

C Clamping units for VDI turrets

- Angled and straight clamping units for external and internal operations.

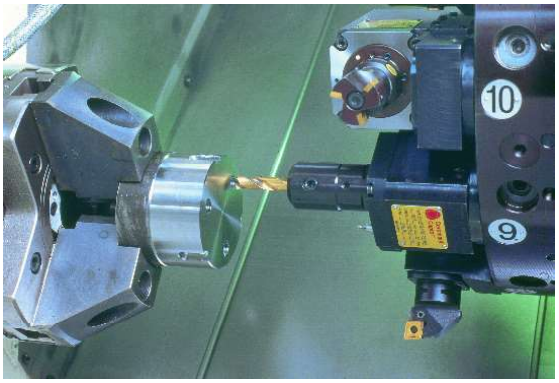


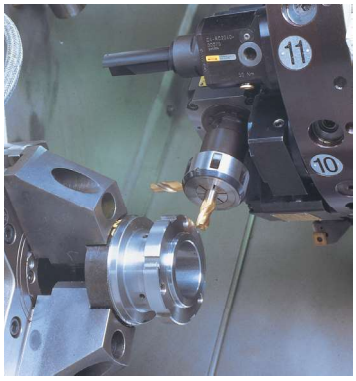
Example of installations.

Coromant Capto® driven tool holders

Driven tool holders provide the key to dramatic improvements in machining economy by allowing milling, turning and drilling operations to be carried out in a single setup.

- Driven tool holders can be supplied for specific machine requirements.
- Spindle dimensions
  - Machine type and model
  - Maximum turret swing diameter
  - Maximum tool length.





Example of installations.

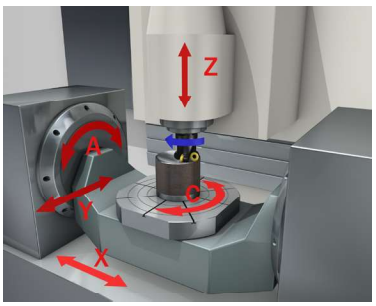
Modular tooling for machining centers

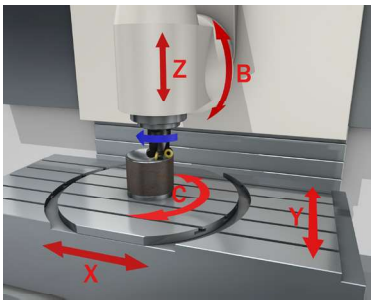
What is a machining center?

- A machining center is a multi-function machine that typically combines boring, drilling and milling tasks.
- Machining centers could be in horizontal design as well as vertical design.
- 5-axis machining centers add two more axes in addition to the three normal axes (X/Y/Z).

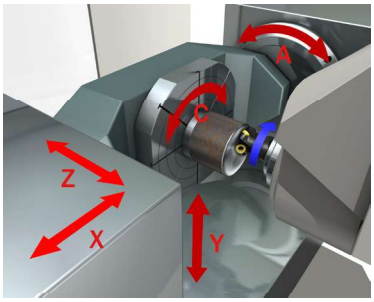
Spindle rotation and definitions of axis

Configuration of a vertical machining center





Configuration of a horizontal machining center



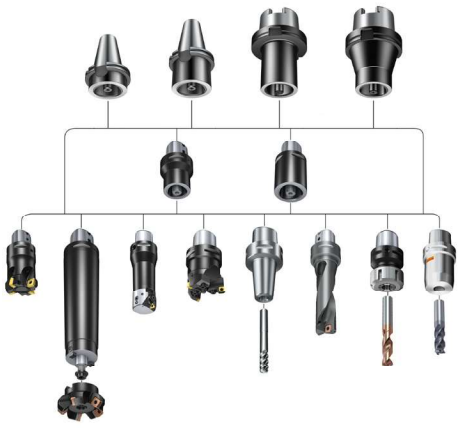
Machining centers can be horizontal and vertical designs

- The basic type has 3 axes. The spindle is mounted along the Z-axes.
- 4- and 5-axes machining centers adds more axes (A/B/C) in addition to the three normal axes (X/Y/Z).
- With several 5-axis machining centers, ones with a rotating or indexing attachments, the fifth-axis moves around the X-axis. (A-axis) and ones with a B-axis head, the fifth-axis moves around the Y-axis. (B-axis).
- Often the B-axis controls the tilt of the cutting tool itself and the A- and C-axes allow the workpiece to be rotated.

Modular tooling for machining centers

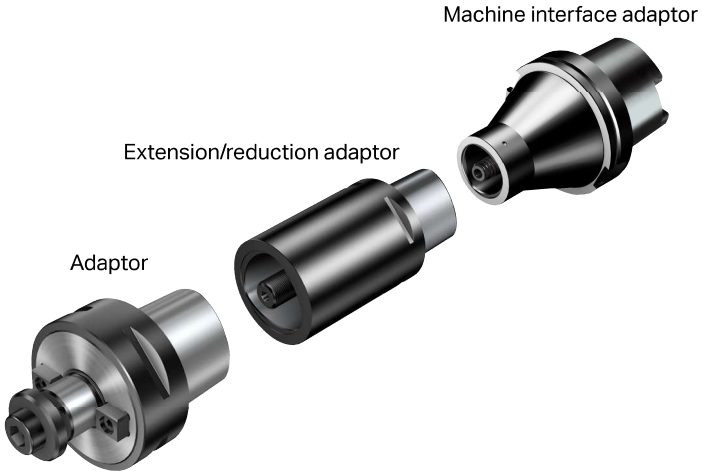
In a machining center a modular system can provide many advantages such as:

- Flexible tooling – the same tools can be used in several machines and machine interfaces.
- Flexible tooling – build your own assemblies and reduce the need for special significantly.
- Reduced inventory.



Build your own assemblies

Use Coromant Capto® adaptors for all spindle interfaces



Minimize tool holder inventory in machining centers

Modular tools give access to a very large number of tooling solutions, with very few items!

Modular

Number of items with modular tools:
4 + 2 + 30 + 10 = 46 items.

Solid

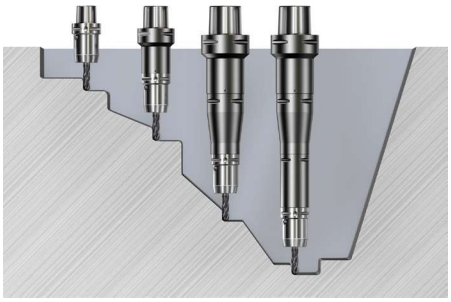
Number of items solid tools:
4 x 3 x (30 + 10) = 480 items.

Right combination for best possible rigidity

Extension adaptors and reduction adaptors

Extended tools for machining centers are frequently required to be able to reach the surface to be machined.

With Coromant Capto® modular system it is possible to build an assembly, so the right length can be achieved.



- It is important that the minimum length is used, particularly when long overhangs are required.
- With modular tools it is always possible to use optimal cutting data for best productivity!
- Modular tools are built together in minutes!
- Get closer tolerances.

All main machine interfaces covered

CAT-V 40
CAT-V 50
CAT-V 60
ISO 40
ISO 50
ISO 60
MAS-BT 30
MAS-BT 40
MAS-BT 50
MAS-BT 60

CAT-V BIG PLUS® 40
CAT-V BIG PLUS® 50

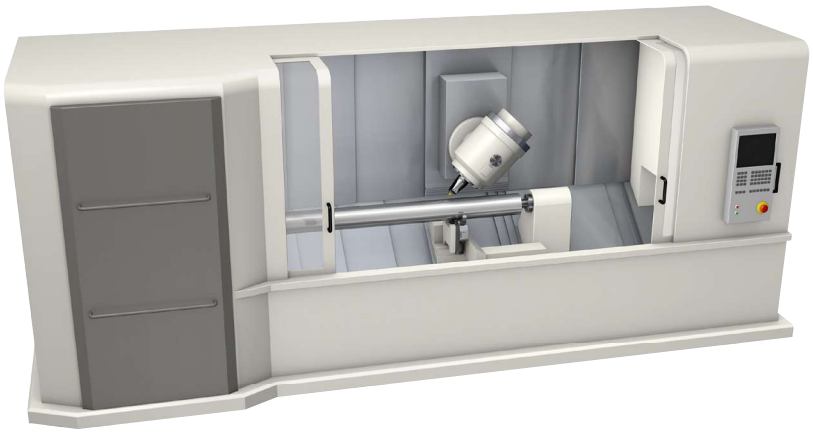
ISO BIG PLUS® 40
ISO BIG PLUS® 50

MAS-BT BIG PLUS® 30
MAS-BT BIG PLUS® 40
MAS-BT BIG PLUS® 50

HSK A/C 40
HSK A/C 50
HSK A/C 63
HSK A/C 80
HSK A/C 100
HSK A/C 125
HSK A/C 160
HSK A/C/T 40
HSK A/C/T 63
HSK A/C/T 100
HSK F 80 (with pins)

Coromant Capto® C3
Coromant Capto® C4
Coromant Capto® C5
Coromant Capto® C6
Coromant Capto® C8
Coromant Capto® C10

Modular tooling for multi-task machines

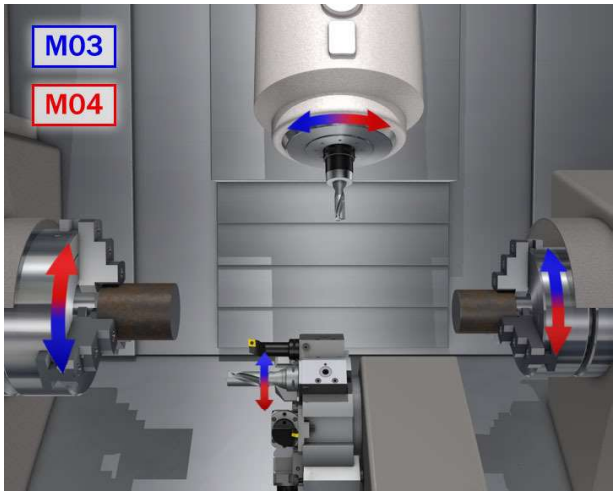


What is a multi-task machine?

- Multi-task machines come in a variety of configurations:
  - horizontal or vertical design.
  - two spindles (main and sub) and a B-axis spindle enable milling and turning operations on both front and back face of the workpiece.
  - each spindle acts as a workpiece holder allowing multi-axis machining on either front or back face of the workpiece.
- In a multi-task machine, the workpiece can be completed in a single machine setup, e.g., turning, milling, contouring and milling of angled surfaces, and grinding.
- Multi-task machines are a combination of a turning center and a machining center.

Definitions of the spindle directions

The program language for defining the spindle direction

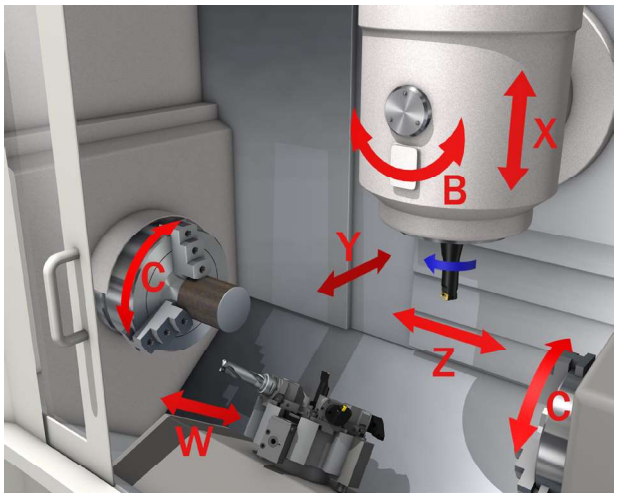


M03 = Clockwise spindle direction

M04 = Counterclockwise spindle direction

Configuration of a multi-task machine

Spindle rotation and definitions of axis

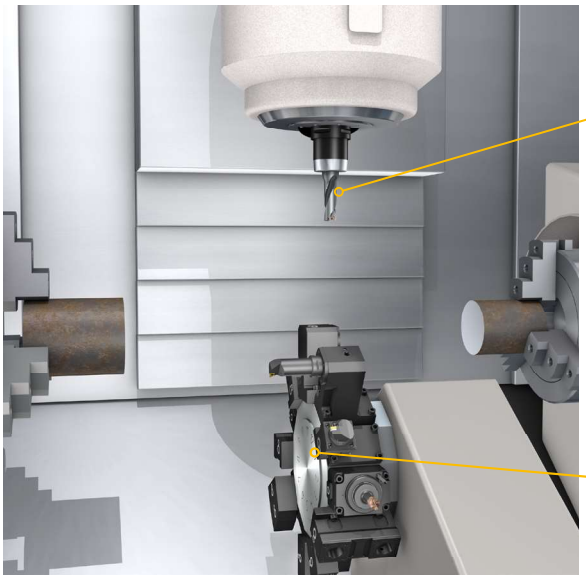


How to use modular tooling in a multi-task machine

The milling spindle in a multi-task machine tool should be able to carry both rotating and non-rotating tools. Coromant Capto® is the only tooling system that can fulfill this demand without compromise.

Multi-task machine tools are often used in "done-in-one" applications in which operations run from roughing to finishing in one machine tool setup.

Therefore multi-task machine tools needed a tooling system with unsurpassed rigidity and repetitive accuracy both radially and axially, like Coromant Capto®.



Multi-task machine tool with Coromant Capto® integrated tool spindle and lower turning turret with Coromant Capto® clamping units.

The Coromant Capto® tooling system is directly integrated in the spindle.

Turret with Coromant Capto® tooling system

New multifunctional tools for multi-task machines

For taking advantage of versatile multi-task machine tools and to optimize their efficiency, there is sometimes a demand for running them with dedicated tooling. These tools are only available with Coromant Capto® and have been invented for multi-task machine tools, offering:

- accessibility, stability and higher productivity
- reduced tool changing time
- saved tool pocket in tool magazine
- cost reduction - one tool replaces many tools.

Multifunctional tools
– one milling and four turning tools in one

Twin tools
– two turning tools in one

Mini-turrets
– four turning tools in one

Build your own mini-turret

Four cutting heads applied to one tool holder

Radial

Axial

Pick and choose from a large number of exchangeable cutting heads for turning, threading, parting and grooving operations for building an optimized tool for the component.

- Reduce tool changing time
- Save tool pockets in tool magazine
- For both external and internal use.

Use of adaptors in a multi-task machine

Tool adaptors for shank tools

Turning tool adaptors for
- shanks
- bars
- blades
- mini-turrets

...to make it possible to use shank tools also in a multi-task machine with an integrated modular tool system in the spindle.

Tool adaptor with blade for parting off

Tool adaptor for boring bar