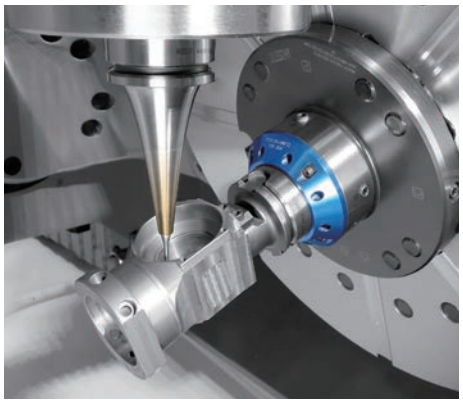
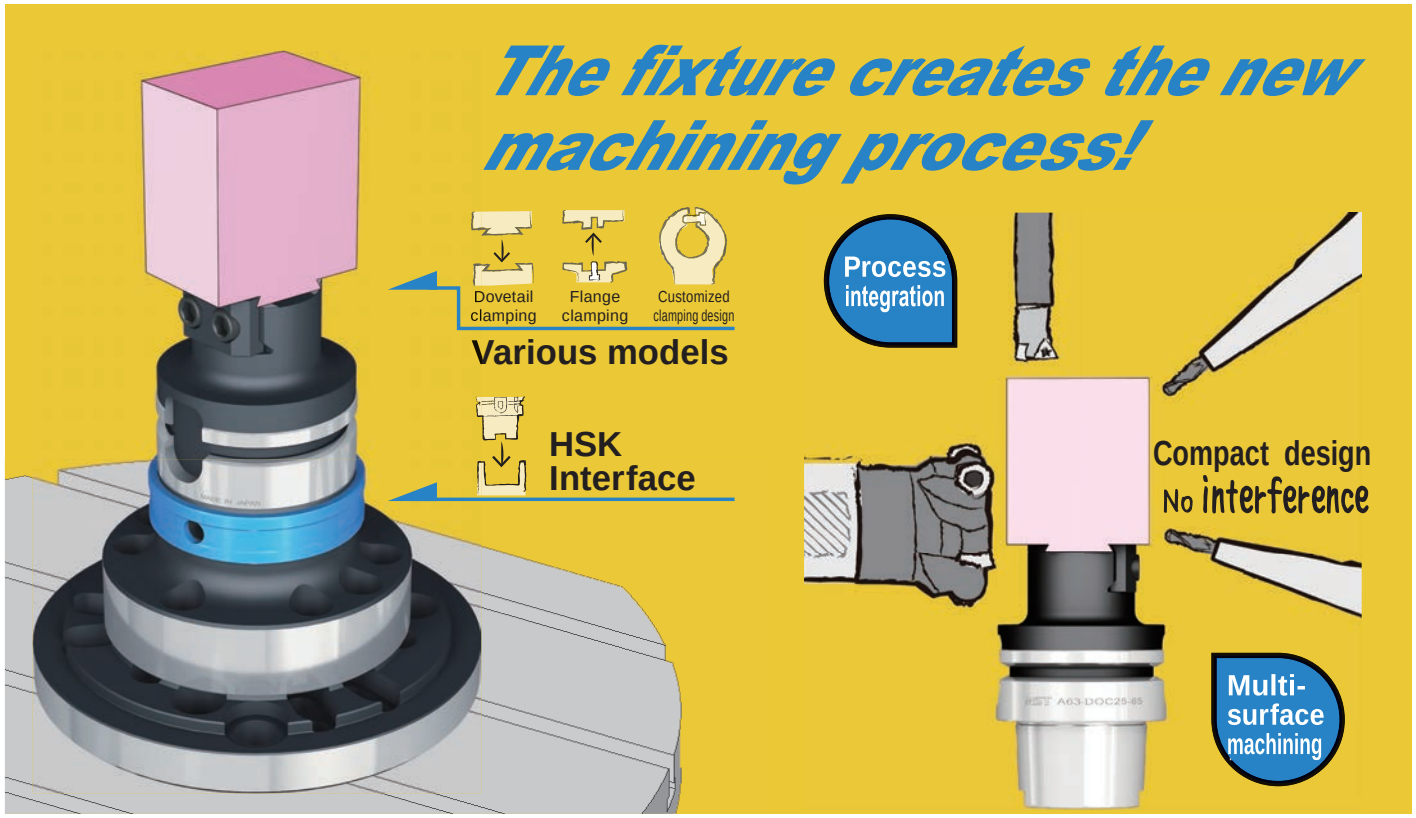


Workpiece holder system

SMART GRIP



PAT.

29th Award

Small- and Medium-size Enterprises Award for Excellence in New Innovative Technologies and Products

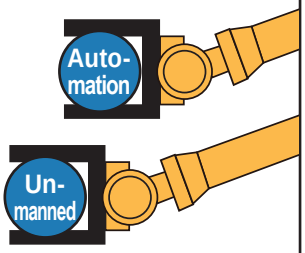
The Resona Foundation for Small and Medium Enterprise Promotion and The Daily Industrial News

Can be used with any machine

5-axis MC
3-axis MC
Turning mill
Measuring machine
⋮

Eliminates a manpower shortage problems

The same robotic arm can be used even if the work-piece is changed.



MST

MST corporation

2309

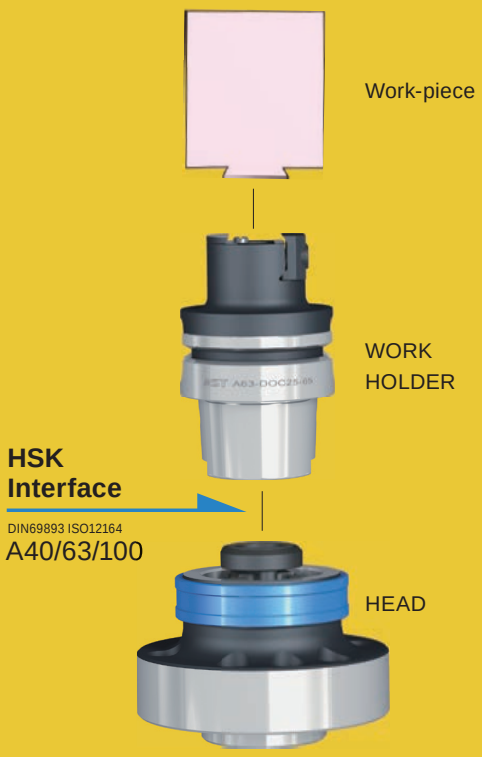
MST's SMART GRIP is a

Work-piece clamping fixture with superior rigidity for multi-surface applications using **5**-axis and **3**-axis machining centers with a rotary table.

The system consists of a "**HEAD**" installed on a machine table and a "**WORK HOLDER**" that clamps the work-piece.
There are two types of "HEADS" — a manual clamping type and an "AUTO-HEAD" available for a robot.
Also, we offer dovetail clamping and flange clamping types in a "WORK HOLDER" system.

The greatest feature of the system is its strong clamping force. We have adopted the twoface contact **ISO-HSK** standard clamping system, time-proven machine spindle interface for the connection between the "**HEAD**" and the "**WORK HOLDER**". And, we have adopted a **Dovetail clamping system** for work-piece clamping.
Both clamping systems firmly integrate the machine table, the SMART GRIP, and the work-piece with superior rigidity.

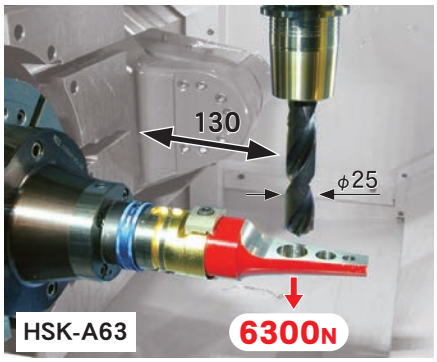
Also, the "HEAD" and "WORK HOLDER" allow multi-directional machining thanks to the compact design that provides superior accessibility enabling the system to meet various customer's applications.

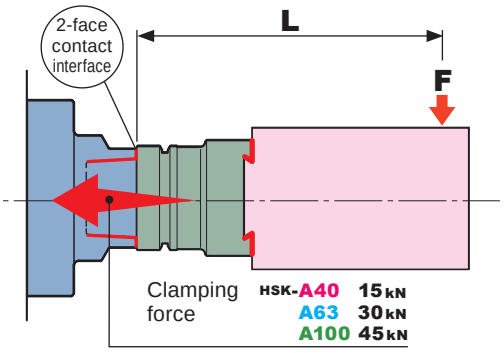


Clamping feature

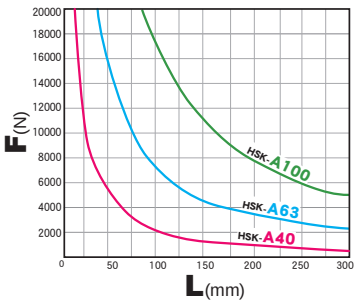
Strong clamping force

● It allows stable machining from various directions without the work-piece rising.



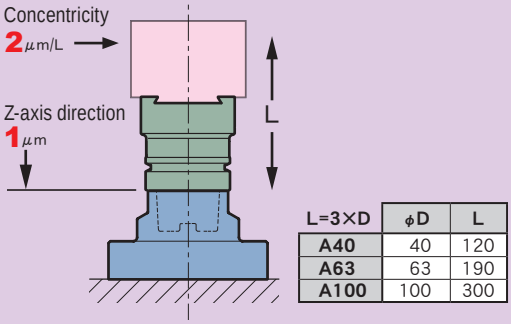


Maximum cutting force

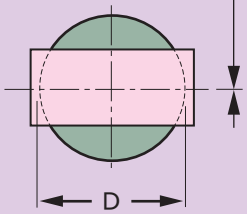


High repeatability

● No skills required for set-up.



L=3×D	ϕD	L
A40	40	120
A63	63	190
A100	100	300



Rotation direction
0.1~0.3mm/D

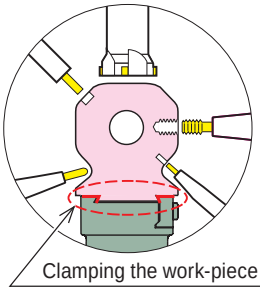
If necessary, please off-set the rotational direction using a touch probe.

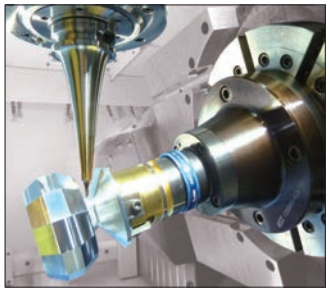
BLUM high-accuracy touch probe

Compact design

Avoid interference

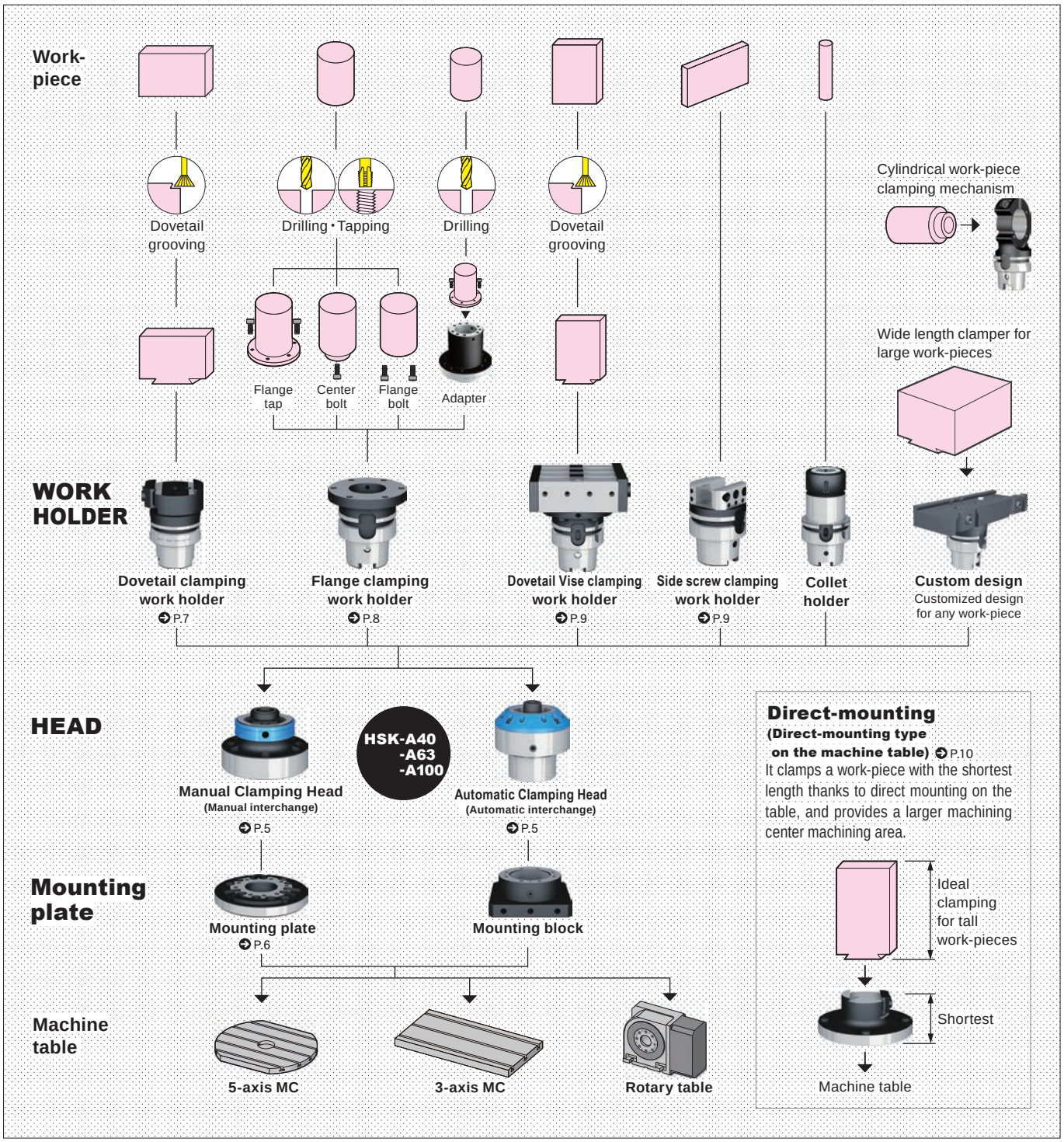
- Maximizes tool accessibility by designing the head and workpiece holder to be as compact as possible and clamping the bottom of the work-piece.





System

Supports various work-piece shapes

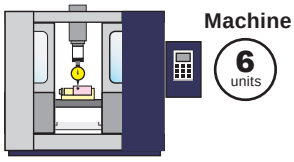


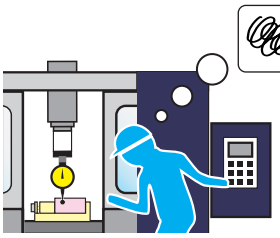
Utilization of SMART GRIP

"Process integration" will improve machine down time and manpower shortages.
SMART GRIP is a good method to integrate the process for a wide variety of work-pieces.

Process integration with 3-axis machining center and rotary table

Usual problems associated with 6-face machining





Centering, Aligning,
Cutting chips cleanup, Deburring

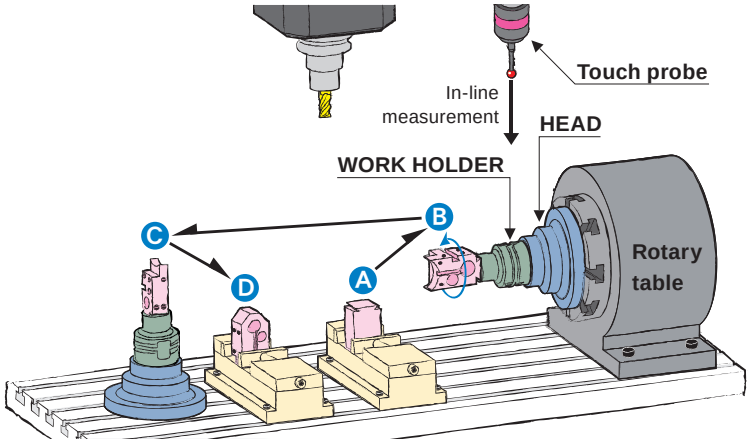
SMART GRIP solves the problem!

- Single-cycle 6-face machining. The entire process can be done done using 1 machine, 1 operator and 1 set-up.
- SMART GRIP's precise positioning accuracy and off line set-up will reduce the time required to change work-pieces.

6-face machining with one cycle

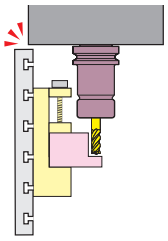
- A Dovetail grooving
- B 1 to 4-face machining
- C 5th face machining
- D Cutting off the dovetail + 6th face machining

Machine	● 3-axis M/C	1unit
Operator	● 1worker	
Fixture	● SMART GRIP	
	HEAD	2pcs
	WORK HOLDER	2pcs
	● Vise	2pcs

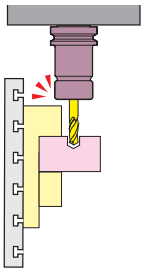


Process integration with 5-axis machining centers

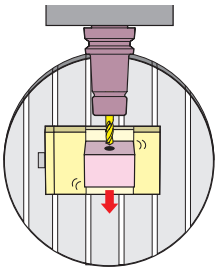
Usual problems



Machine spindle interferes with machine table



Tool holder interferes with machine vise



Insufficient clamping strength in machining direction

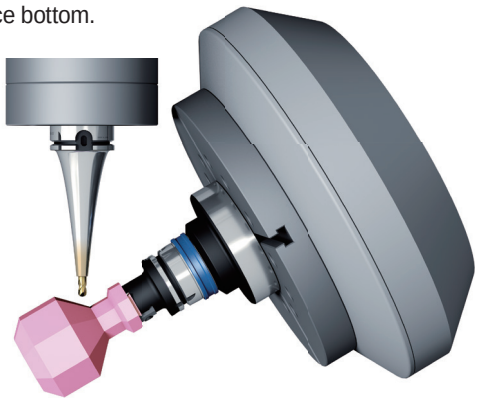
SMART GRIP solves the problem!

- Stable and rigid machining can be performed even when the work-piece is located away from machine table.
- No interference since work-piece holder is more compact than the work-piece.
- Stable machining in any direction, since clamping vector is towards the work-piece bottom.

5-face machining with 1 clamp

- Under-cut machining
- Simultaneous 5-axis machining
- Turning machining

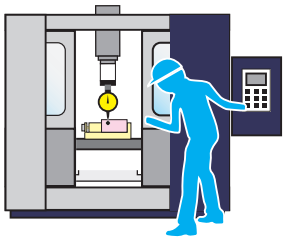
Machine	● 5-axis M/C	1unit
Operator	● 1worker	
Fixture	● SMART GRIP	
	HEAD	1pc
	WORK HOLDER	1pc

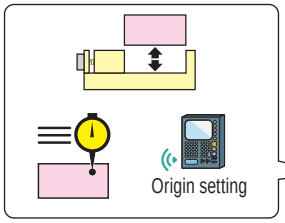


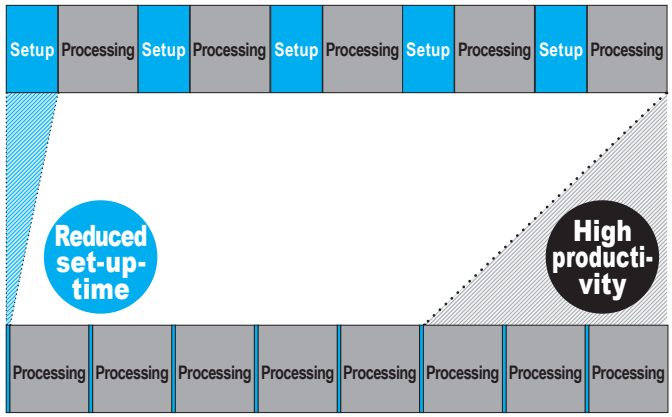
Off-line set-up

● By setting up the next work-piece off the machine while machining is in progress, the next operation can be performed immediately after machining is complete, thereby improving machine utilization.

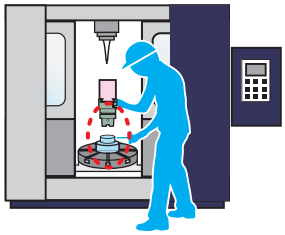
Usual work-piece change by machine vice



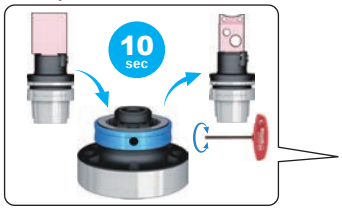




SMART GRIP



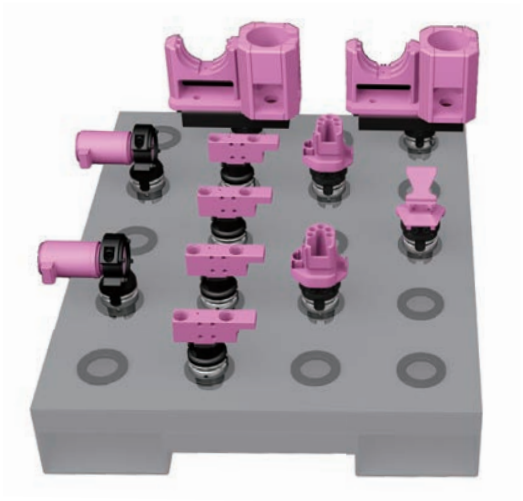
All you need to do is change the holder since the work-piece is already set. ♪

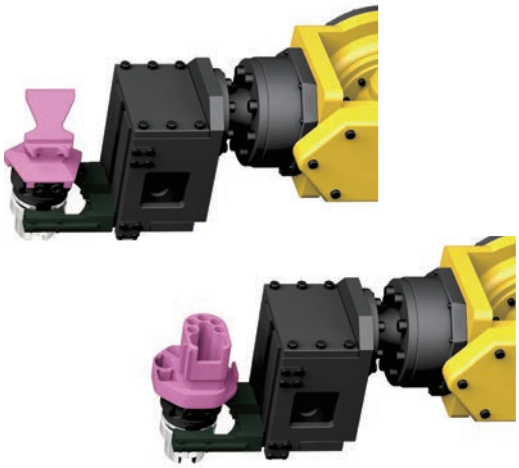


Automation

● Even if the work-piece changes, since the robot only grips the HSK interface portion of the workholder, a single robot hand can handle a wide variety of work-pieces.

Various work-pieces, 1 system

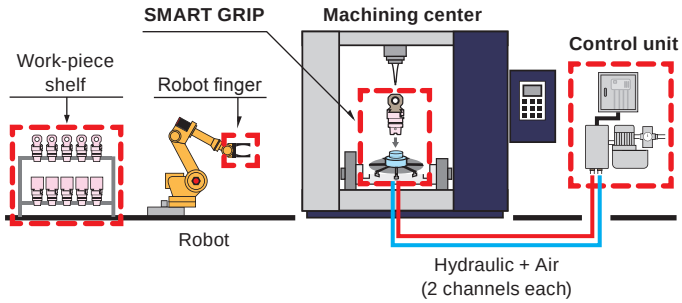




Automation system

We can provide the following items to automate your system:

●**Control unit** ●**Work-piece shelf** ●**Robot finger**



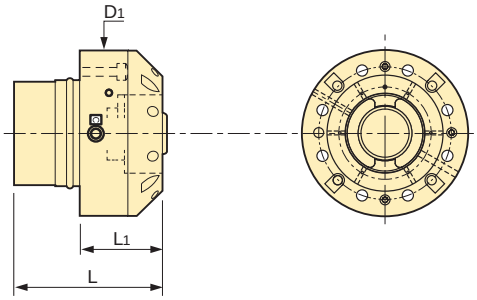
System Code table

HEAD

Automatic Clamping Head (Automatic exchange)

● The hydraulic clamping design allows you to interchange work-pieces automatically, and makes it possible for you to combine your machining centers with robots to create a fully-automated system.

F100S65-A63-89

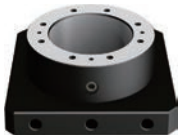


CODE	Interface	L	ϕD1	L1	Clamping force	Max. loading weight	Kg
F70S45 -A40 - 64	HSK-A40	64	70	35	6.6(kN)	40(kg)	1.1
F100S65 -A63 - 89	HSK-A63	89	100	50	24	160	2.9
F140S100-A100-139	HSK-A100	139	140	80	55	640	9.7

■Note
- Hydraulic pressure range : 2.7 ~ 4.3MPa
- Recommended pressure
  Clamp / Unclamp : 3.5MPa (Hydraulic oil ISO-VG32)
  Seating confirmation air : 0.1 ~ 0.2MPa (Pneumatic)
  Air purge : 0.5MPa (Pneumatic)

Mounting block

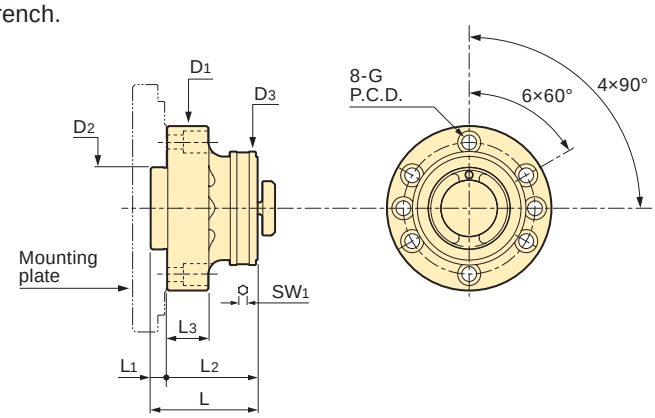
The mounting plate is an adapter for installation on the machine table and for connecting the hydraulic and pneumatic lines.
Please provide us with a detailed drawing of your machine table and the plumbing drawing of your hydraulic and pneumatic lines.
We can design and produce an exclusive mounting block, so please contact us for more information.



Manual Clamping Head (Manual exchange)

● Easy work-piece exchange by a wrench.

F100S50-A63-65



CODE	Interface	Screw hole	P.C.D.	ϕD1	ϕD2	ϕD3	L	L1	L2	L3	Clamping force	Kg
F 63S32-A40 - 42.5	HSK-A40	M 5	50	63	32	46	42.5	7.5	35	15	15(kN)	0.5
F100S50-A63 - 65	HSK-A63	M 8	80	100	50	69	65	10	55	25	30	1.9
F160S80-A100-106	HSK-A100	M12	125	160	80	106	106	21	85	35	45	7.4

■Std access.
- ●T-handle wrench
- ●Mounting bolt × 4pcs.

■Option
- ●Mounting plate

■Note
- ●A manual clamping hole on the work holder is required for mounting.

■Caution
- ●Requires mounting plate to attach on any table.

Mounting plate

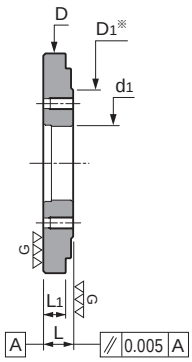


Fig. 1

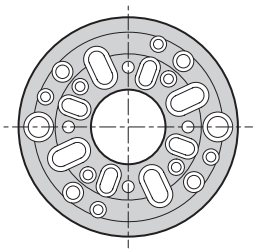


Fig. 2

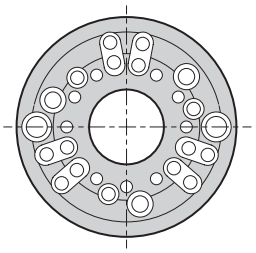


Fig. 3

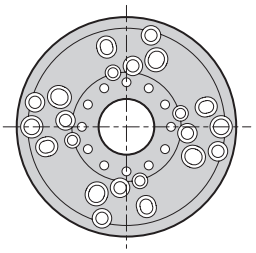
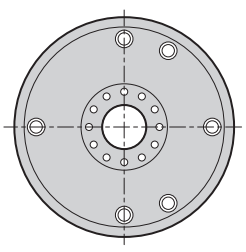


Fig. 4

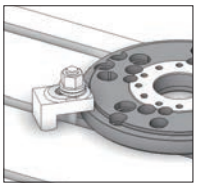


※D1 : Mounting surface for the Manual Clamping Head

CODE	HEAD	ϕD	L	ϕD1	ϕd1	L1	Kg
MP 40F150-1	A 40	147	20	62	32	15	1.8
-2							1.9
MP 63F150-1	A 63	147	20	98	50	15	1.6
-2							1.7
MP 63F200		197	22			17	3.8
MP 63F250		247	25			20	8.1
MP100F250	A100	247	25	157	80	20	7.5

■Caution

- MP63F250 / MP100F250 is a mounting plate for 5-axis machining center. Please modify the mounting plate if it doesn't fit the table. (Material : SCM415 / 55±2 HRC (1mm carburized case depth))
- Please fix with two M12 bolt for vertical machining center's table.
- Bolts, T-nuts and clampers are not included.



Please apply additional clampers if required.

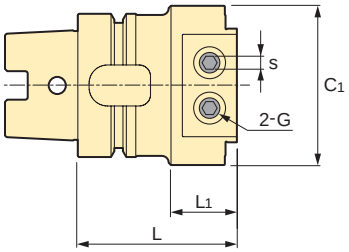
Please refer to below flow chart to select the mounting plate.
Feel free to contact us for any queries.

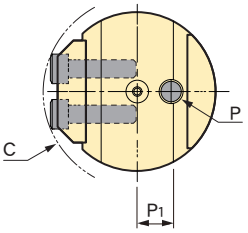
Head size	Screw hole	Equally spaced	P.C.D.	Mounting plate	Fig.
 A40	M6	4	84 118	MP40F150-1	1
	M8	4	68-85 115	MP40F150-1	1
		3	84 88 93 113 115	MP40F150-2	2
	M10	4	75-100	MP40F150-1	1
		3	104.7	MP40F150-2	2
	M12	2	120	MP40F150-1 / MP40F150-2	1 / 2
 A63	M6	4	84 118	MP63F150-1	1
	M8	4	68-85 115	MP63F150-1	1
			100	MP63F200	3
		3	84 88 93 113 115	MP63F150-2	2
	M10	4	75-100	MP63F150-1	1
			110 145-150 170	MP63F200	3
		3	104.7	MP63F150-2	2
	M12	4	130-133.4	MP63F200	3
			200	MP63F250	4
		3	200	MP63F250	4
		2	120	MP63F150-1 / MP63F150-2	1 / 2
			170	MP63F200	3
 A100	M12	4	200	MP100F250	4
		3	200	MP100F250	4

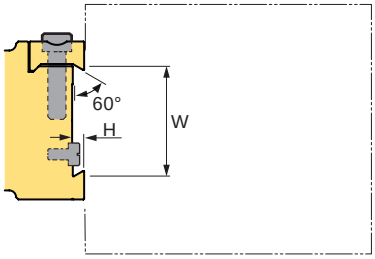
WORK HOLDER

Dovetail clamping work holder

A63-DOC25-65







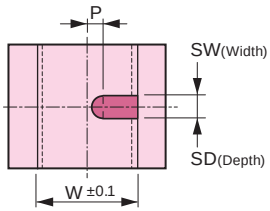
CODE	L	L1	ϕC	ϕC1	W	H	ϕP	P1	G	s	Kg
A40 -DOC 17.5-55	55	25	41	30	17.5	2	4	5	M 5	4	0.5
-DOC 25 -55		28	54	40	25	3	6	6	M 6	5	
-DOC 35 -55		25	63	50	35		8	10			0.6
-DOC 50 -60	60	30	84	70	50	5	10	15	M 8	6	1.1
A63 -DOC 25 -65	65	27	54	40	25	3	6	6	M 6	5	1.2
-DOC 35 -65			63	50	35		8	10			1.3
-DOC 50 -70	70	30	84	70	50	5	10	15	M 8	6	1.8
-DOC 70 -75	75	35	114	100	70		12	25	M10	8	2.7
A100-DOC 35 -70	70	27	63	50	35	3	8	10	M 6	5	3.2
-DOC 50 -75	75	32	84	70	50	5	10	15	M 8	6	3.6
-DOC 70 -75		35	114	100	70		12	25	M10	8	4.6
-DOC100 -85	85	40	157	140	100	10	15	35	M12	10	6.5

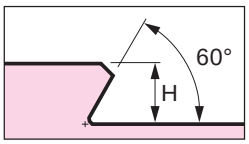
■**Std access.**
- Fixing bolt(G) × 2pcs
- Marker pin(P) × 1pc

Dovetail grooving

Dovetail grooving of the work-piece clamping area using an angular cutter is required prior to machining.

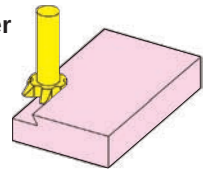
■**Details of dovetail dimensions**





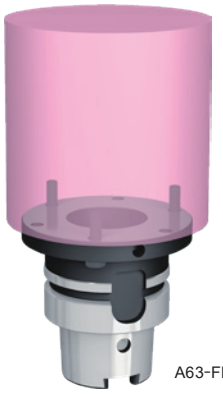
Holder type	W	H	P	SW	SD
DOC 17.5	17.5	2.5	2.5	4	2
DOC 25	25	3.5		6	2.5
DOC 35	35		5.5	8	
DOC 50	50	5.5	9	10	4
DOC 70	70		18	12	
DOC100	100	10.5	26	15	

■**Angular cutter**



Please purchase market standard dovetail cutters.
For more information, please contact us.

Flange clamping work holder



A63-FP85-50

Fig. 1

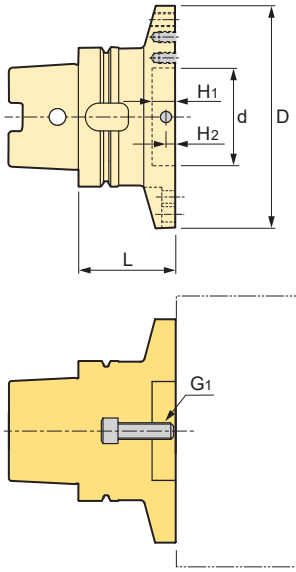


Fig. 2

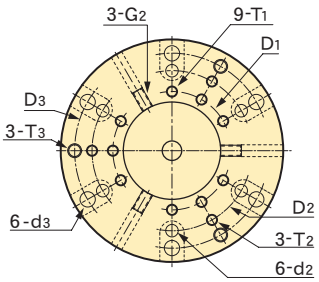
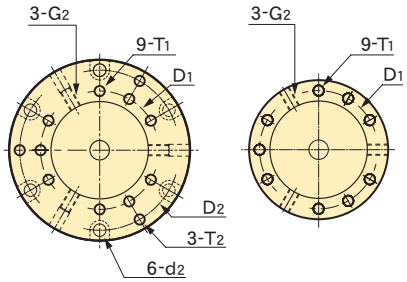


Fig. 3



CODE	Fig.	L	φD	φD1	T1	φD2	T2	φd2	φD3	T3	φd3	φd	H1	H2	G1	G2	Kg
A40 -FP40 -35	3	35	40	32	M4× 6	—	—	—	—	—	—	25 +0.053 +0.020	12	4	M 6×15	M4× 8	0.3
-FP63 -40	2	40	63			50	M5 thru	5.5							M 6×20		0.5
A63 -FP63 -45	3	45	63	50	M5× 8	—	—	—	—	—	—	40 +0.064 +0.025	13	5	M10×20	M6×10	0.9
-FP85 -50	2	50	85			73	M6 thru	6.6							M10×25		1.2
-FP110-55	1	55	110				M6×9		95	M 8 thru	9				M10×30		1.7
A100-FP100-55	3	55	100	85	M8×12	—	—	—	—	—	—	70 +0.076 +0.030	17	7	M12×25	M8×16	3.0
-FP130-65	2	65	130			115	M8 thru	9							M12×35		4.2
-FP160-70	1	70	160				M8×12		140	M10 thru	11				M12×40		5.3

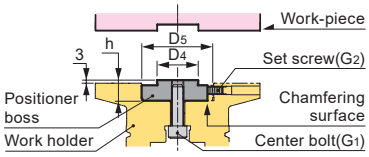
■**Std access.**
- Center bolt (G1)×1pc. ● Set screw (G2)×3pcs.
- M6 special small-head bolt (the head diameter size is the same as the M5 bolt) ×6pcs. (A63FP-85-50 / A63-FP110-55)
  ※Regular M6 cap screw doesn't fit.

■**Option**
- Positioner boss ● Adapter

■**Note**
- Use the center bolt (G1) when you use the center bolt to clamp the work-piece. When you need whirl-stop machining of a work-piece, make a flat surface on the work-piece and clamp it using a set screw (G2).

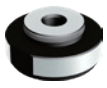
Positioner boss

Please use when you need centering.



CODE	Work holder	φD4	φD5	h	Kg
IR15-A40 FP	A40	15 0 -0.027	25	15	0.05
IR25-A63 FP	A63	25 0 -0.033	40	16	0.1
IR40-A100FP	A100	40 0 -0.039	70	20	0.5

■**Note**
- Clamp it with the center bolt(G1). When you do not want the work-piece to rotate, secure the chamfering surface using a set screw(G2).



IR25-A63FP

Adapter

Minimizing clamping area for a small-size work-pieces reduces the interference area.

RS-A63-A40

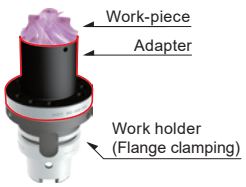


Fig. 1

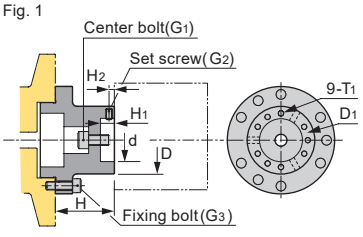
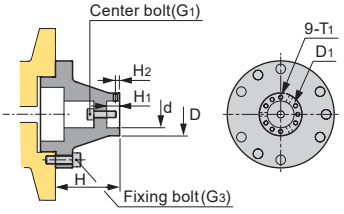


Fig. 2



CODE	Work holder	Fig.	φD	φD1	φd	H1	H2	H	T1	G1	G2	G3	Kg
RS-A63 -A40	A63	1	40 +0.064 +0.025	32	25	12	4	50	M4×6	M 6×20	M4× 8	M5×16	0.5
RS-A100-A40	A100	2	40 +0.053 +0.020	32	25	12	4	60	M4×6	M 6×20	M4× 8	M8×25	1.5
RS-A100-A63	A100	1	63 +0.053 +0.020	50	40	13	5	55	M5×8	M10×20	M6×10	M8×25	1.7

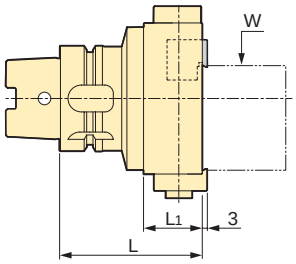
■**Std access.**
- Center bolt (G1)×1pc. ● Set screw (G2)×3pcs.
- Fixing bolt (G3)×3pcs.

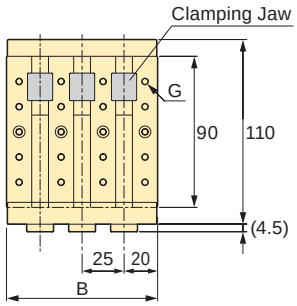
■**Note**
- Attach the work-piece with the center bolt (G1). When you do not want the work-piece to rotate, secure the chamfering surface using a set screw(G2).

Dovetail Vise clamping work holder

A63-DOV90

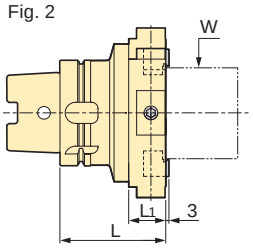
Fig. 1

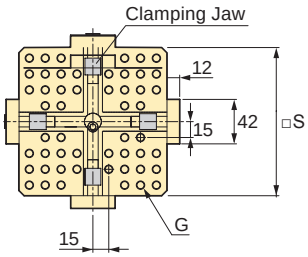




A63-DOV110I

Fig. 2





CODE	Fig.	□S	Number of grooves	B	W	G	L	L1	Kg
A63 -DOV 90	1	—	3	90	12～ 73	20-M4× 6	85	35	3.8
-DOV110I	2	110	—	—	36～ 80	24-M8×10	90	35	5.7
A100-DOV140	1	—	5	140	12～ 73	30-M4× 6	100	35	7.7
-DOV140I	2	140	—	—	36～110	52-M8×10	100	35	9.9

■**Std access.**
- 8mm hexagonal wrench

■**Note**
- Please refer to P.7 for dovetail details.
- Work-piece clamping jaws move individually.
- Please use the screw hole on the top face as necessary.

Side screw clamping work holder

A63-SCS20-55

A63-SCD40-85

Fig. 1

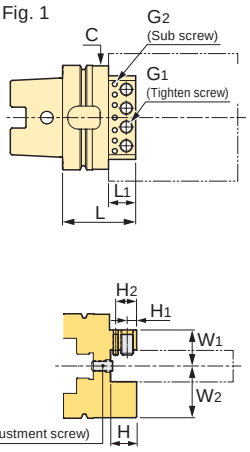
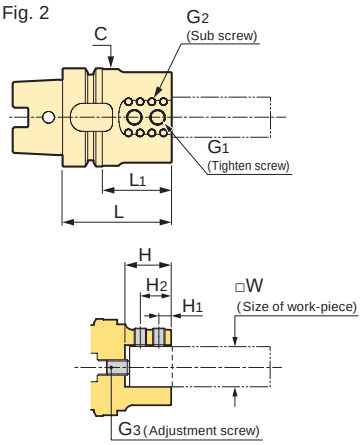


Fig. 2



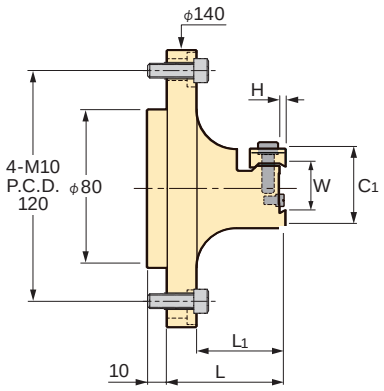
CODE	Fig.	W	W1	W2	B	L	L1	φC	H	H1	H2	G1	G2	G3	Kg
A40 -SCS10-40	1	5 ~ 10	13	18.6	30	40	11	39	10	4.5	—	M 6×10	—	M 6	0.5
-SCD20-55	2	15 ~ 20	—	—	—	55	30	49	25	11	—	M 8×16	M4	M10	0.5
A63 -SCS10-55	1	5 ~ 10	20	23.5	50	55	21	62	20	7.5	17	M10×15	M5	M10	1.1
-SCS20-55		15 ~ 20	25	28.5											
-SCD20-65	2	15 ~ 20	—	—	—	65	30	49	25	11	—	M 8×16	M4	M10	1.2
-SCD25-70		20 ~ 25				70	35	56	30	8	20				1.3
-SCD30-70		25 ~ 30					44	62	35	9	24	M10×20	M5		1.4
-SCD40-85		35 ~ 40				85	52	76	45	12	30	M12×20	M6		1.9
A100-SCS20-70	1	12 ~ 20	29.5	34	80	70	26	99	25	9	20	M12×20	M5	M12	3.6
-SCS30-70		22 ~ 30	34.5	39											
-SCD20-70	2	15 ~ 20	—	—	—	70	30	49	25	11	—	M 8×16	M4	M10	3
-SCD25-75		20 ~ 25				75	35	56	30	8	20				3.4
-SCD30-80		25 ~ 30				80		62	35	9	24	M10×20	M5		3.5
-SCD40-90		35 ~ 40				90	45	76	45	12	30	M12×20	M6		3.9

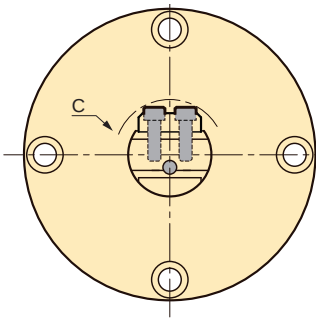
■**Std access.**
- Tighten screw (G1) SCS× 2pcs. SCD× 4pcs.

Direct-mounting (Direct-mounting type on the machine table)

Dovetail clamping type

F140S80-DOC50-55





CODE	L	L1	H	ϕC	ϕC1	W	Kg
F140S80-DOC 17.5-60	60	45	2	41	30	17.5	2.5
-DOC 25 -60			3	54	40	25	2.6
-DOC 35 -55	55	40		63	50	35	2.8
-DOC 50 -55			5	84	70	50	3.4
-DOC 70 -55				114	100	70	4.7
-DOC100 -55			10	157	140	100	5.5

■**Std access.**
- Mounting bolt × 4pcs.

■**Option**
- Mounting plate

■**Note**
- Please refer to P.7 for dovetail details.

■**Caution**
- Requires mounting plate to attach on any table.

Flange clamping type

F140S80-FP85-50

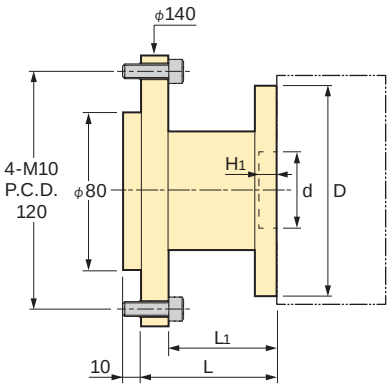


Fig. 1

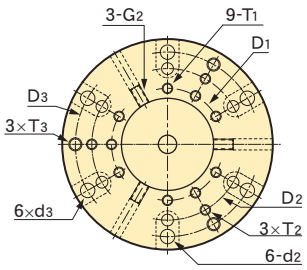


Fig. 2

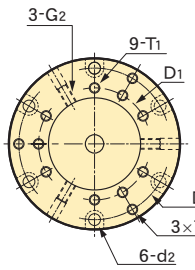
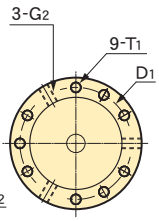


Fig. 3



CODE	Fig.	L	L1	H1	ϕD	ϕD1	T1	ϕD2	T2	d2	ϕD3	T3	d3	ϕd	G2	Kg
F140S80-FP 63-50	3	50	25	13	63	50	M5× 8	—	—	—	—	—	—	40 +0.064 +0.025	M6×10	2.6
-FP 85-50	2				85			73	M6 thru	6.6						3.1
-FP110-70	1	70	45		110				M6×9		95	M8 thru	9			3.7
-FP130-75	2	75		17	130	85	M8×12	115	M8 thru	9	—	—	—	70 +0.076 +0.030	M8×16	5.5

■**Std access.**
- Mounting bolt × 4pcs.

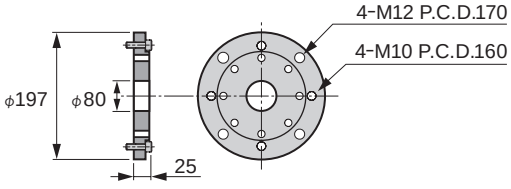
■**Option**
- Mounting plate
- Positioner boss→P.8
- Adapter→P.8

■**Caution**
- Requires mounting plate to attach on any table.

Mounting plate

Also, we can make a custom design mounting plate.

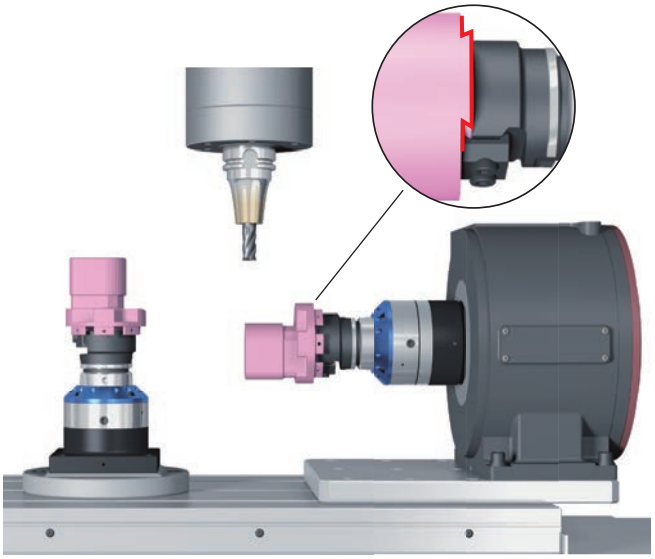
CODE	Kg
F200H80-MP140-25	4.3



Case studies

1 4+1-face machining with a 3-axis MC and Rotary table

A5052
35min

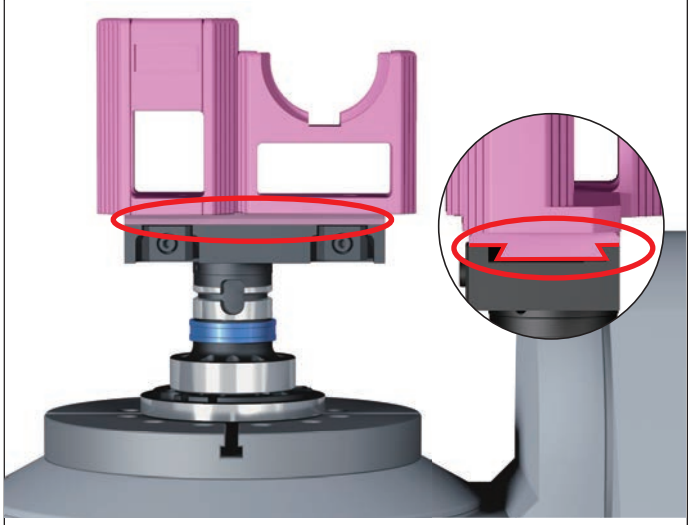


- The dovetail clamping method clamps at the bottom of the workpiece. Dovetail clamping method clamps the workpiece at the bottom, providing compact, strong clamping.
- No work-piece rise from radial direction force.
- Ideal for multiple-direction and heavy load-machining with a single clamp

Movie

2 5-axis machining of large work-pieces

S45C
83min



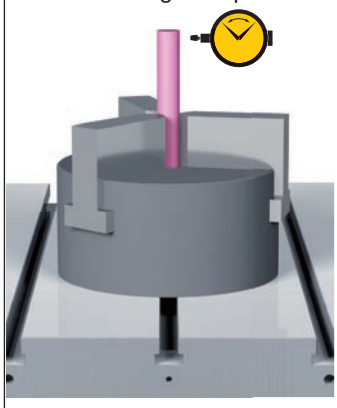
- Uses a long dovetail clamping holder to strongly clamp large work-pieces.
- Adding a dovetail adapter to the work-piece bottom eliminates the dovetail process and material waste.

Movie

3 Uses a MC (collet) holder to clamp cylindrical work-pieces

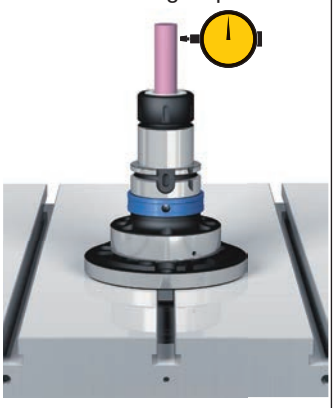
Scroll chuck

Centering is required.



Collet holder
+
SMART GRIP

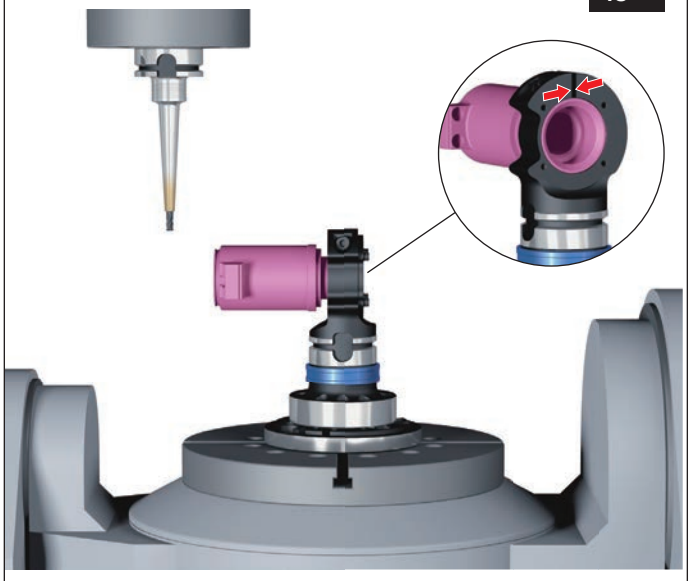
No centering required.



- Use your HSK-A holder to clamp cylindrical work-pieces.
- High positioning accuracy and repeatability eliminate the centering process.
- Off line set-up will reduce the time required to change work-pieces and allows continuous operation.
- Various diameter work-pieces can be clamped by changing collets.

4 5-axis cylindrical work-piece machining

FCD450
48min



- Customized design allows clamping of cylindrical work-pieces
- Work-piece holders can be custom-designed to any shape depending on your application or work-piece shape.

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