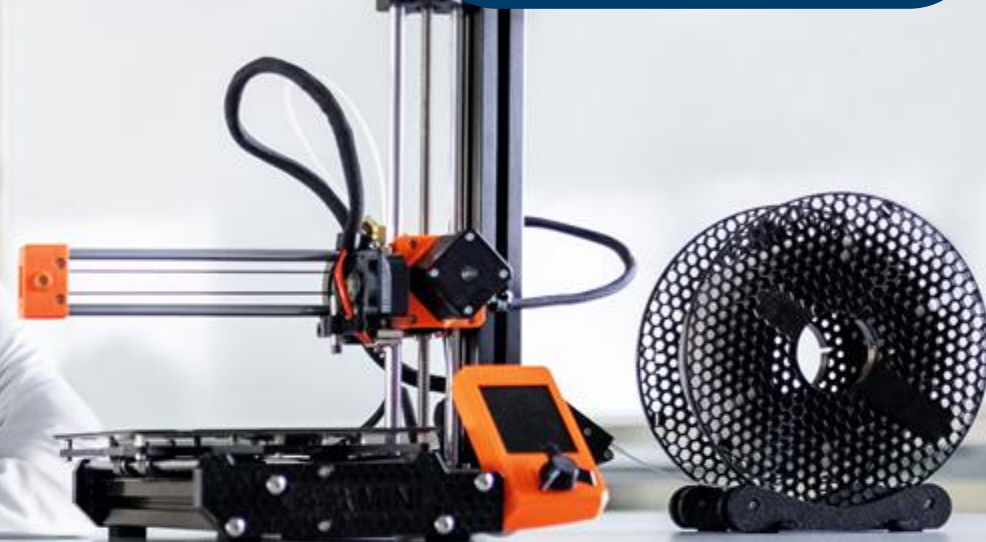


Hand in hand for tomorrow

SCHUNK 

Treinamento de Sistemas de Fixação

SCHUNK





Julio Del Valle

Gerente de Engenharia – SCHUNK Brasil (11 anos)

(11) 97140-6230

Julio.delvalle@br.schunk.com

Desde 14 anos de idade, trabalhando em indústria nos setores como manutenção, ferramentaria e automação.

- Técnico mecânico SENAI SP
- Técnico eletrônico SENAI SP
- Engenheiro mecânico
- Especialização em automação e controles
- MBA Gestão de projetos – USP SP



Fundador:
Friedrich Schunk



Hoje é administrado por dois netos Kristina I. Schunk e Henrik A. Schunk. Direita: Filho do fundador, Heinz-Dieter Schunk



Como tudo começou



De uma oficina para um parceiro de produtividade

1966

Gama de produtos
castanhas



1988

Gama de produtos
Fixação Estacionária



2013

Tecnologia de
Depanelização



2020

ADHESO
garra
adesivas



2021

Laboratório de
aplicações

CoLab

1983

Gama de produtos
Sistema de garras



1994

Gama de produtos
Placas de torno



2016

Garras para
operações
colaborativas



2018

iTENDO –
O primeiro Porta-
ferramentas
inteligente



1945

Friedrich Schunk
instala a oficina
mecânica

**O que fazemos: Mais
produtividade para
nossos clientes.**

O consistente Programa de Tecnologia de Garras com mais de 4.000 Componentes Padrão.



Garras

2,500 componentes,
pneumáticos e
elétricos



Módulo de Giro

600 componentes,
pneumático e elétrico



Movimentação Linear

450 componentes,
pneumáticos e elétricos



Acessórios de Robô

Mais de 450 componentes
para compensação, passagem
direta, troca, controle e
medição

A linha completa de Tecnologia de Fixação – desde a solução padrão até soluções



Porta-Ferramentas

- 13 séries de porta-ferramentas para diferentes necessidades.
- Mais de 2 milhões de porta ferramentas vendidos.



Fixação Estacionária

- Todas soluções para sistemas modulares
- Mais de 1.000 maneiras de fixar as peças
- Redução do tempo de preparação em até 90%.



Placas

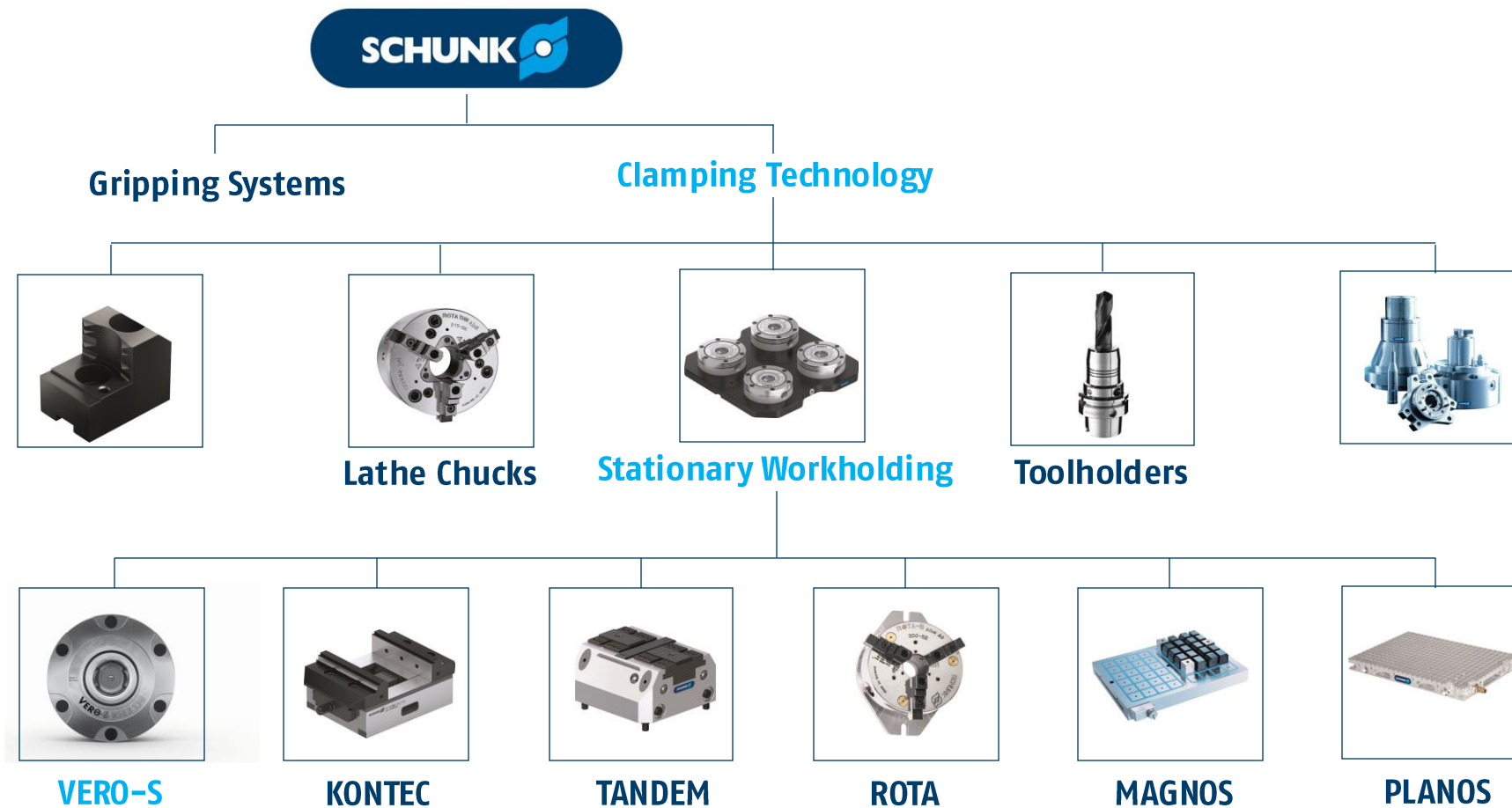
- Placas manuais e acionadas com troca rápida de castanhas
- Troca de castanhas em <60 segundos.
- Força de fixação de até 410kN.



Castanhas

- Mais de 1.200 tipos diferentes
- Mais de 16 milhões de castanhas padrões já estão em uso ao redor do mundo.

Overview



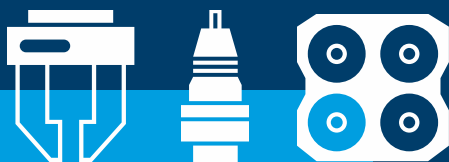
Quem somos nós

Líder nos ramos de porta-ferramentas, tecnologia de fixação, sistemas de garras e tecnologia de automação

Mais de

11,000

Componentes



€ 500 milhões

Faturamento em 2021



2,000

soluções
costumizadas por ano



9 plantas

34 países

3,500 empregados



8.5%

Taxa de investimento em
R&D



Quem somos nós



A SCHUNK está perto de você – mundialmente



- + Em mais de 50 países
- + Com 34 subsidiárias de propriedade direta
- + 9 plantas de produção mundialmente



Lauffen/Neckar



Brackenheim-Hausen



Mengen



St. Georgen



Morrisville USA



S.P.D. S.p.a.
Italy



Gressel AG
Switzerland



Winkler
Präzisionswerke



Eberhardt
Stanztechnik

Quem somos nós

Estrutura SCHUNK Brasil



- + Fundada em 2012
- + 16 vendedores externos
- + Engenharia de Vendas
- + Assistência técnica
- + Estoque nacional
- + CoLab
- + Mais de 1.500 clientes já atendidos
- + Cobertura nacional



Eficiência e Produtividade



Produtividade

É saída por unidade de tempo. Desconta-se a parada de máquina (parada planejada) no cálculo.

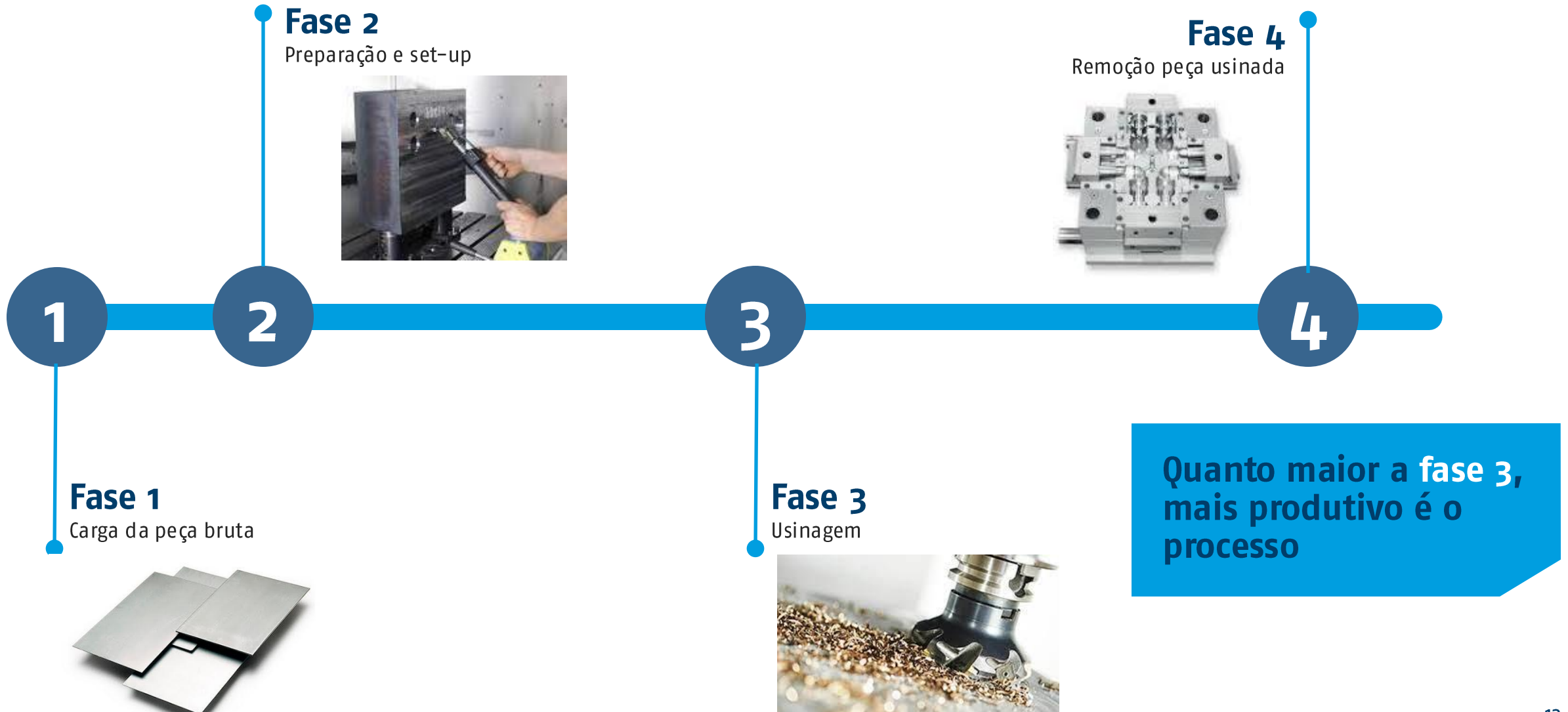
Ex.: quantas peças foram produzidas em um turno.

Eficiência

É a melhor saída possível para cada unidade de tempo. Considera-se a parada de máquina.

Ex.: qual o melhor processo usado para produzir uma certa quantidade de peças em um turno.

Produtividade



Produtividade

Produtividade média

Industria ferramenteira



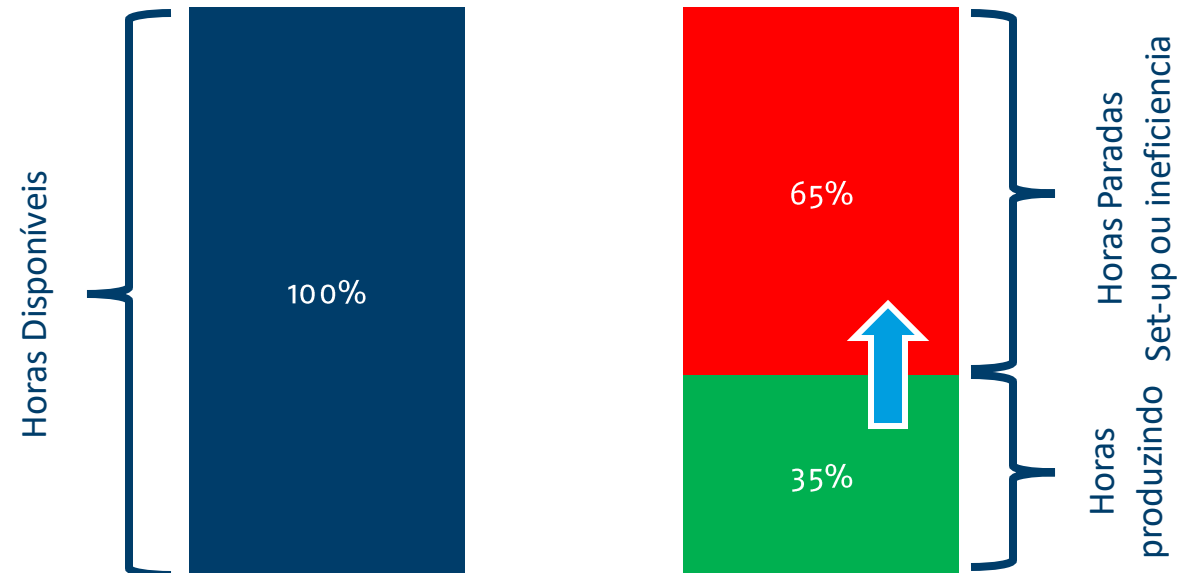
Brasil



Mundo



Fonte: ABINFER



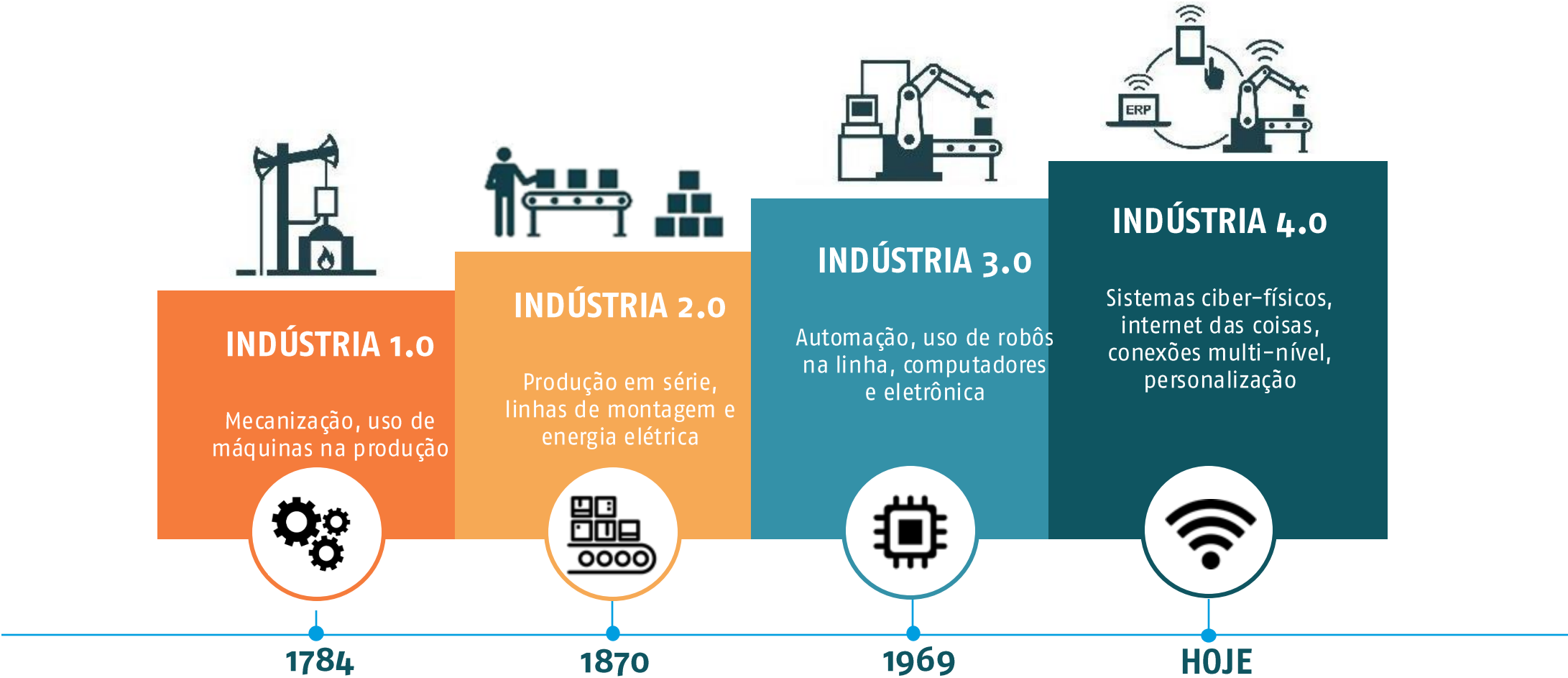
O mundo está mudando

Estamos preparados para essa mudança?



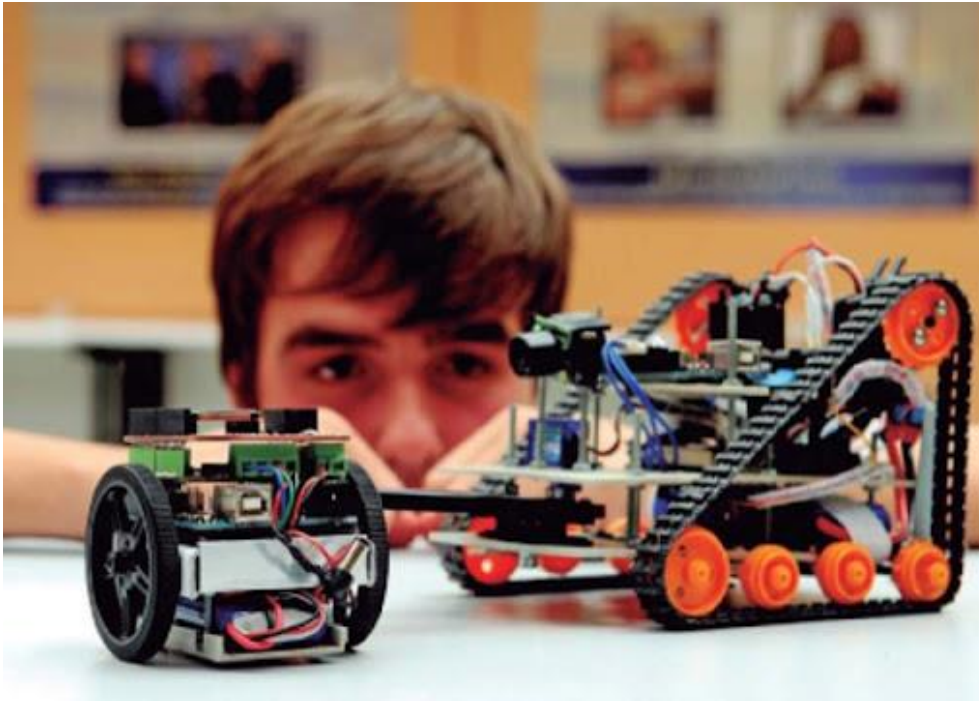
O mundo está mudando

Estamos preparados para essa mudança?



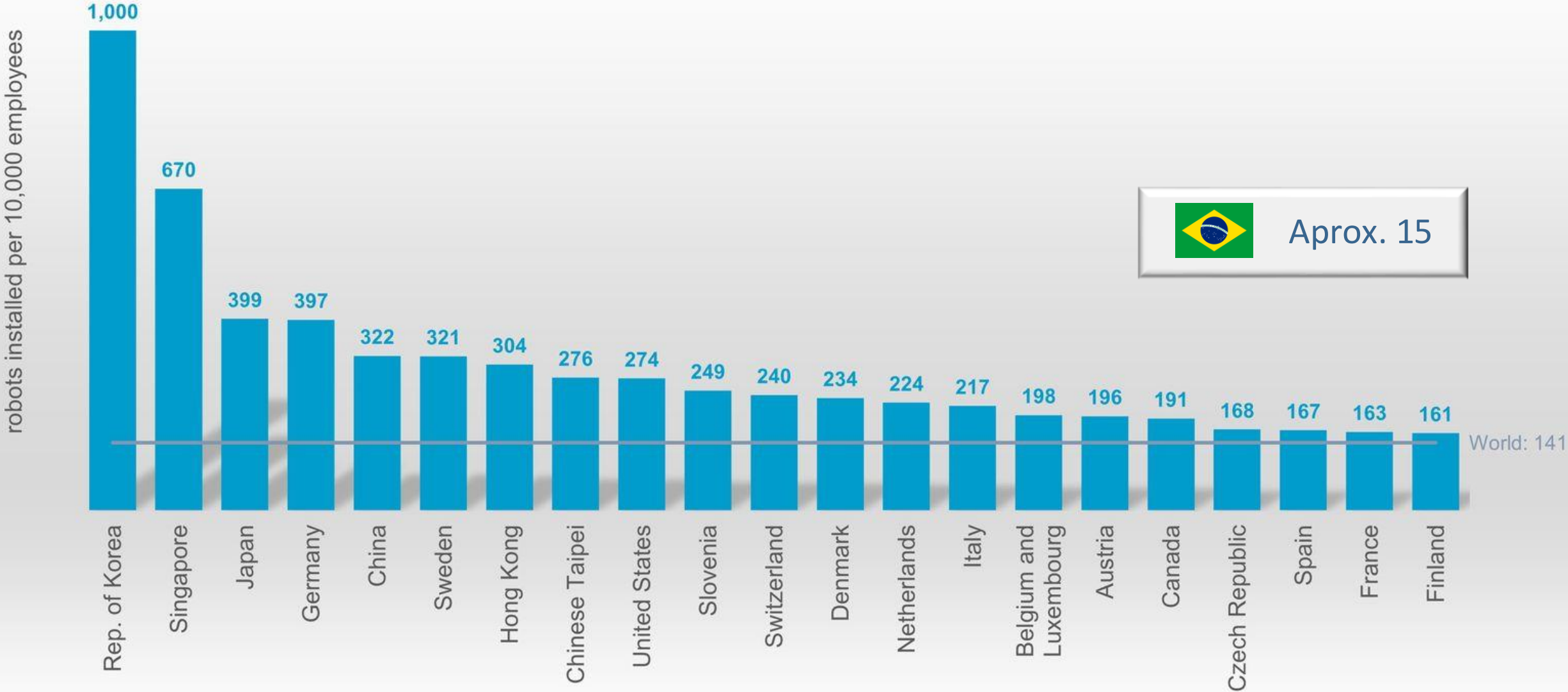
O mundo está mudando

Estamos preparados para essa mudança?

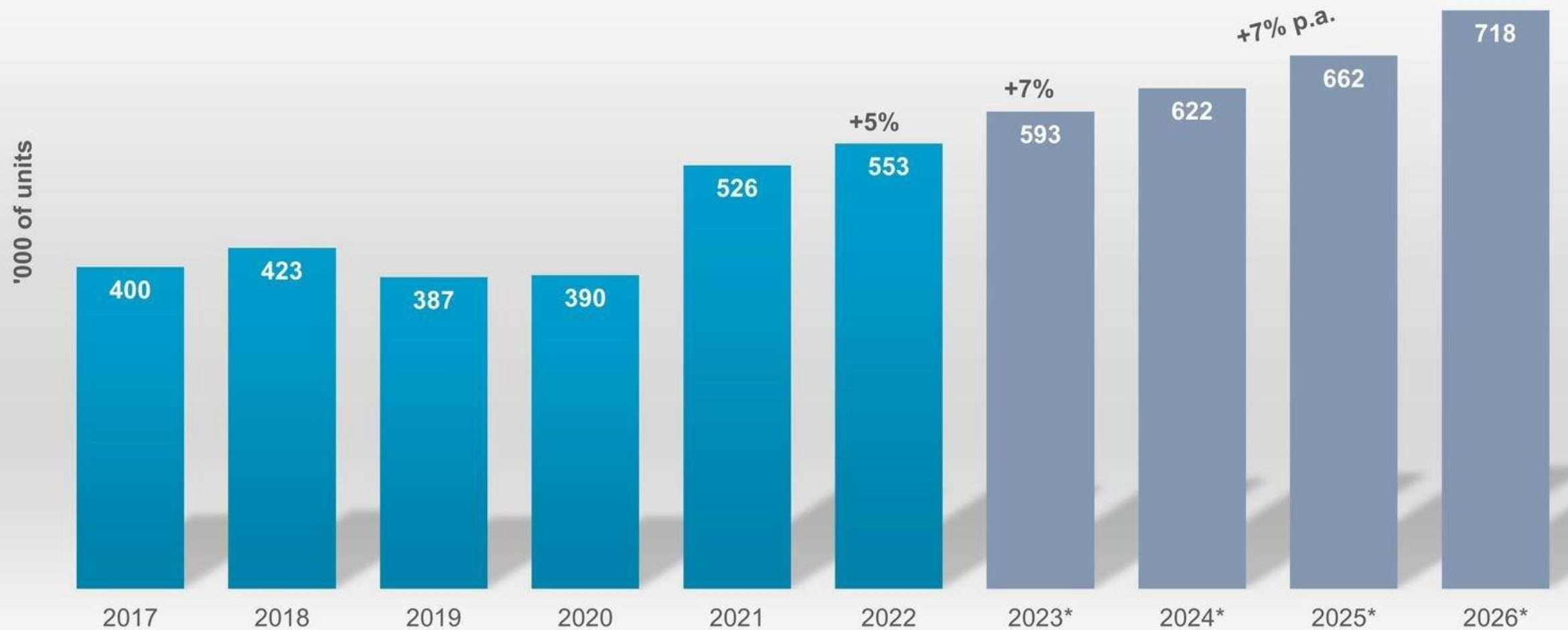


30% das
profissões que
existirão em 10 anos,
NÃO existem hoje!

Robot density in the manufacturing industry 2021



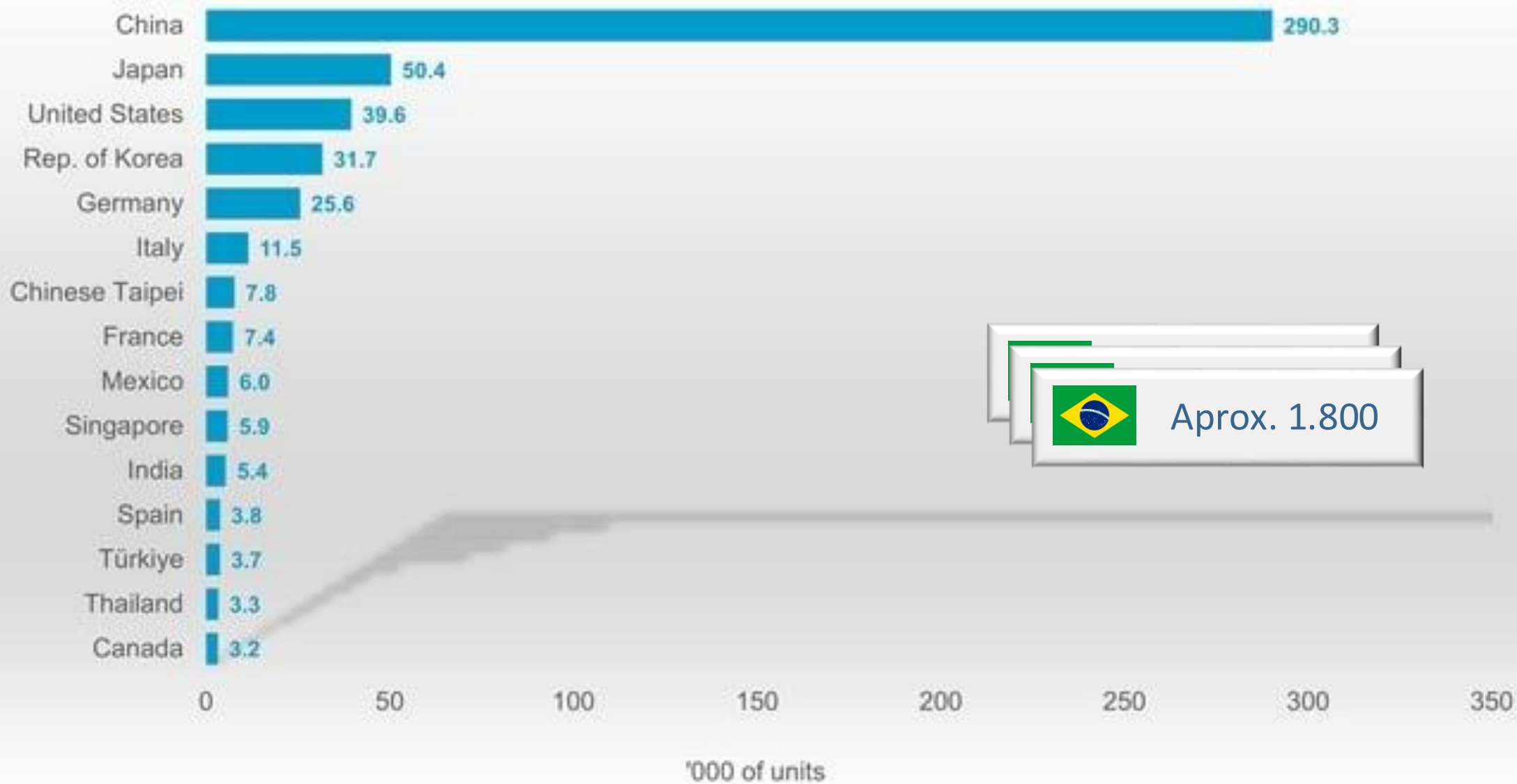
Annual installations of industrial robots 2017-2022 and 2023*-2026*



*forecast

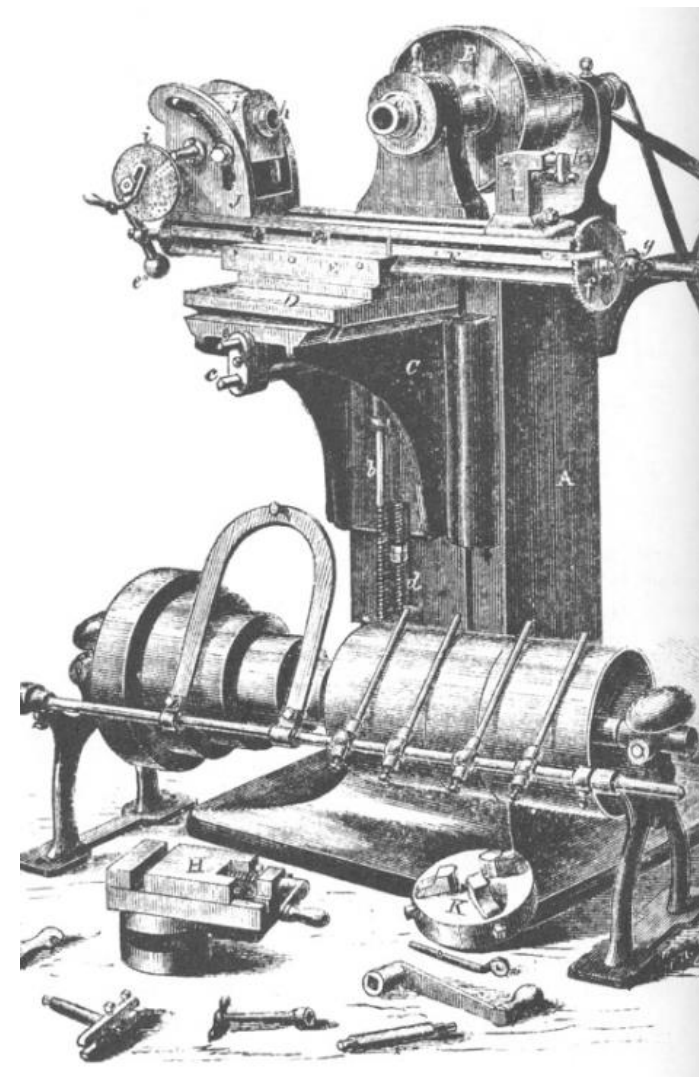
Source: International Federation of Robotics

Annual installations of industrial robots 15 largest markets 2022



Introdução à Usinagem e CNC: Uma Jornada Histórica

A usinagem é o processo de dar forma a materiais brutos. Desde a antiguidade até a era industrial, a usinagem evoluiu. O advento do CNC trouxe precisão e eficiência. Vamos explorar essa jornada histórica.



A primeira morsa do mundo

Mark Fisher - Newport, ME - One Parallel Vice

Em 1847, o Sr. Fisher e William Martin Jr. inventaram um método para soldar ferro fundido em ferro maleável ou aço. Em abril de 1852, ele se uniu a John H. Norris, de Trenton, NJ, para patentear uma melhoria em um método de soldagem de ferro fundido em aço



Quando falamos em morsas de fixação ou fixação de peças o que vem em mente?



Métodos de Fixação em Usinagem CNC



Placas

Fixação rotativa para peças cilíndricas.



Morsas

Tipos, vantagens e desvantagens das morsas.



Vácuo

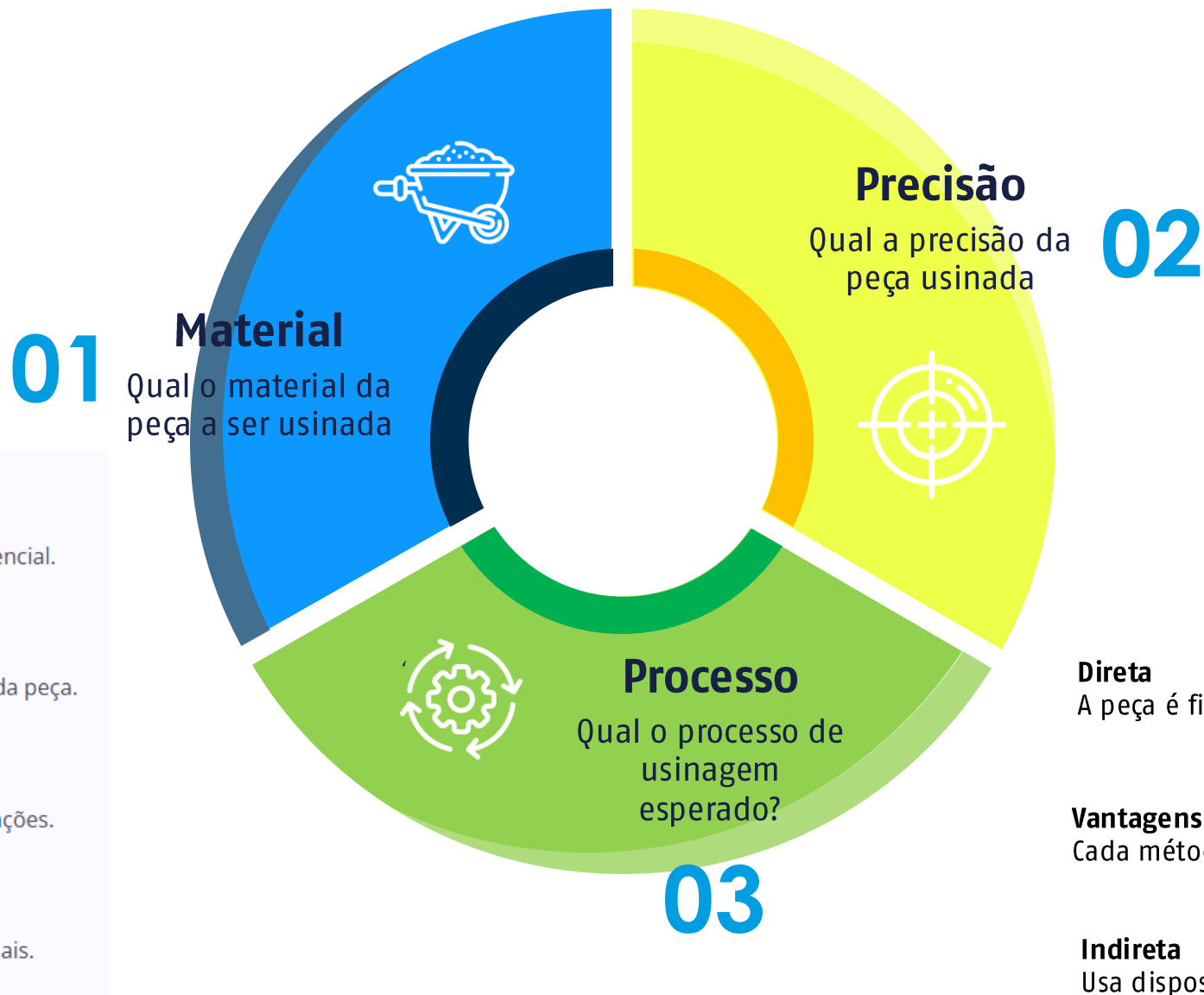
Dispositivos ideais para materiais delicados.



Modular

Sistemas modulares oferecem flexibilidade.

Pontos importantes na fixação das peças



Visão geral

Acionamento manual



Single-acting Clamping Vises



Centric Clamping Vises



Multi Clamping Vises

Acionamento automático



Pneumatic Clamping Force Blocks

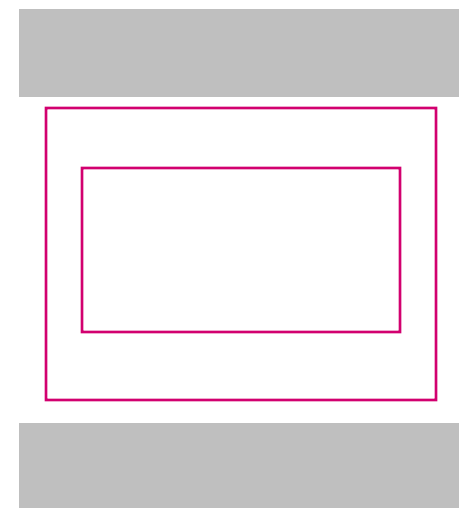
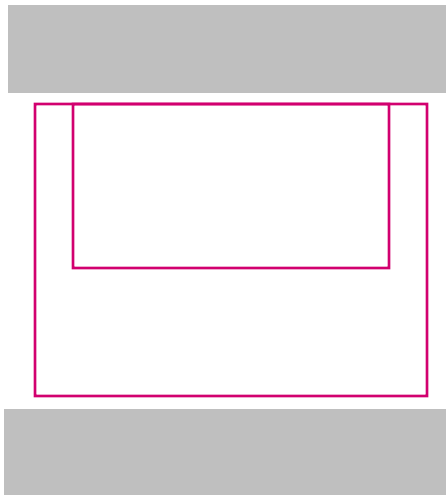


Hydraulic Clamping Force Blocks

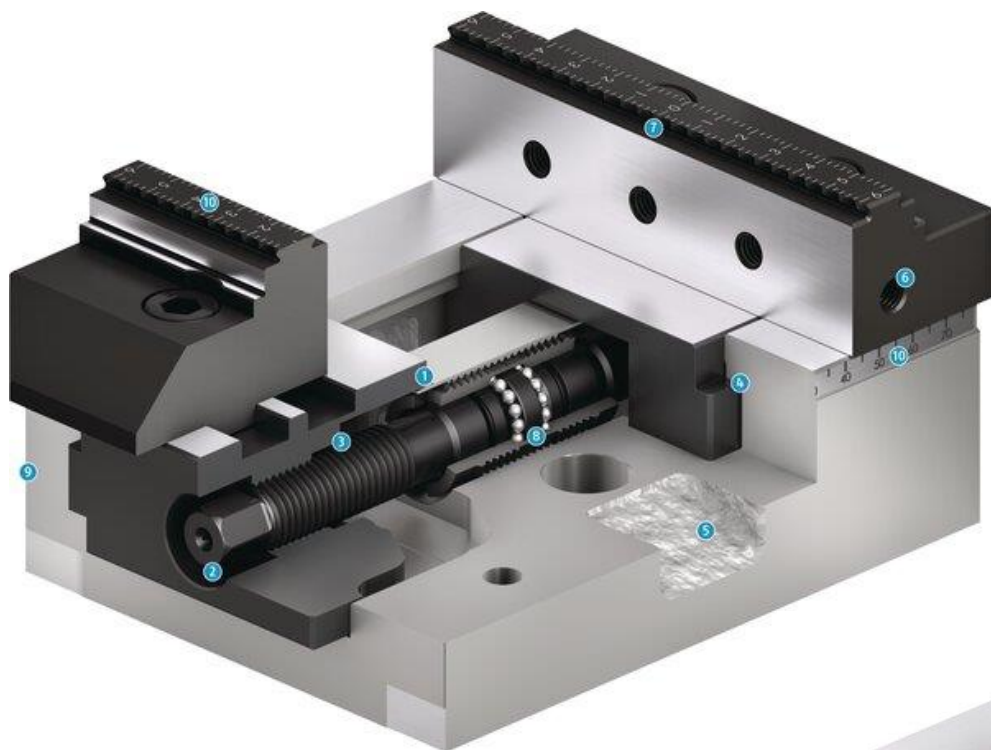


Spring-loaded Clamping Force

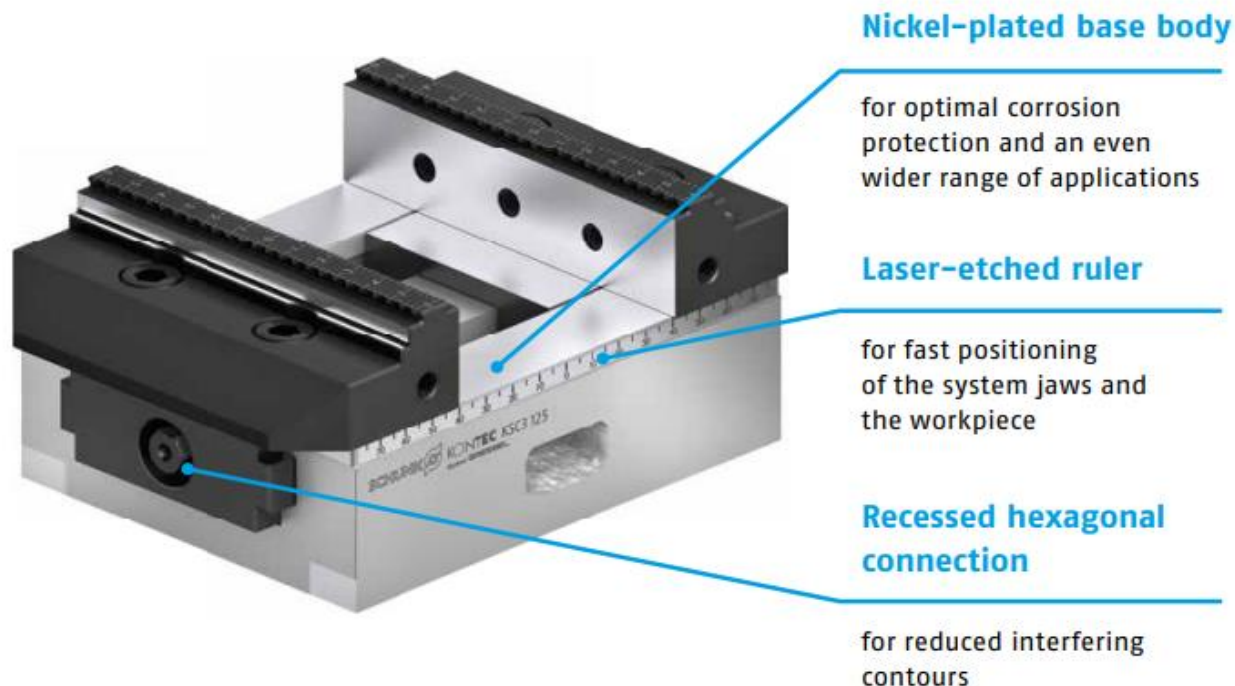
Visão geral – Mordente fixo x auto centrante



Morsa KSC3 "Autocentrante"

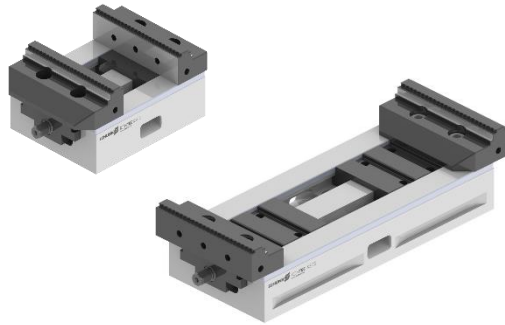


Morsa KSC3 "Autocentrante"

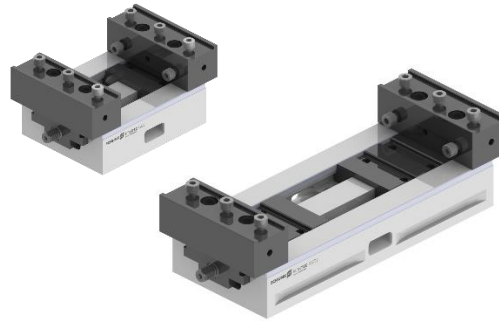


Size	Width of the clamping vise [mm]	Vise length [mm]	Max. clamping force [kN]	Max. torque [Nm]
KSC3 80-130	80	130	25	90
KSC3 80-190	80	190	25	90
KSC3 125-160	125	160	35	100
KSC3 125-235	125	235	35	100
KSC3 125-300	125	300	35	100
KSC3 160-280	160	280	50	175
KSC3 160-480	160	480	50	175

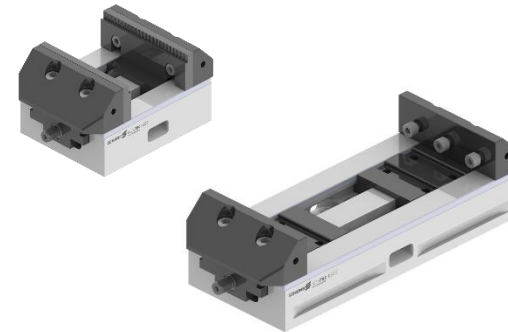
A família de KSC3 "Autocentrante"



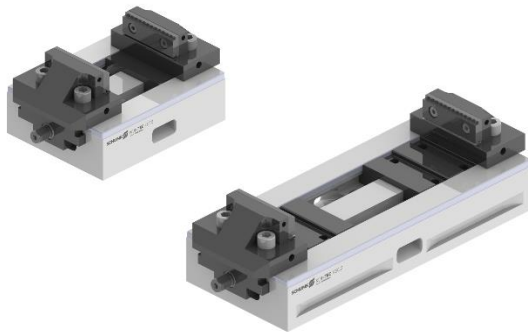
KSC3 125
with reversible grip
jaws



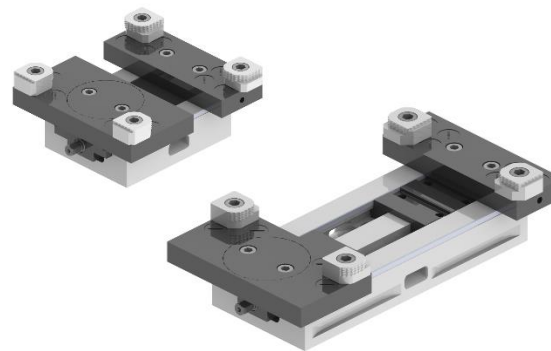
KSC3 125
with combi jaws



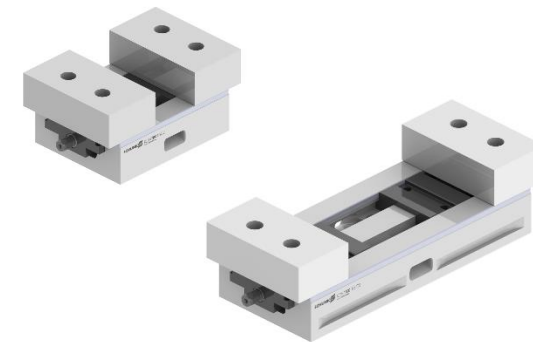
KSC3 125
with 5-axis jaws width 125



KSC3 125
with 5-axis jaws width 65



KSC3 125
with swivel- and adapter plate



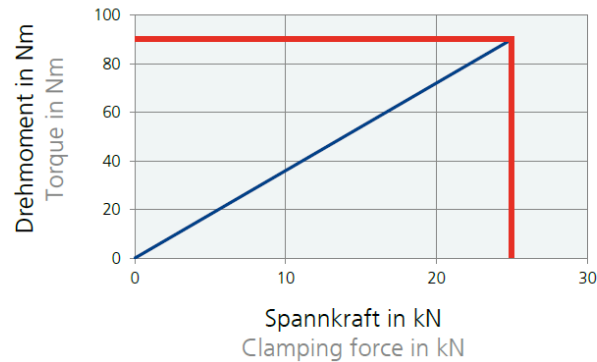
KSC3 125
with aluminium jaws

Força de fechamento

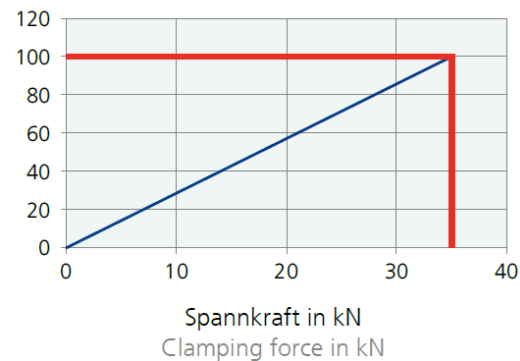
2. Spannkräfte C2 Clamping forces C2

Baugröße Size	Max. Anzugs-Drehmoment Max. torque	Max. Spannkraft Max. clamping force
C2 80	90 Nm	25 kN
C2 125	100 Nm	35 kN
C2 160	175 Nm	50 kN

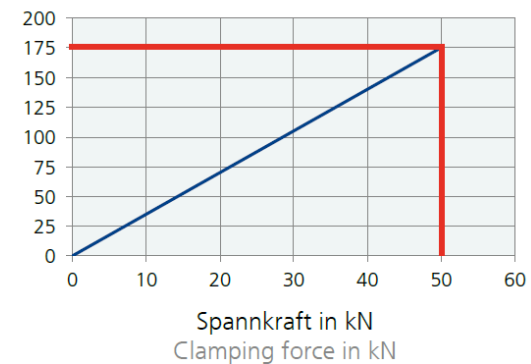
Anzugs-Drehmoment/Spannkraft C2 80
Clamping torque/clamping force C2 80



Anzugs-Drehmoment/Spannkraft C2 125
Clamping torque/clamping force C2 125



Anzugs-Drehmoment/Spannkraft C2 160
Clamping torque/clamping force C2 160



Mordente base KSC3 / KSC-F "Autocentrante"

Reversible grip jaw



30Hrc

Reversible jaw carbide-grip



Reversal jaw soft-grip



Reversible jaw with embossed profile



Reversible jaw



Alu jaw



Swivel and Adapter plate



5-axis jaw



Combi jaw



6-fold jaw system



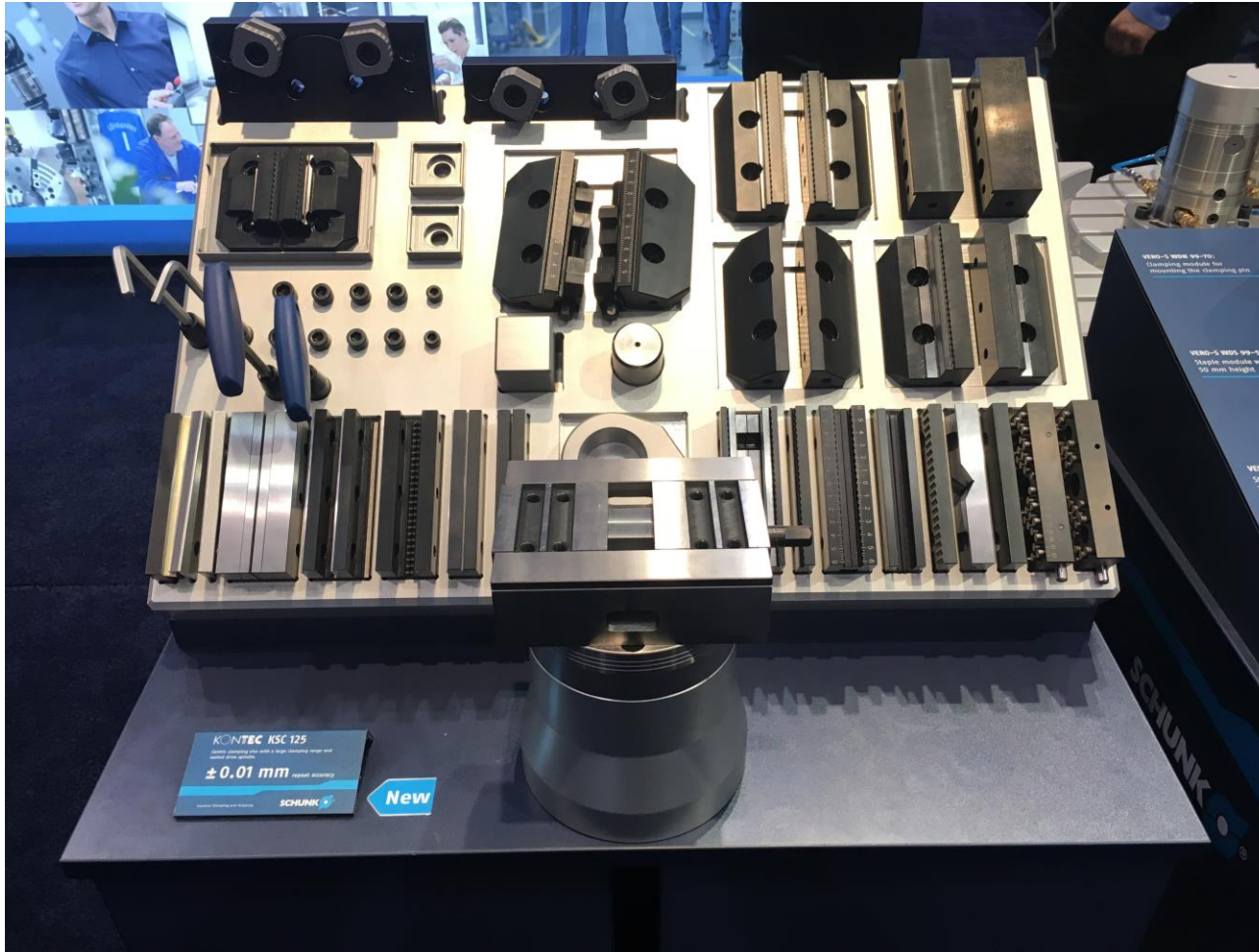
Prismatic jaw



Central jaw grip



Morsas KONTEC KSC₃ / KSC-F / KSC-D Insertos



Baukasten Construction kit

TFA.125.010.11 Stufenbacke grip 5 mm Stepped grip jaw 5 mm	TFA.125.011.11 Backe geschliffen Ground jaw	TFA.125.012.11 Backe grip Grip jaw	TFA.125.013.11 Backe beschichtet Coated jaw	TFA.125.017.11 Stufenbacke grip 3 mm Stepped grip jaw 3 mm	TFA.125.018.11 Stufenbacke beschichtet 5 mm Stepped jaw with 5 mm coating
gripes 125 Kombi-Wendebacke beweglich wendbar für Aufsatzbacken Höhe 40 und 18 mm Combi reversible jaw moveable reversible for top jaws height 40 and 18 mm GPA.125.053.01					
MSA.125.150.11 Stufenbacke grip 8 mm mit T-Nut Stepped grip jaw 8 mm with t-slot	MSA.125.151.11 Stufenbacke grip 5 mm mit T-Nut Stepped grip jaw 5 mm with t-slot	MSA.125.152.11 Stufenbacke grip 3 mm mit T-Nut Stepped grip jaw 3 mm with t-slot	MSA.125.153.01 Stufenbacke Prägeprofil LANG Stepped jaw pre-stamp LANG	MSA.125.160.01 Stufenbacke carbide-grip 3 mm Stepped carbide- grip jaw 3 mm	MSA.125.167.11 Stufenbacke 18 mm und 3 mm grip Stepped jaw 18 mm and 3 mm grip
MSA.125.168.11 Stufenbacke breit 18 mm und 3 mm grip Stepped jaw width 18 mm and 3 mm grip	MHS.125.170.12 Stufenbacke grip 8 mm Stepped grip jaw 8 mm	MHS.125.171.12 Stufenbacke grip 5 mm Stepped grip jaw 5 mm	MHS.125.172.12 Stufenbacke grip 3 mm Stepped grip jaw 3 mm	MSA.125.181.01 Spannbacke mit Positionierstiften- Stift rechts Clamping jaw with positioning pins pen right	MSA.125.182.01 Spannbacke mit Positionierstiften- Stift links Clamping jaw with positioning pins pen left
MSA.125.188.11 Stufenbacke 17 mm Stepped jaw 17 mm	MSA.125.189.11 Stufenbacke beschichtet 5 mm Stepped jaw coated 5 mm	MHS.125.190.11 Stufenbacke 8 mm Stepped jaw 8 mm	MHS.125.191.11 Prismabacke Prismatic jaw	MHS.125.192.11 Backe weich Soft jaw	MHZ.125.094.11 Stufenbacke grip 5 mm für Aluminium und Kunststoff Stepped grip jaw 5 mm for aluminium and plastic

***ATENÇÃO para a altura do mordente

Visão geral KONTEC "mordente fixo"



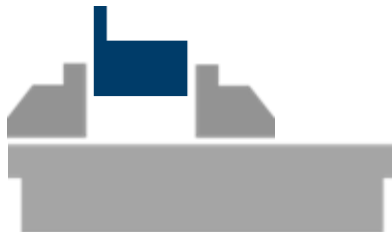
Single-acting Clamping Vises



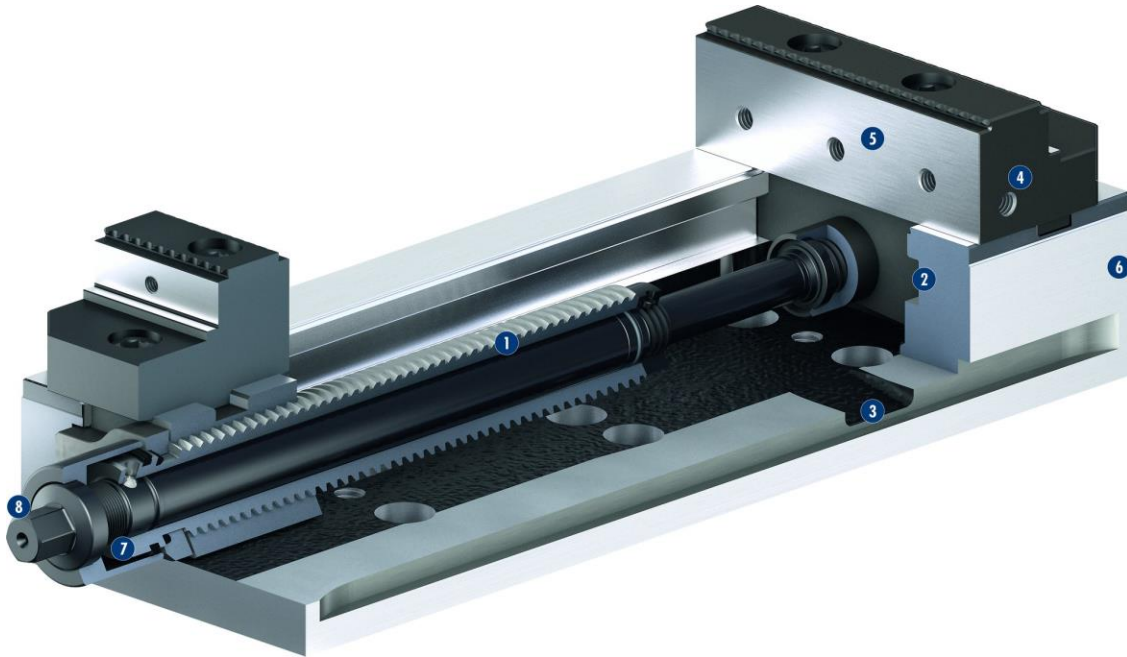
Centric Clamping Vises



Multi Clamping Vises



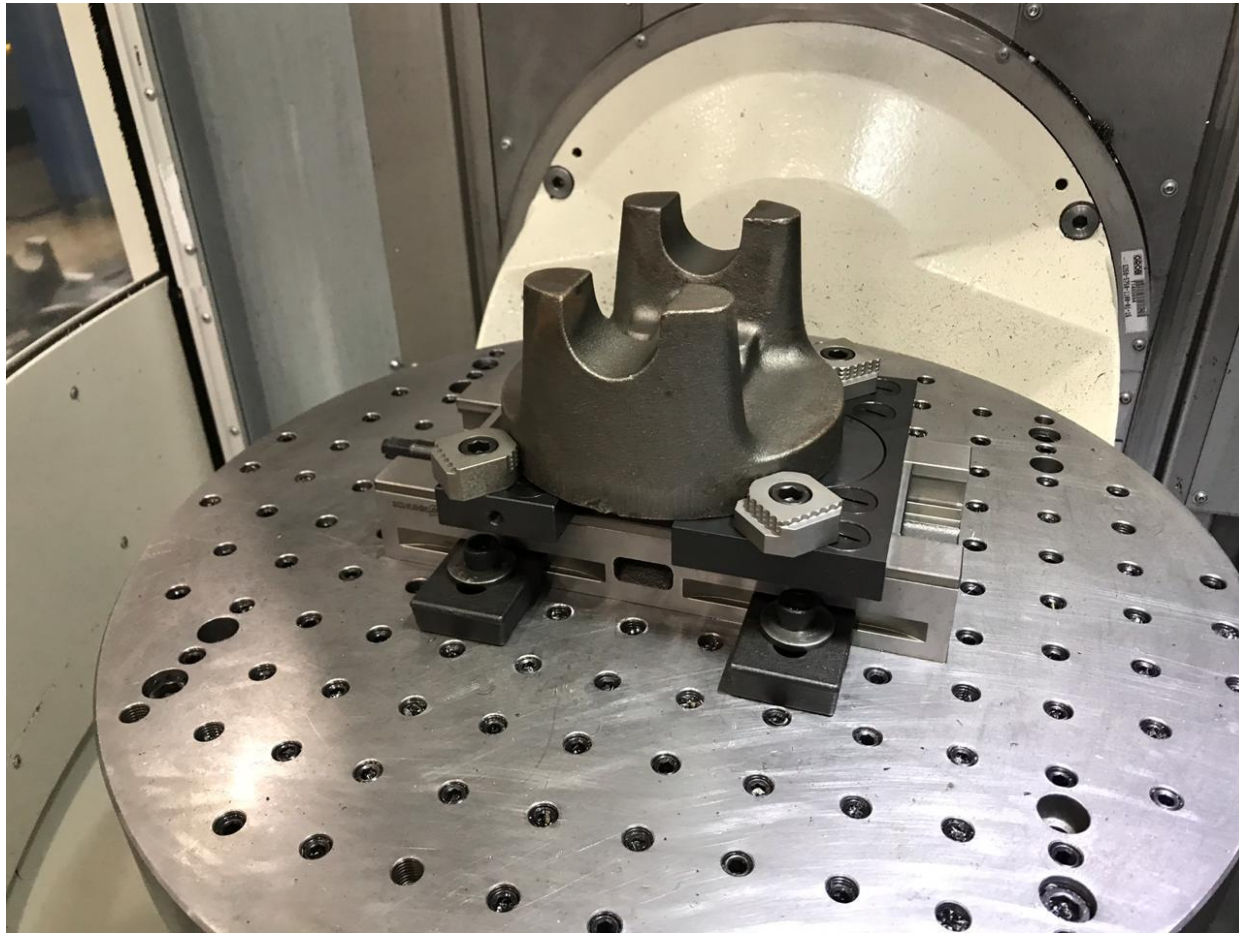
Visão geral KSC-F - "Mordente fixo"



Technical data	KSC-F 80-214*	KSC-F 125-362*	KSC-F 160-480*
Max. clamping force [kN]	25	40	50
Max. torque [Nm]	50	90	120
Weight [kg]	5	15	28.5



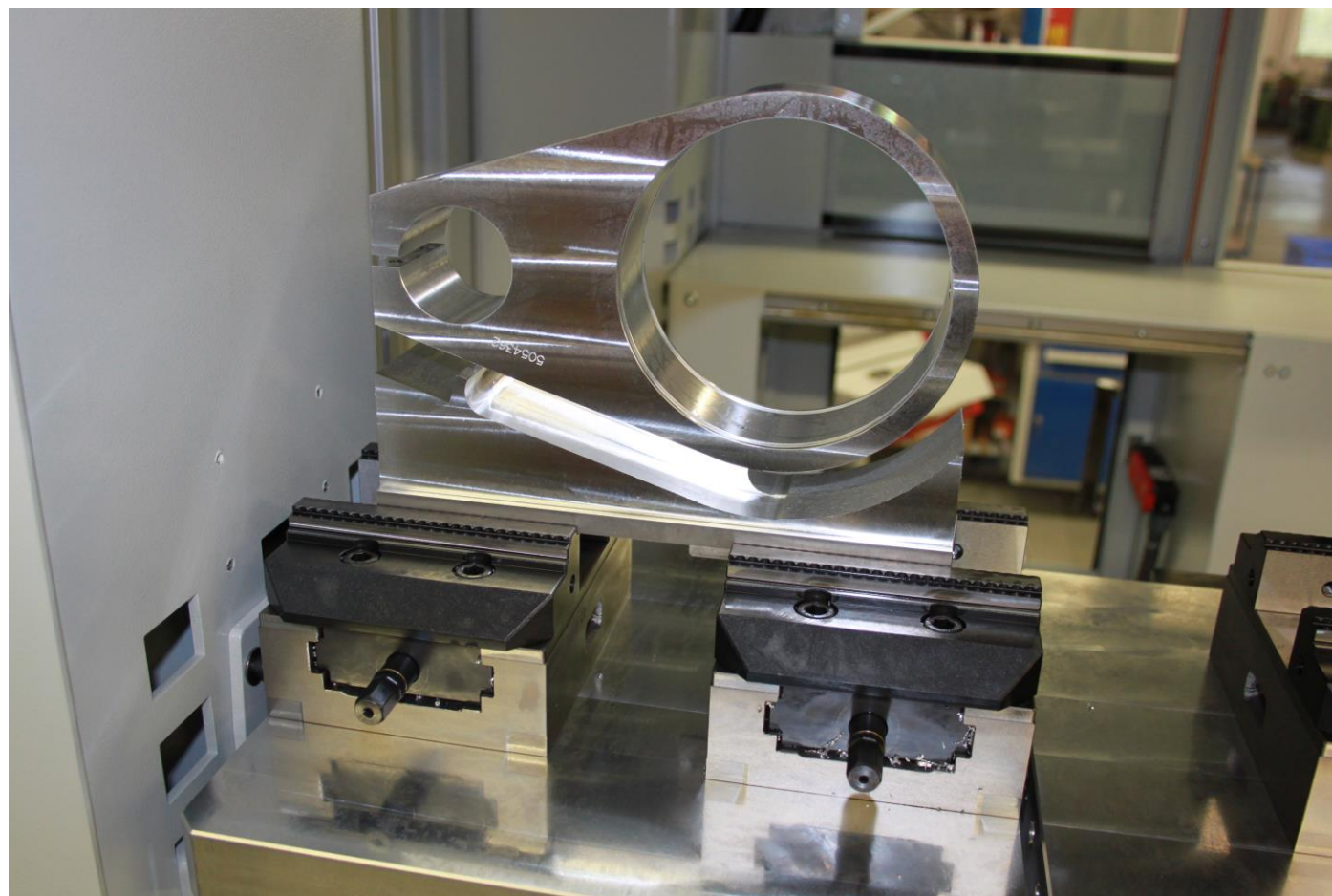
Aplicação mordente basculante



Aplicação



Aplicação



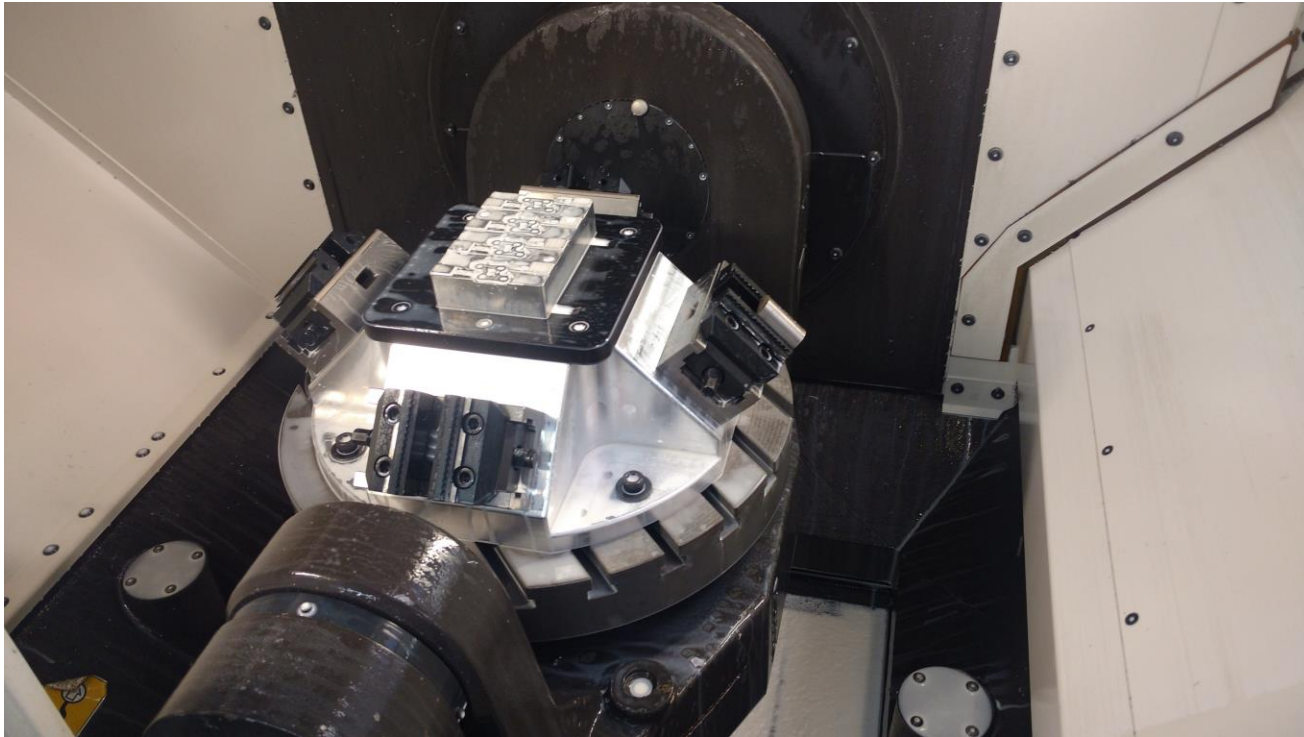


Aplicação

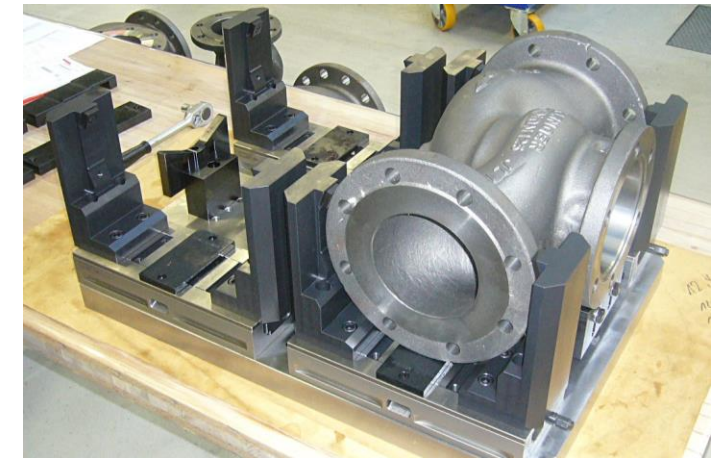
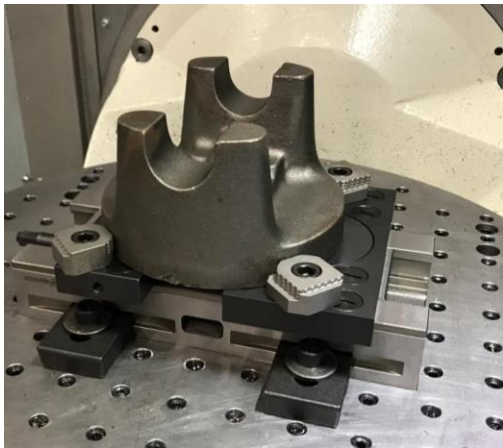
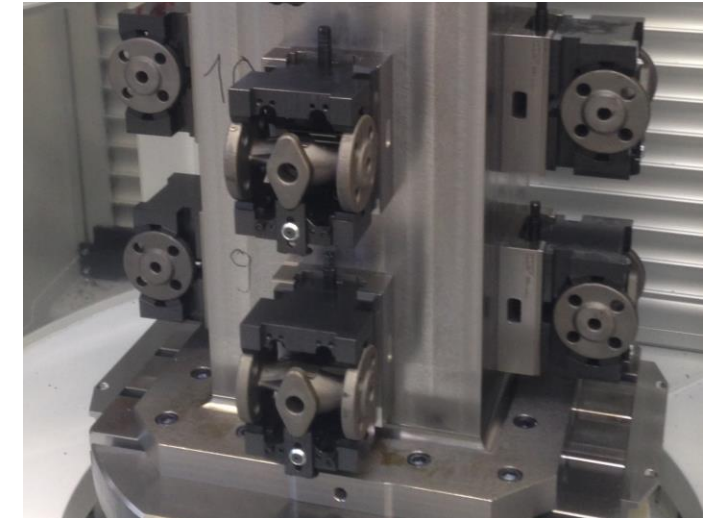
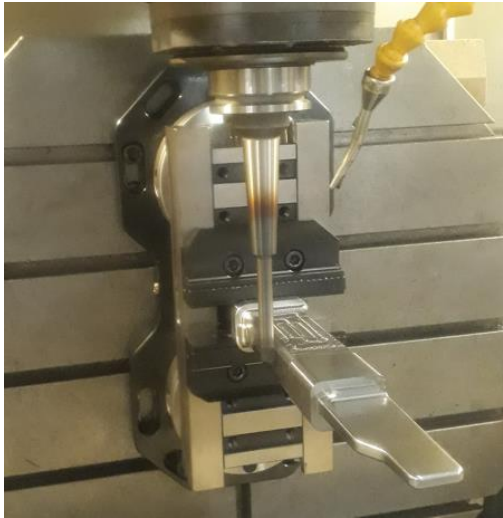


Aplicação

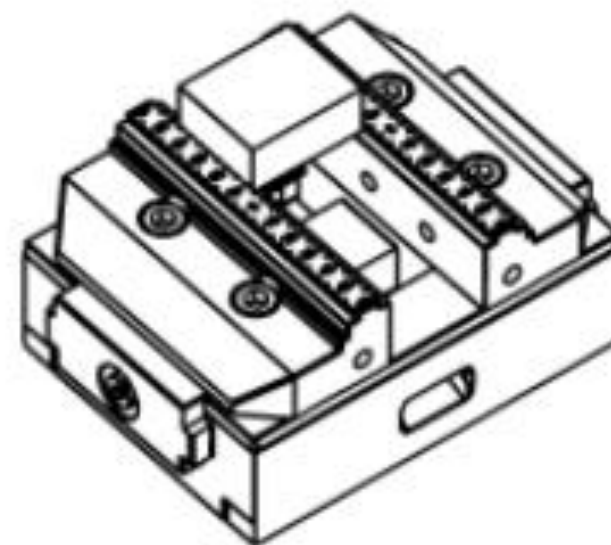
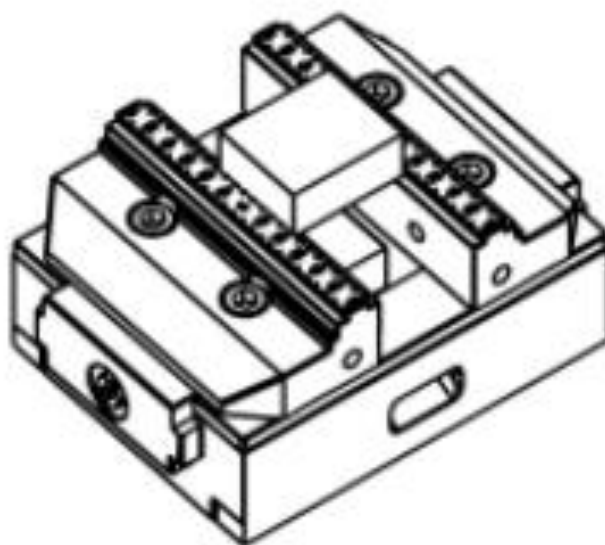
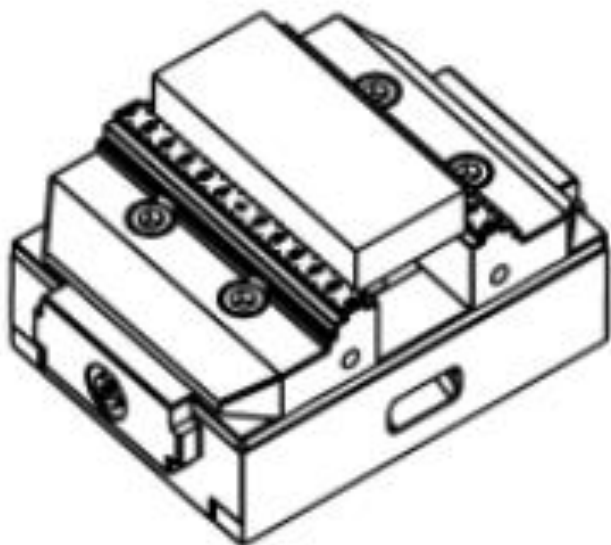




Fixação de peças pequenas com morsa



Uso correto das morsas



Visão geral "Mordente fixo"



KSC-F



KSG

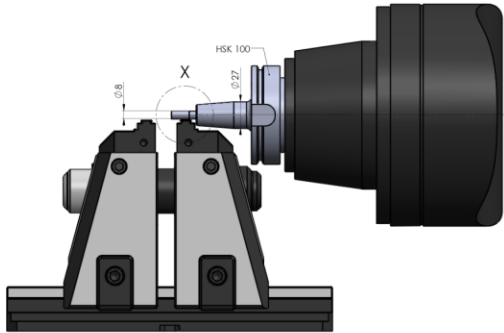


KSX-C2

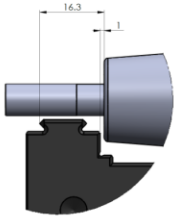


KSX

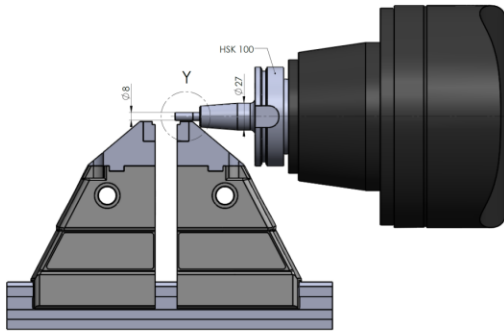
Acessibilidade da morsa KSX



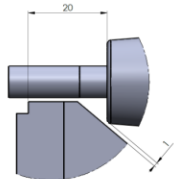
SC5X 125 (Spindel mechanisch) - Minimaler Abstand von Spannfutter zu Werkstück
Werkzeughalter Abstand zu Störkontur 1mm



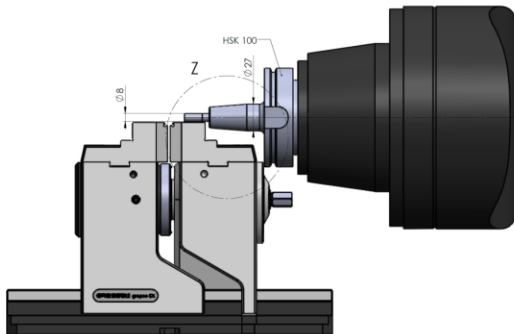
X (2 : 1)



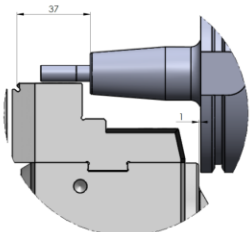
Xpent - Minimaler Abstand von Spannfutter zu Werkstück
Werkzeughalter Abstand zu Störkontur 1mm



Y (2 : 1)



5X 125 - Minimaler Abstand von Spannfutter zu Werkstück
Werkzeughalter Abstand zu Störkontur 1mm



Z (1 : 1)

Werkstoff		Dimension / Model		Gewicht /kg		Allgemeintoleranzen	
				124.47		ISO 2768-mK	
Art.-Nr.		gel.		27.04.2020		MF	
Drehen		heig.				Akzessat. Formel Blatt	
				1:2		A1 8/8	
Bemerkung / Projektnummer							
SC5X 125 H-214 mech. SWB Grip 3mm L-330							
GRESSEL		20-AE 10000037677		G04		Arbeitsnummer	
 greselltechnik		30-AE 10000037678		G03 AA		TMM.125.002.01	

Visão geral "Mordente fixo"



KSC-F



KSG

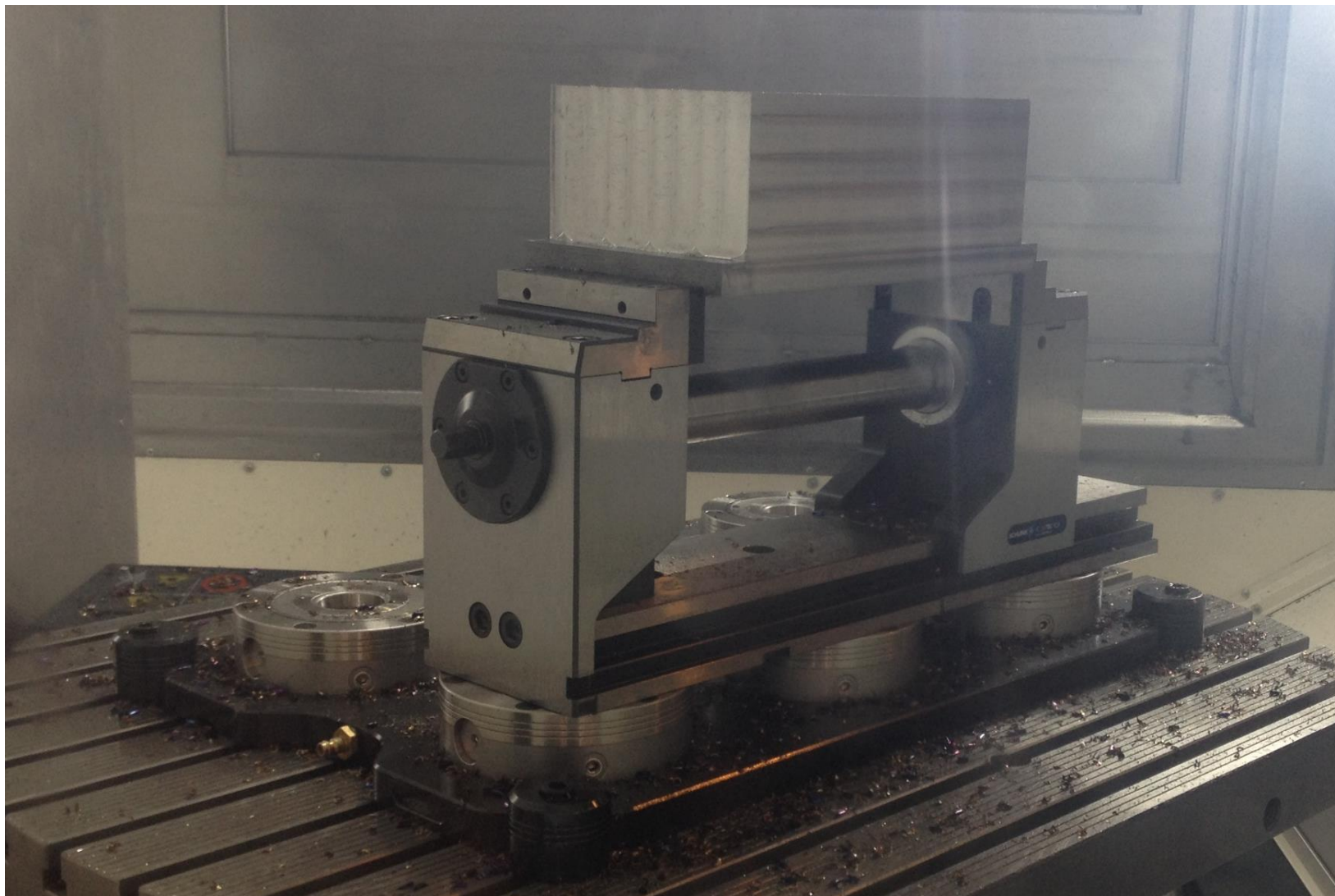


KSX-C2

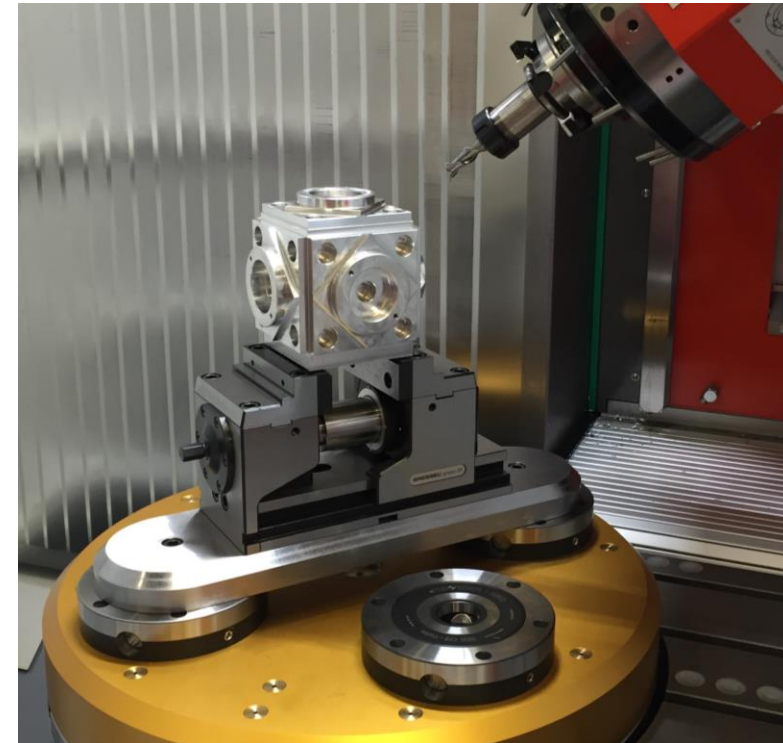
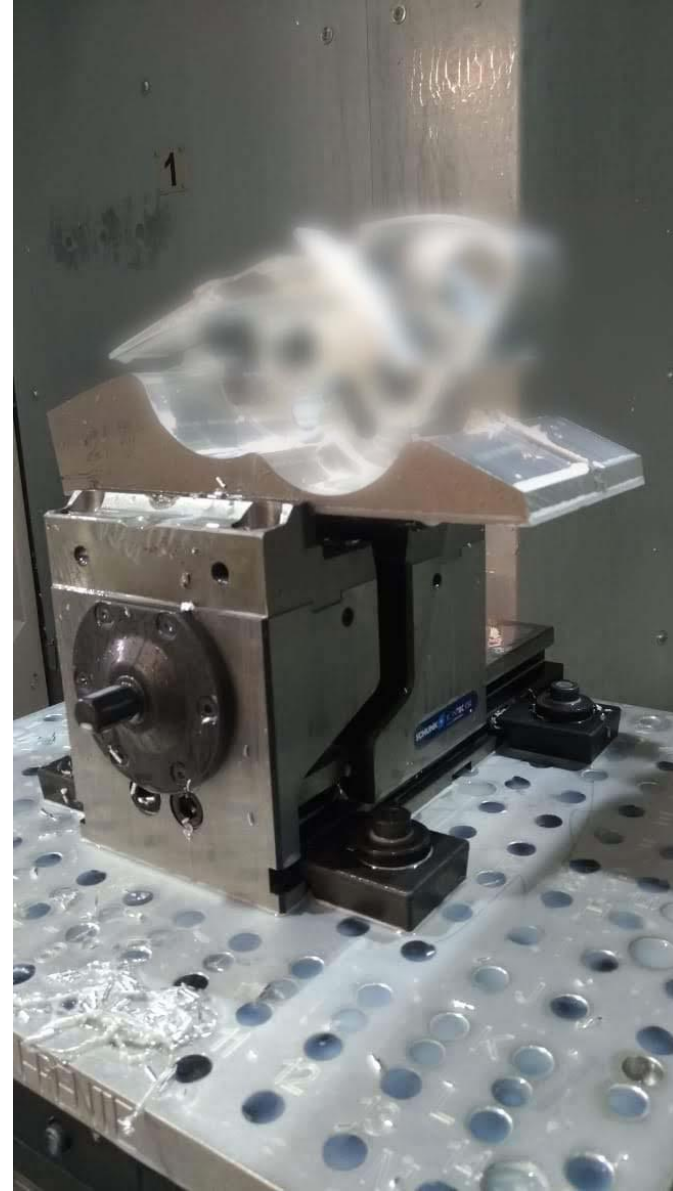


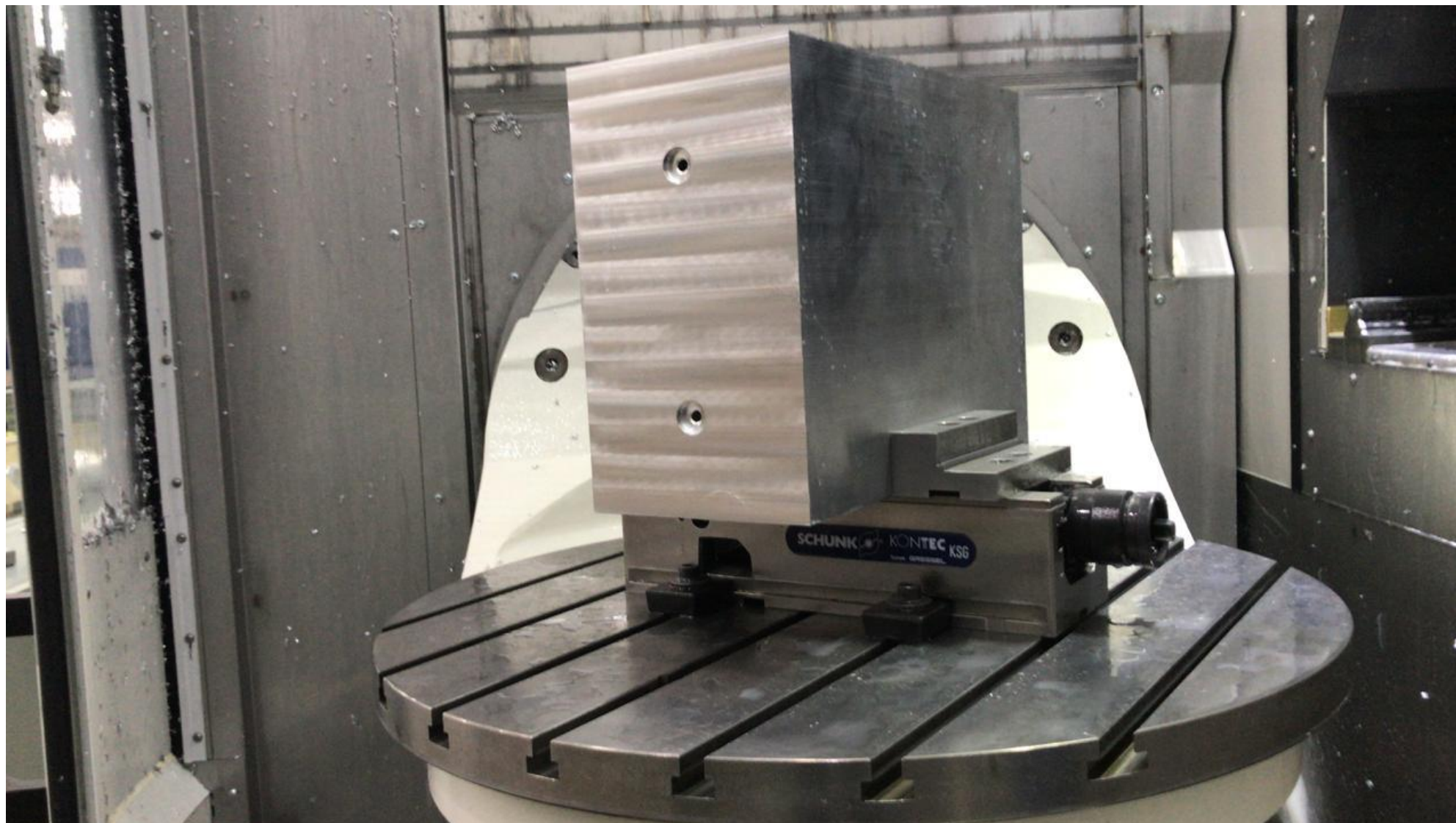
KSX

Aplicação



Aplicação





Visão geral – KONTEC



Single-acting Clamping Vises



Centric Clamping Vises



Multi Clamping Vises



Visão geral – KONTEC multiplas peças



KSC-D



KSM2

Aplicação



Visão geral – KONTEC



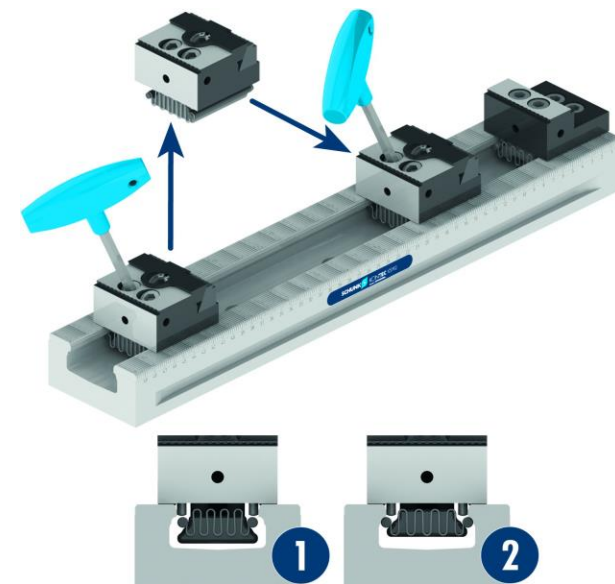
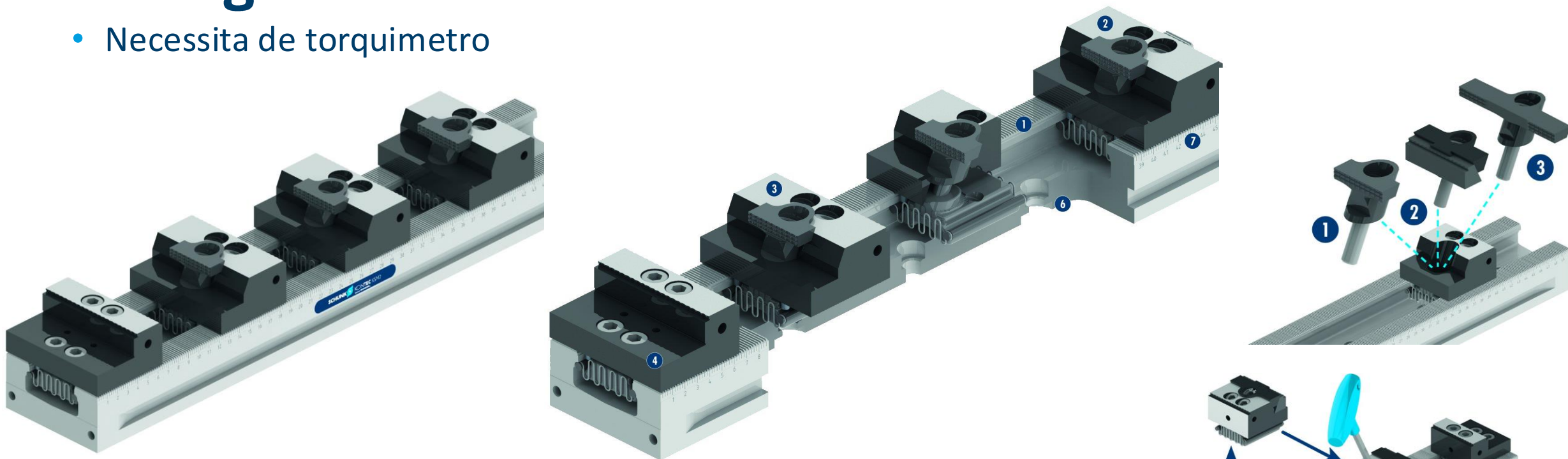
KSC-D



KSM2

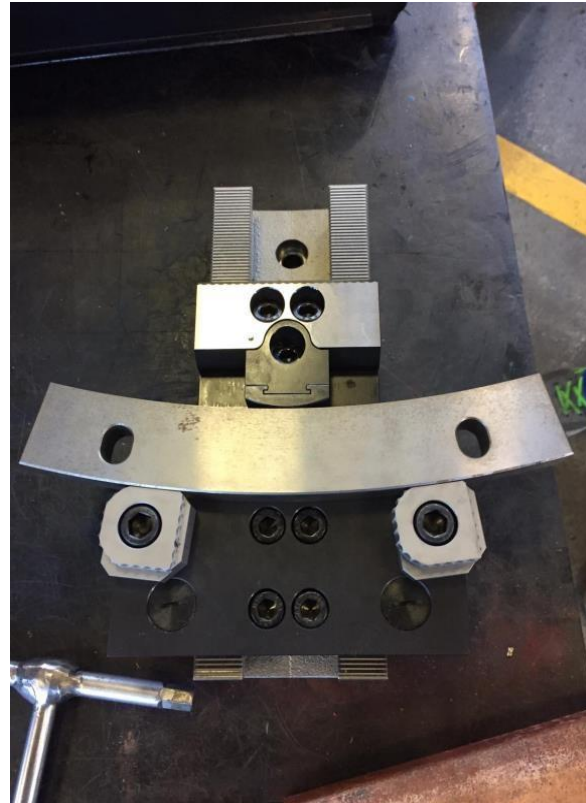
Visão geral

- Necessita de torquimetro



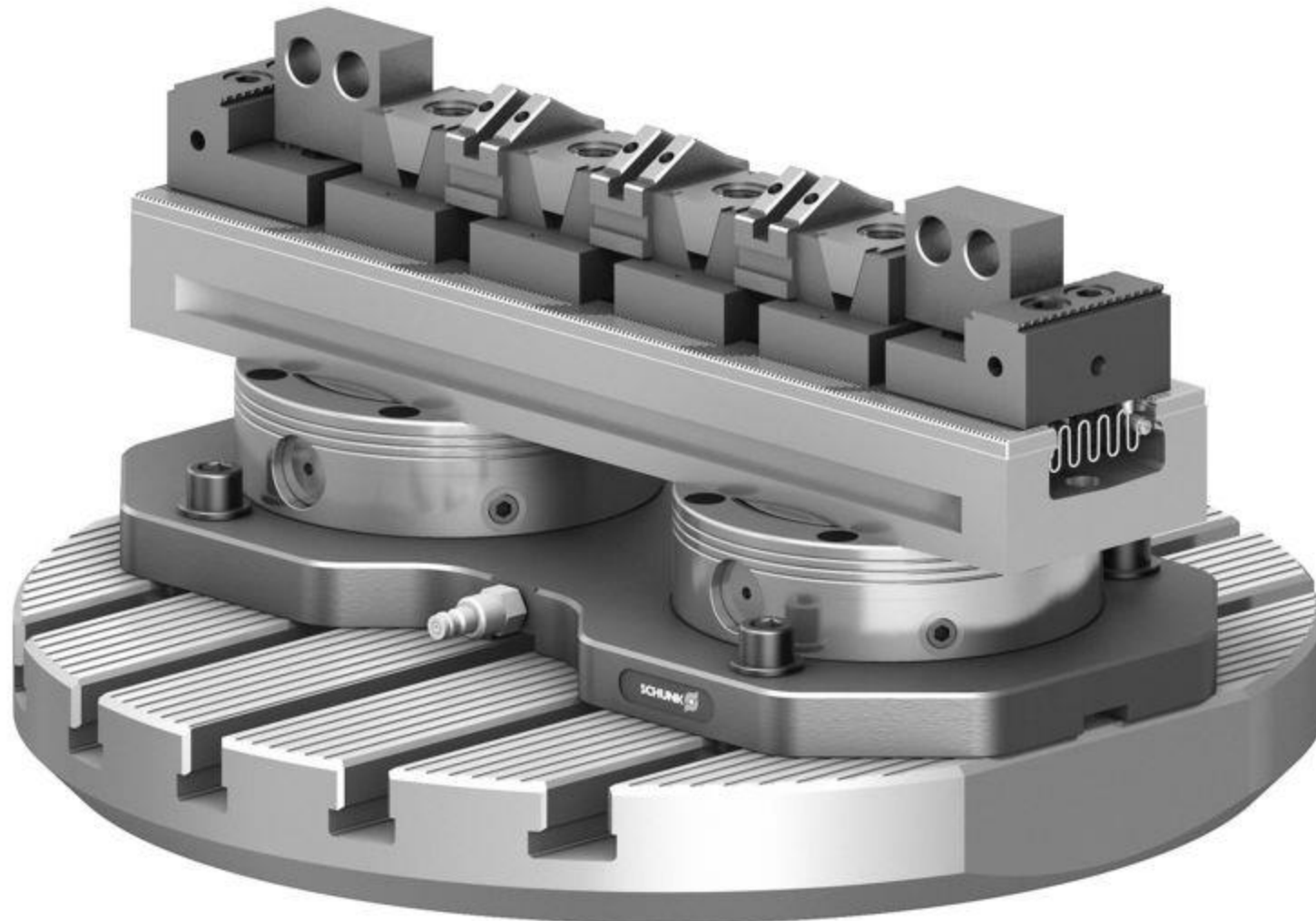
Technical data	KSM2 90-260	KSM2 90-400	KSM2 90-500	KSM2 90-600	KSM2 90-650
Rail width [mm]	90	90	90	90	90
Clamping force [kN]	30	30	30	30	30
Max. torque [Nm]	50	50	50	50	50
Weight [kg]	5	7.7	9.6	11.5	12.5

Aplicação



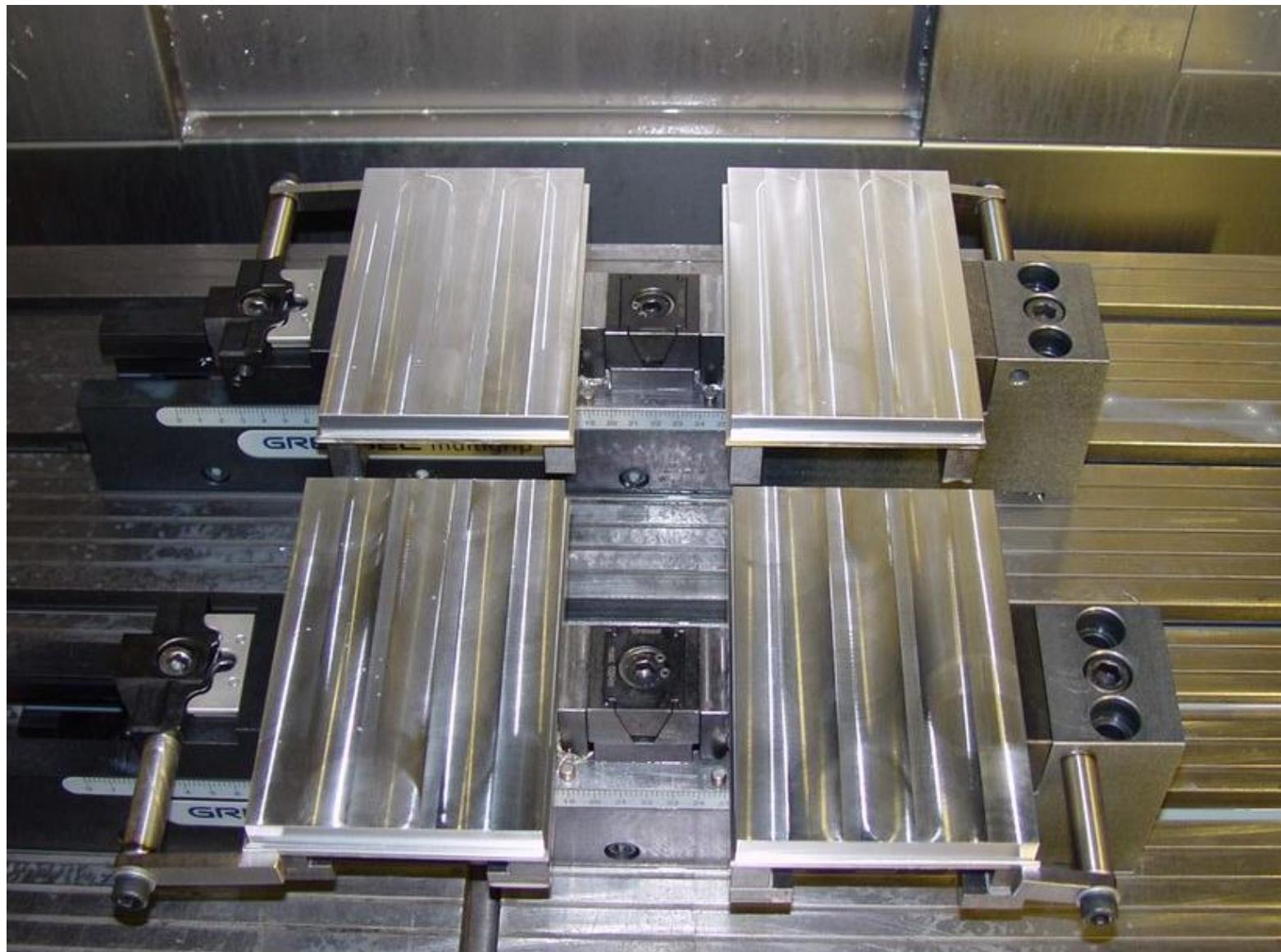
Aplicação





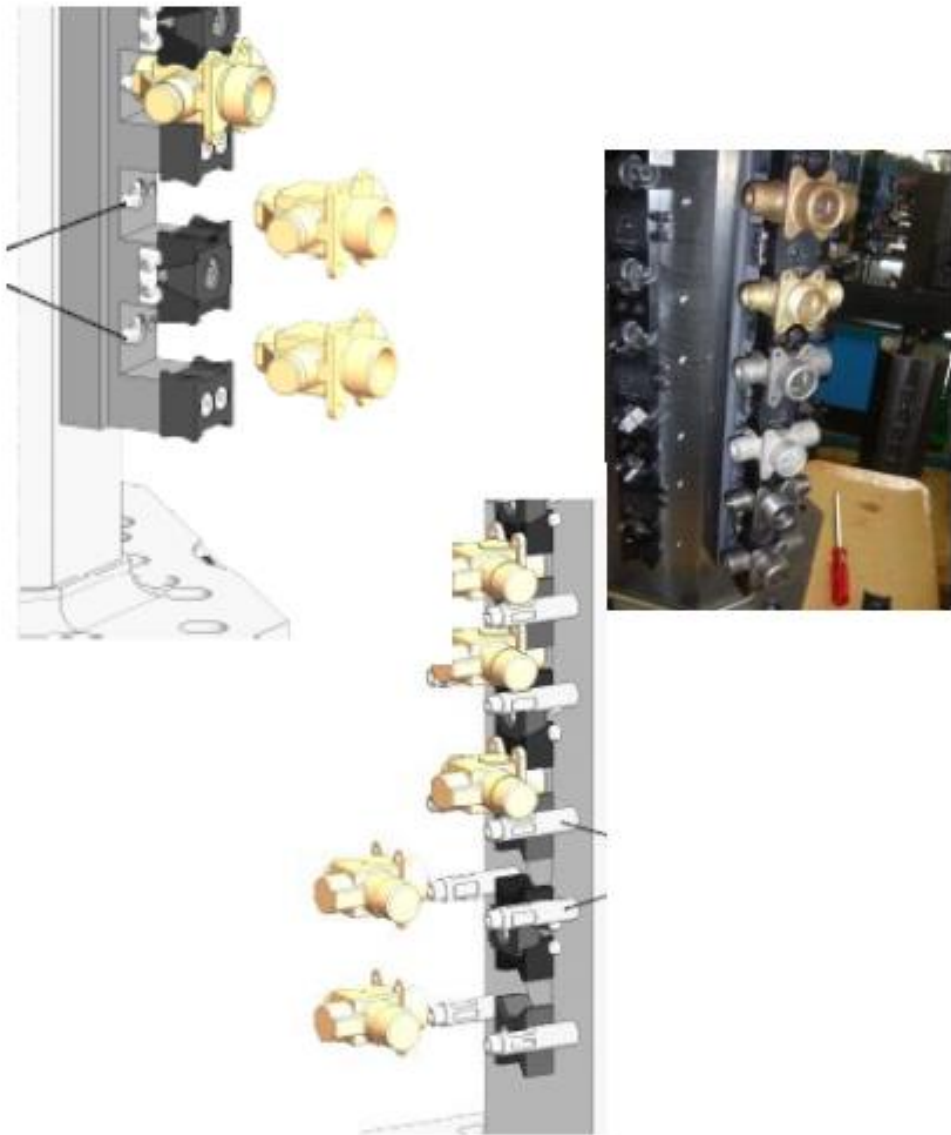
Aplicação

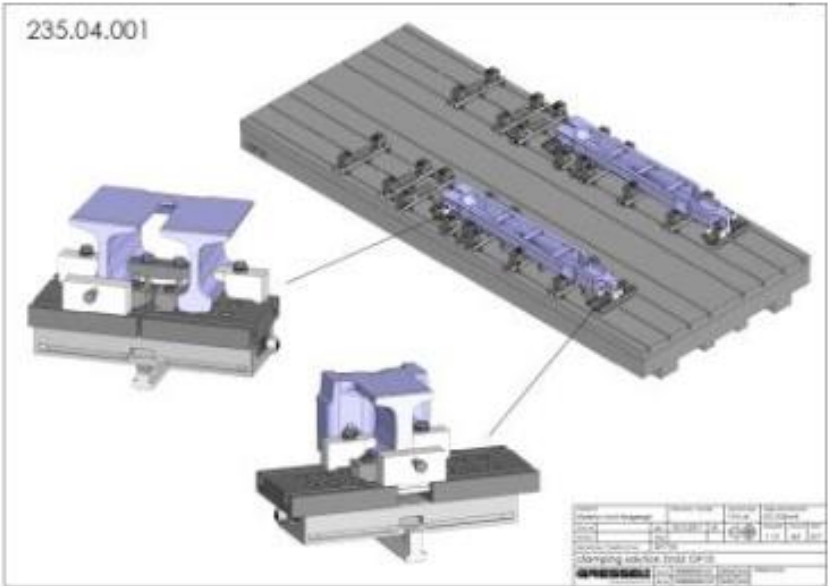
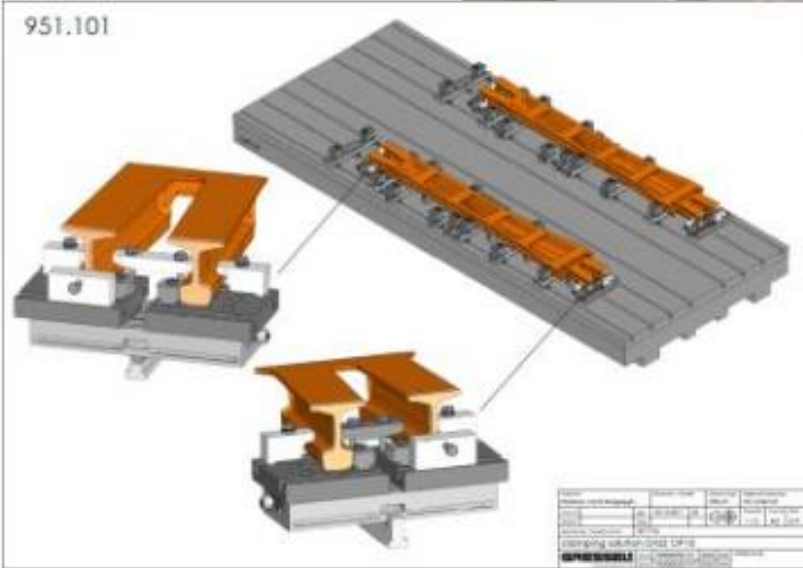
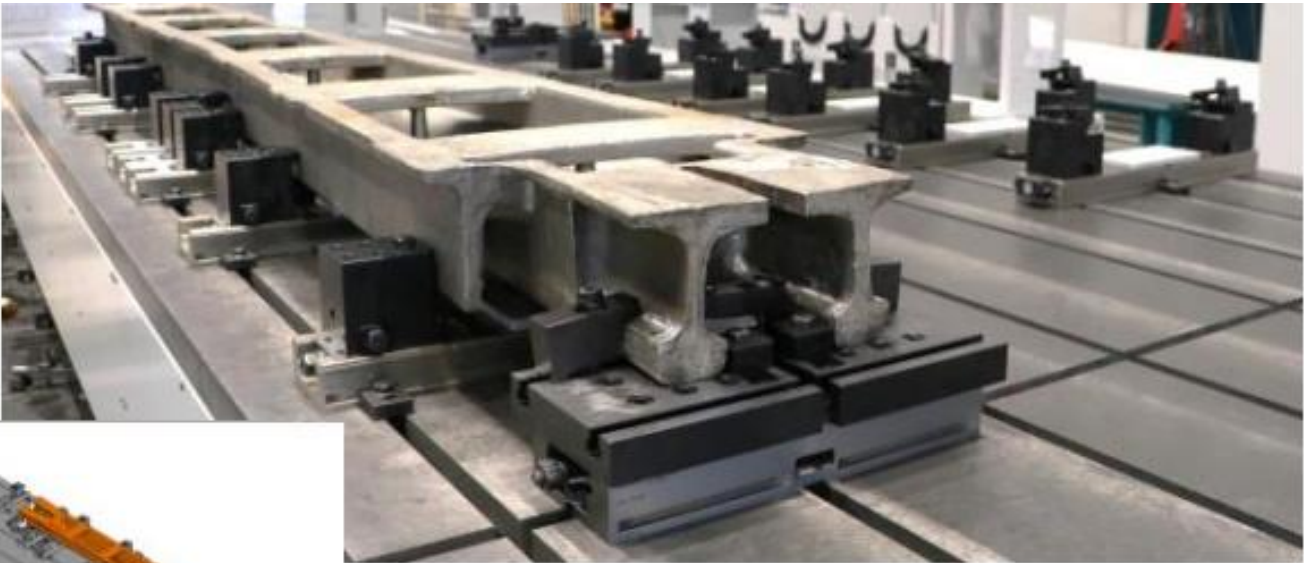






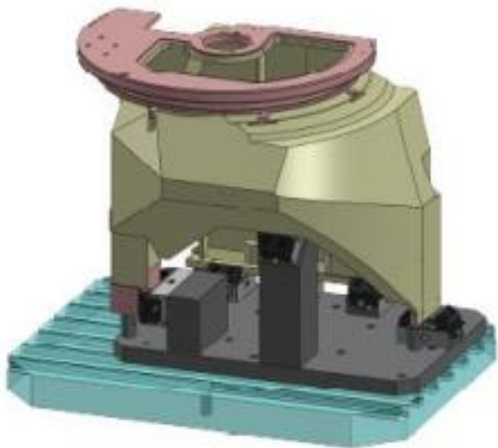


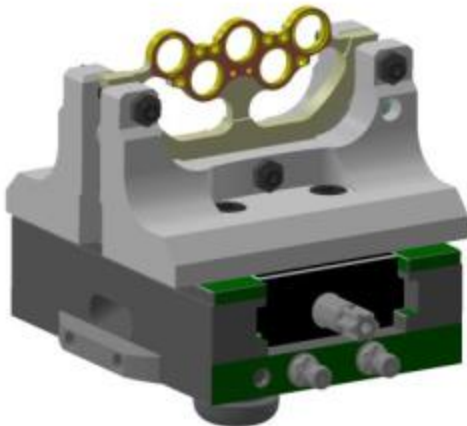
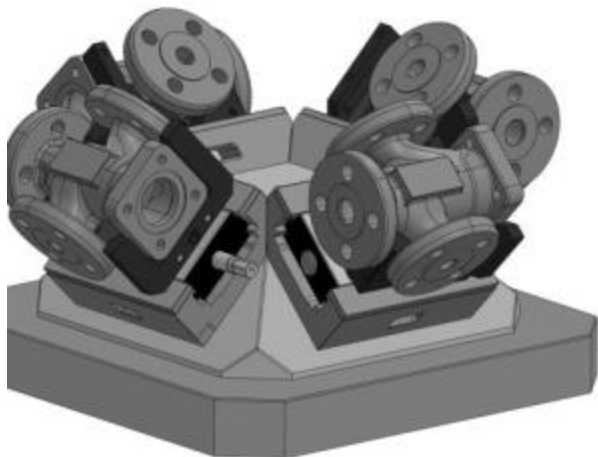






100%





Visão geral de fixação de peças

Acionamento manual



Single-acting Clamping Vises



Centric Clamping Vises



Multi Clamping Vises

Acionamento automático



Pneumatic Clamping Force Blocks

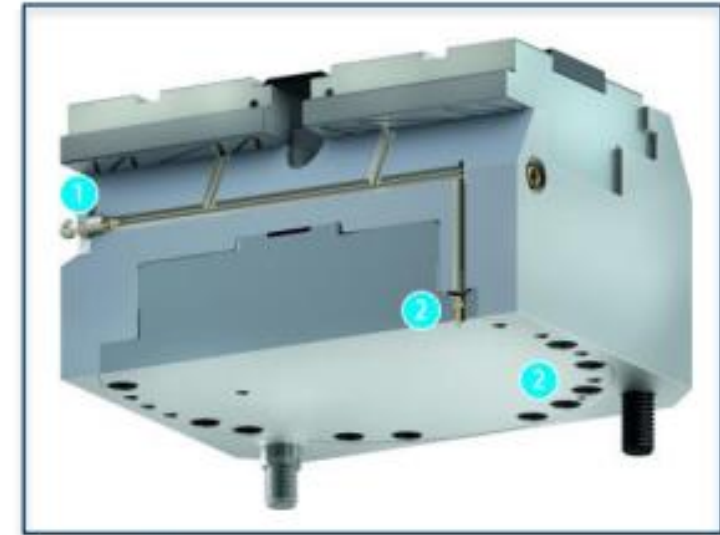
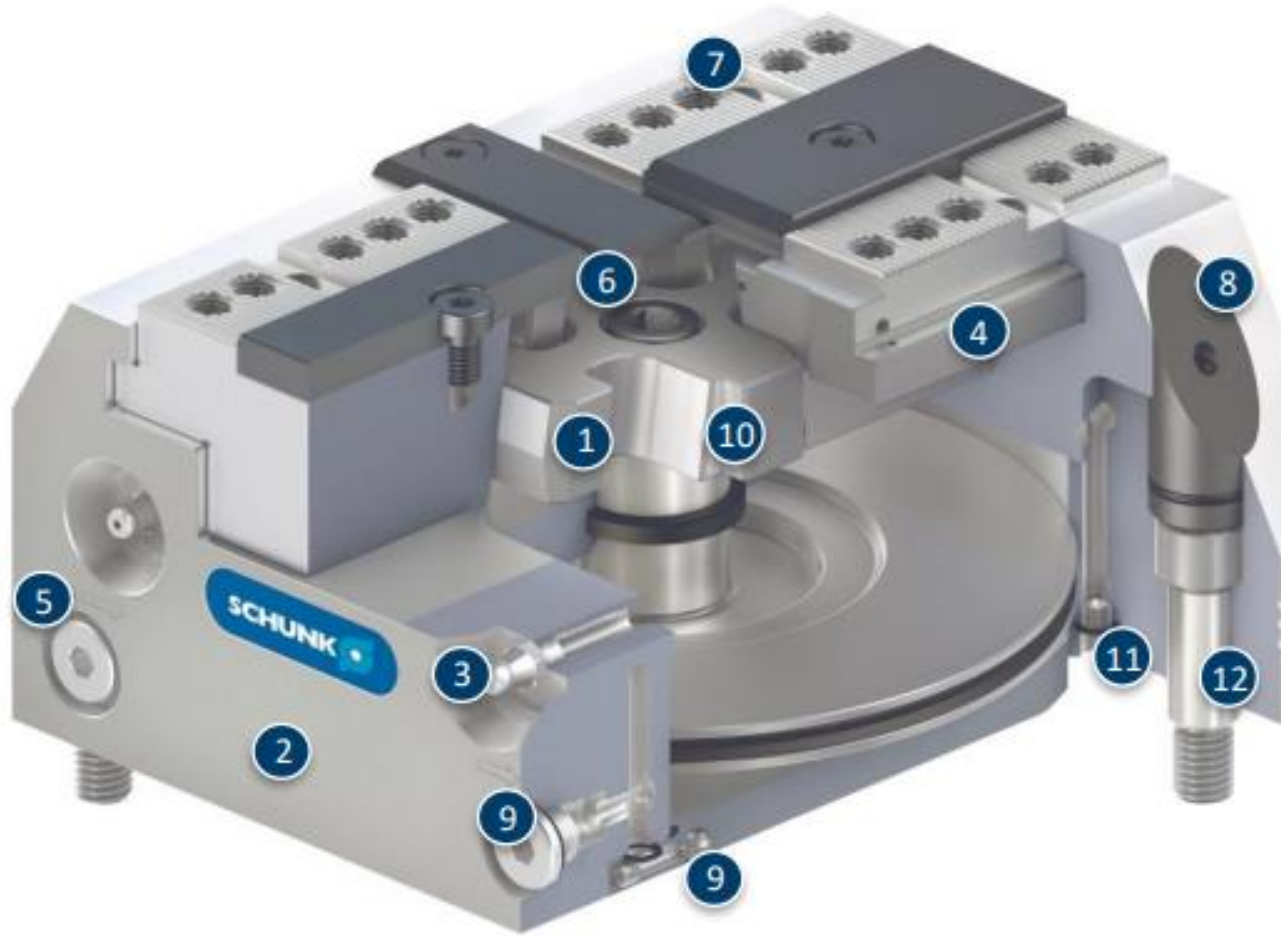


Hydraulic Clamping Force Blocks



Spring-loaded Clamping Force

TANDEM 3



Greasing system

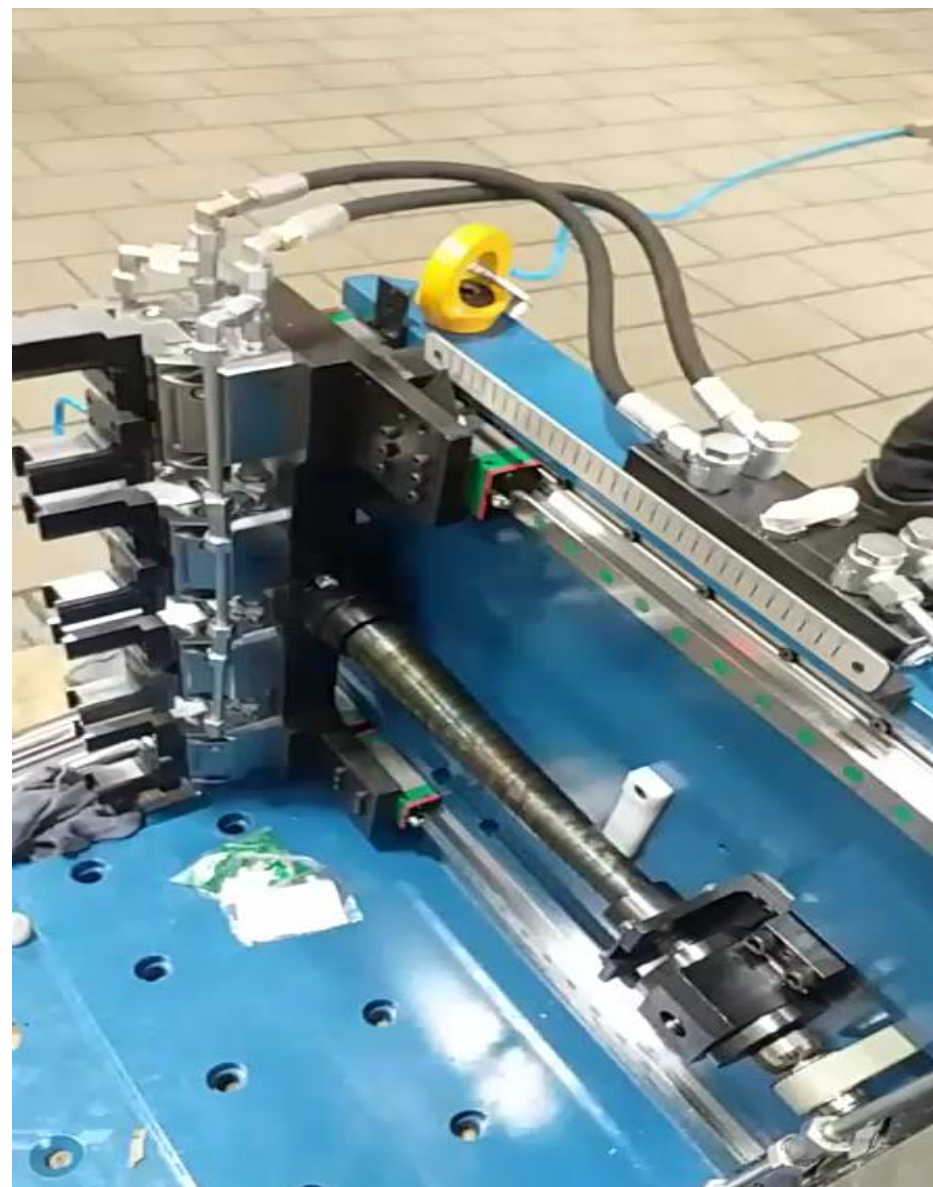
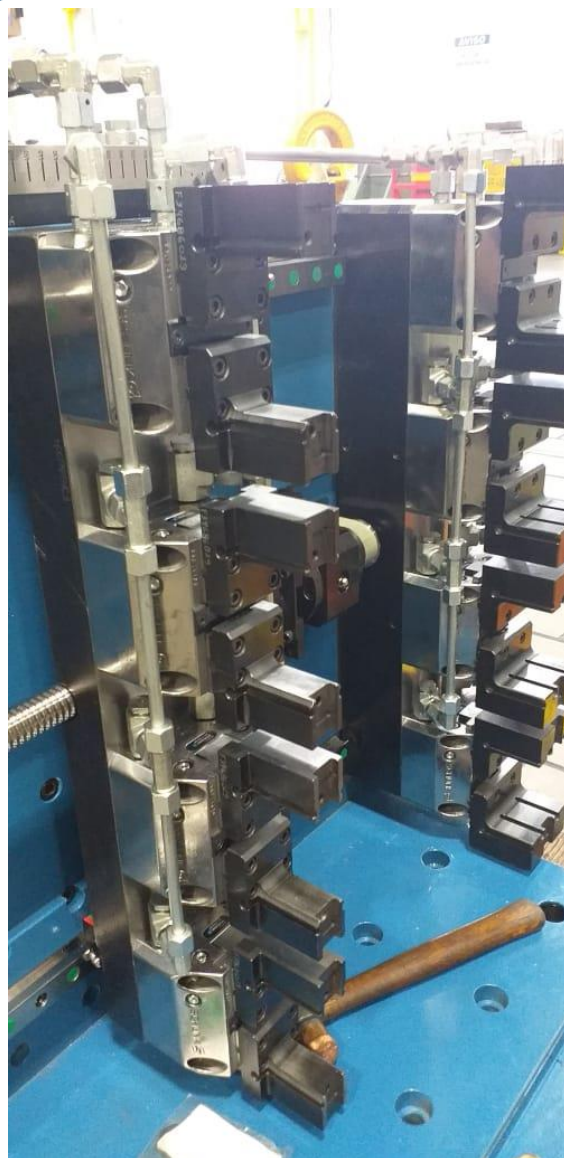
- ① Manual greasing: A grease is used to supply all friction surfaces (jaw guidance, piston guide, and diagonal pull) evenly.
- ② Central greasing: The connections on the base side are used to supply all friction surfaces evenly with grease.

Morsas TANDEM

TANDEM KRP3/KRH3/KRF3



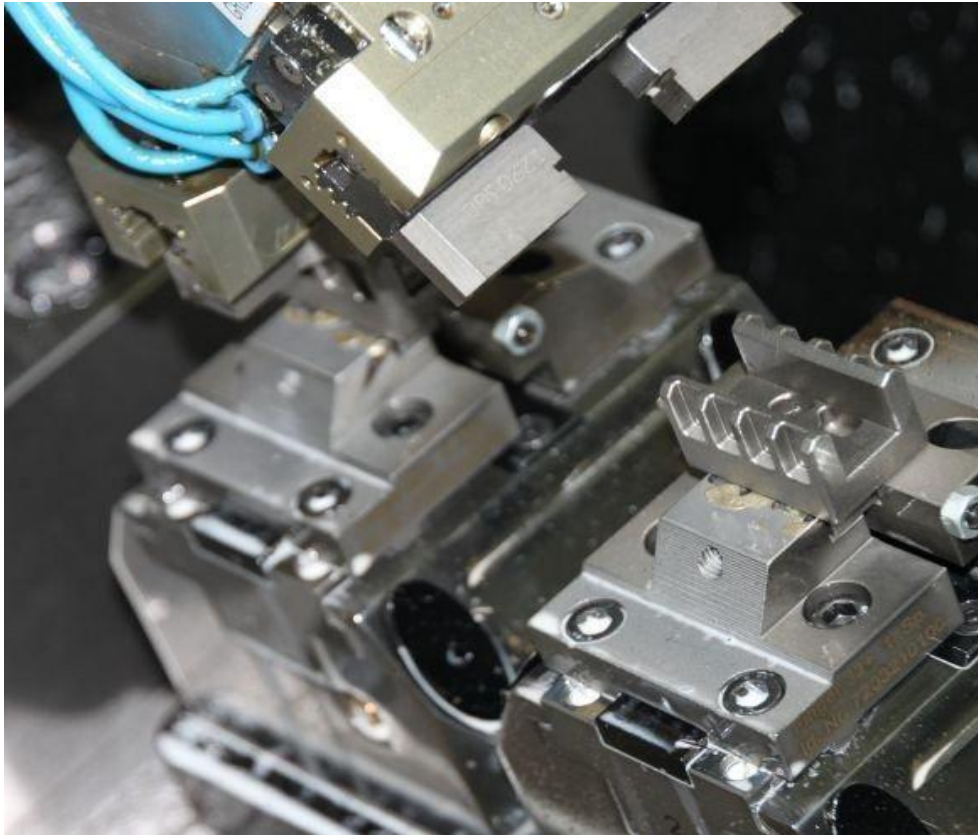
Aplicação



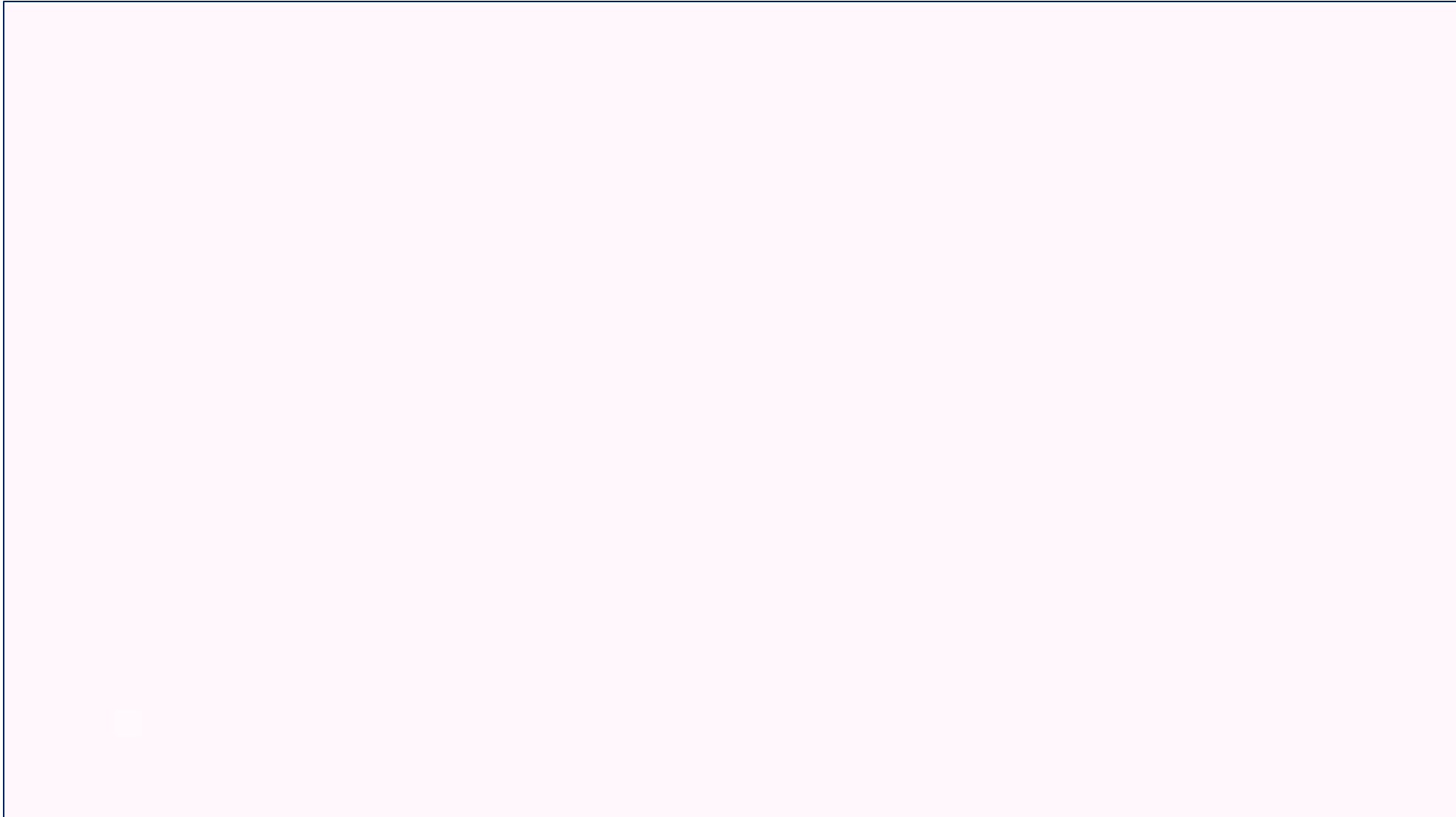
Aplicação



Aplicação



Aplicação



Hand in hand for tomorrow



Automação de peças em ferramentarias / produção

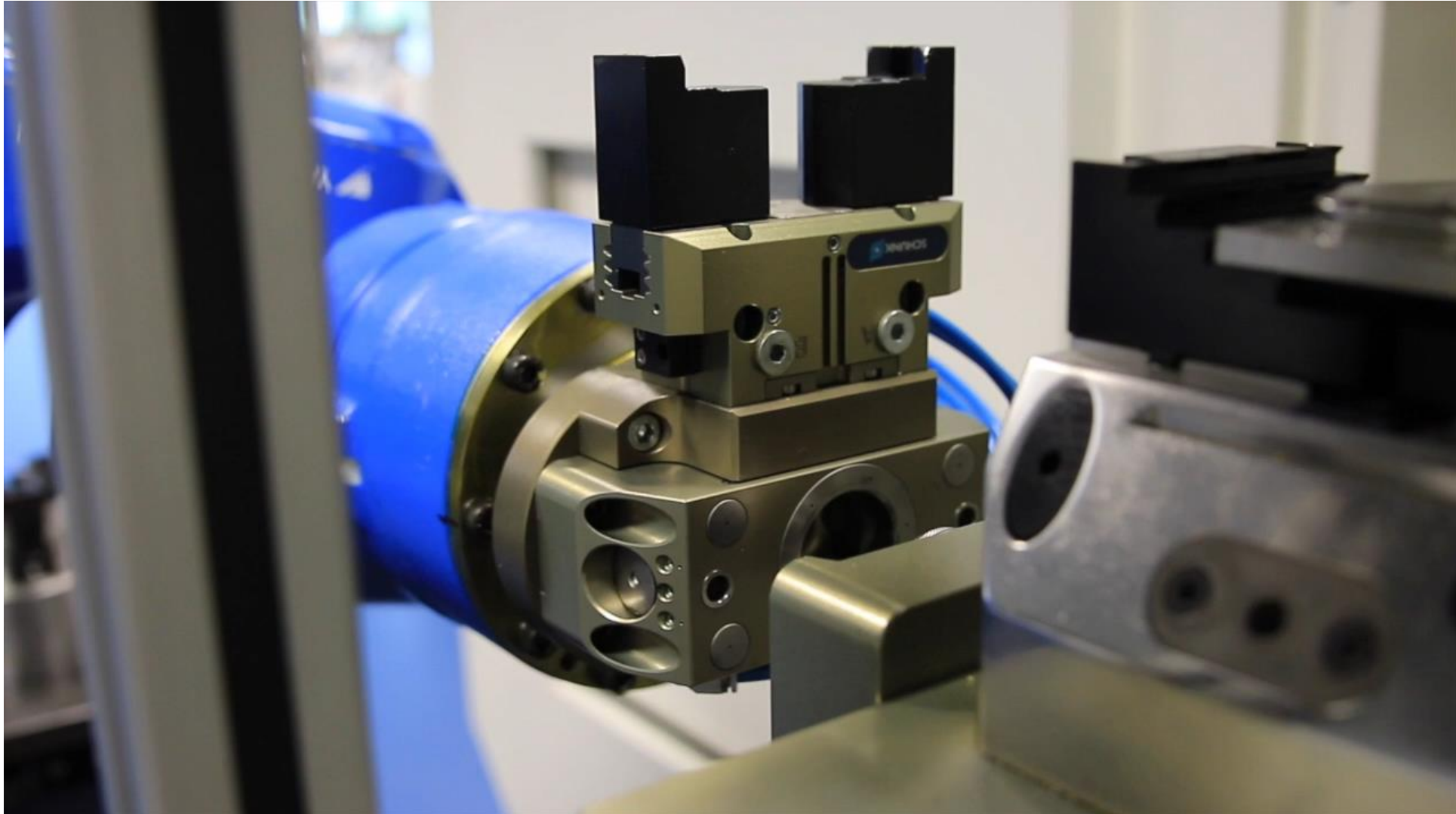
Automação SCHUNK



Automação na indústria ferramenteira



Automação na indústria ferramenteira



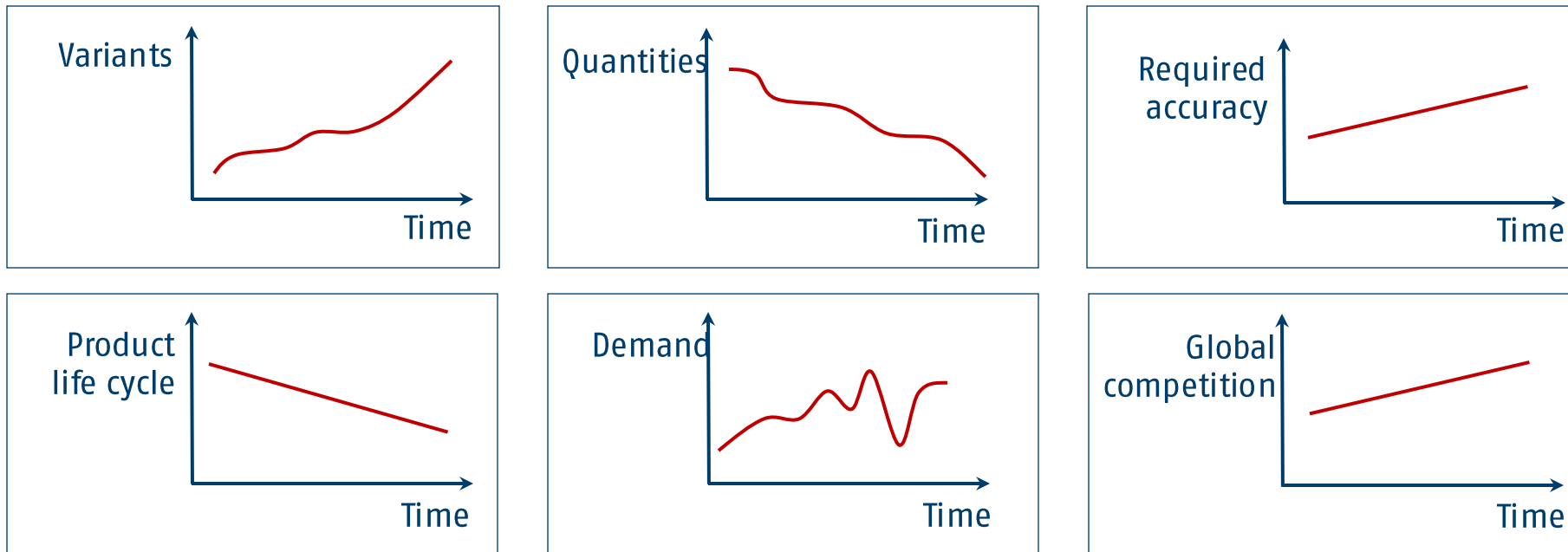
Hand in hand for tomorrow



VERO-S

PONTO ZERO

Variáveis da indústria



Increasing relevance of the set-up process

Otimizar o set-up

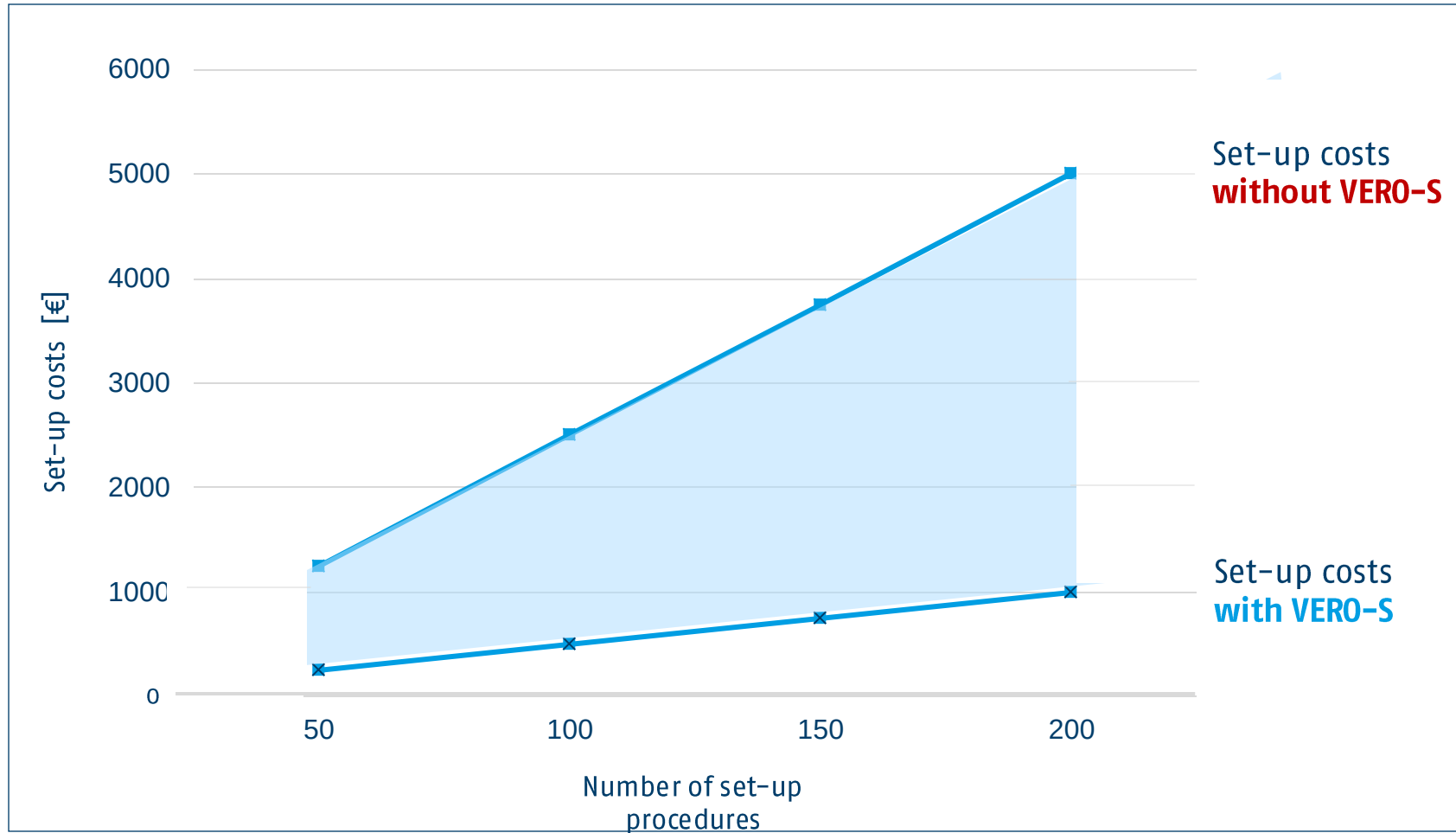


Módulo padrão NSE3 138

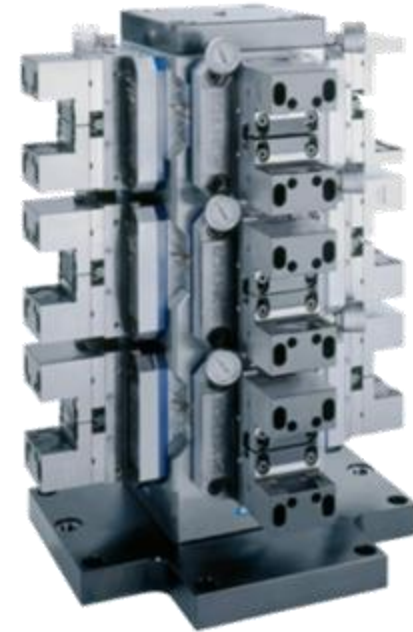
Superior Clamping and Gripping



Redução de tempo



Fixar Peça ou Dispositivo? Produção seriada ou não seriada?



Tecnologia de Fixação Modular VERO-S



Escopo de produtos VERO-S (Standard)



Clamping Stations



Clamping stations "Turn"



Module Height Extensions



Clamping pallets empty



Clamping Device Height Extensions



Clamping Pins



Individual modules NSE-A3



Individual modules NSE3

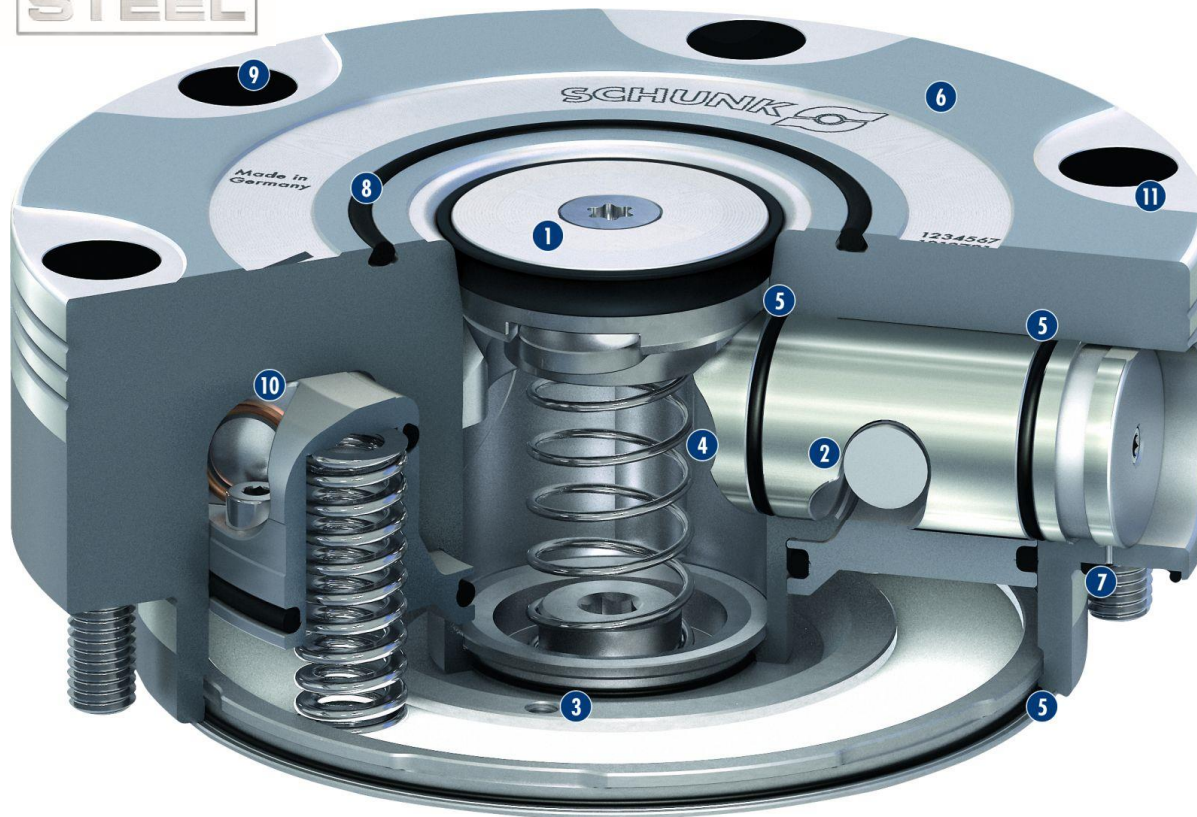


Individual modules NSE plus



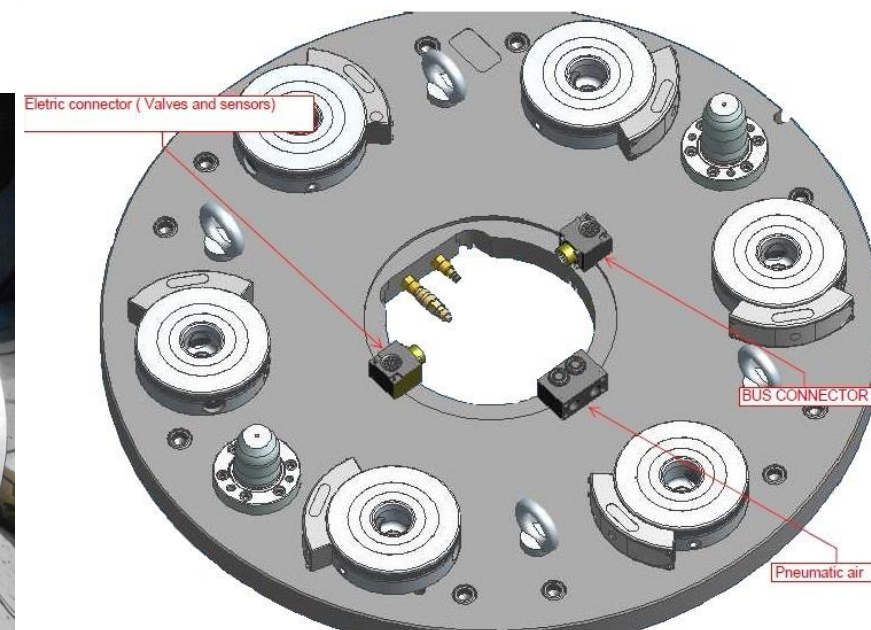
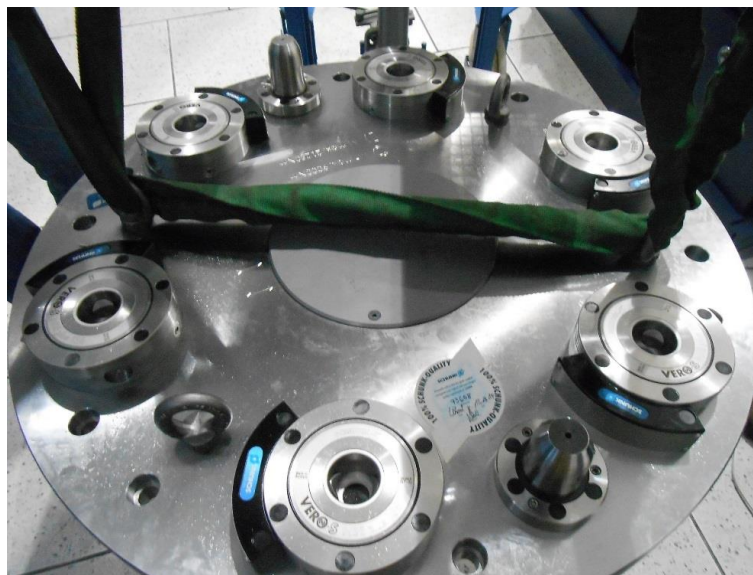
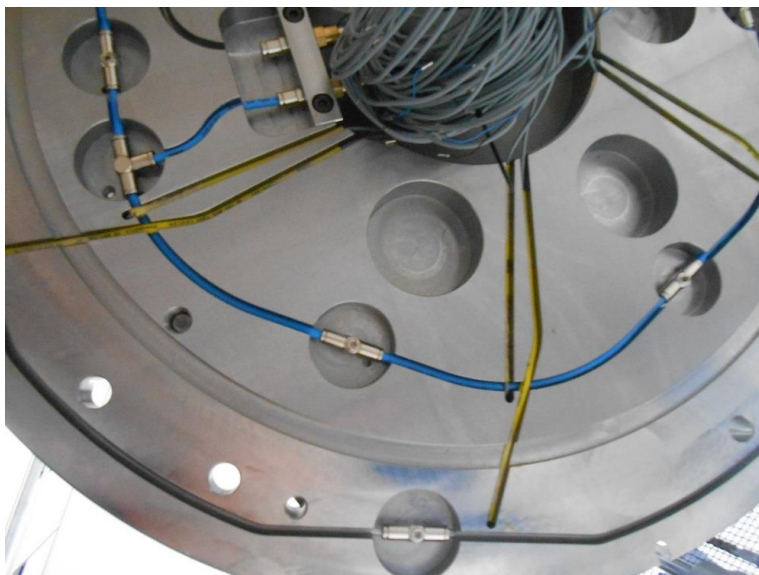
Fixture Membrane

Módulo padrão NSE3 138



- ① Optional cone seal
- ② Patented dual stroke system
- ③ Turbo function
- ④ Large surfaces
- ⑤ Completely sealed system
- ⑥ Large flat surfaces
- ⑦ Monitoring of the clamping slide position „open condition“ and „locked position“
- ⑧ Flat seal to protect the interface during machining
- ⑨ Cover caps for fastening screws
- ⑩ Sliding bearings in force flow
- ⑪ Lower-lying countersunk screws

Paleta especial com sensores

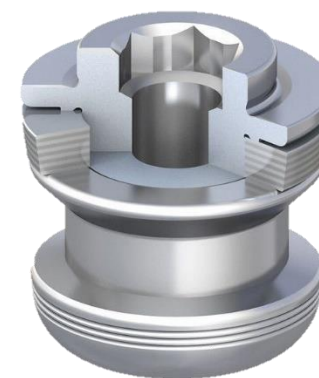


ESTE DESENHO NAO PODE SER REPRODUZIDO TOTAL
OU PARCIALMENTE SEM AUTORIZACAO EXPRESSA DA
SCHUNK Intec-BR.

VERO-S

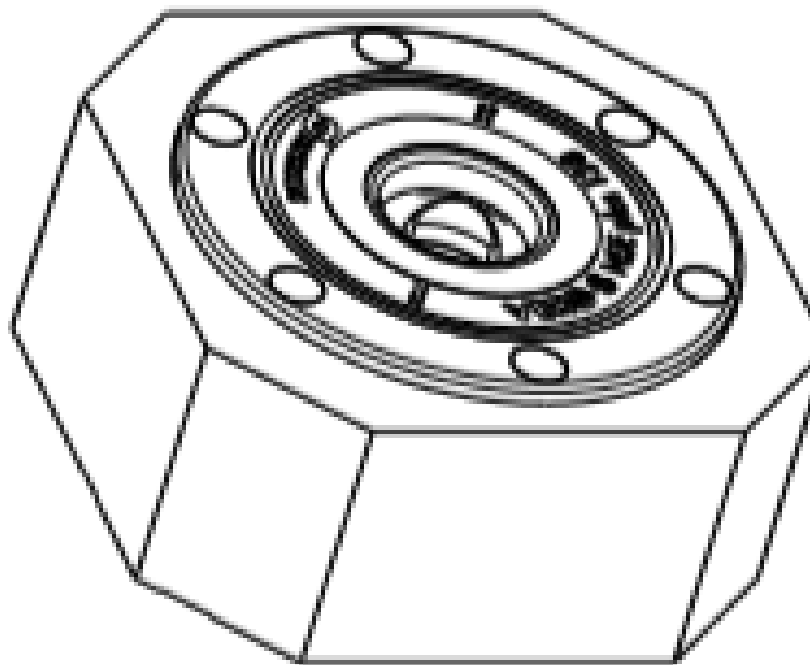
NSE3 138

SCHUNK



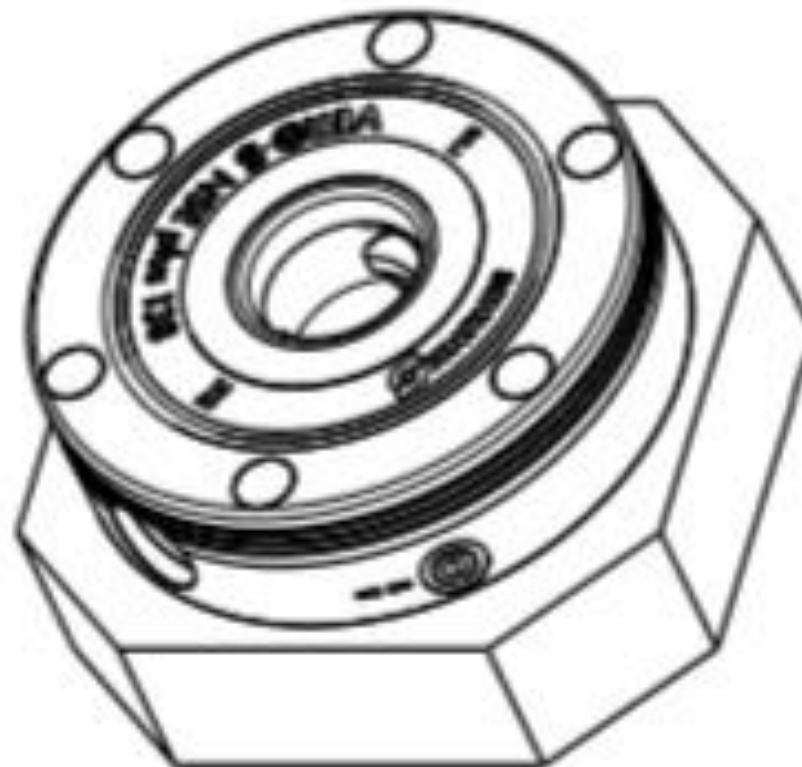
Pino de Fixação SPG

Precisão de
repetibilidade de
0.002 mm.



Módulo embutido

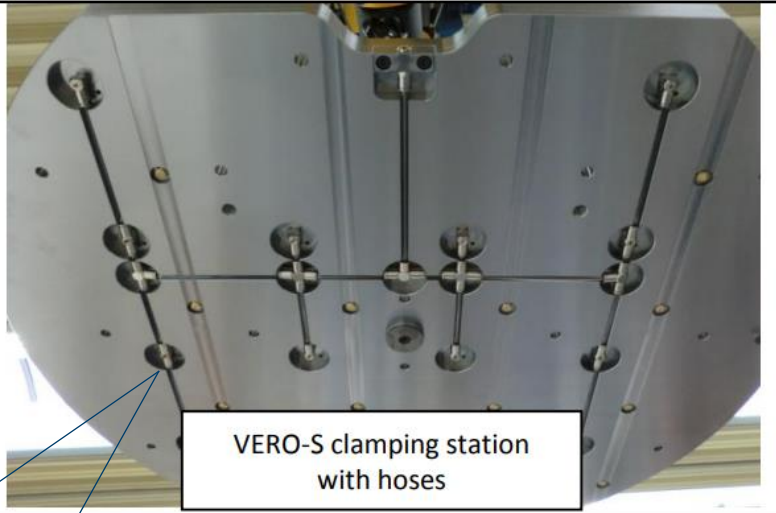
Módulo parcial



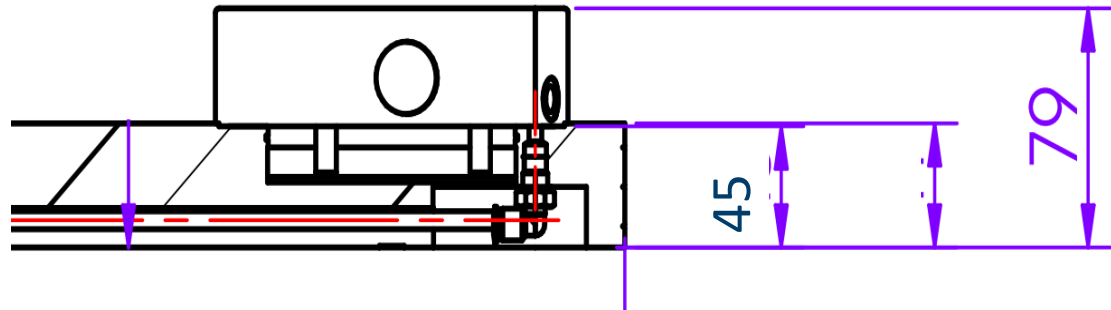
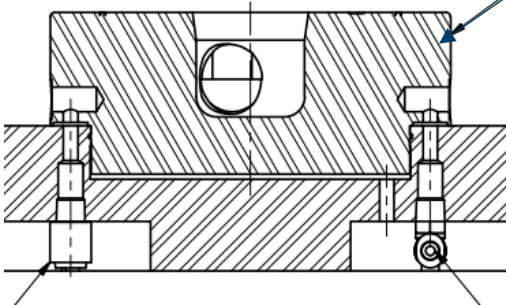
Projetos especiais



VERO-S clamping station with gun-drilled holes



VERO-S clamping station with hoses



- Peso máximo no modulo 4000kg

Tamanhos de módulos adicionais NSE



- NSE+ 100-75



- NSE+ 176



- NSE-M 138



- NSE mini 90



- NSE mini 90-25



- NSE-A3 138V4-P1



- NSE-A3 138-V4-P



- NSE3 99



- NSE-HT mini 200°C



- NSE mikro

Escopo de produtos VERO-S (Standard)



Clamping Stations



Clamping stations "Turn"



Module Height Extensions



Clamping pallets empty



Clamping Device Height Extensions



Clamping Pins



Individual modules NSE-A3



Individual modules NSE3



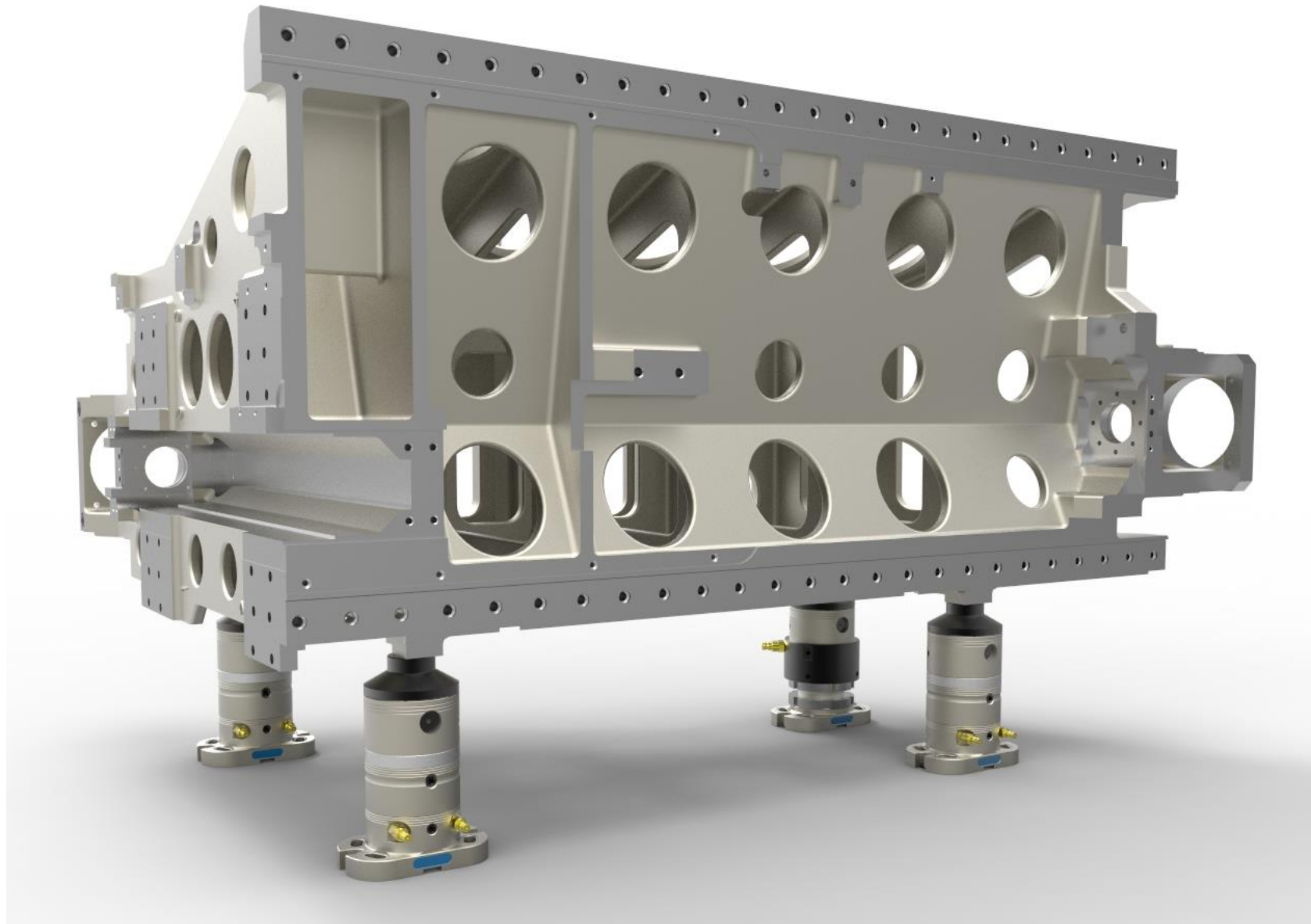
Individual modules NSE plus



Fixture Membrane

VERO-S

NSE3 138



VERO-S

VERO-S NSL3

- Base aço carbono



- NSL3 800



- NSL3 600



- NSL3 400



- NSL3 200

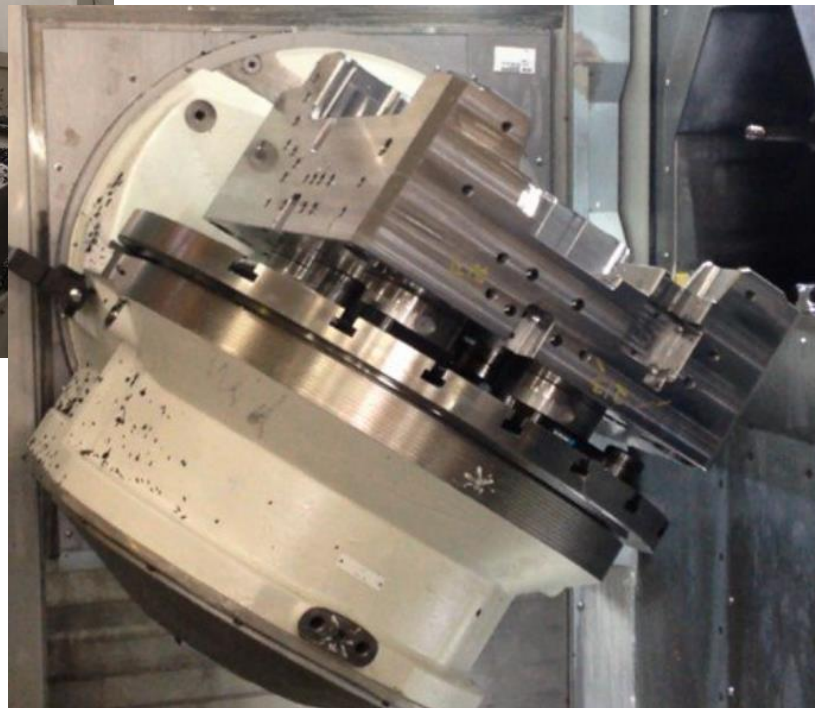
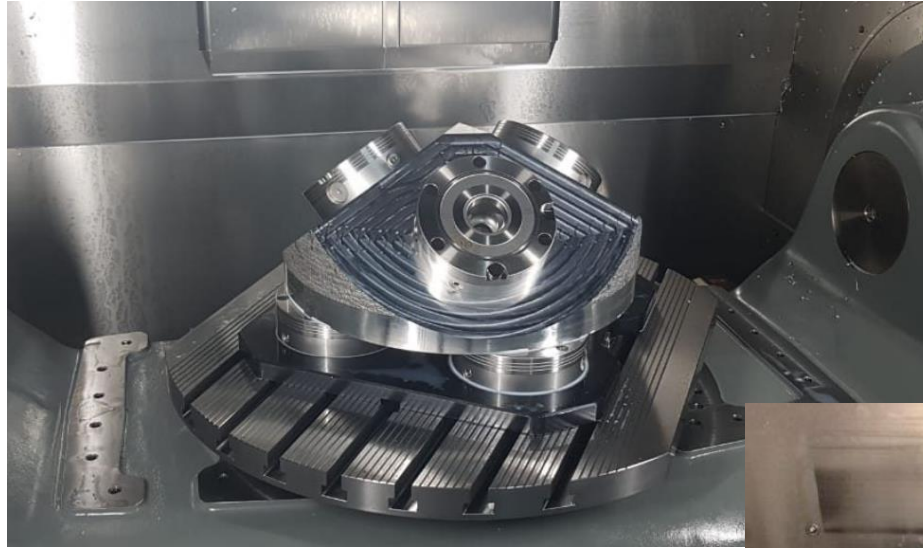


- NSL3 150

VERO-S

VERO-S NSL3

SCHUNK

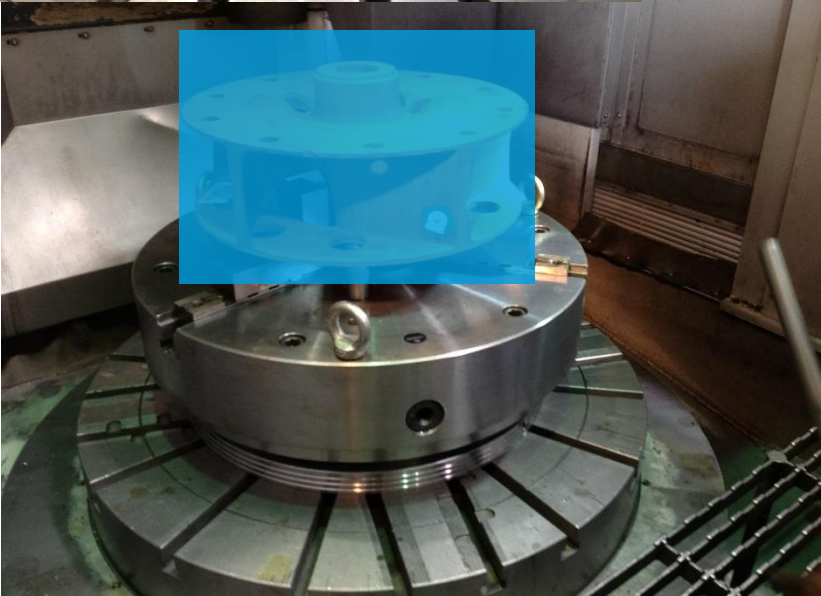


VERO-S

NSL Turn



NSL Turn



VERO-S

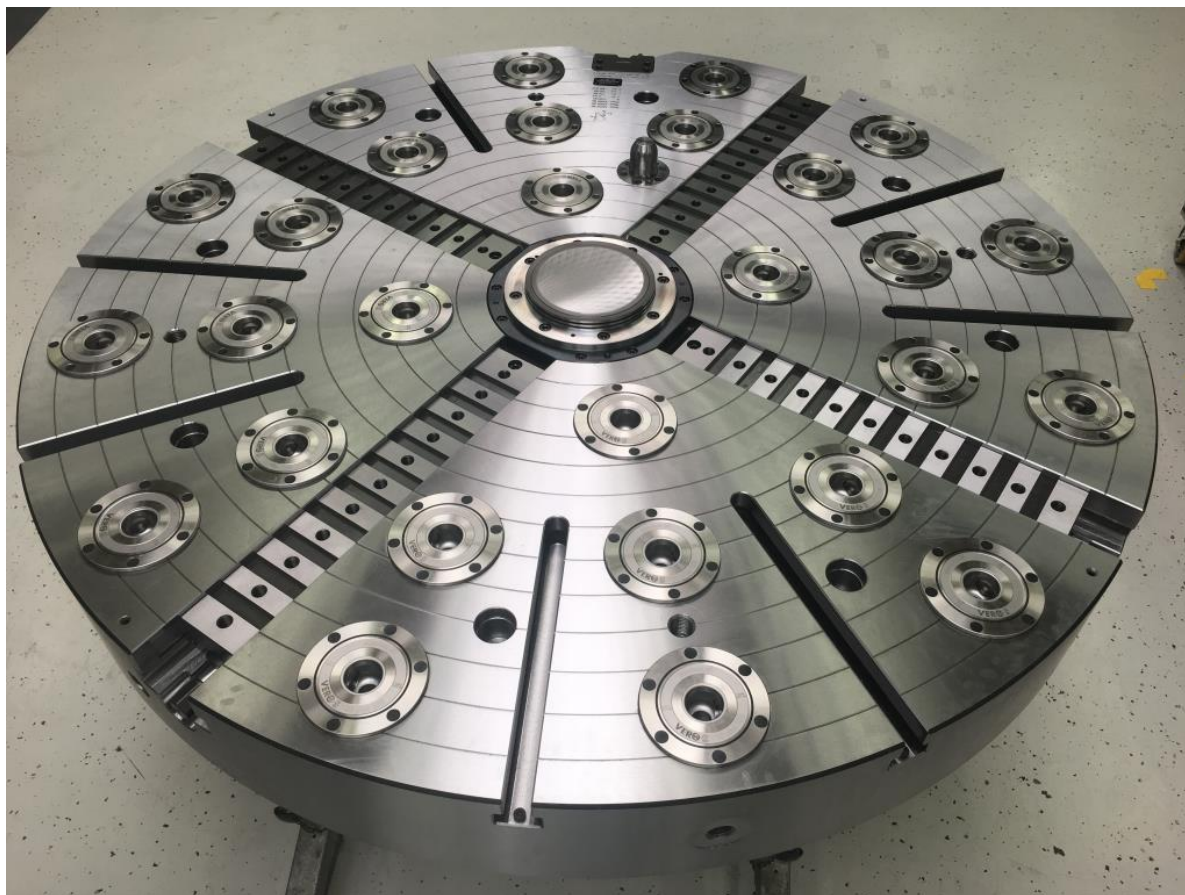
NSL Turn

SCHUNK

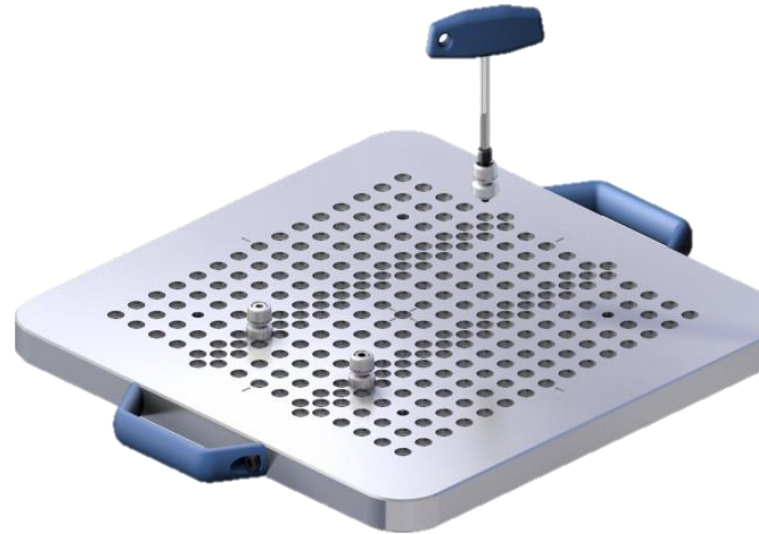


VERO-S

Aplicações VERO-S



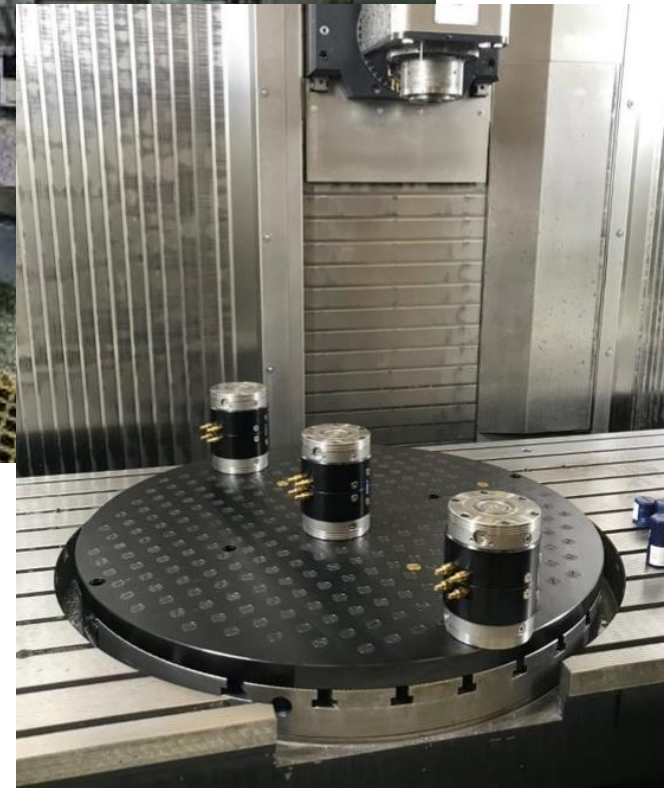
Placa matriz



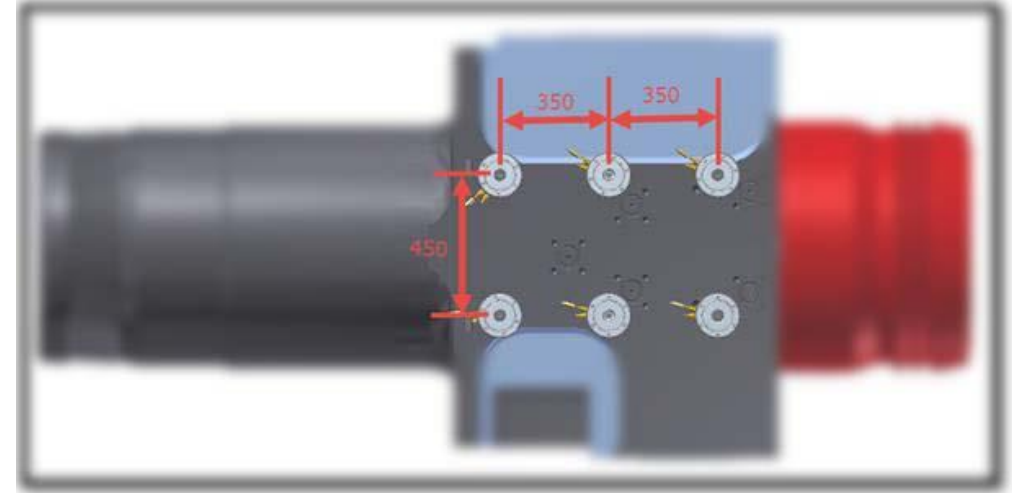
VERO-S

Placa matriz

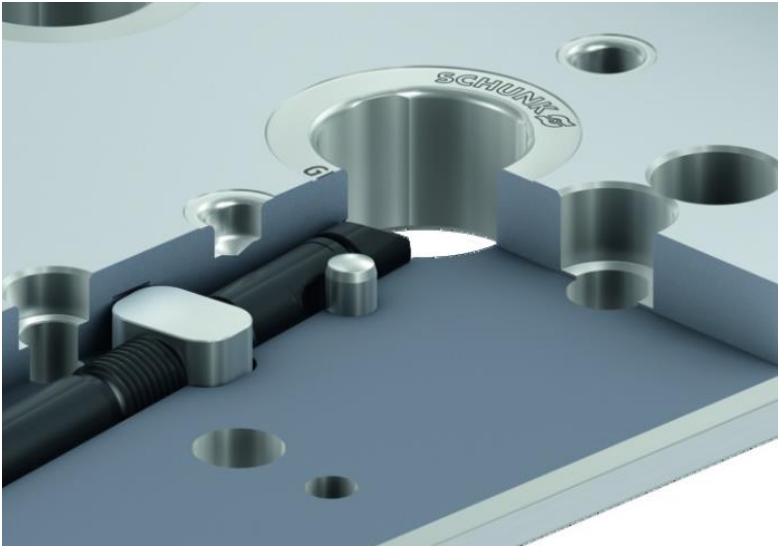
SCHUNK



Fixação sem zerramento



VERO-S
SCHUNK GFD

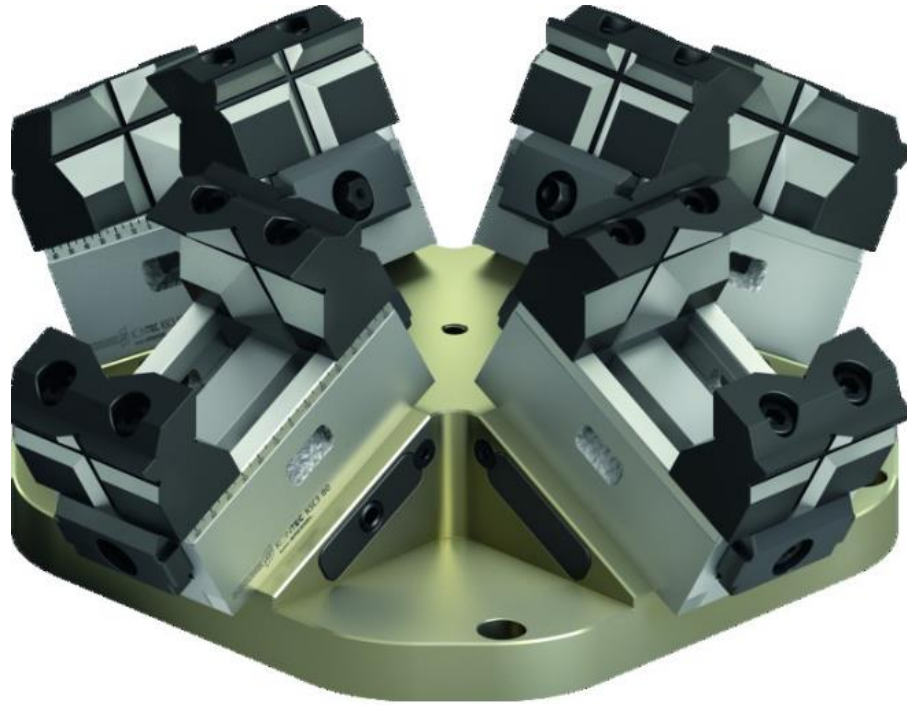


VERO-S

SCHUNK GFD mini



VERO-S
SCHUNK GFD mini



Hand in hand for tomorrow



Placas de torno ROTA

HailTool

Física do produto

Physical correlations

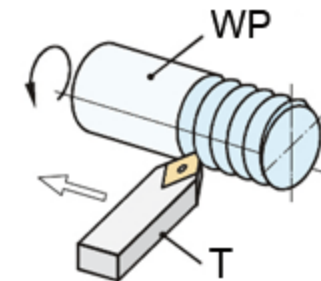


As the majority of lathe chucks is used within lathing the following information is mainly geared to the requirements of rotating clamping devices for lathes and lathing-milling centres.

The forces resulting from the **cutting through the tool** as well as the **drive capacity** are impacting on the workpiece during processing.

In the following displays the resulting cutting forces on the workpiece (lathe tool) which are also impacting on the workpiece during lathing (actio = reactio) are brought out stylised.

Please click on the right display.

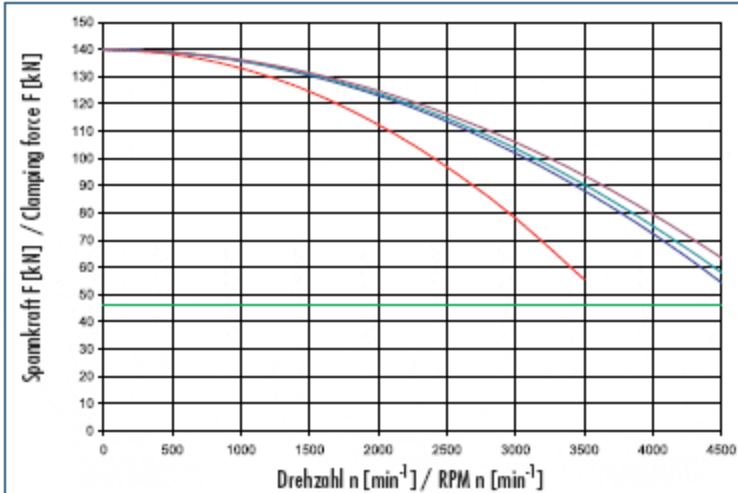


For more information please click on the display.



Força centrífuga x força da placa

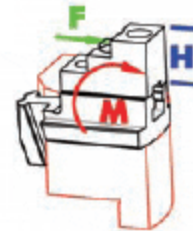
Spannkraft-Drehzahl-Diagramm



Clamping force-RPM-diagram

■ Restspannkraft/Residual clamp. force 33 %		
■ SHB 250		3.5 kg
■ SWB 250		9.4 kg
■ SHB-J 100		2.75 kg
■ KM-WB 110		3.8 kg

Führungsbahnbelastung
Load of base jaw
guidance



$M_{max} = 2240 \text{ Nm}$

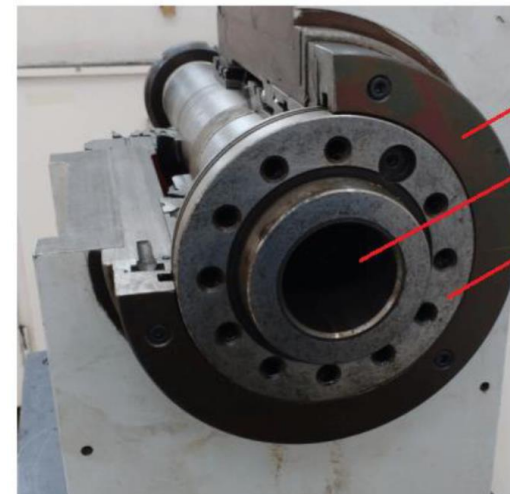
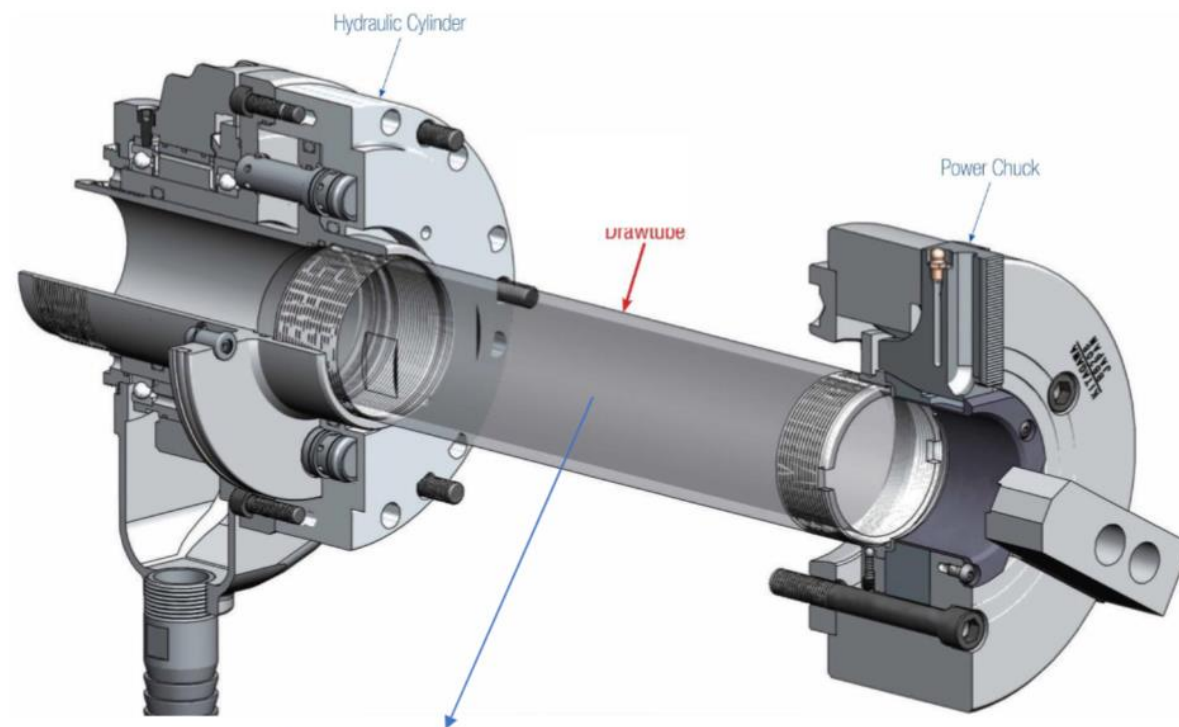


Devido à força centrífuga a força de aperto diminui com o aumento da velocidade do spindle.

A altura dos mordentes usados também influencia a força de aperto.

A uma velocidade máxima do spindle, pelo menos 1/3 da força de aperto

Por dentro do torno



8 MAQUINA

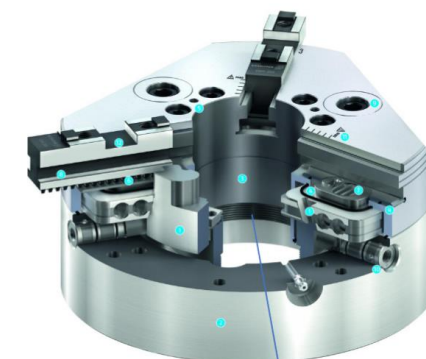
9 FURO DE PASSAGEM TUBO OU VARÃO

10 SPINDLE INTERFACE PARA A PLACA



INTERFACE PARA VARÃO

AMBAS AS PLACAS PODEM SER ADAPTADAS PARA CILINDRO OU VARÃO

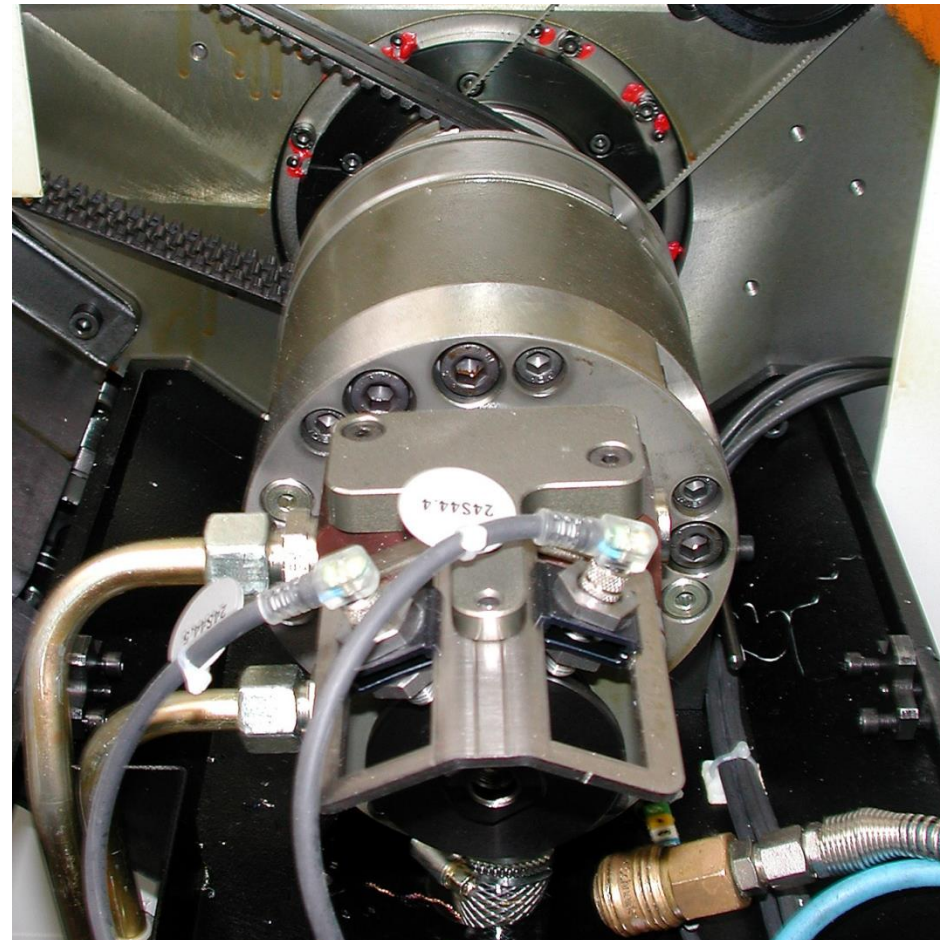
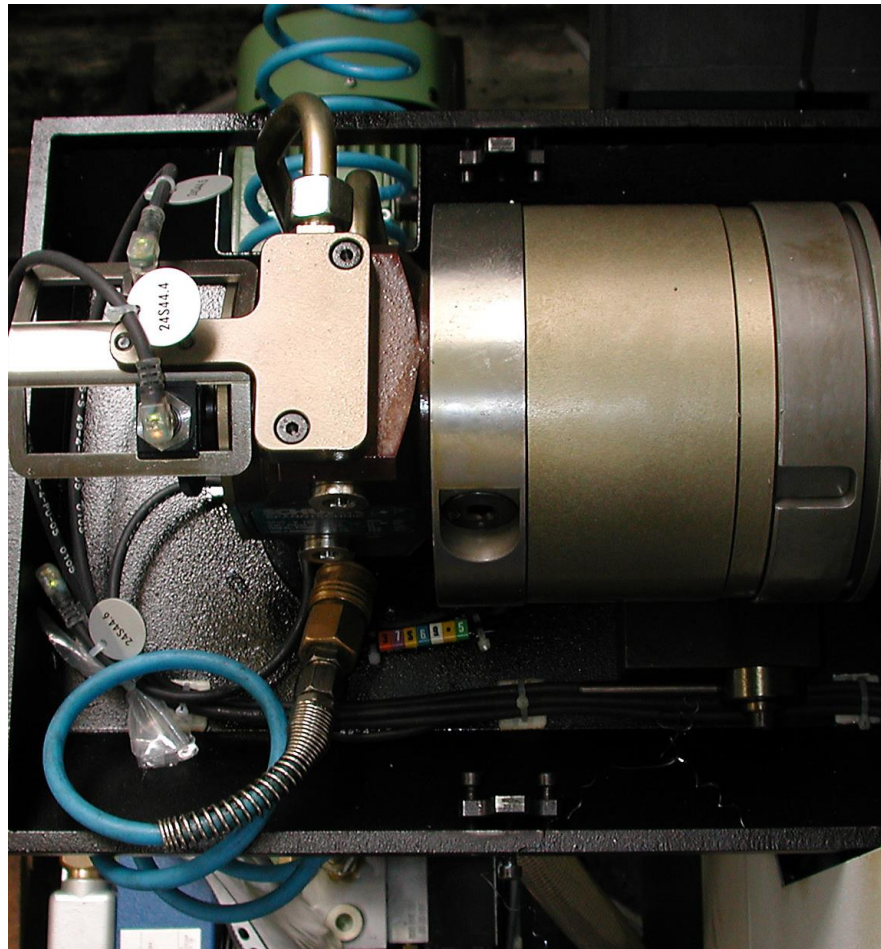


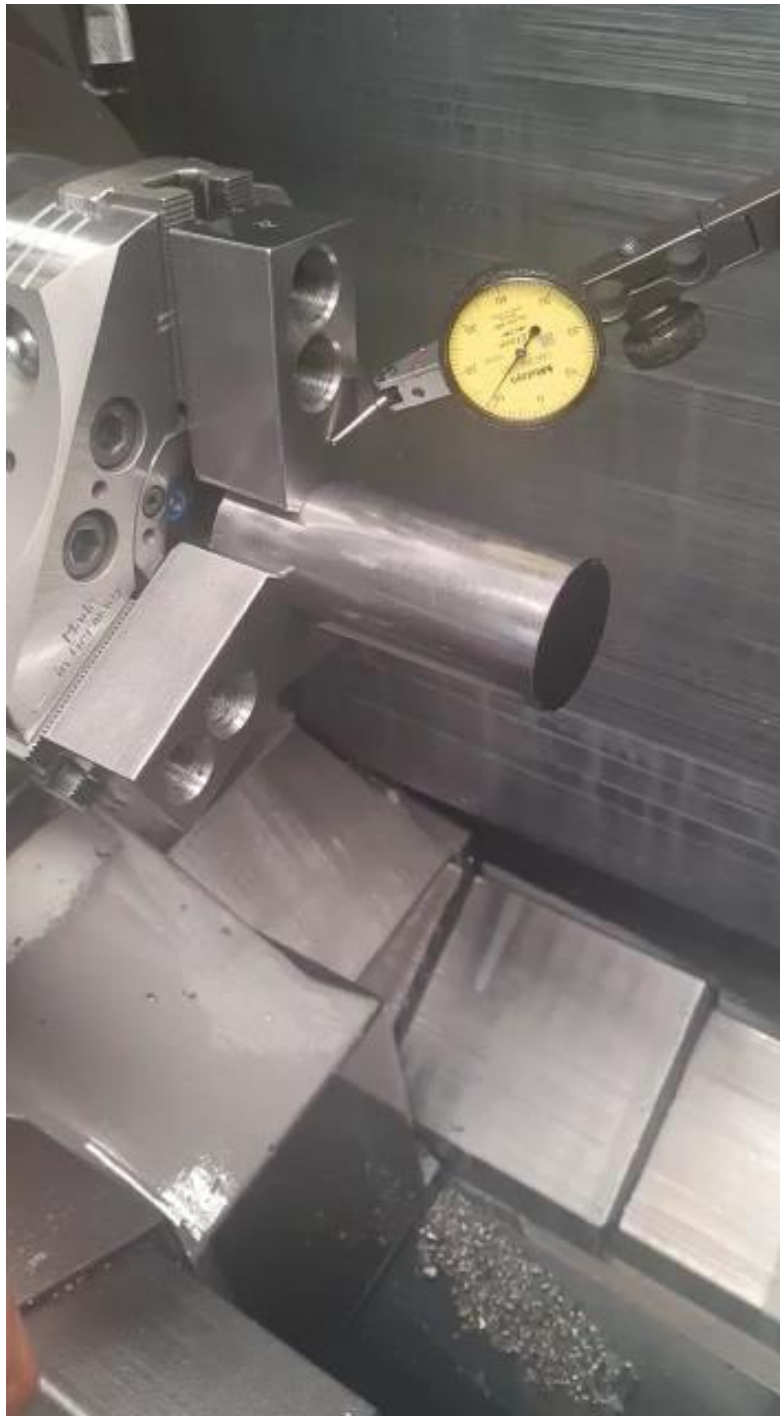
INTERFACE PARA CILINDRO

TUBO DE ACIONAMENTO = TUBO VAZADO COM ROSCA NA PONTA PODE SER INTERNO OU EXTERNO
OU

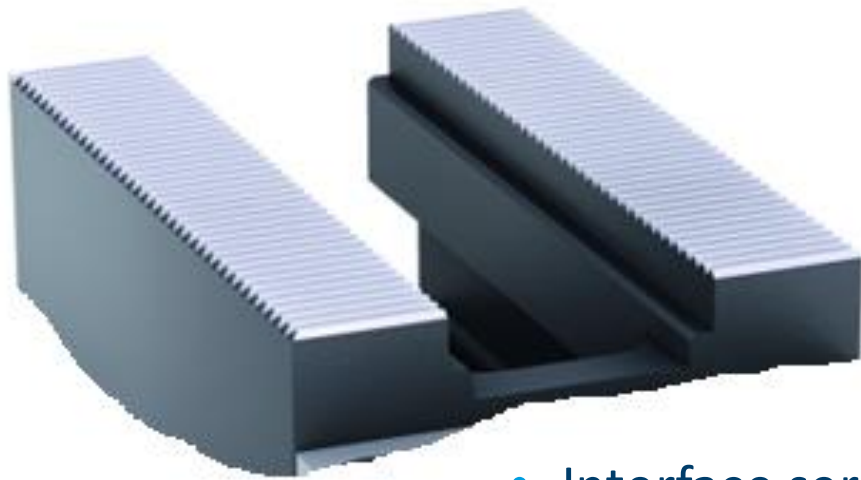
VARÃO DE ACIONAMENTO = BARRA "CEGA" COM FURO E ROSCA NA FACE

Cilindro do torno





Tipos de interfaces para castanhas



- Interface serrilhada
Sistema
métrico ou polegada



- Interface TG
Tongle & groove
Chaveta cruzada

Família de placas e complementos



Manual Lathe Chucks



Power lathe chucks with jaw quick change



Power Lathe Chucks with Through-hole



Power Lathe Chucks without Through-hole



Chuck quick-change



Pneumatic Power Chucks



Hybrid chuck



Customized lathe chucks

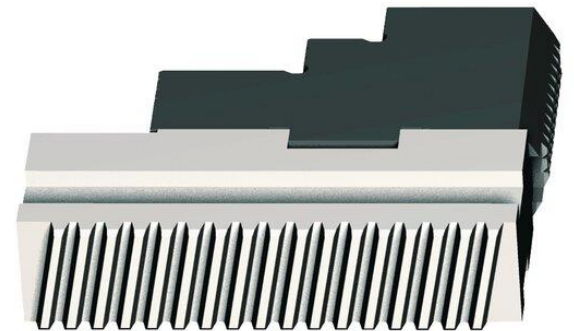
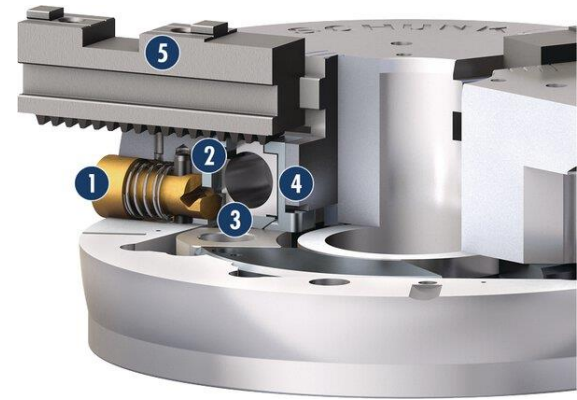
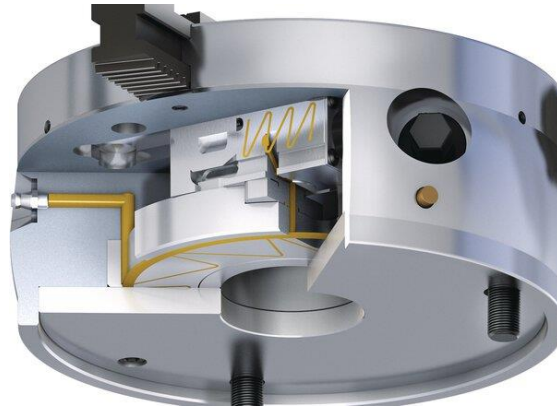
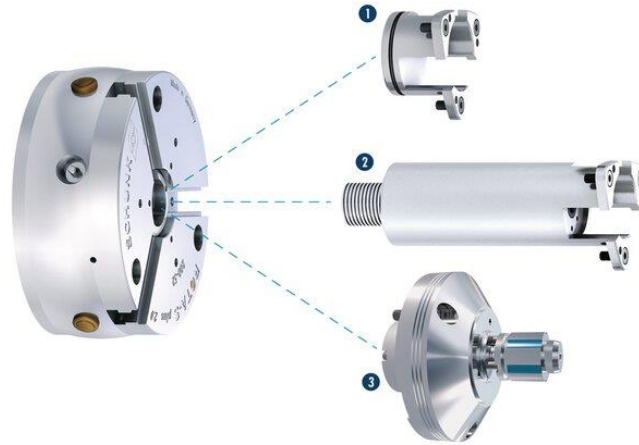
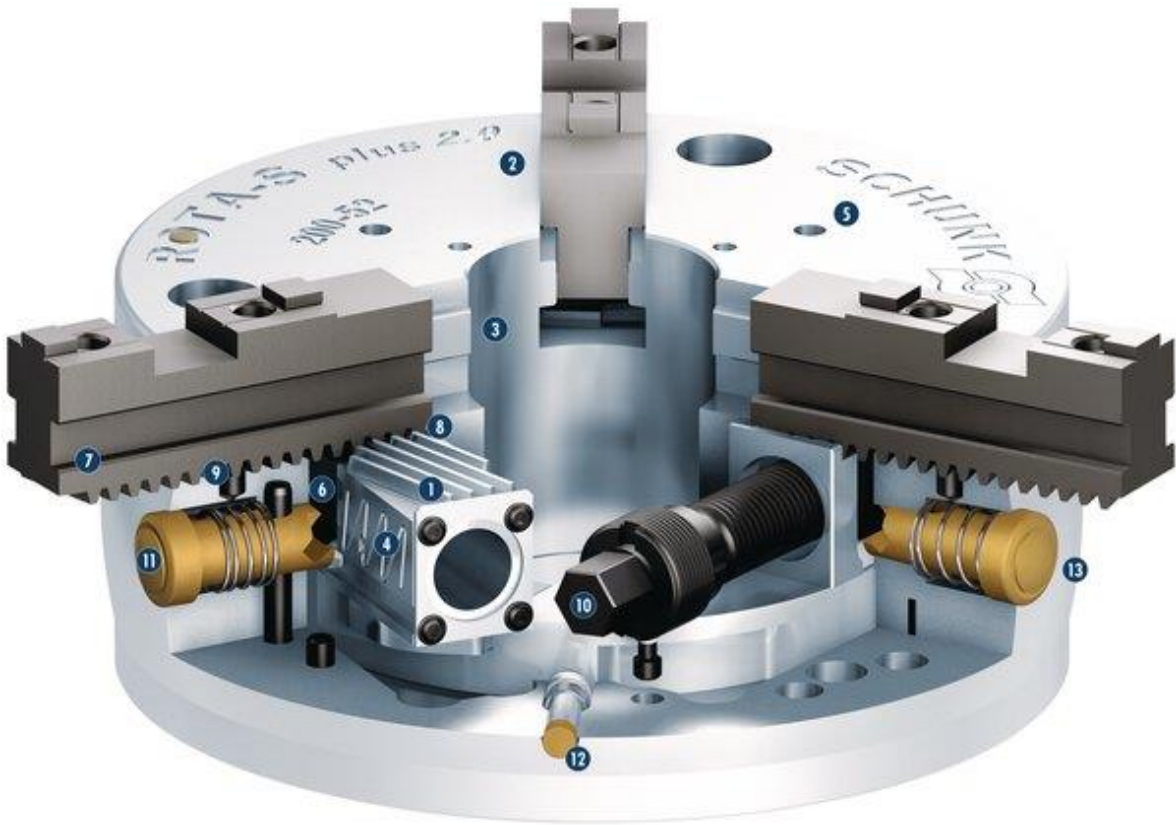


Steady Rests

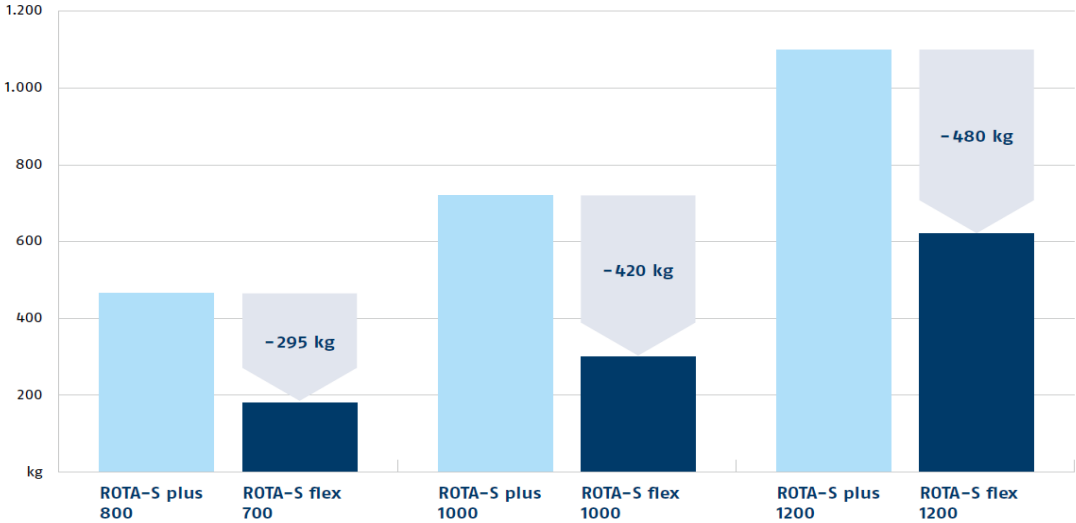
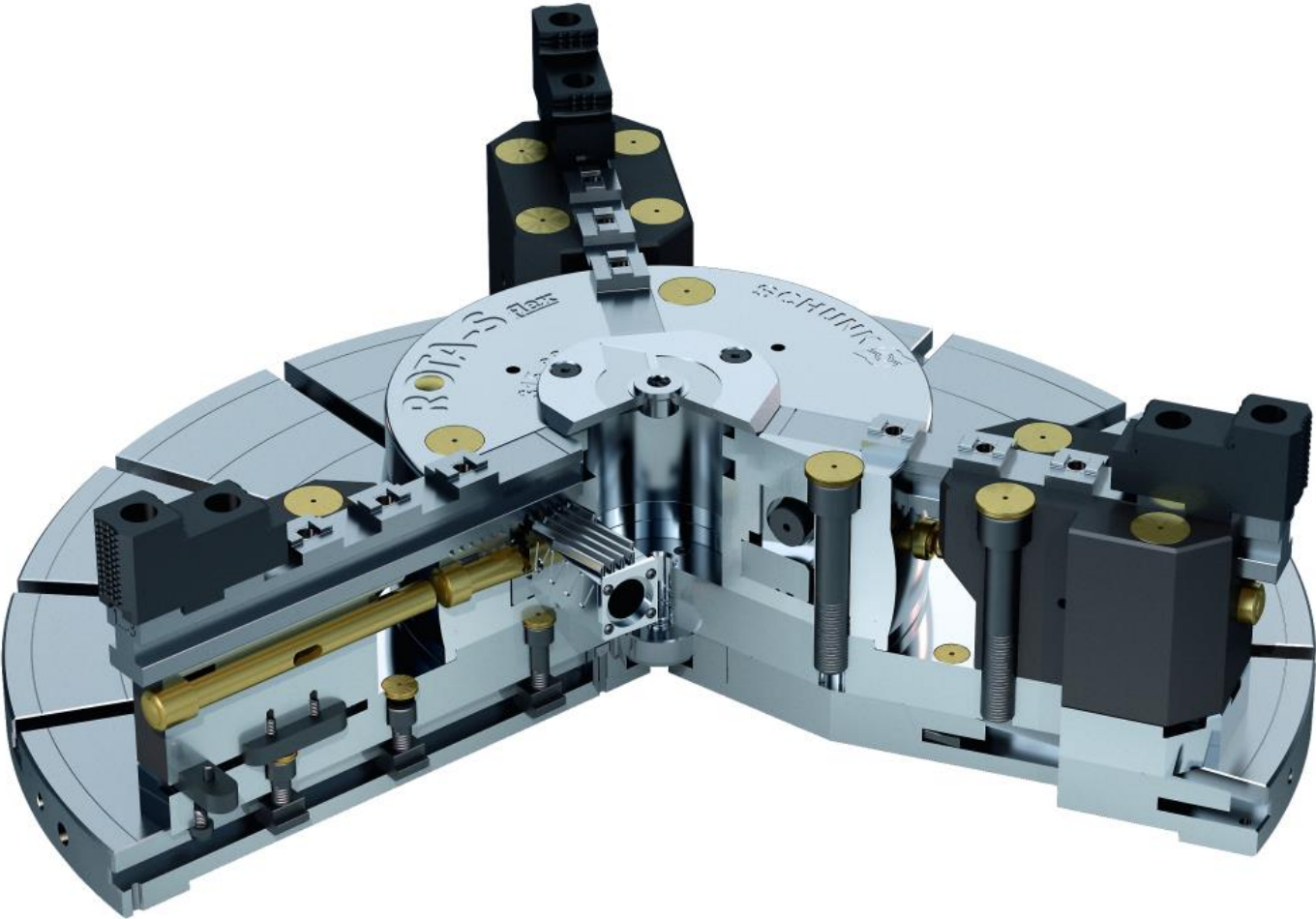


Clamping Cylinders

ROTA-S plus

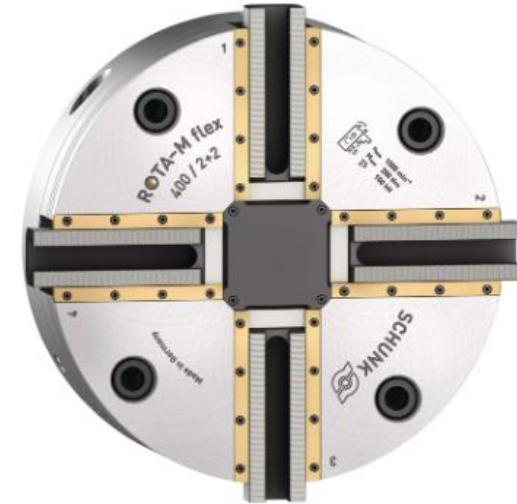


ROTA-S Flex

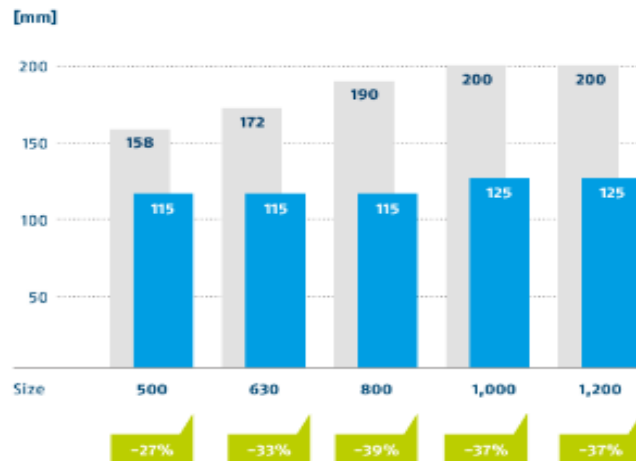


Placas para torno -> ML-Flex x M-Flex

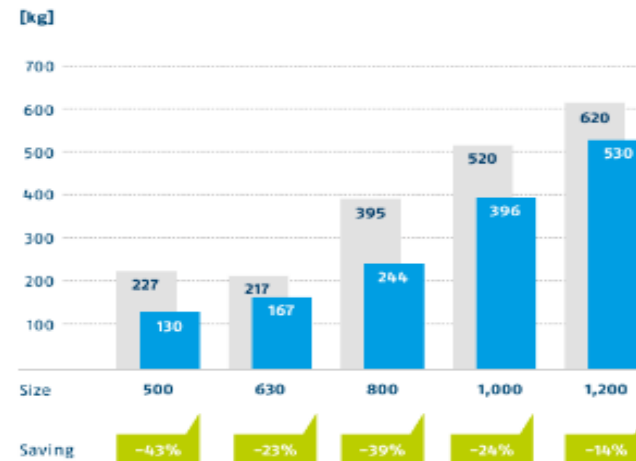
- Placas até 400mm M-Flex
- Acima de 400 ML-Flex



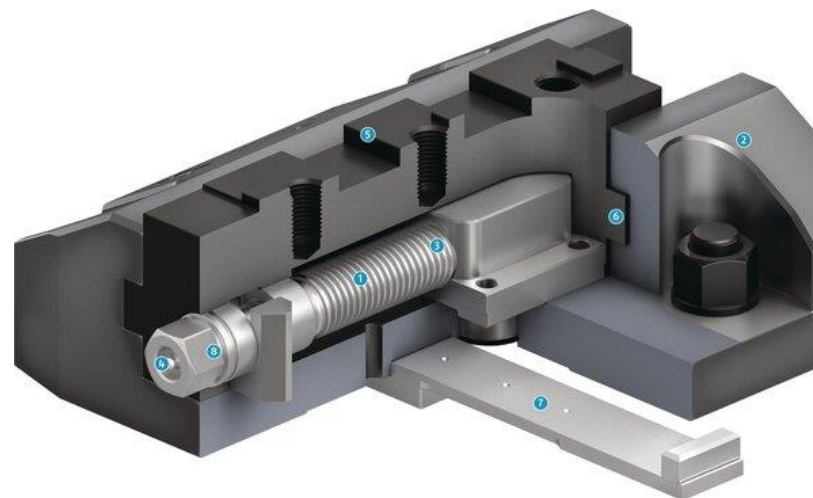
Height comparison



Weight comparison



Jaw box SPK



Família de placas e complementos



Manual Lathe Chucks



Power lathe chucks with jaw quick change



Power Lathe Chucks with Through-hole



Power Lathe Chucks without Through-hole



Chuck quick-change



Pneumatic Power Chucks



Hybrid chuck



Customized lathe chucks



Steady Rests



Clamping Cylinders

Placas de torno com troca rápida de castanhas

Placas com troca rápida de castanhas e barras de cunhas



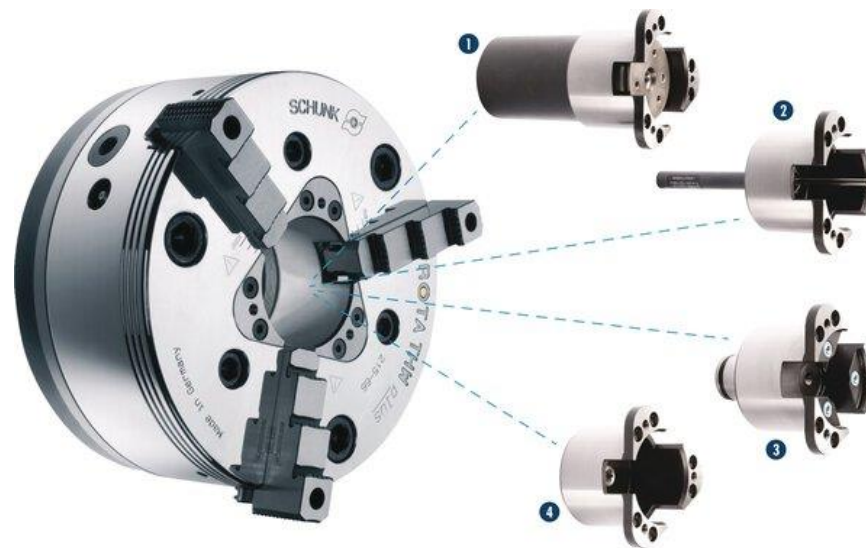
ROTA THW3



ROTA THW plus

Placas de torno com troca rápida de castanhas

ROTA THW plus



Placas de torno com troca rápida de castanhas

ROTA THW3



Família de placas e complementos



Manual Lathe Chucks



Power lathe chucks with jaw quick change



Power Lathe Chucks with Through-hole



Power Lathe Chucks without Through-hole



Chuck quick-change



Pneumatic Power Chucks



Hybrid chuck



Customized lathe chucks



Steady Rests



Clamping Cylinders

A família



ROTA NCE



ROTA NCA



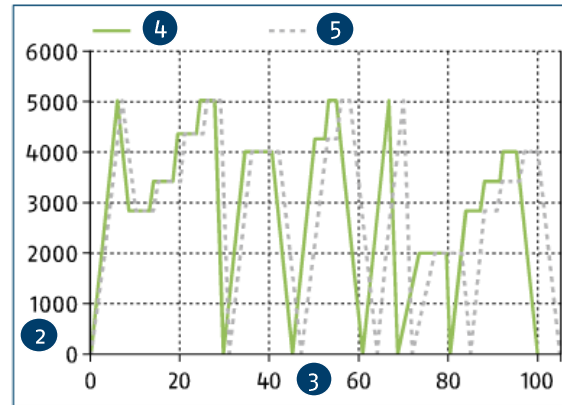
ROTA NC plus 2



ROTA NCF plus 2

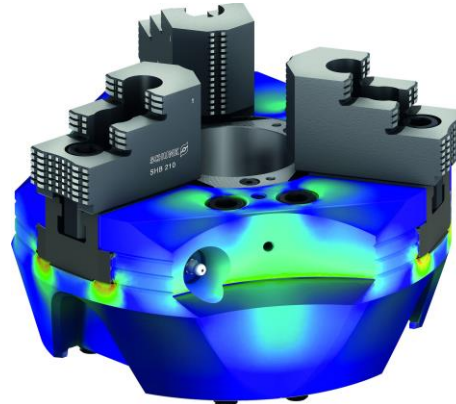
ROTA NCE

Cycle time and energy-efficient processing – toolholder

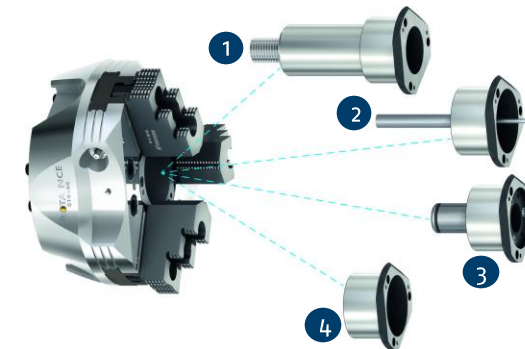


- 1 Toolholder
- 2 RPM in min⁻¹
- 3 Processing time in %
- 4 Speed collective and savings due to the use of a ROTA NCE
- 5 Speed collective of a conventional lathe chuck

Weight-optimized Power Lathe Chuck

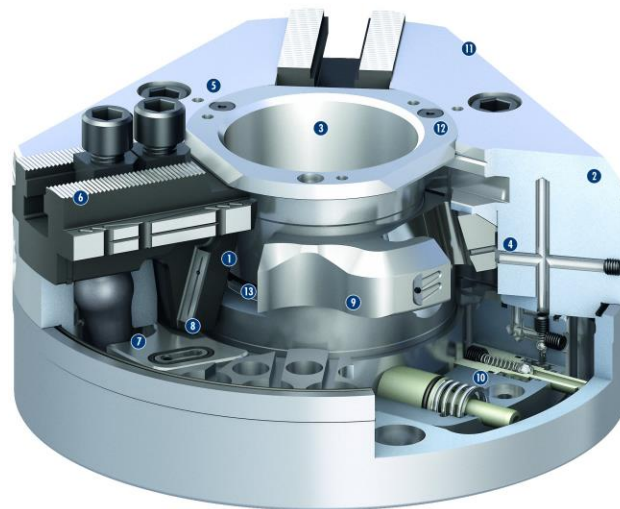
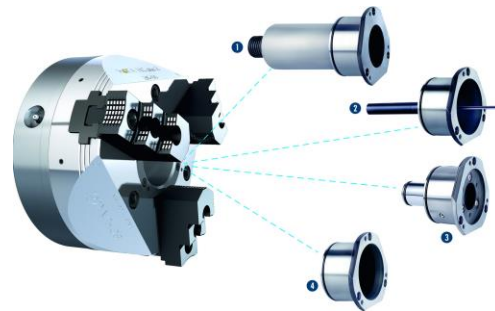
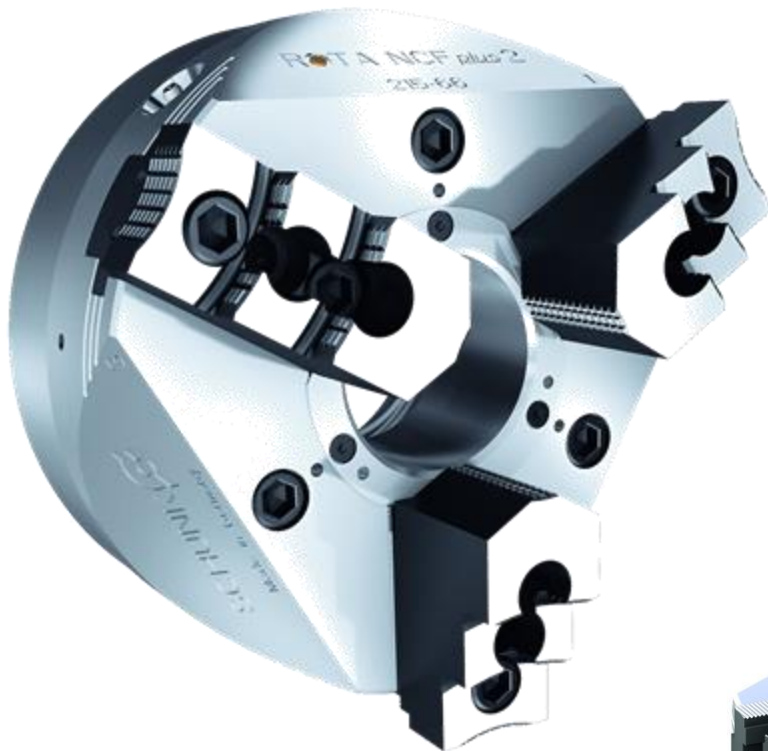


Modular Center Sleeve System



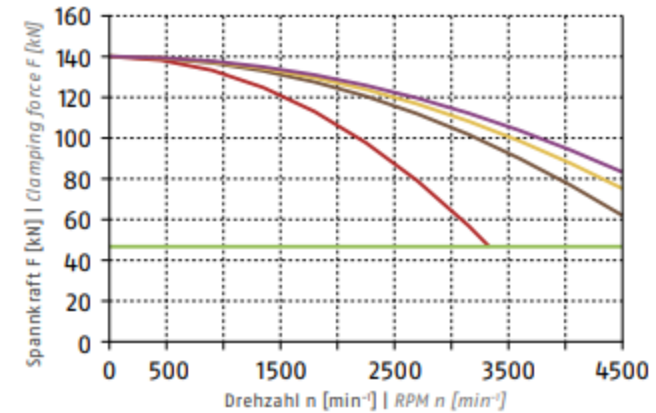
- 1 Adjustable stop in the center sleeve
- 2 Part ejector in the center sleeve
- 3 Coolant nozzles in the center sleeve
- 4 Closed center sleeve

ROTA NCF



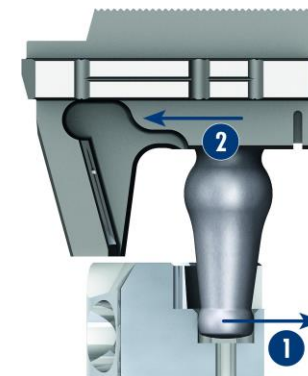
Spannkraft-Drehzahl-Diagramm

Clamping force-RPM-diagram

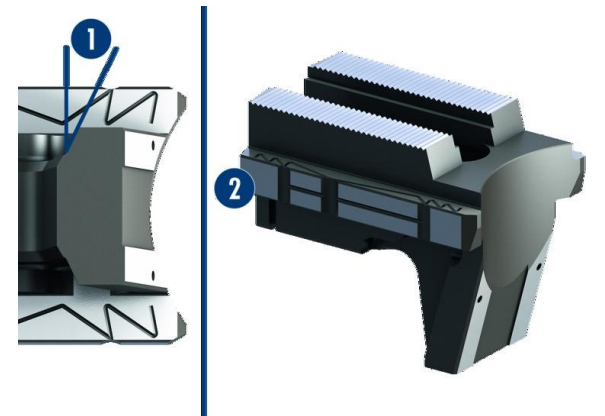
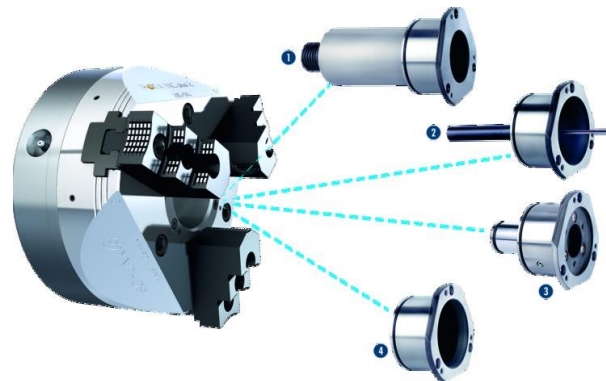
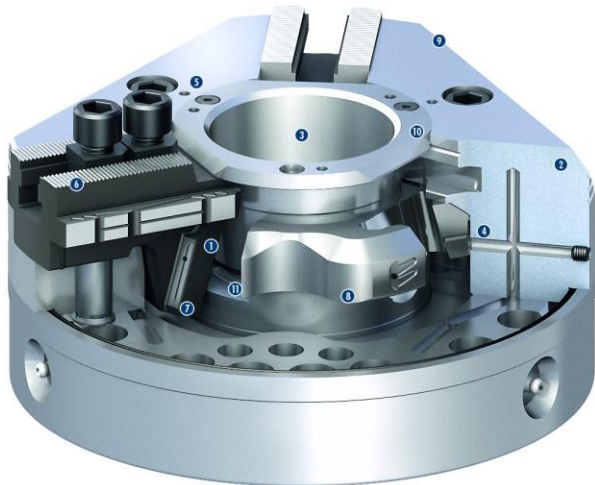
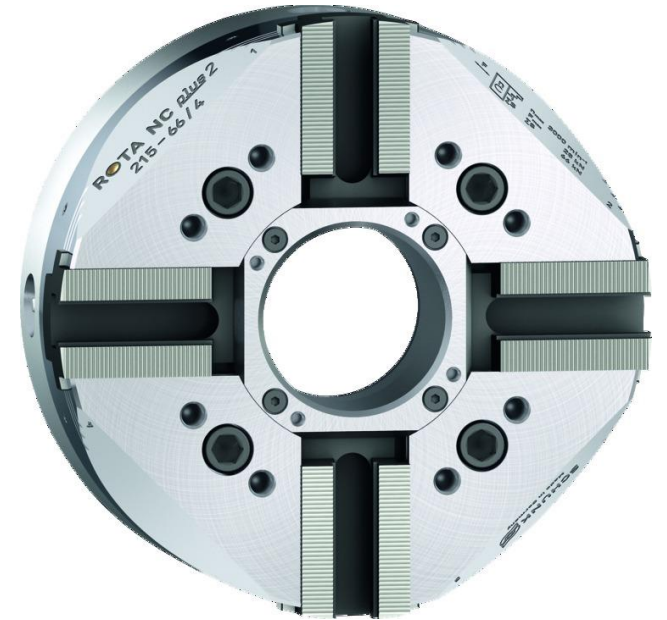
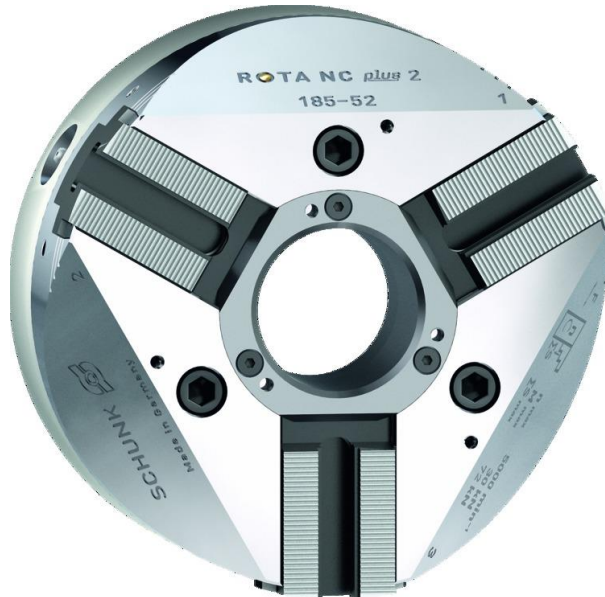


① Siehe Seite 828 | See page 828

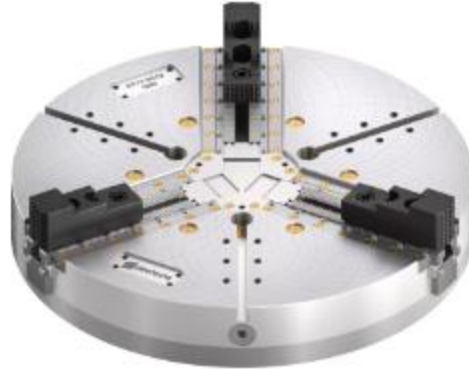
- Erforderliche Mindestspannkraft $F_{\text{apmin}} 33\%$
Required minimum clamping force $F_{\text{apmin}} 33\%$
- SHB 250
3.5 kg
- SWB 250
9.4 kg
- SHB-J 100
2.8 kg
- KM-WB 110
3.8 kg



ROTA NC



A família



ROTA NCO2



ROTA NCR



ROTA NCO



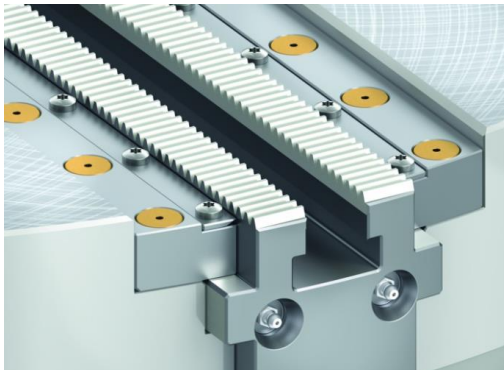
ROTA 2B



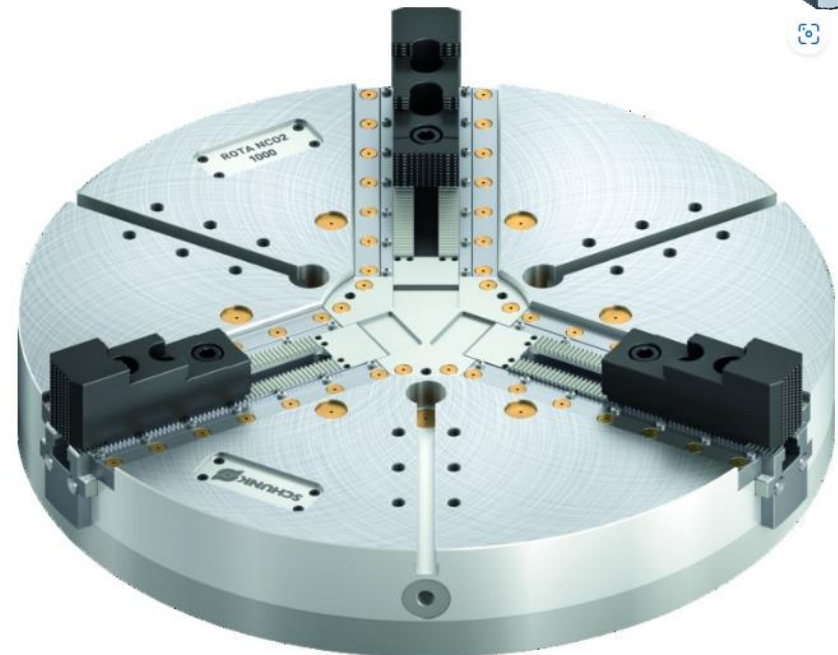
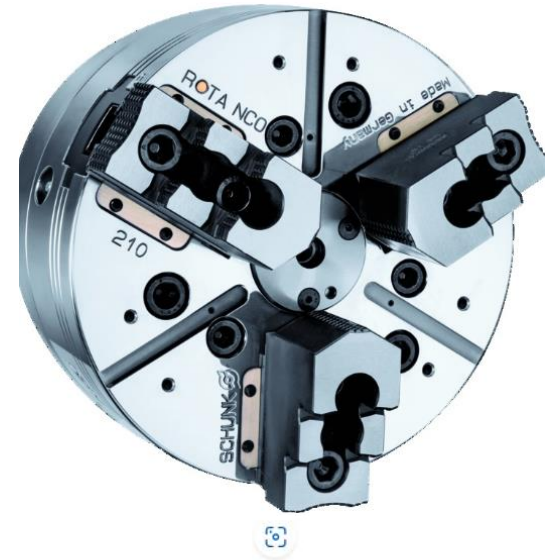
ROTA NCR-A

Placas para torno ->NCO2

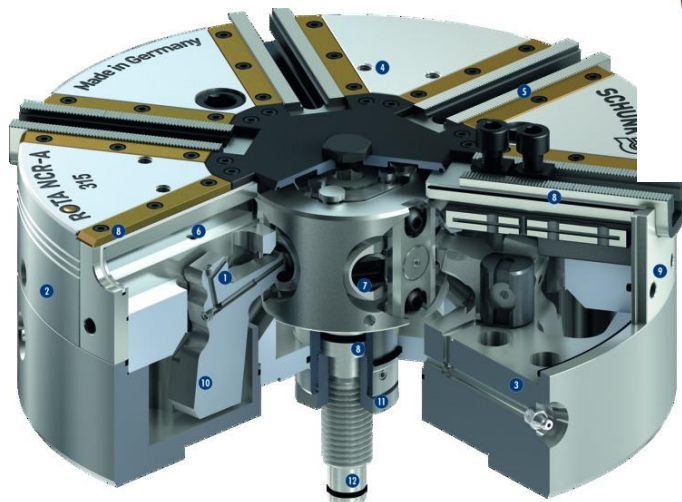
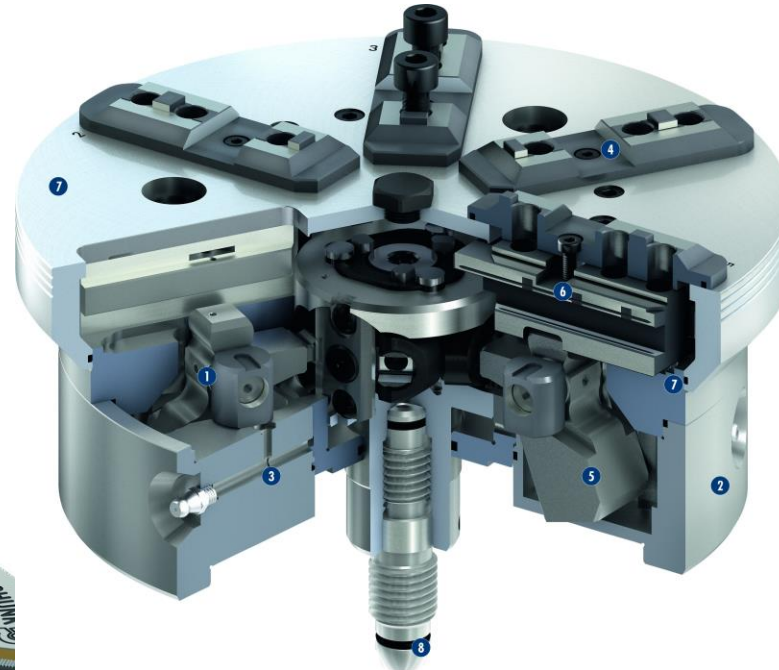
- Placas até 800mm NCO
- Acima de 800 NCO2



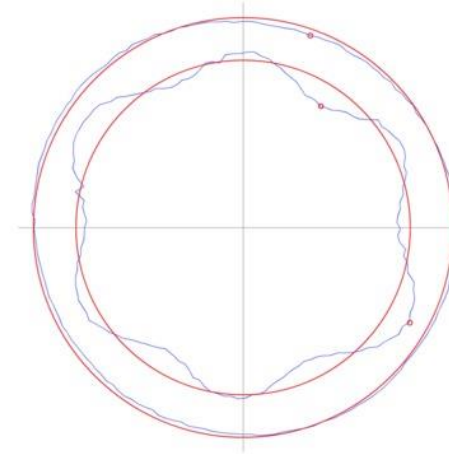
- Ajuste individual de castanhas
- Corpo em aço fundido – Mais leve + resistente a vibrações
- Serrilhado modulo 2 (similar a engrenagens)
- Compensação de força centrífuga
- Mais baixa que versão antiga
- Placa selada
- Lubrificação otimizada



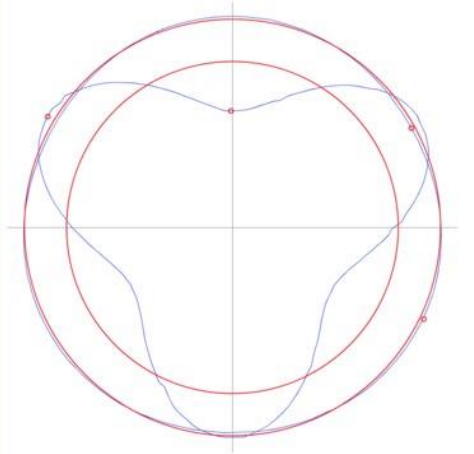
ROTA NCR-A



1



2



Versão ajustável (Centrica ou com compensação)

SCHUNK  ROTA NCR

A família



ROTA TP

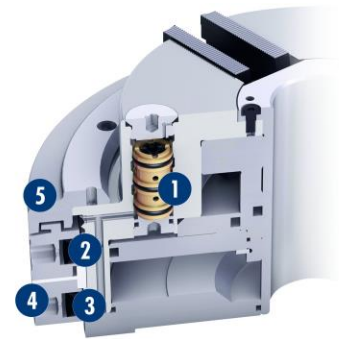
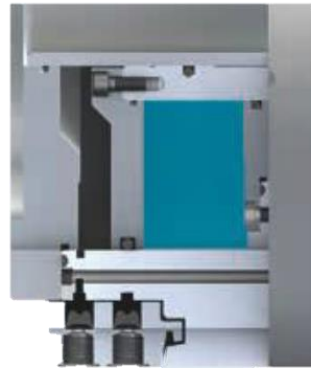
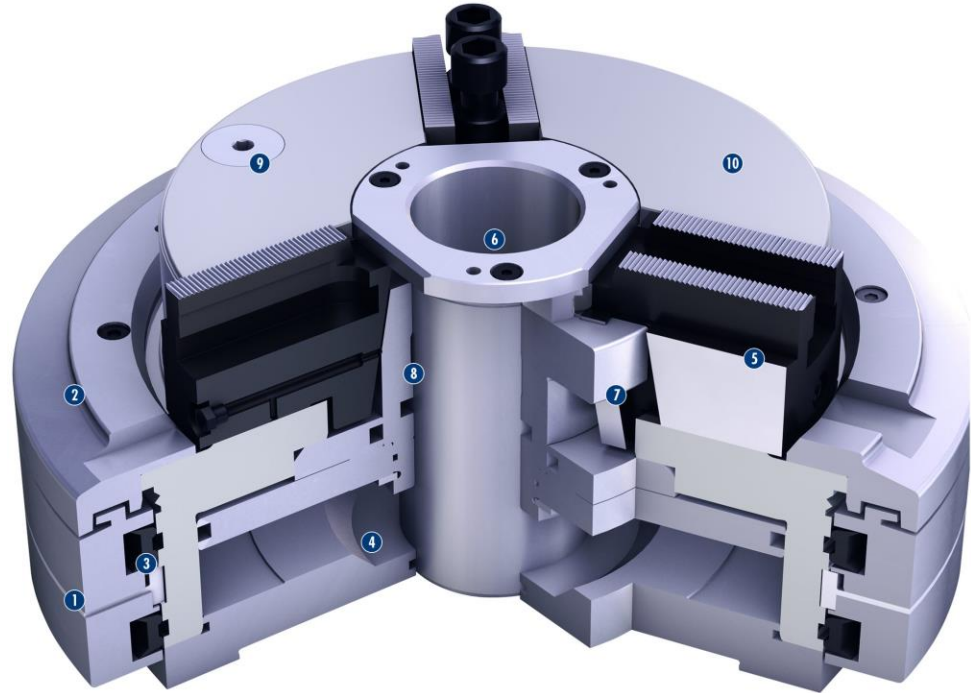


ROTA TB2



ROTA TB2-LH

ROTA TP

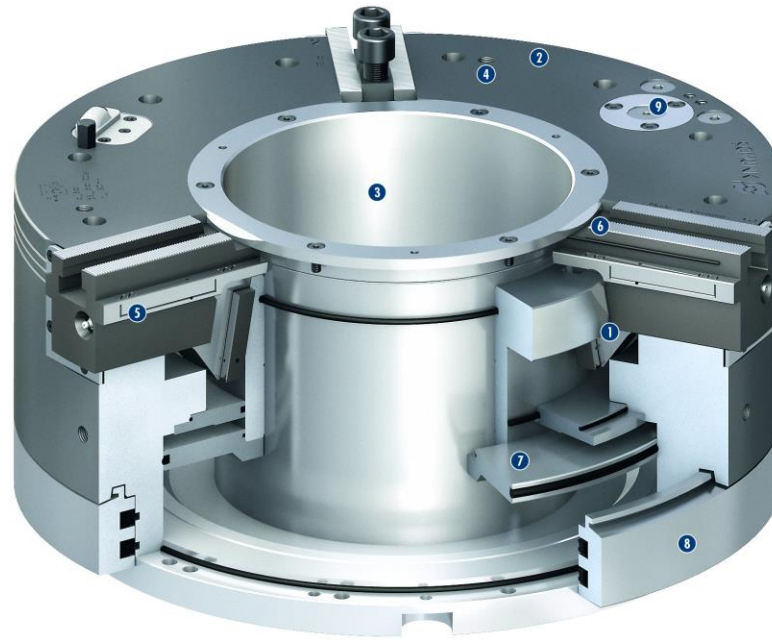


D125 a 350mm

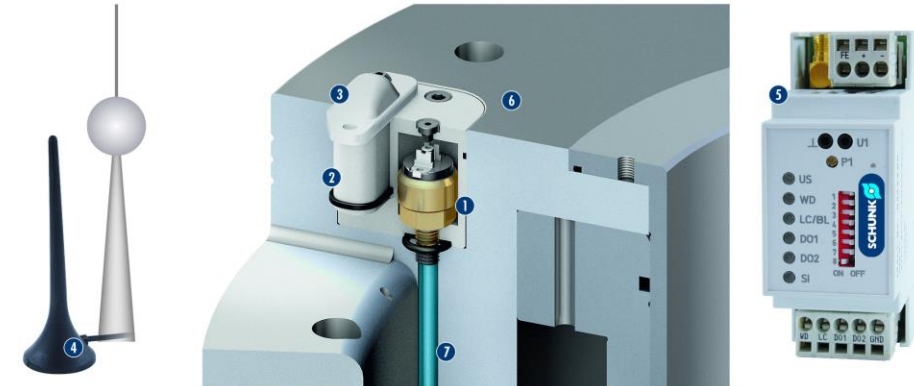
ROTA TB2 / TB2-LH



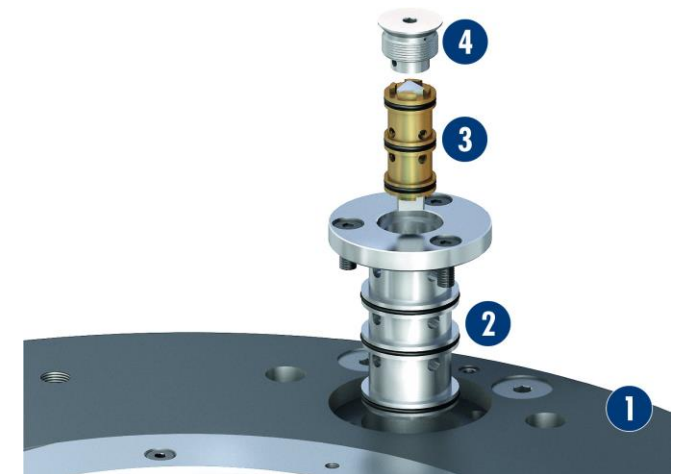
D470 a 1000mm



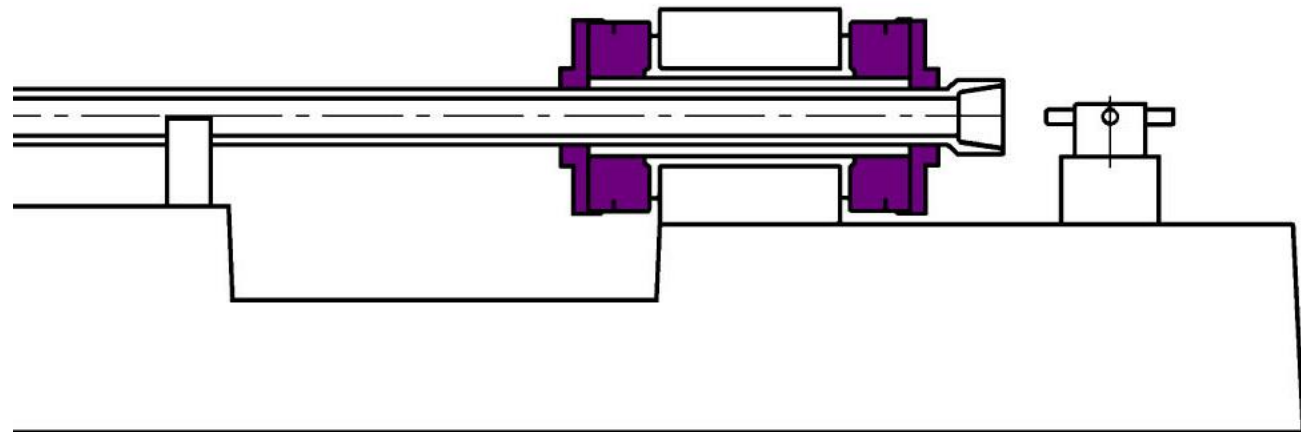
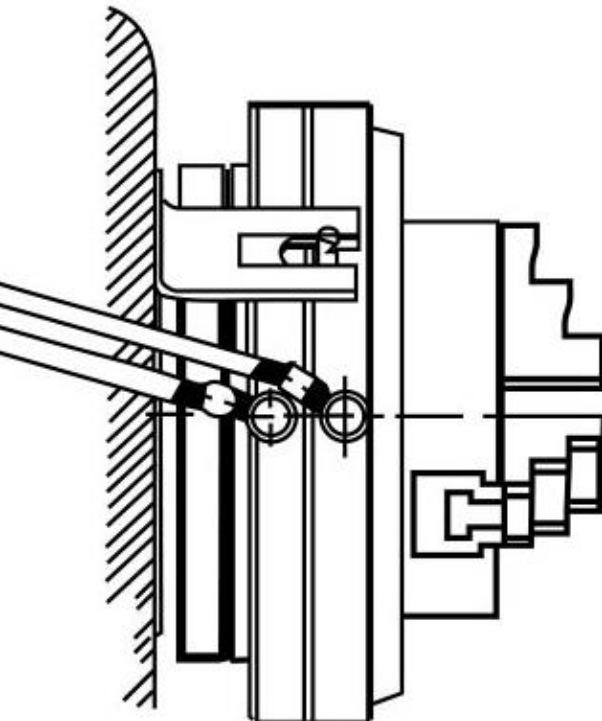
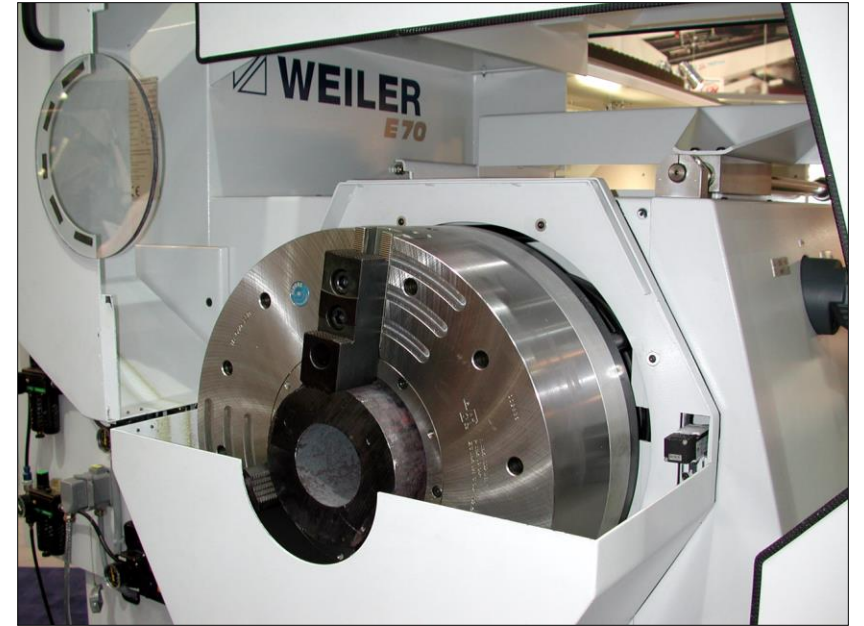
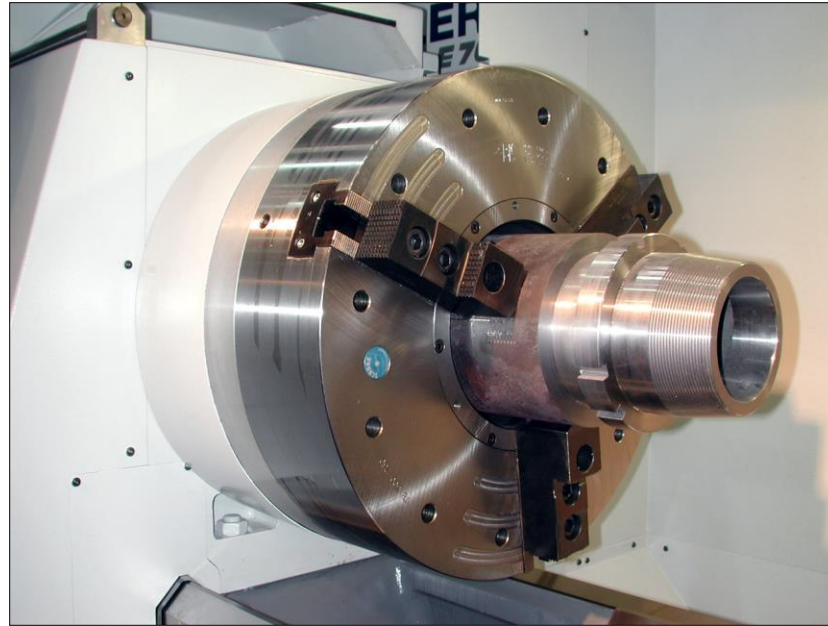
RSS-P1: Wireless Clamping Pressure Control



Exchangeable valve

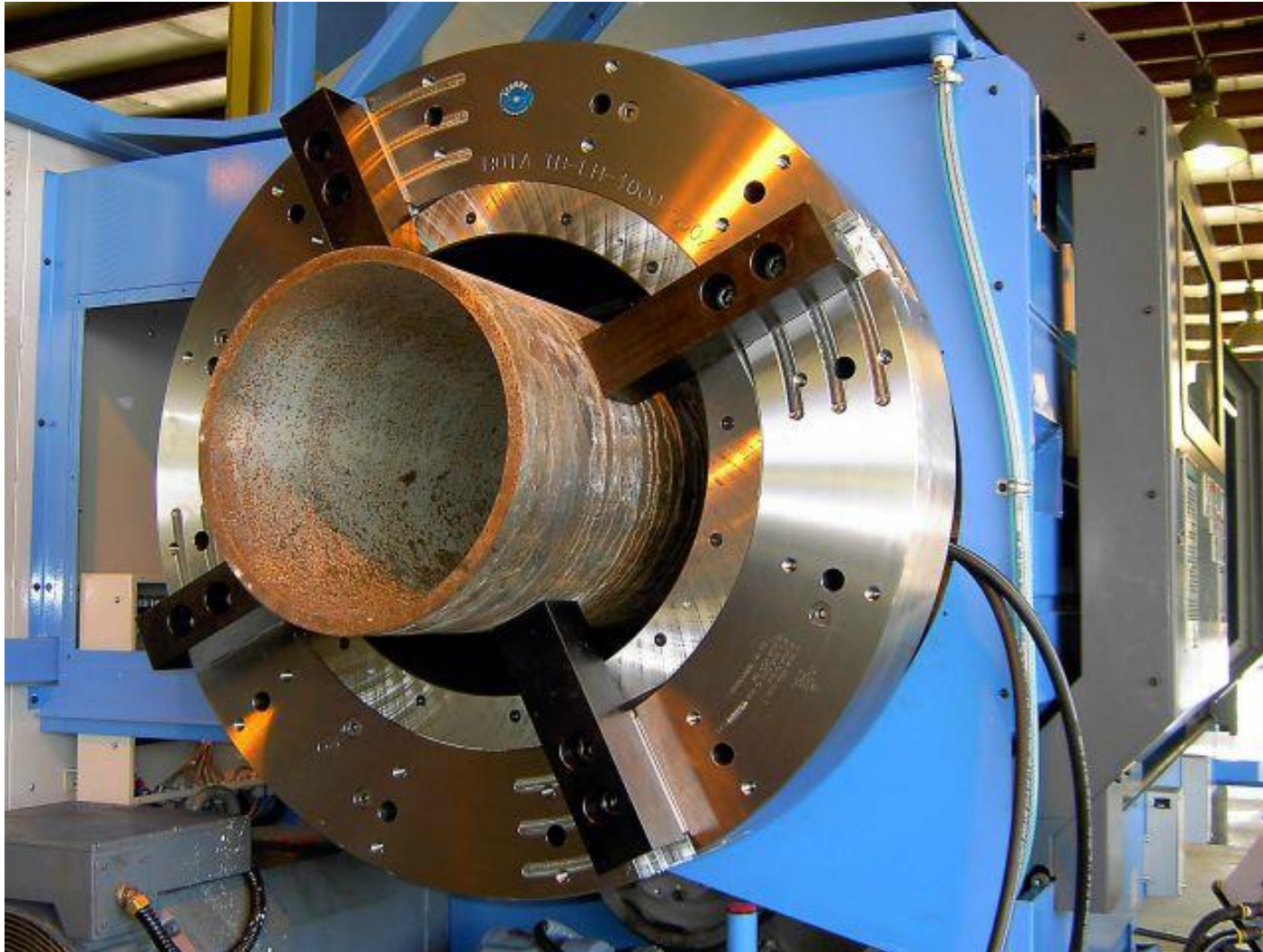


ROTA TB



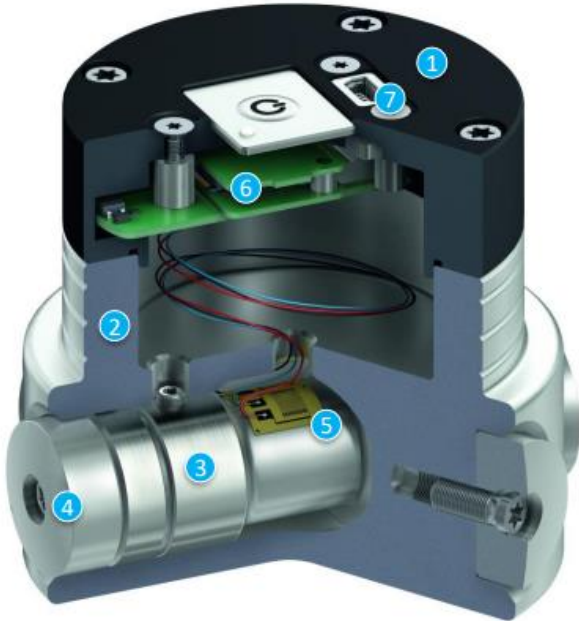
Placa pneumática

ROTA TB2

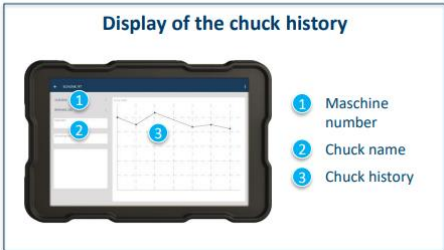
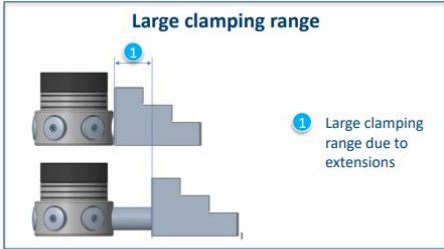


Medidor de força IFT

IFT

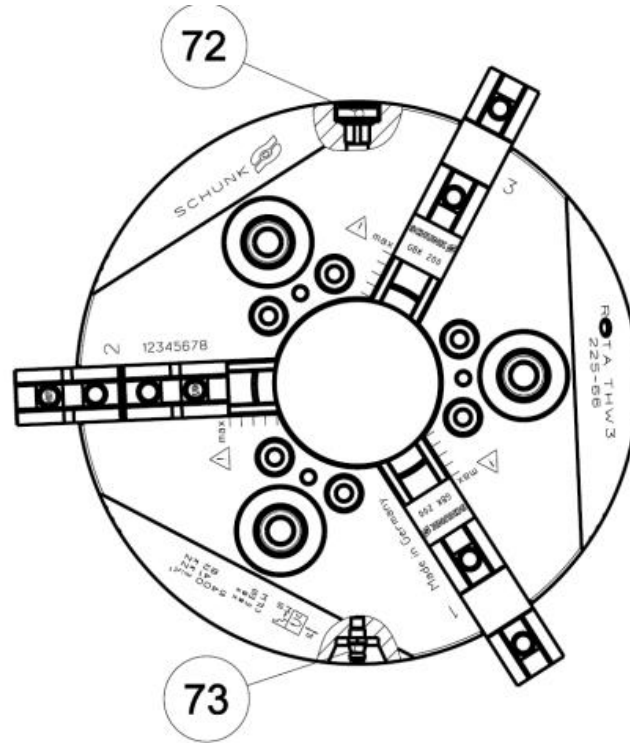


IFT



Description		Measuring Head
Power supply		Internal energy storage
Energy storage capacity		approx. 1.5 h @ 100% d.c.
Charge time	[min]	< 3
Charge connection		USB mini
Number of jaws		2, 3 and 6 jaws
Force measuring range	[kN]	0 – 180 (2 jaws) 0 – 270 (3 jaws) 0 – 540 (6 jaws)
Accuracy force measurement	[% fsr]	< 3
Speed measurement	[min ⁻¹]	approx. 200 – 6000
Accuracy speed measurement	[% fsr]	< 1
Clamping range	[mm]	Ø 72/Ø 96/Ø 136
Value transmitting rate	[ms]	500
Operating temperature	[°C]	0 – 40
Sending frequency	[GHz]	2.4

Graxa Linomax plus

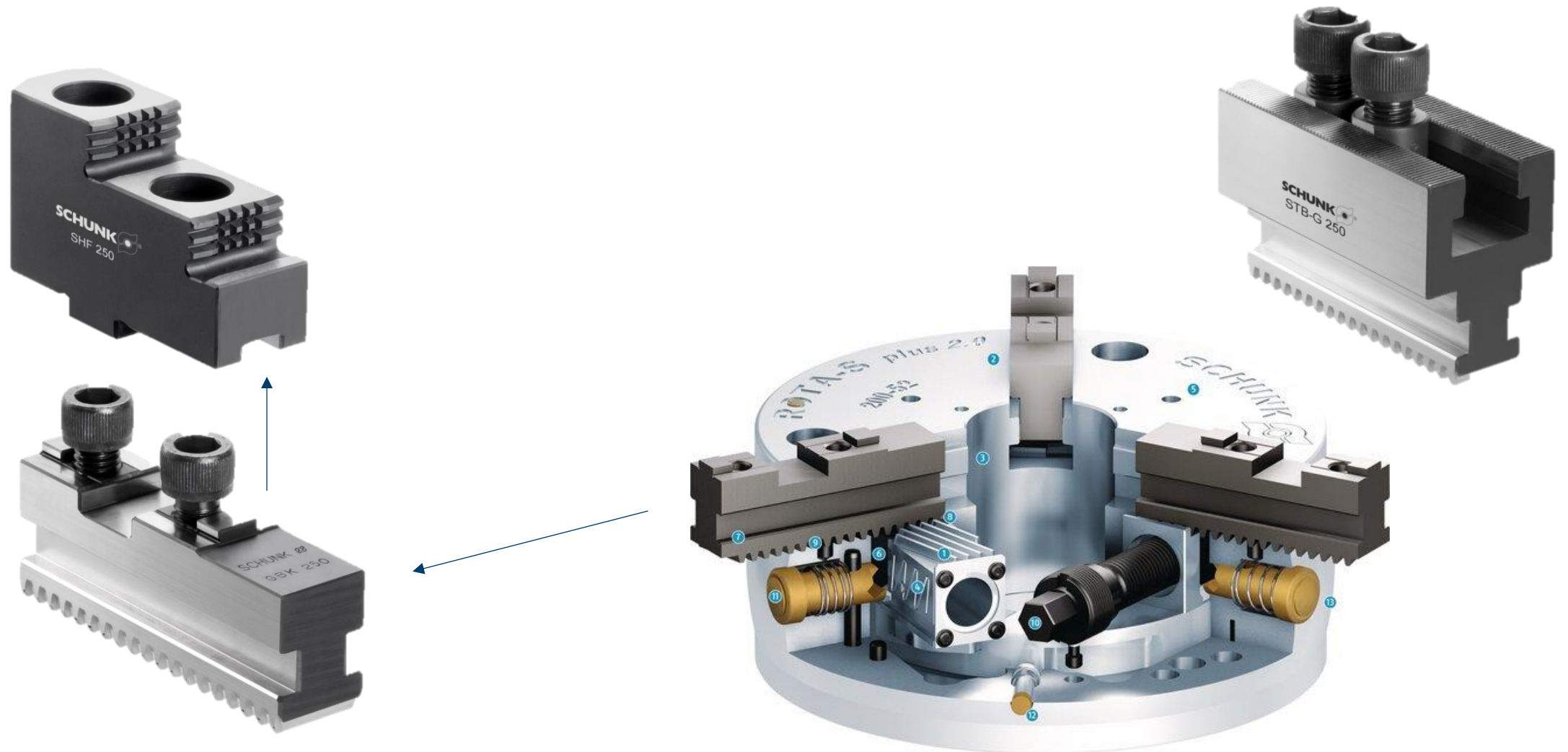


- Alguns modelos de placas seladas necessitam remover o expurgo antes da lubrificação





Castanhas com CHAVETA e GBK



Castanhas com serrilhado





Castanha
Base



Castanha
Mole



Castanha de
segmentada



Castanha
Pendular



Castanha
QUENTES



Castanha
Claw Jaw



Castanha Dura
de sobrepor



Castanha
Monobloco



Castanha com
insertos intercambiáveis



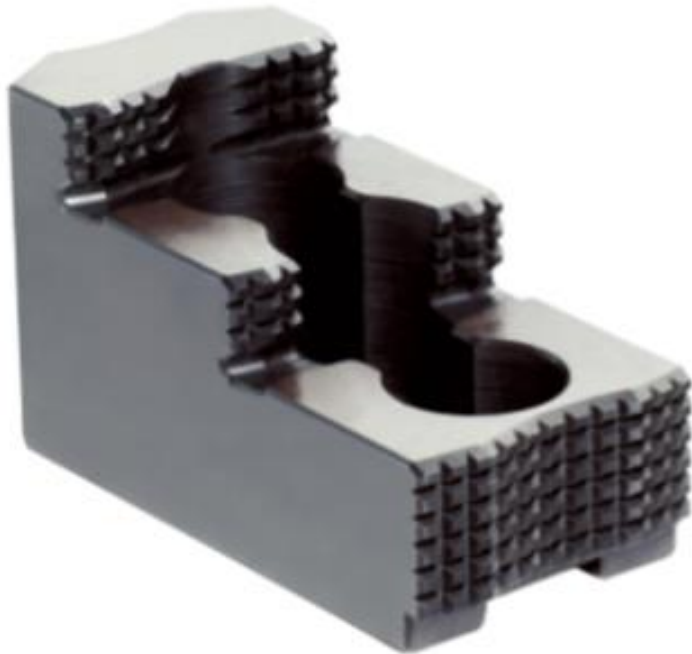
Castanhas mole



Soft block jaw



Castanhas dura com recartilhado

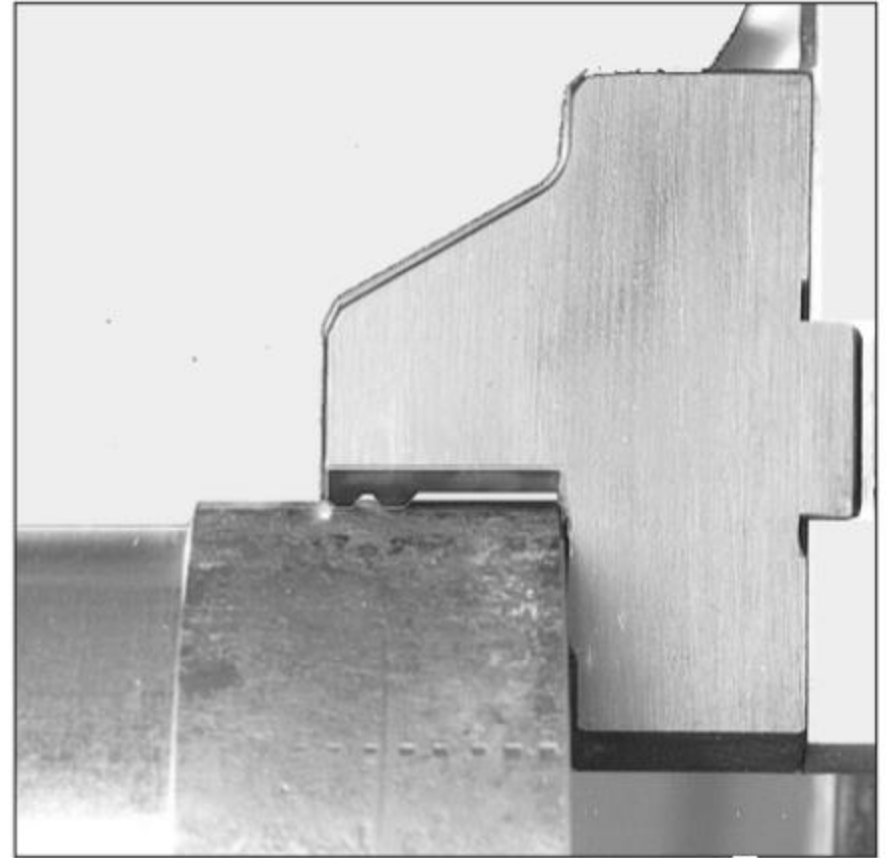
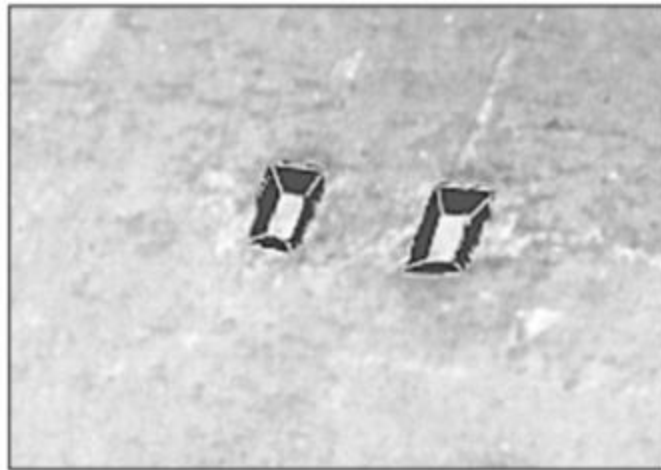
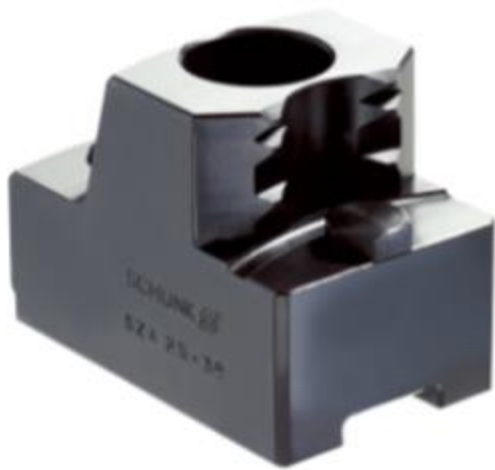


Stepped top jaws
with fine serration

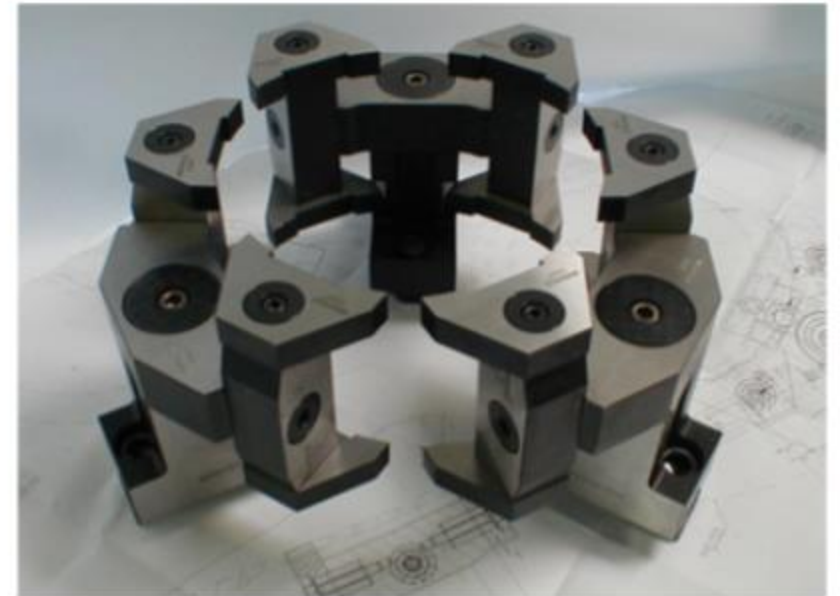


Stepped top jaws
with tongue and groove

Impact (Claw jaw)

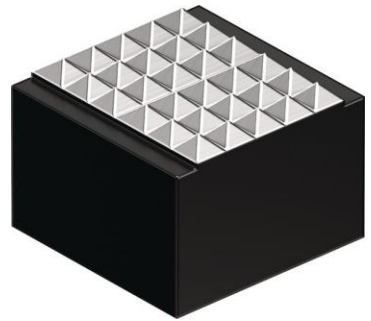


ROTA – CASTANHAS PENDULARES



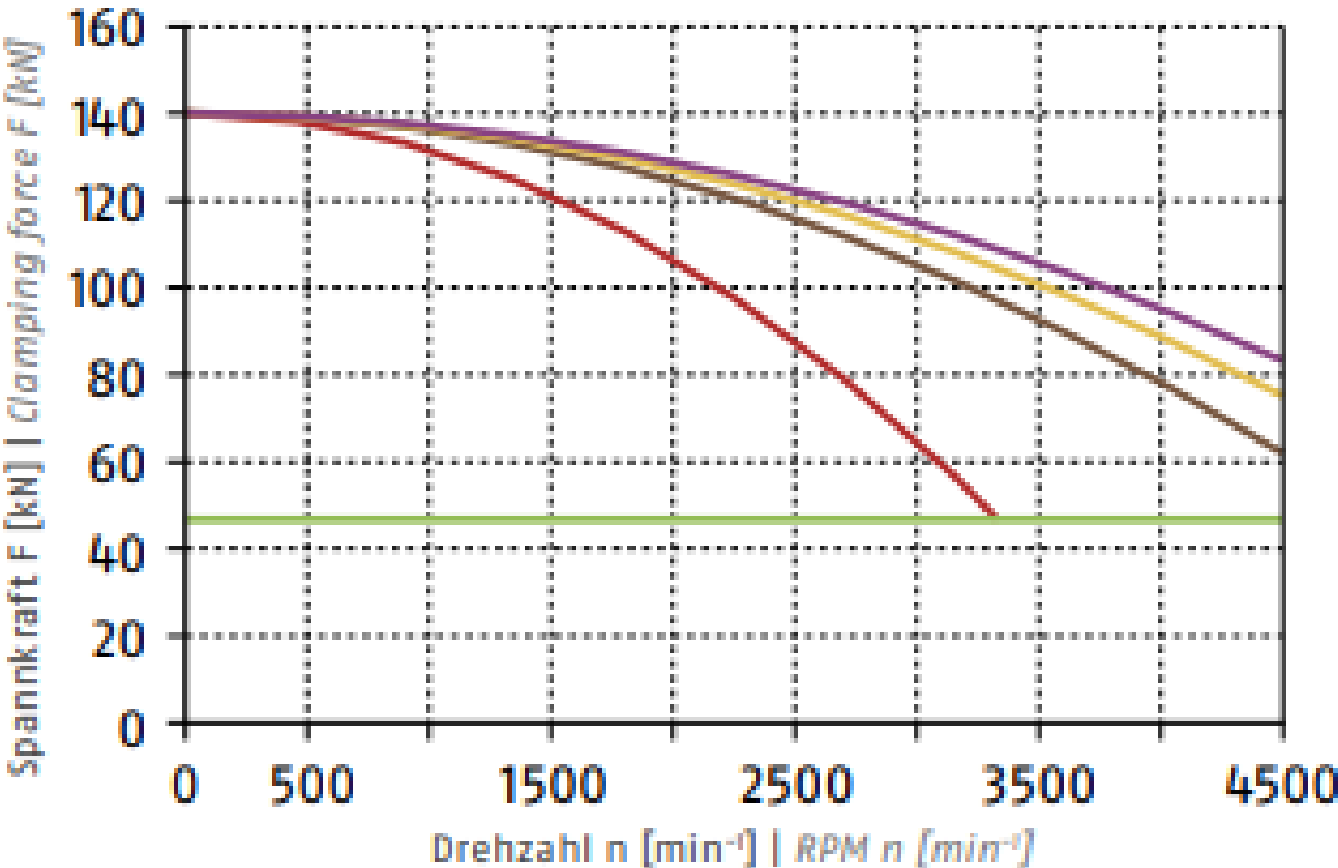


Insertos para castanhas



Spannkraft-Drehzahl-Diagramm

Clamping force-RPM-diagram



① Siehe Seite 828 | See page 828

■ Erforderliche Mindestspannkraft F_{ipmin} 33 %
Required minimum clamping force F_{ipmin} 33%

- SHB 250
3.5 kg

- SWB 250
9.4 kg

- SHB-J 100
2.8 kg

- KM-WB 110
3.8 kg


Hand in hand for tomorrow



Tecnologia de fixação e garras magnéticas
MAGNOS

SCHUNK

Visão geral de produtos



Milling Applications



Turning Applications



Grinding Applications



Lifting applications



Control unit



EGM

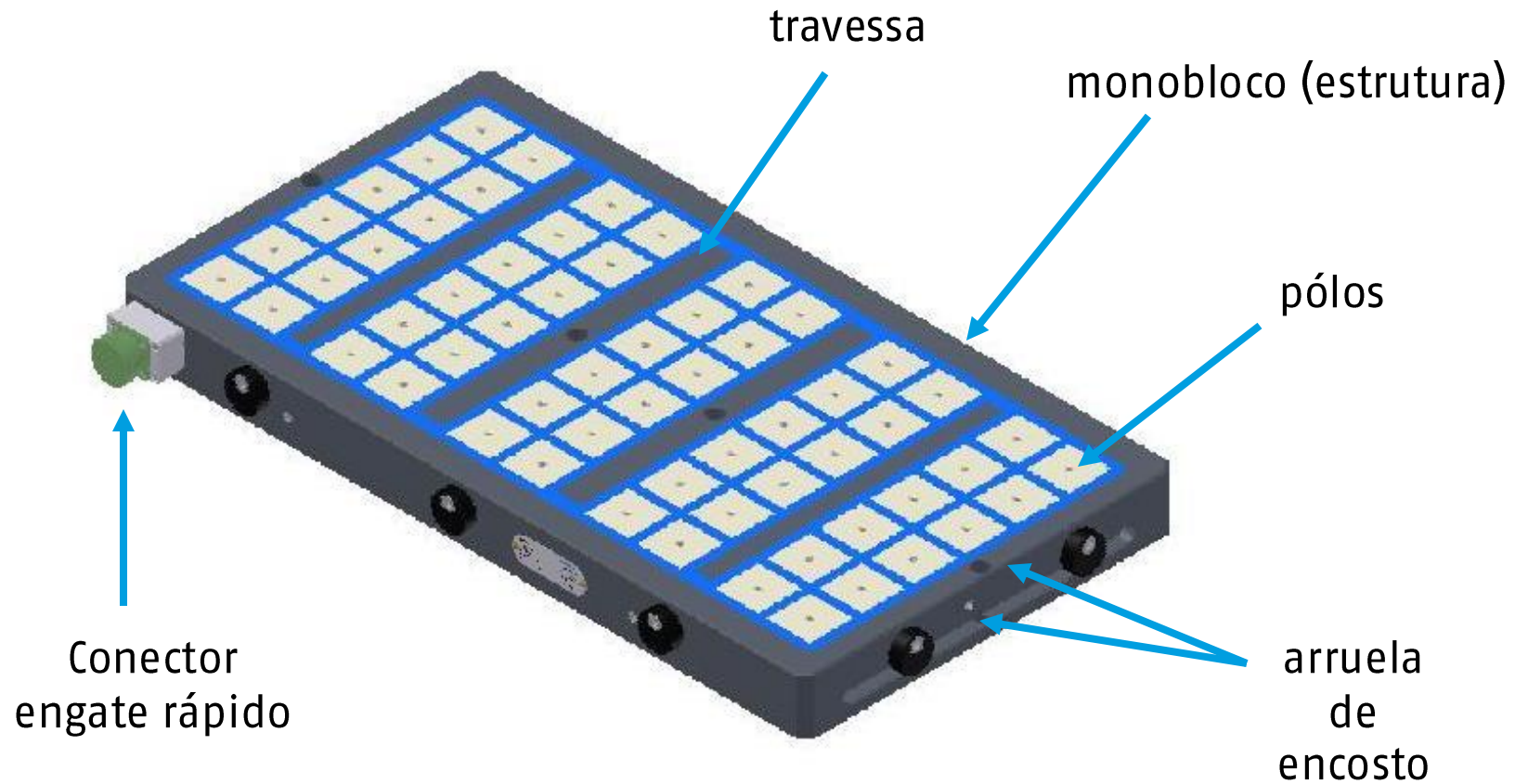


EMH



GSW-M

Mesa magnética



Tecnologia Magnética

Conceito

MAGNOS

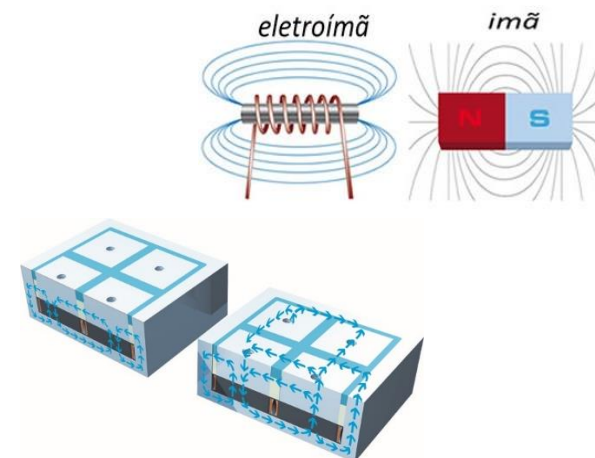
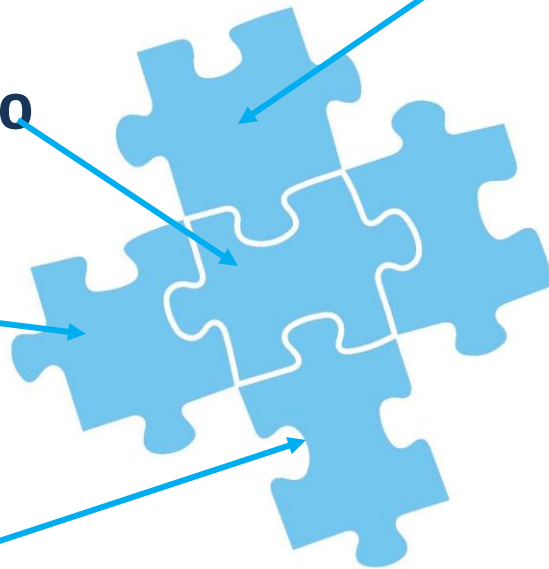
Eletropermanente (EP)

- fresamento
- torneamento
- retificação
- levantamento
- manipulação

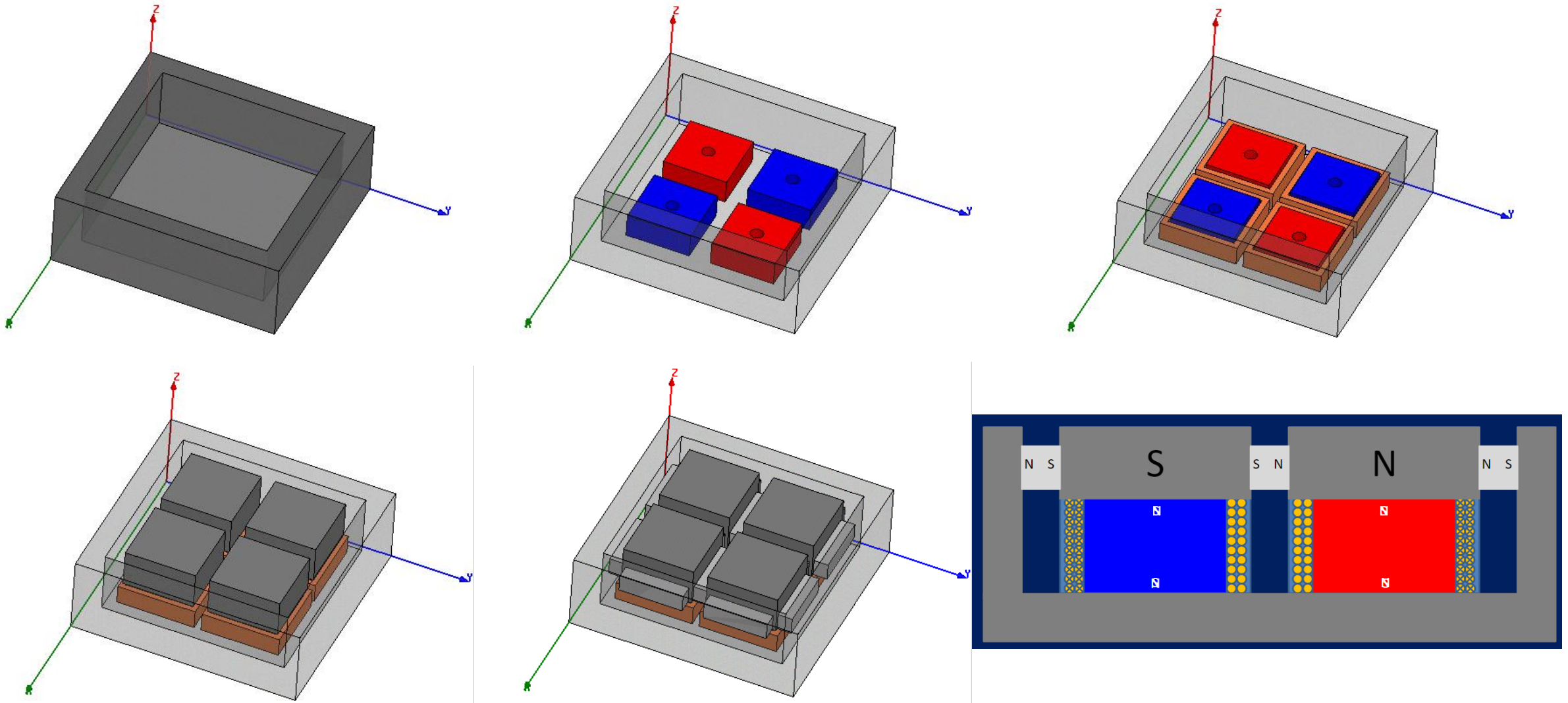
Material magnético

Magnetismo
Permanente

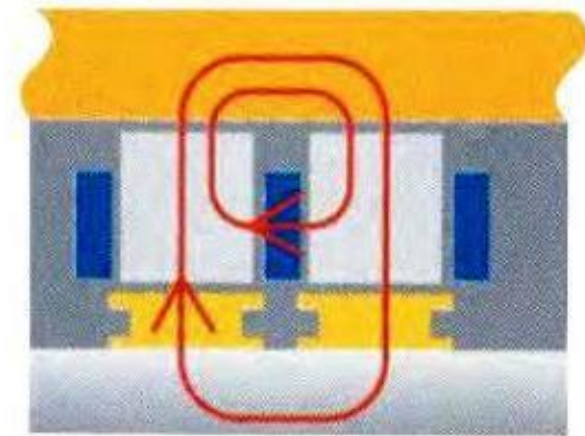
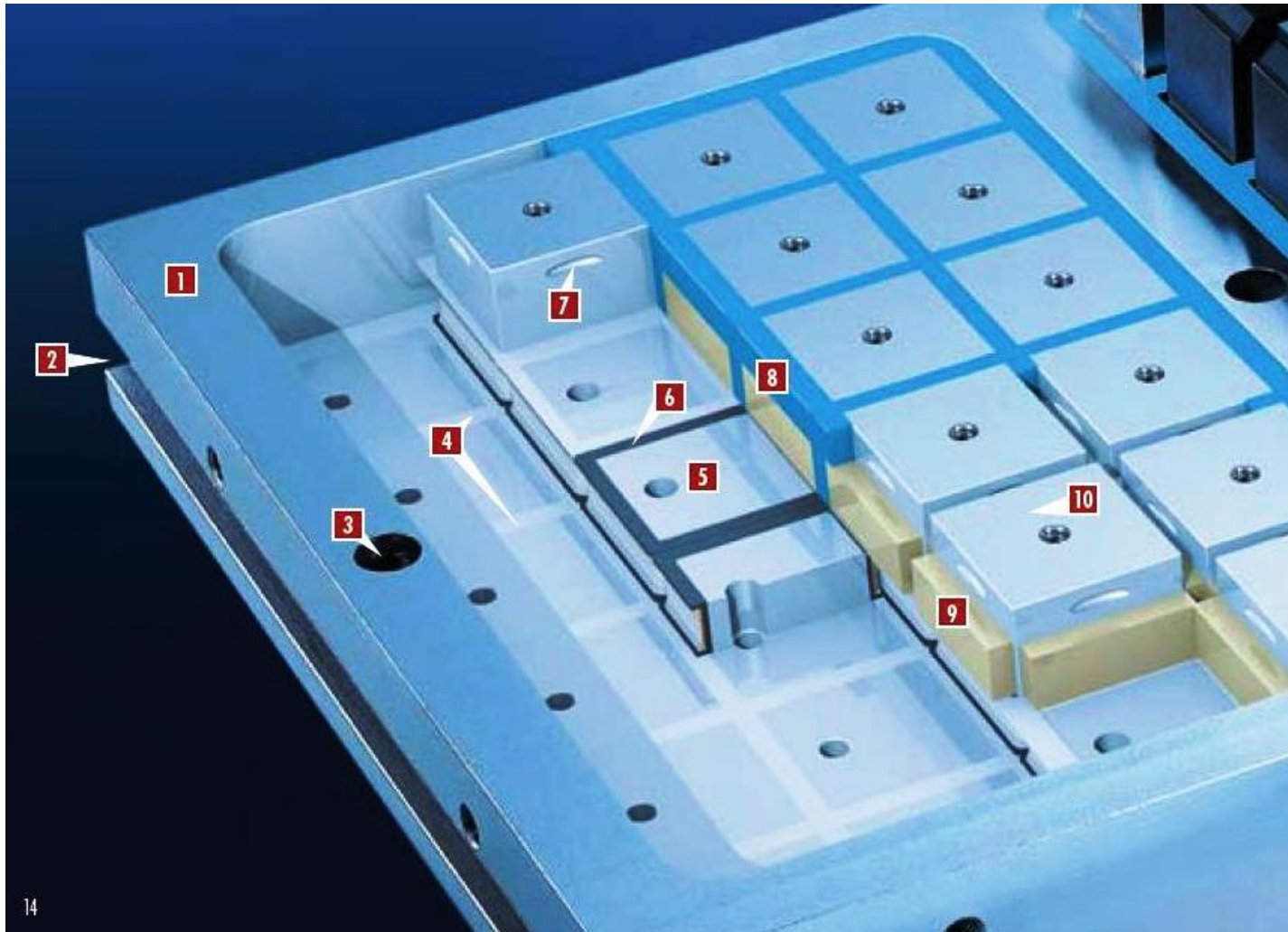
Eletromagnético
(E-Mag)



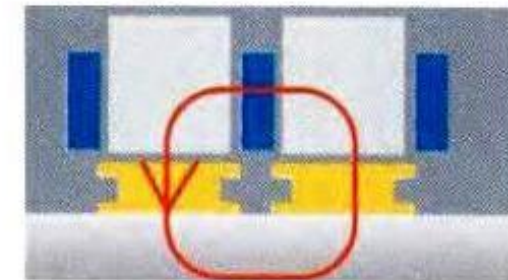
Magnetismo eletropermanente



Estrutura das mesas magnéticas e garras



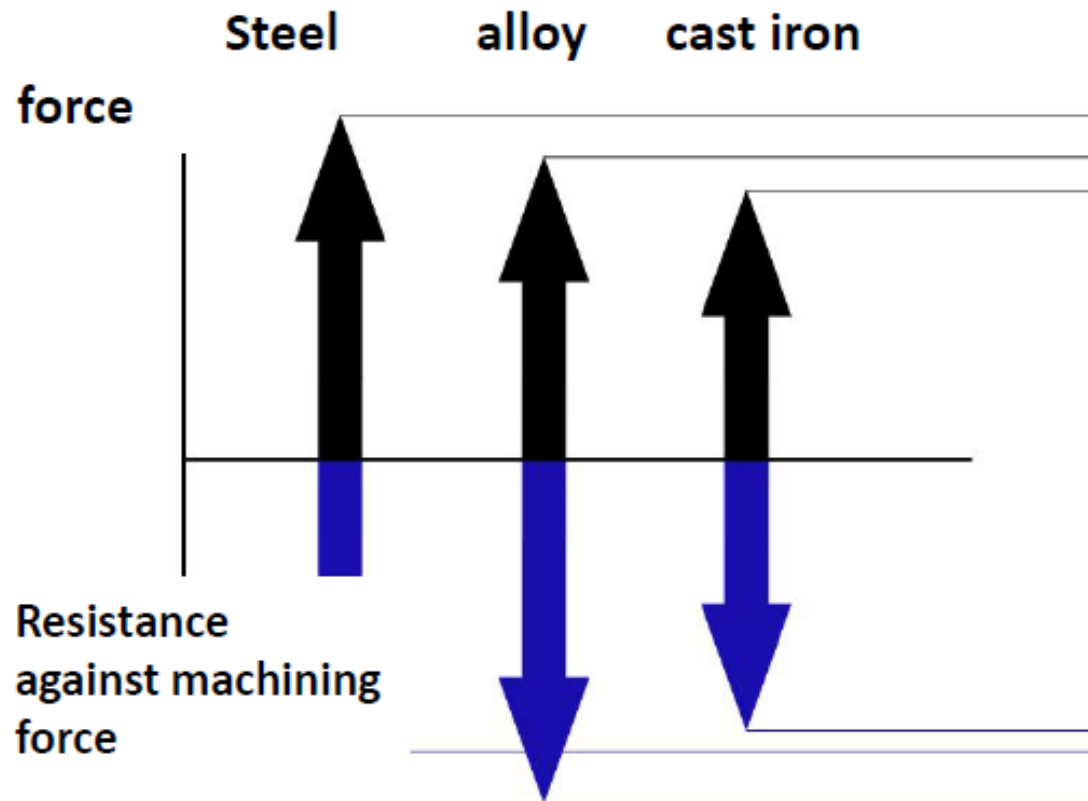
MAG



DEMAG



MAGNOS - Influências na Força de Fixação



pure iron (without alloy)	100%
St 37	94%
St 34	82%
GS (cast steel) & St 50	75%
St 70	70%
Gt (malleable cast iron)	60%
20 MnCr5	50%
GG (grey iron)	30%

Visão geral de produtos



Milling Applications



Turning Applications



Grinding Applications



Lifting applications



Control unit



EGM

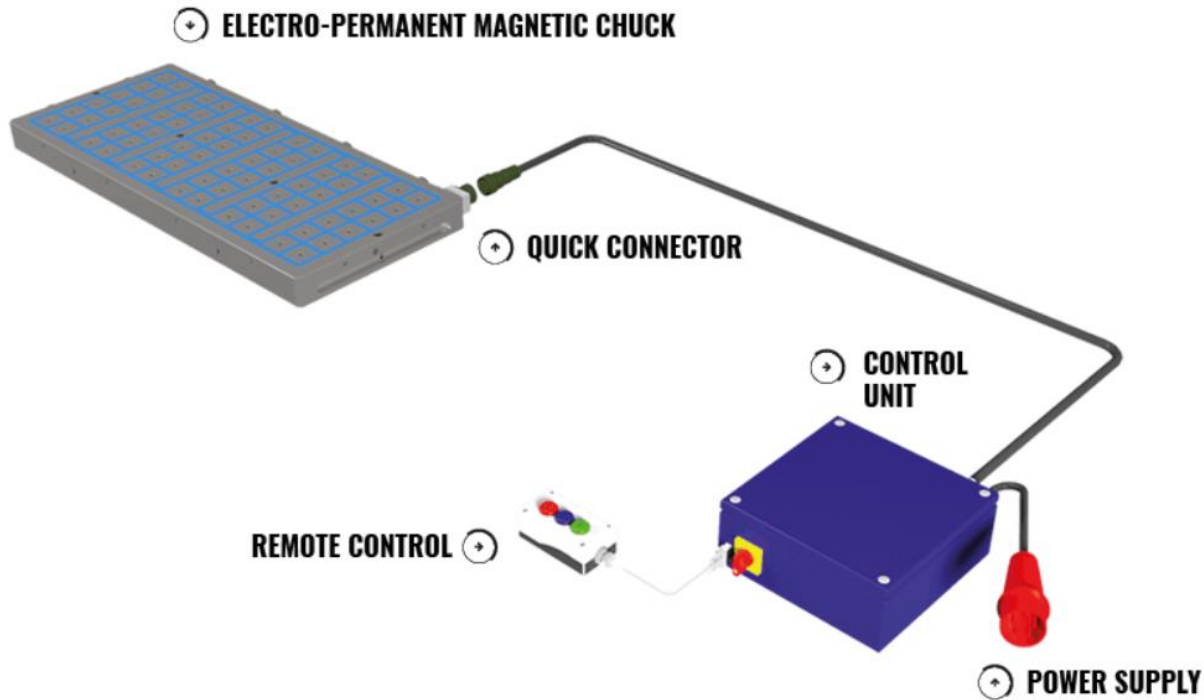


EMH



GSW-M

Configuração Magnos e garras



Qual o melhor controlador?

1, 2 ou 4 canais. 4 ou 7 pinos. 220V ou 380V

KSS (01)



KEH-S (01, 02, 04)



KEH-plus (01, 02, 04, 08)



1 Canal



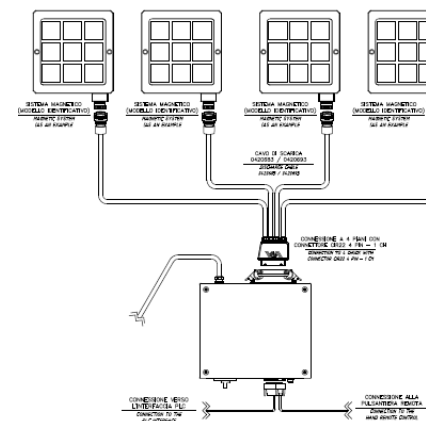
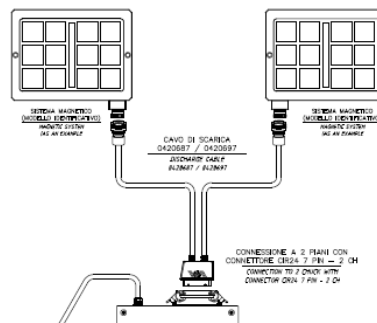
4 pinos

2 Canais

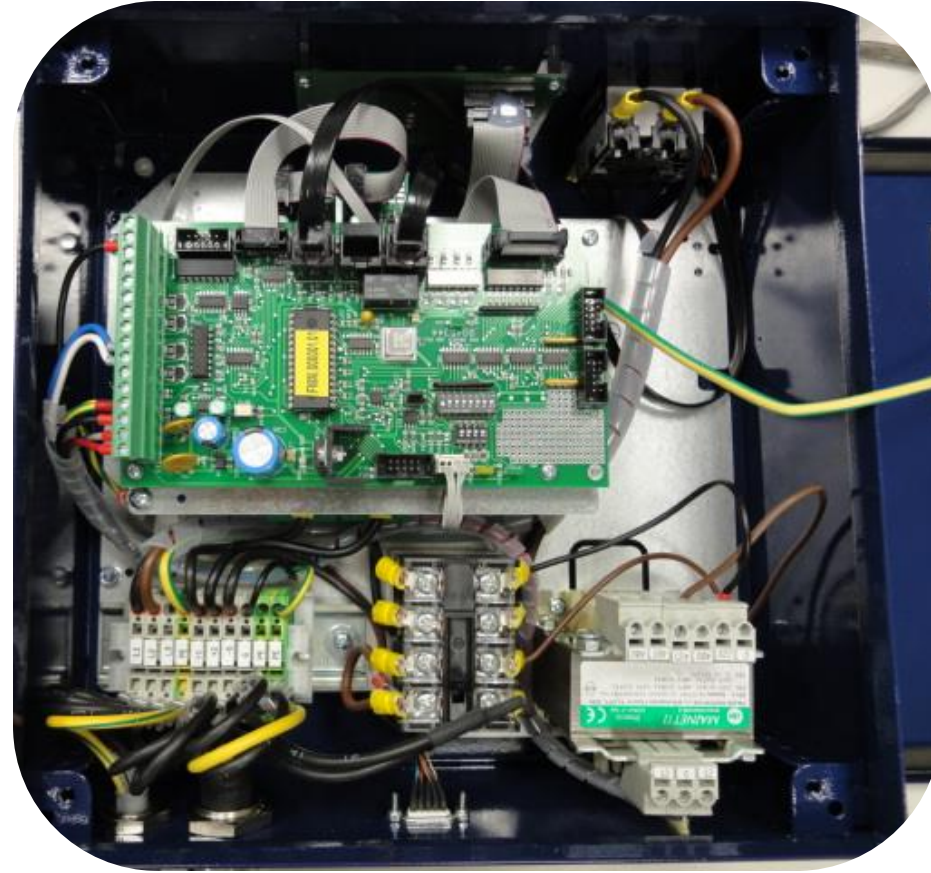
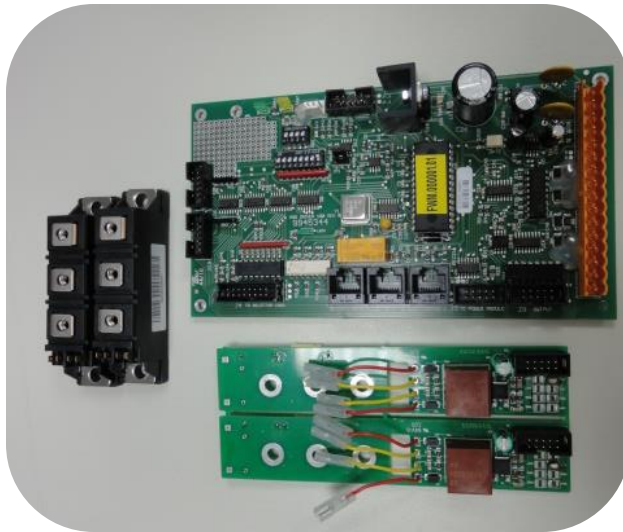
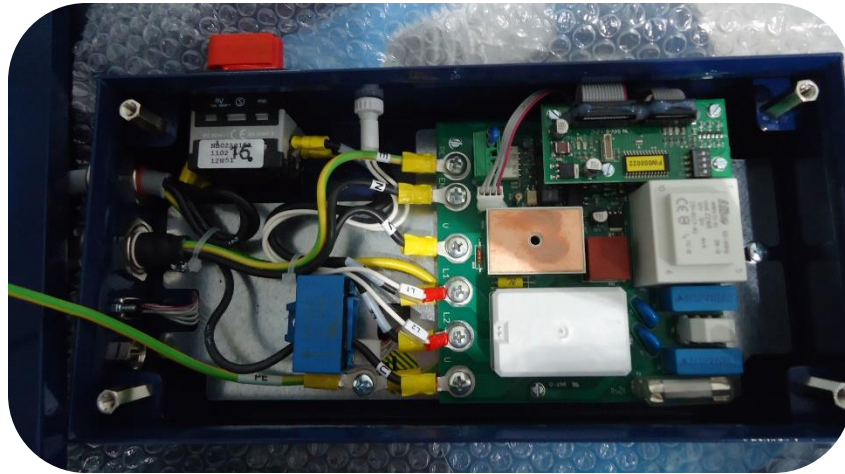


7 pinos

4 ou + canais



Controladores

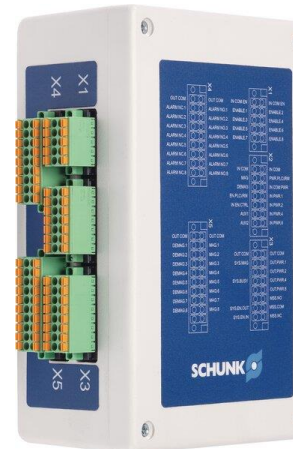


Interface para automação KEH+

- 2 maneiras de integrar com a maquina/robô

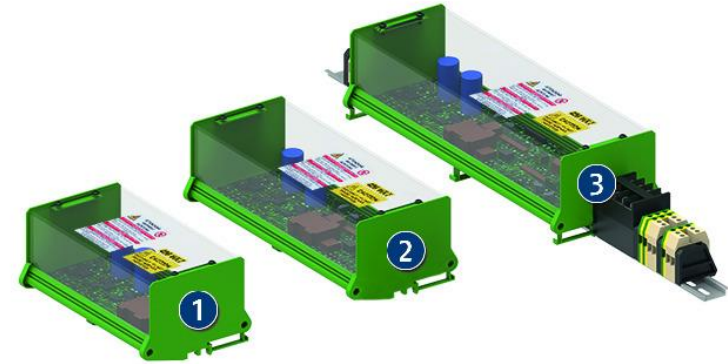


- PLC easy
Automação simples



- PLC Box
Automação completa

Controladores EGM



ECG-C is used to magnetize/demagnetize and can be actuated via digital I/O.

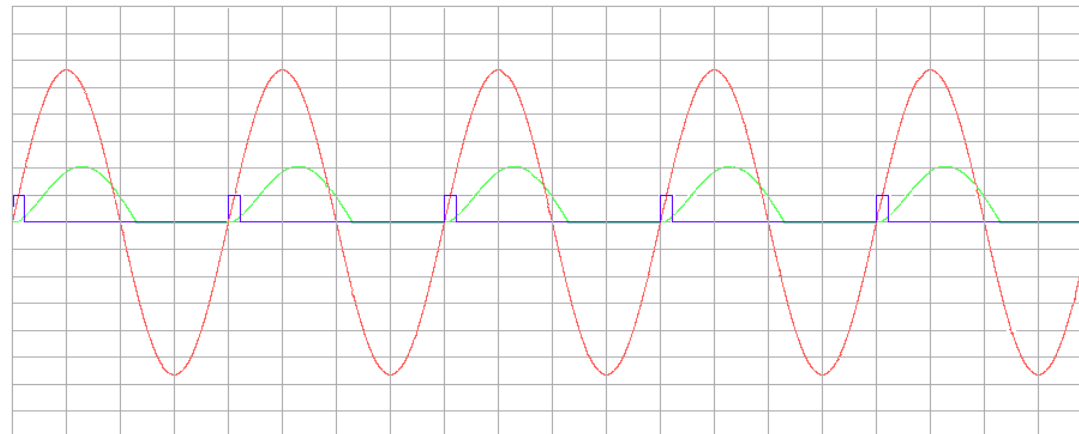
ECG-R, the output of the magnetic gripper can be controlled with up to eight levels via digital signals.

ECG-W is particularly designed for applications in the direct welding

Instalação controlador

- Não ligar o controlador em tomadas convencionais
- Utilizar cabo elétrico com bitola mínima de 4mm² recomendado 6mm²
- Utilizar disjuntor maior que 40 A

Para a magnetização e desmagnetização o controlador poderá atingir picos de corrente de 32A@2 segundos.



O controlador em stand by, trabalha com corrente lógica de aproximada de 300mA a 1A

Visão geral de produtos



Milling Applications



Turning Applications



Grinding Applications



Lifting applications



Control unit



EGM



EMH



GSW-M

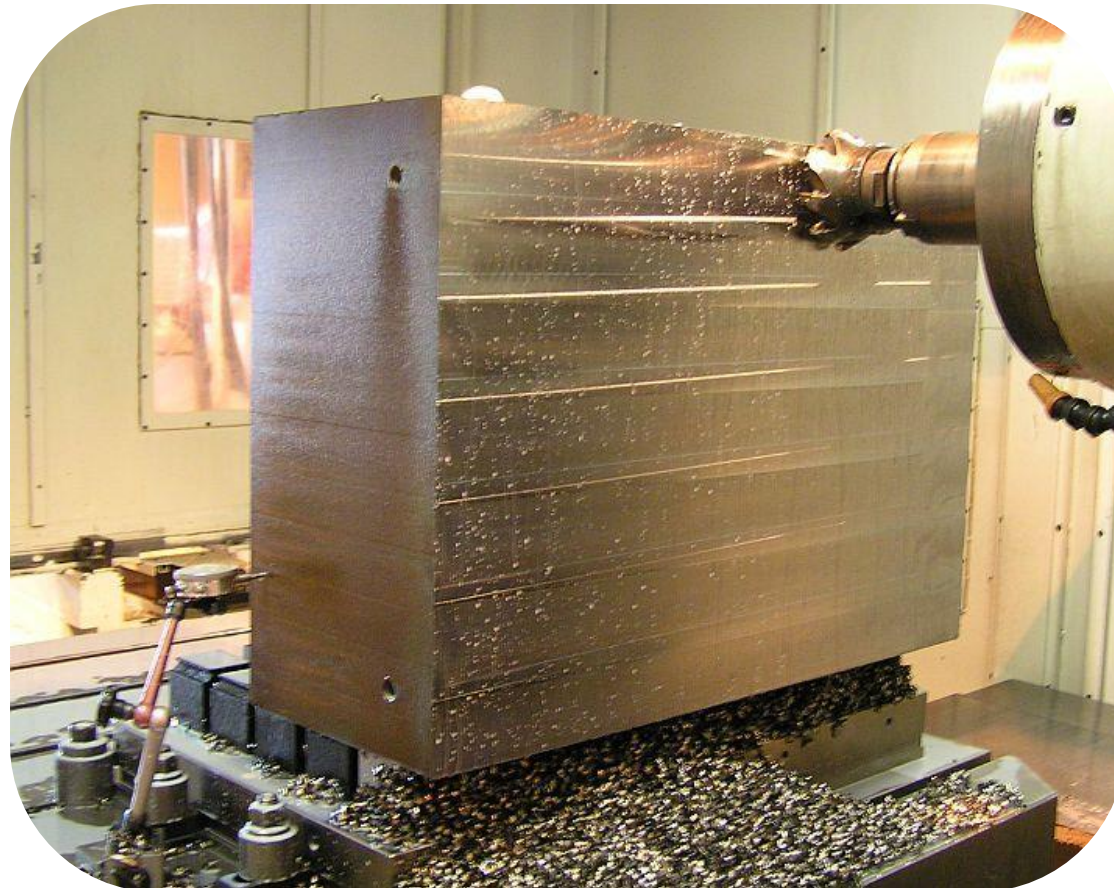
Aplicações

Uso em ferramentaria

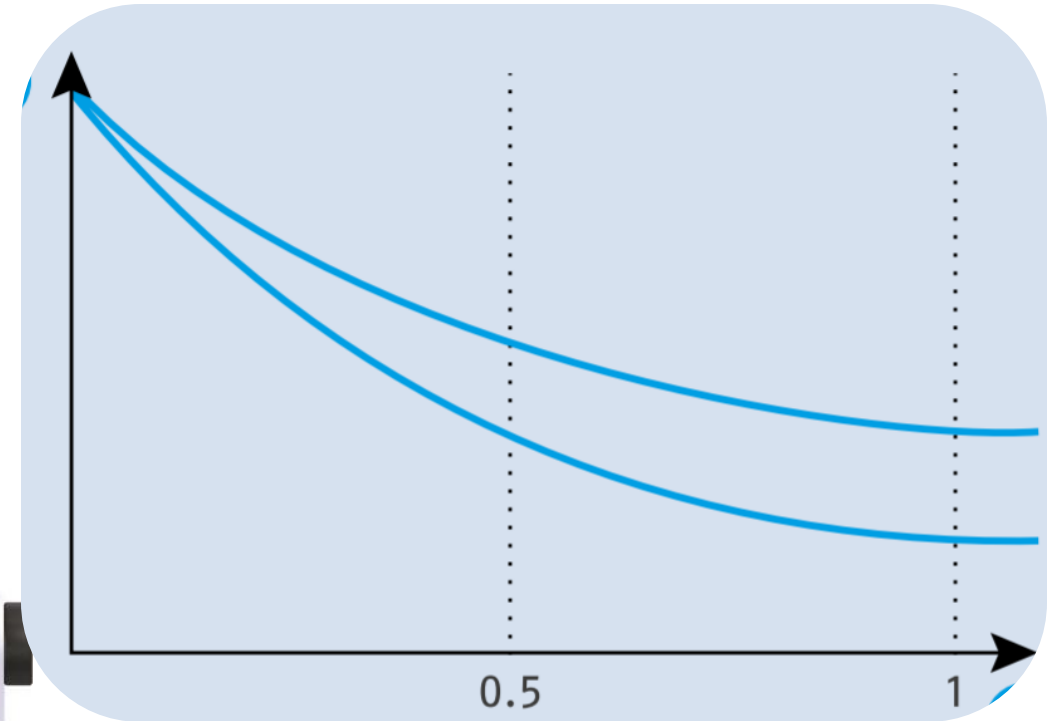
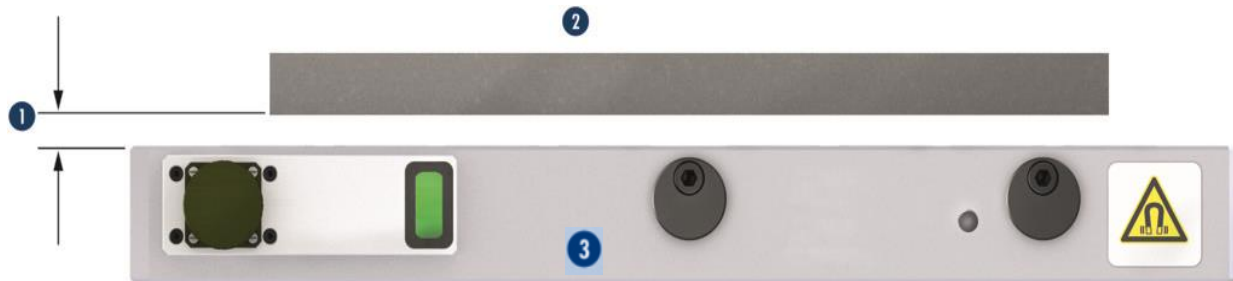
Blocos, brutos e acabados



- 5 lados livres
- Sem tensionamento
- Ótima planeza
- Sem residual magnético



MAGNOS - Influências na Força de Fixação



- 1 Air gap (espaço em vazio onde a peça não encosta na mesa ou nos prolongadores de polos)
- 2 Peça
- 3 Mesa magnética MAGNOS

MAGNOS 32, 50, 70, A1, A2

Simplificando os modelos e as aplicações

32

50

70

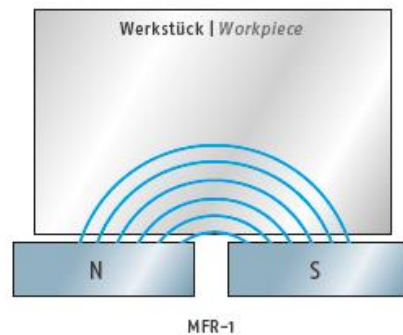
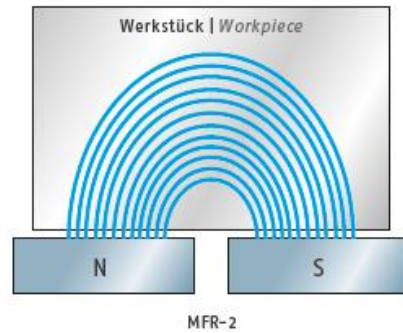
A1

Maior o polo, maior o fluxo e espessura

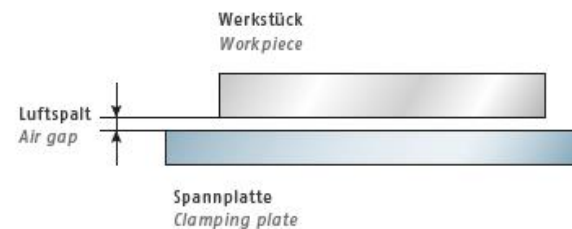
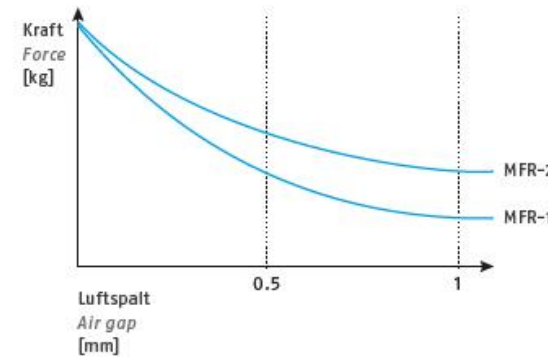
A2

Duplo ímã, maior o fluxo magnético e eficácia (airgap, liga do material)

Density of the magnetic field



Air gap



mín 16mm

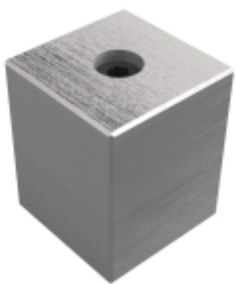
mín 20mm

MAGNOS – Montagem correta dos prolongadores de polos

Os prolongadores de polos são utilizados em situações como:

- Usinagens de produtos com **faces irregulares** (laminadas, forjadas, fundidas). Isso minimiza o *air gap*. Já que os polos móveis possuem movimento para cima e para baixo, isso proporciona **altas Forças de Fixação SEM deformar** a peça.

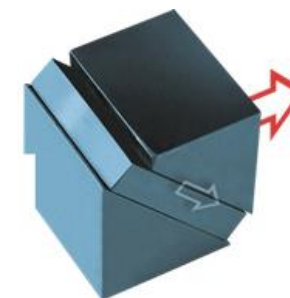
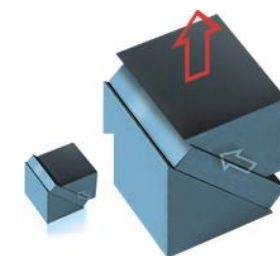
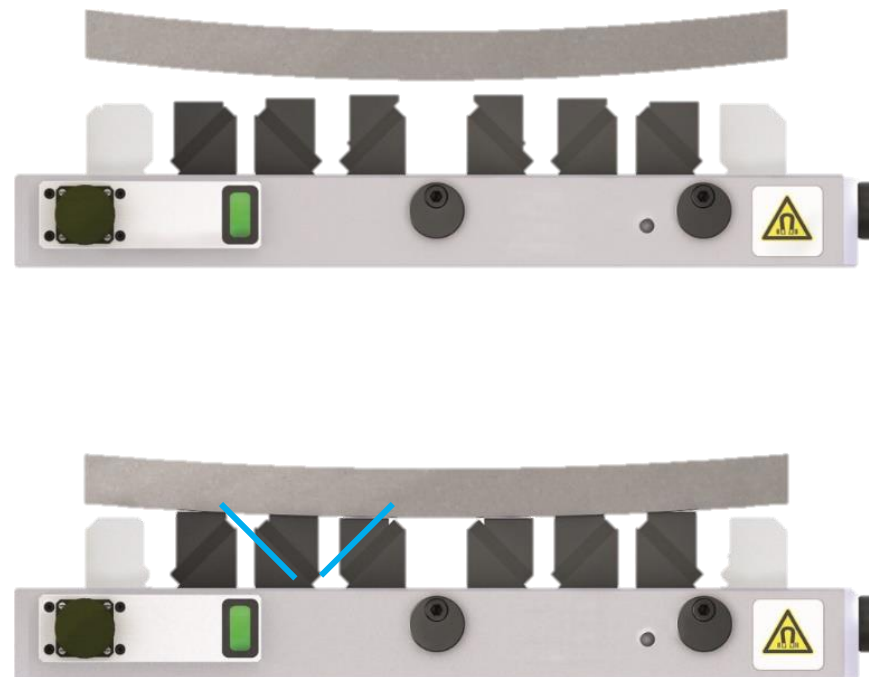
Fixo



Móvel



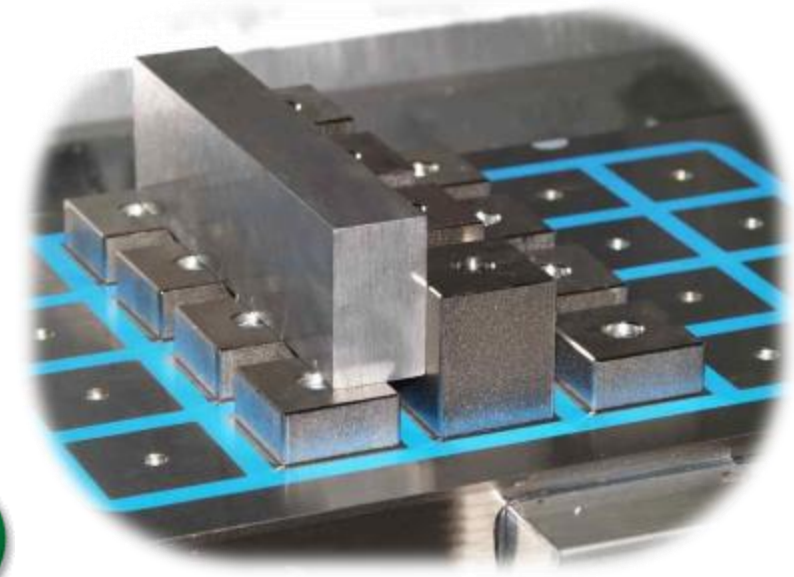
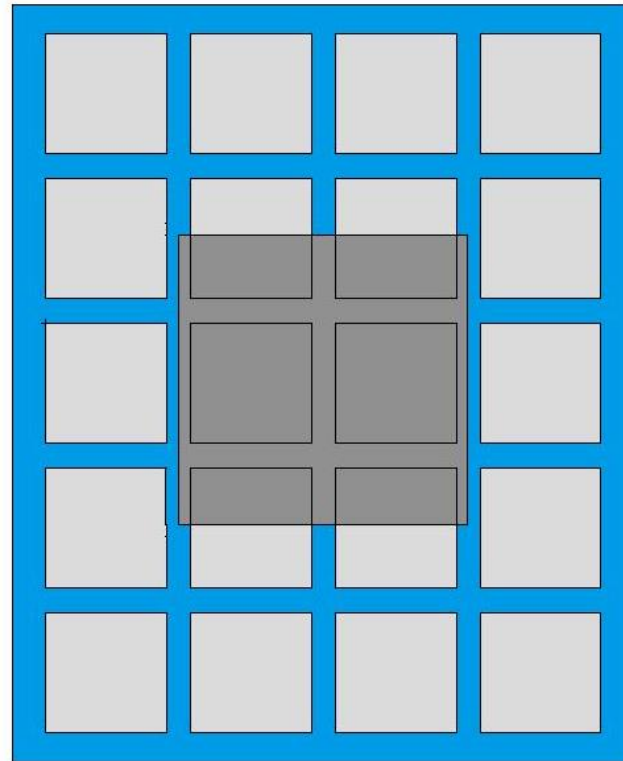
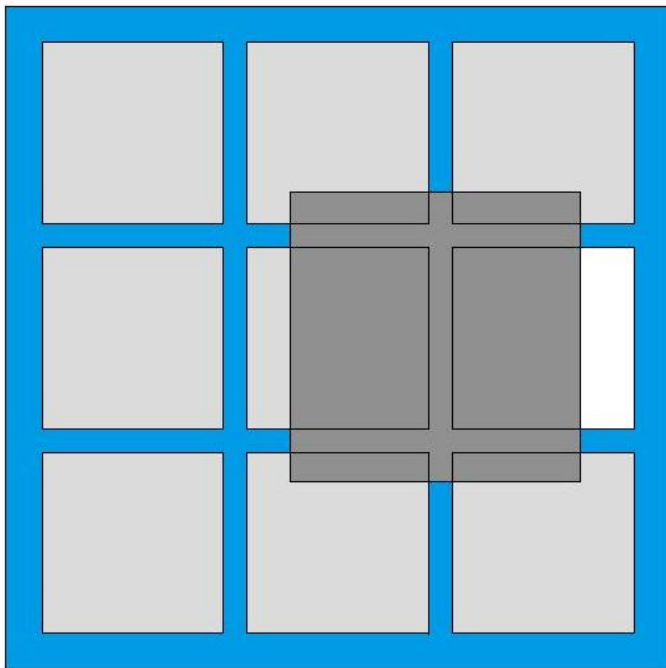
SEMPRE são utilizados no mínimo **3 polos fixos** para garantir o **plano de referência** para a peça



Prolongadores com coberturas especiais
> **coef. atrito**



Exemplos de Fixação de Peças



1 mesa MAGNOS preenchida nas condições ideais tem força aproximada de 18 t,

48 polos com 15.2 daN/cm² cada

1 pole = 50 mm x 50 mm = 25 cm²
48 x (25 cm² x 15.2 daN/cm²)
= 18,240 daN

Video: Actuation



Sistema de fixação magnético

- + Os 5 lados da peça livres para usinagem completa
- + Prolongadores de pólos que se adequam às irregularidades
- + Nenhum residual magnético após a fixação



3 Seg
PARA FIXAR UMA PEÇA



Escorregou com peça grande... E agora?

Correção de erros na fixação da peça



Encosto mecânico



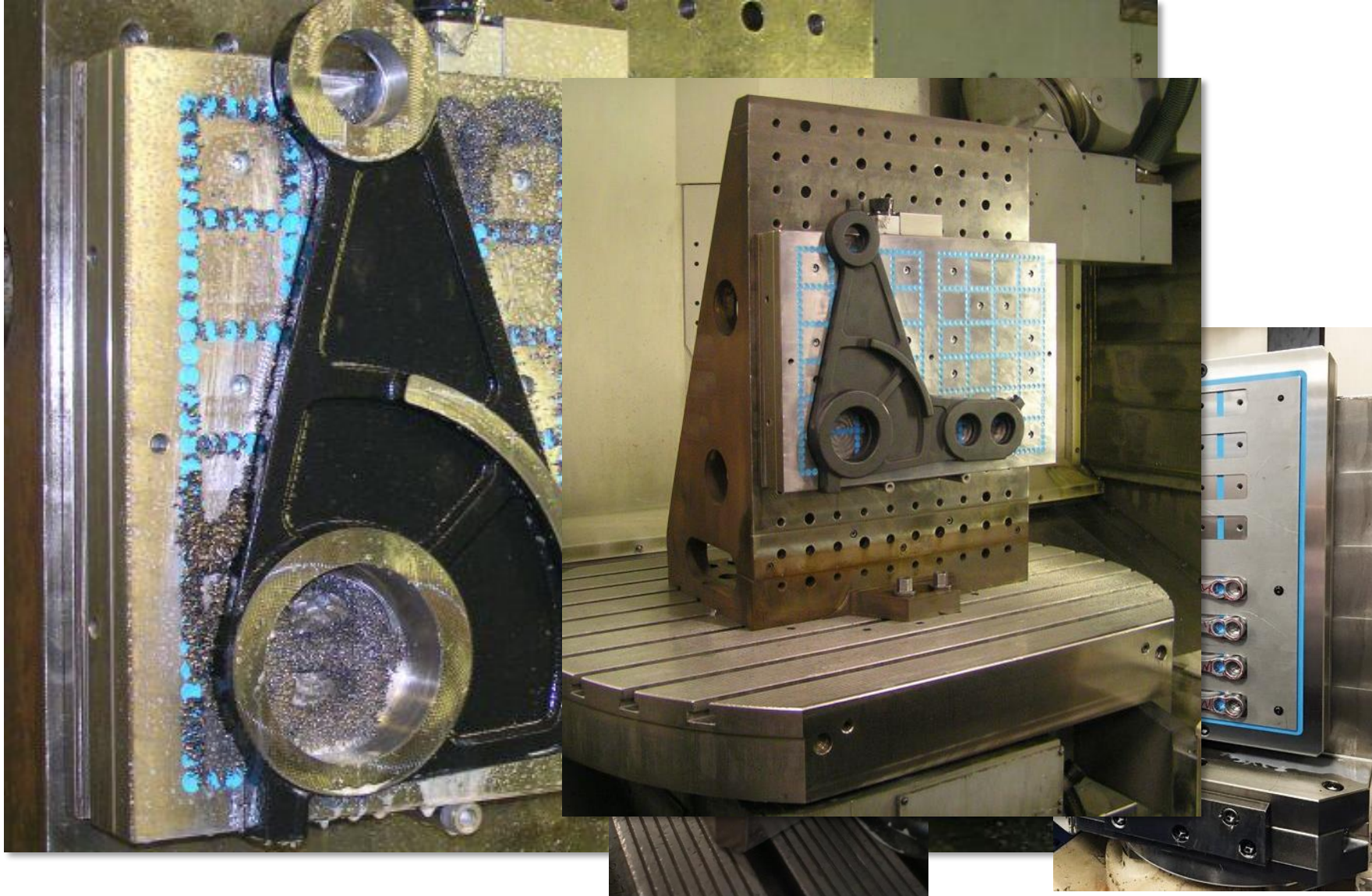
Encosto magnético



Prolongadores especiais

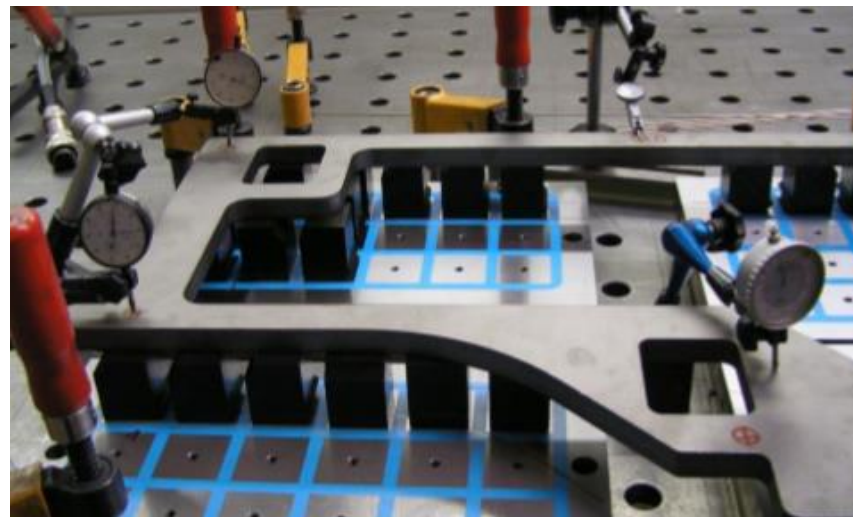


Mascaras para fixação



Exemplos de fixação

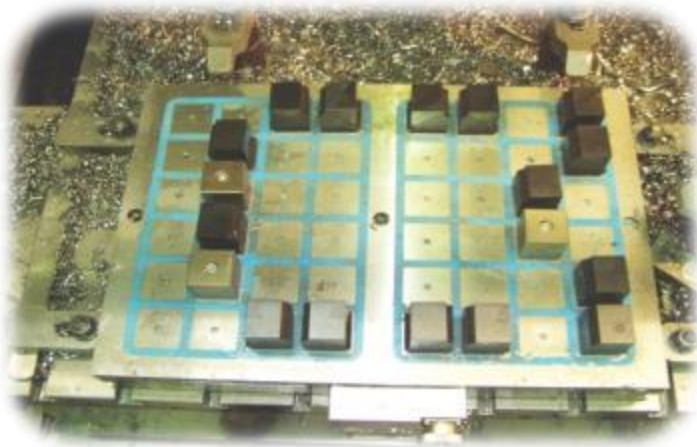
Máscaras, encostos e dispositivos



Fixação magnética



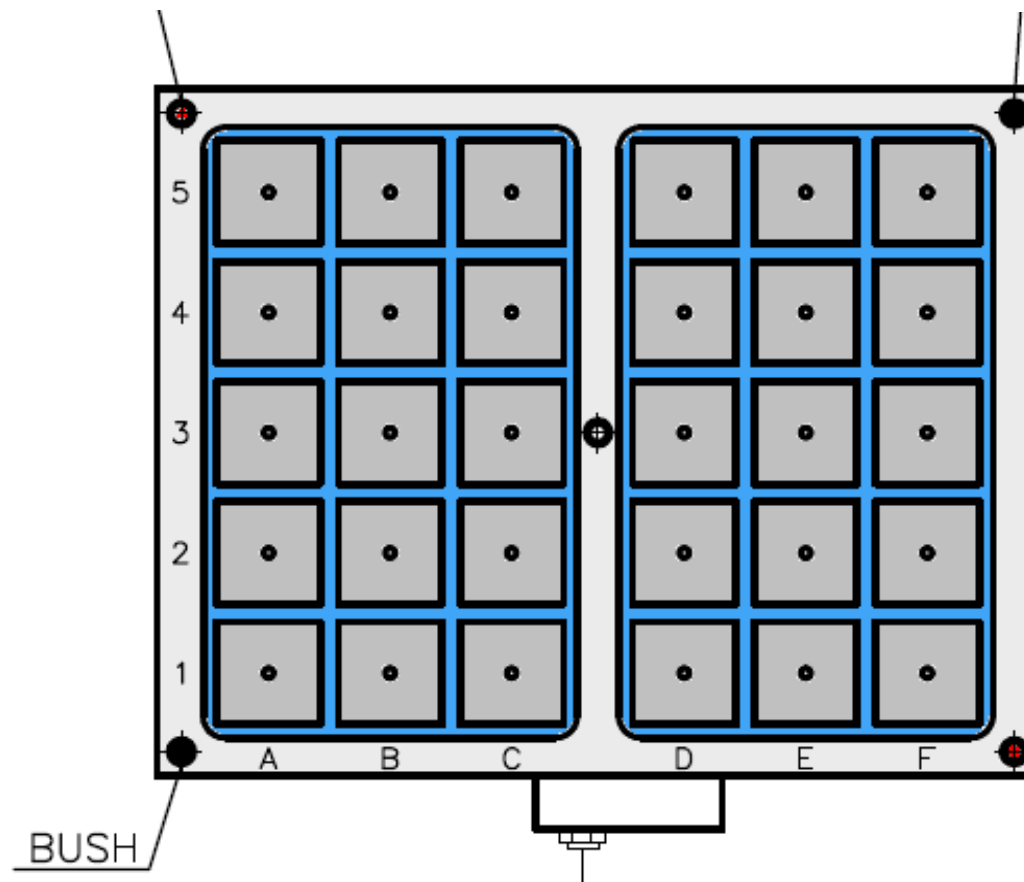
Indicadores alfanuméricos para set-up rápido



Melhor documentação na preparação
graças à indicação alfanumérica

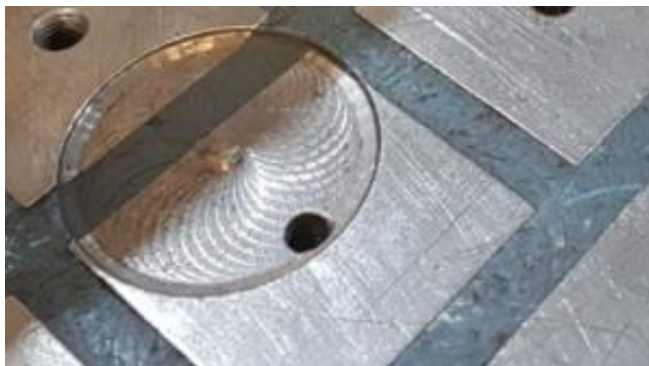
Furos para orientação

Furos para fixação



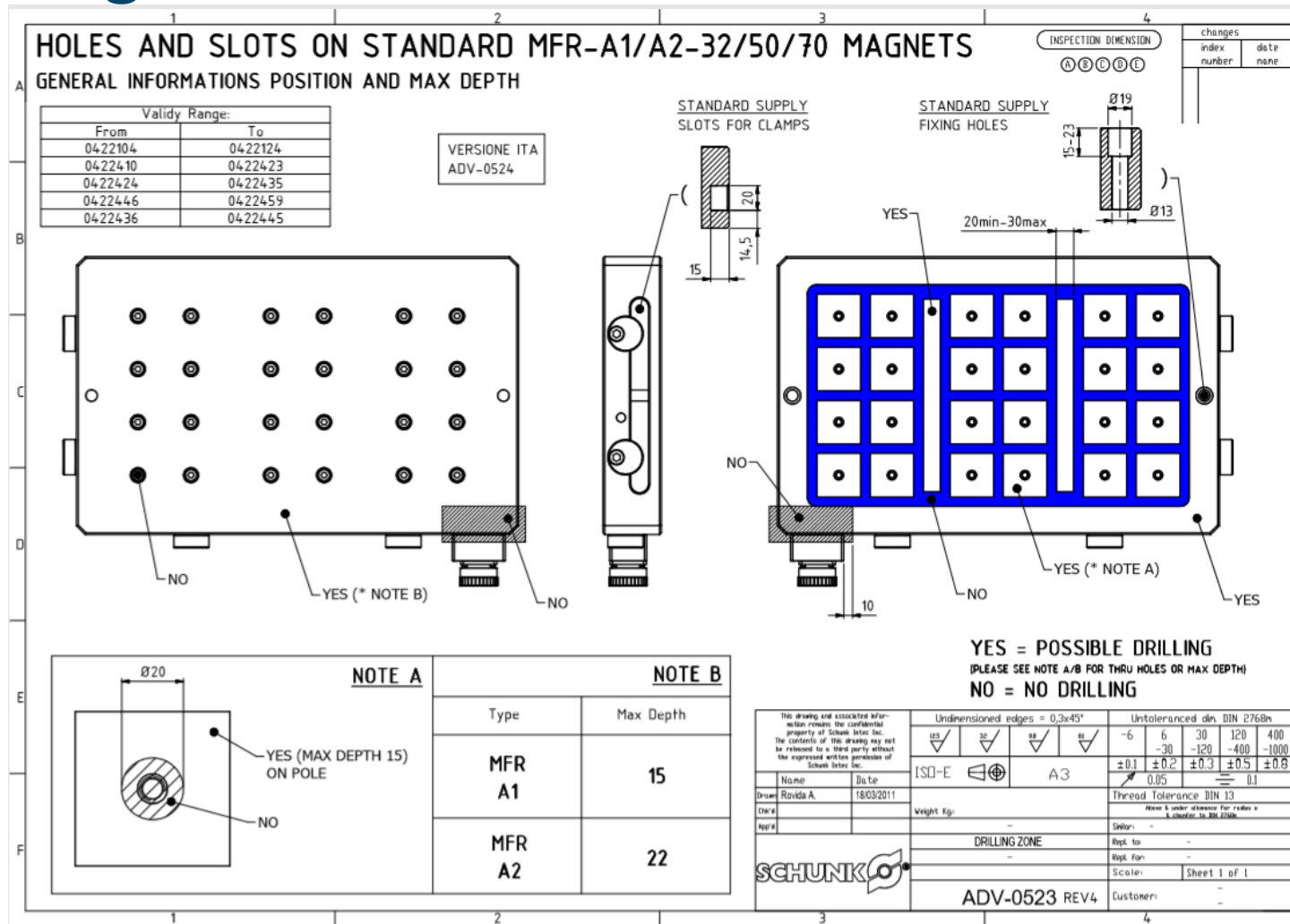
Marcação pode ser feita
pelo próprio cliente

Possibilidade de usinagem na face da mesa



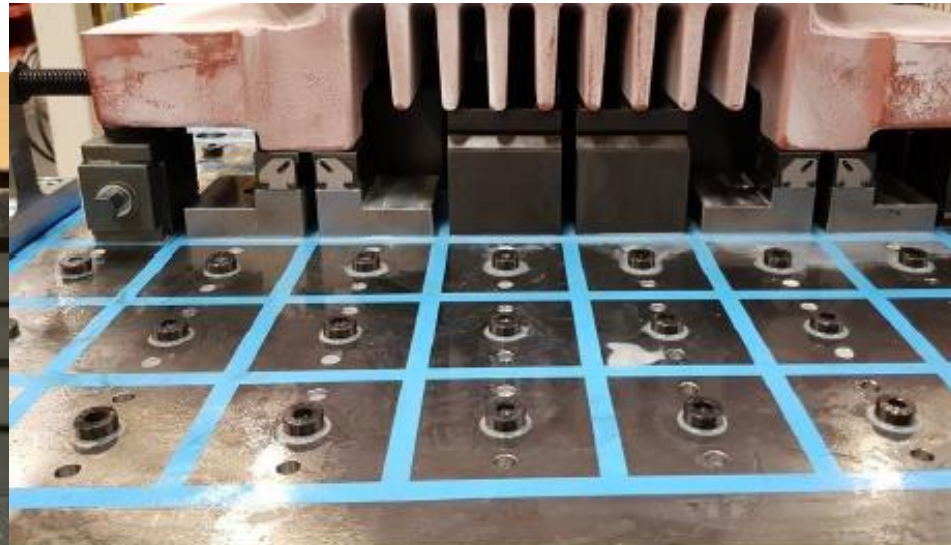
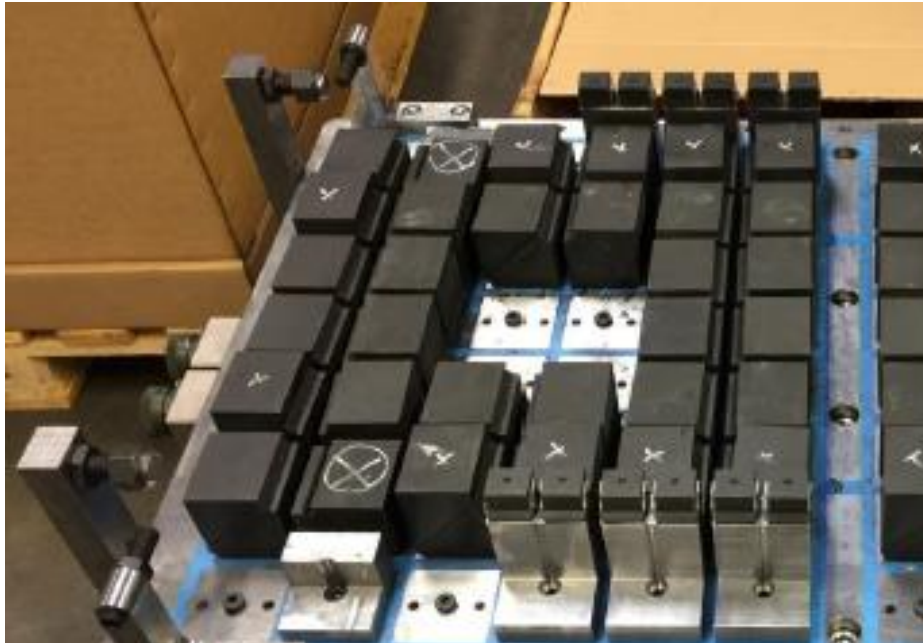
Sobremetal e resina

- 3mm EC
- 5mm MFRS



Desenho de exemplo favor consultar para correta especificação

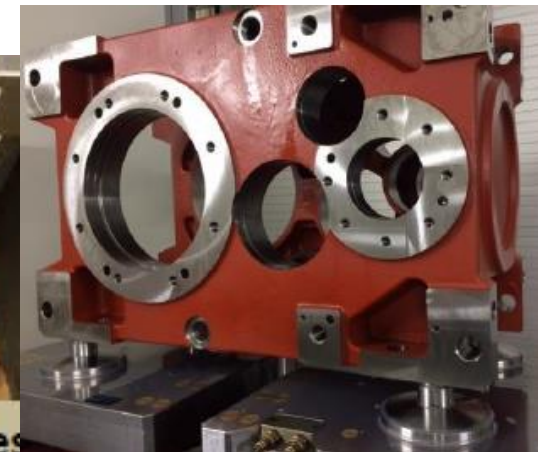
Pino centralizador na face da mesa



OP10 com MAGNOS; polos adaptados (furo calibrado mais pinos) para troca rápida da disposição/arranjo na mesa magnética (sem necessidade de aparafusar à mesa)



OP20, com VERO-S fixo direto na peça



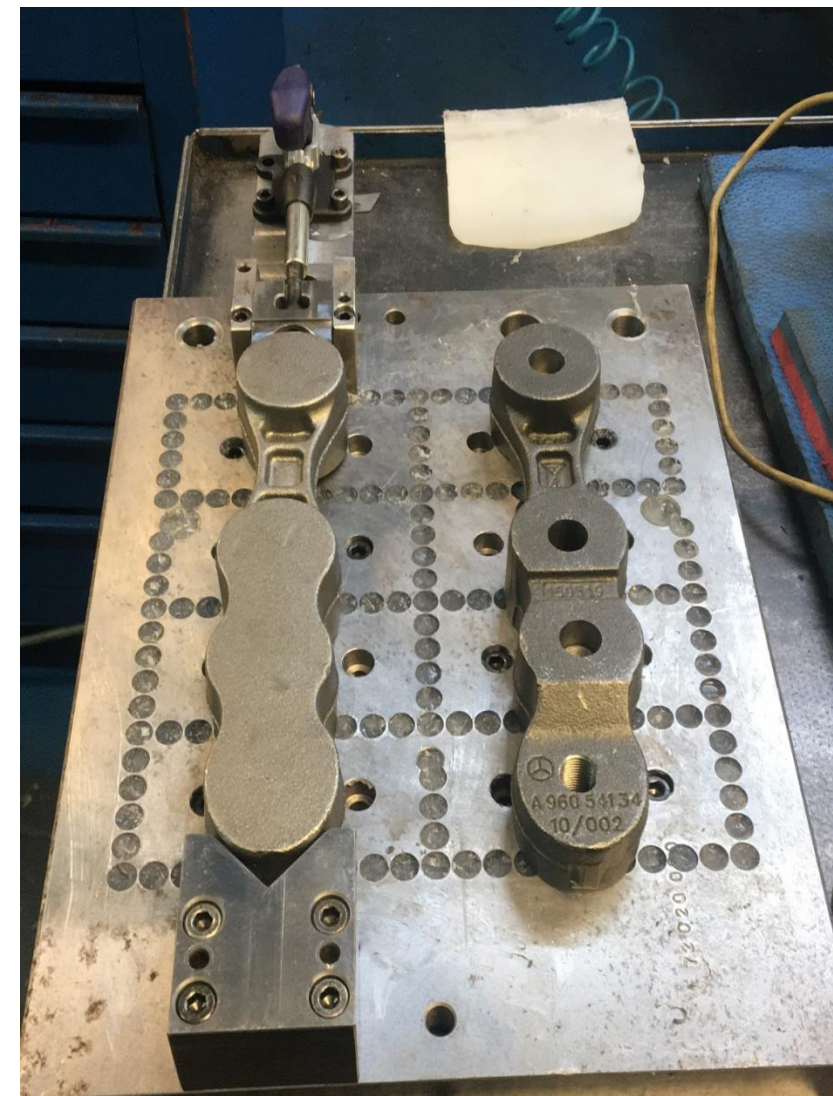
Fixação magnética



Aplicações

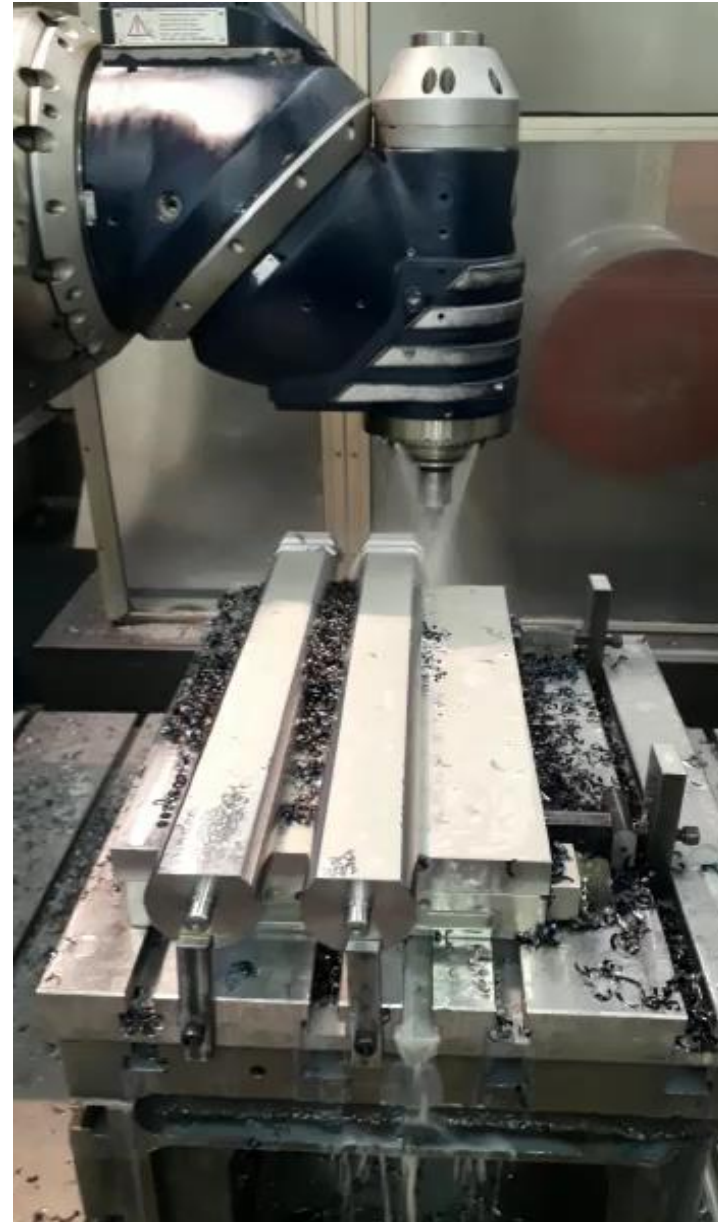


7 PONTOS DE APERTO



1 PONTO DE APERTO

Aplicações



Aplicações



Workpiece size

1000 x 800 x 190 mm

Type of material

Cast iron steels

Machining operations

Drilling

Face milling

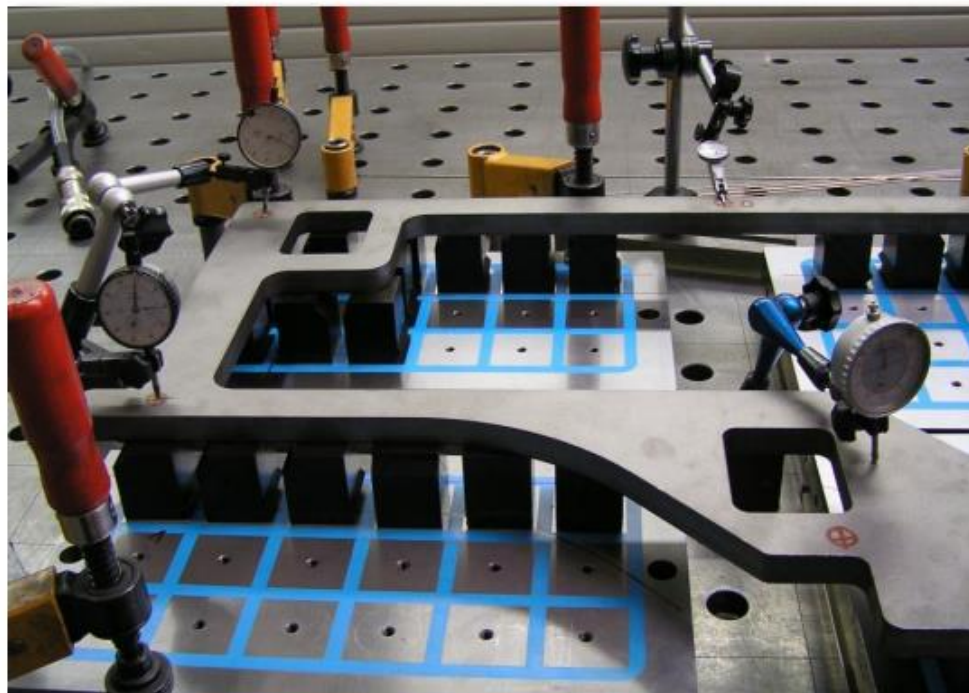
Form milling

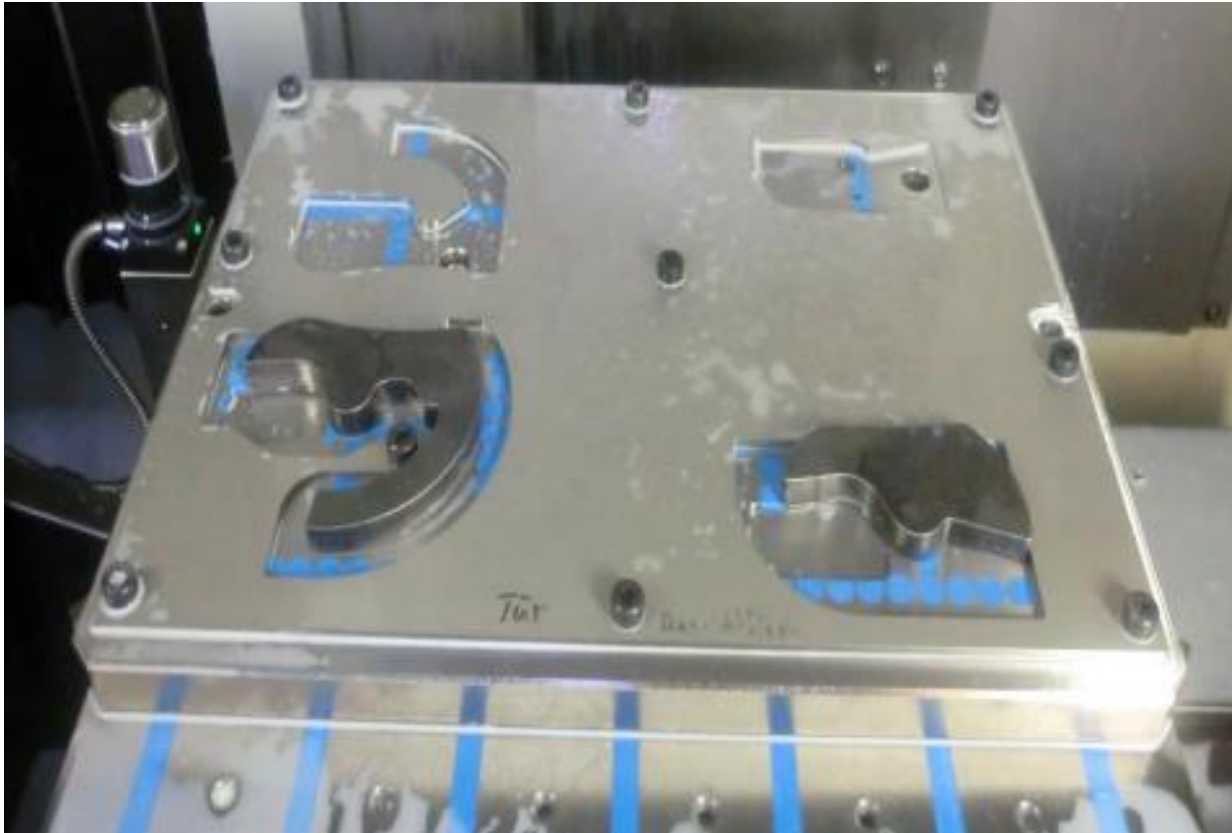
Aplicações

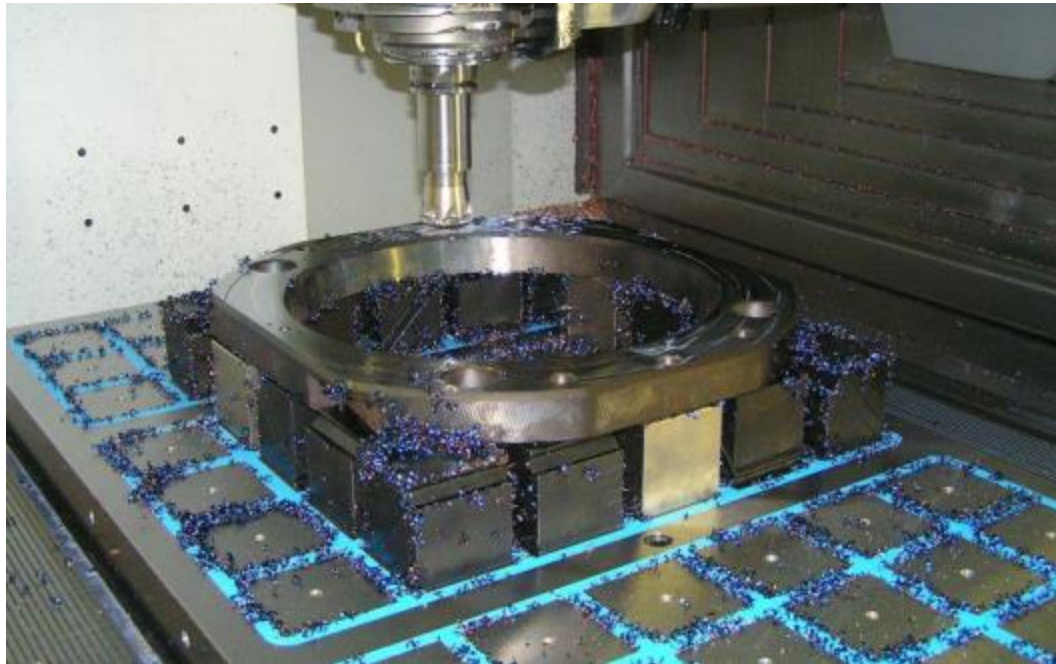
Workpiece size
950 x 530 x 20mm

Type of material
Structural steel

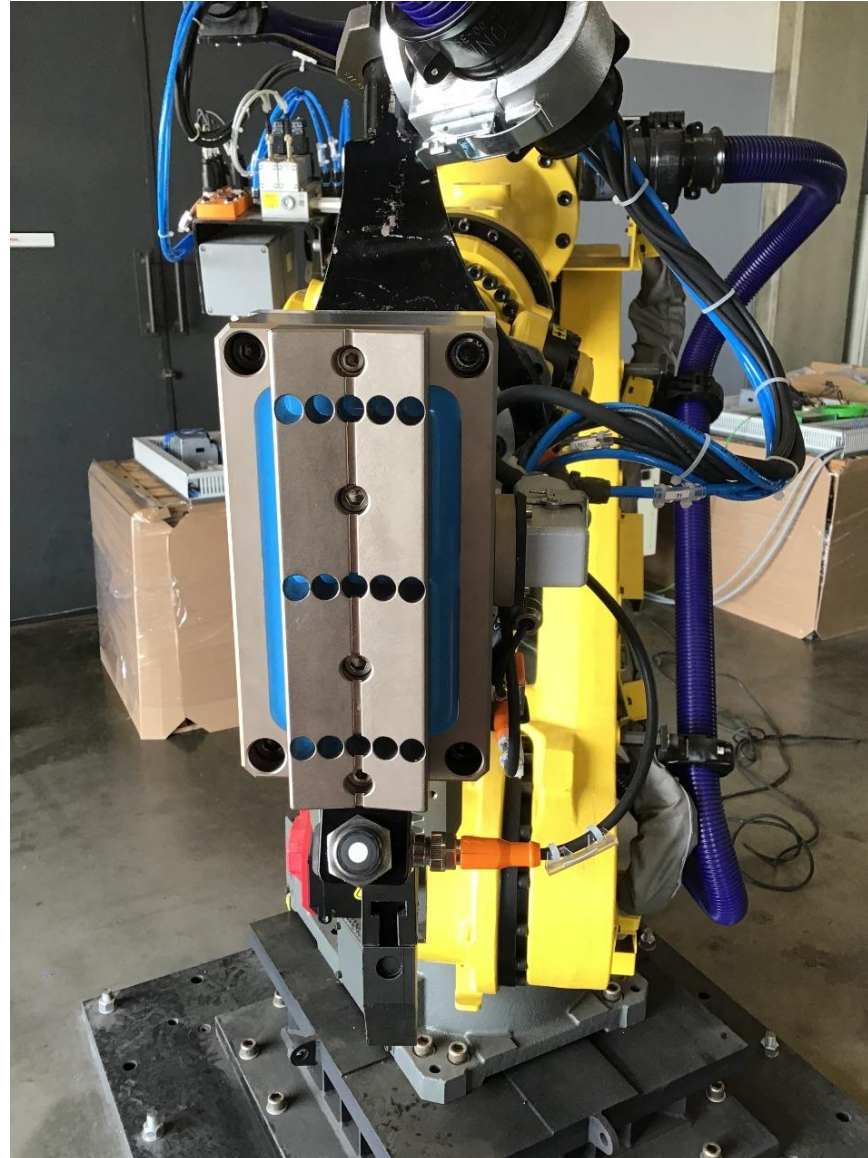
Machining operations
Face milling







Aplicações



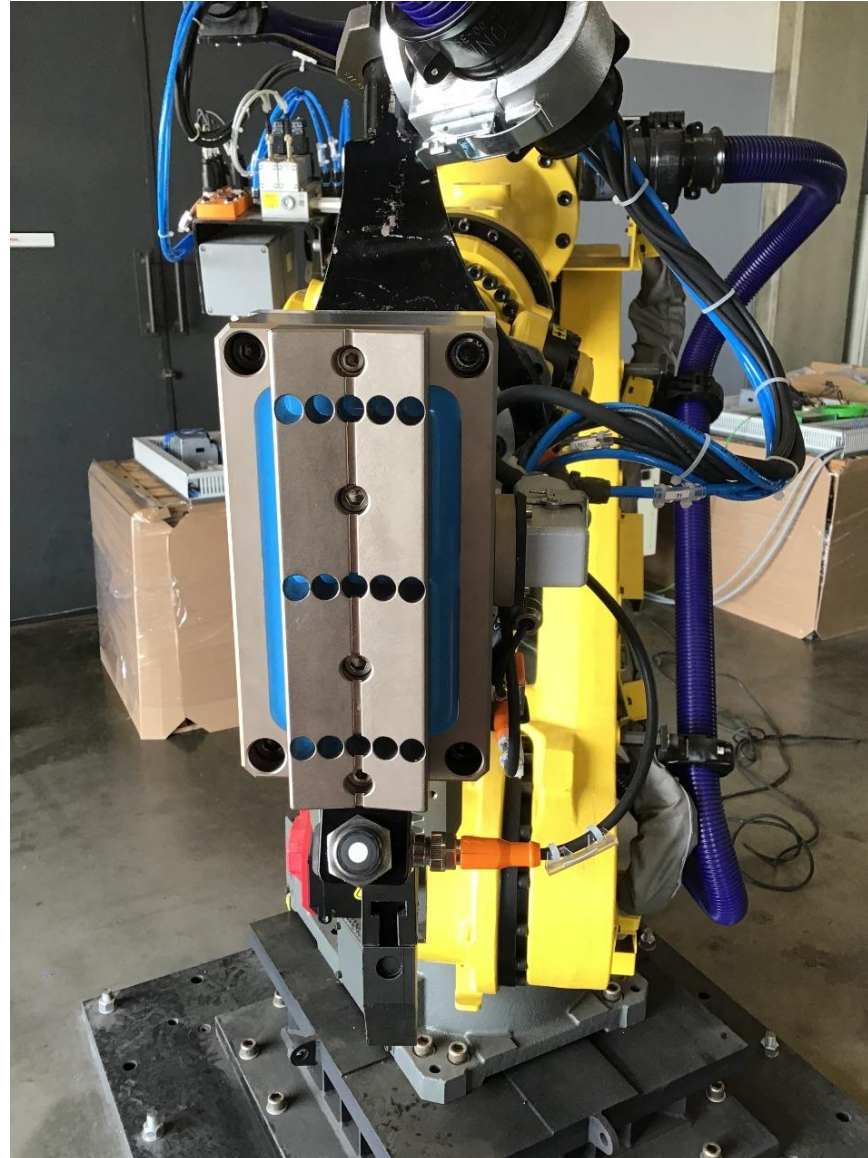
Aplicações



Aplicações



Aplicações



Aplicações



A close-up photograph of a CNC machine's tool head. Two drill bits are visible, one in the foreground and one slightly behind it, both pointing downwards towards a metal workpiece. The machine components are made of polished metal, and the background is softly blurred.

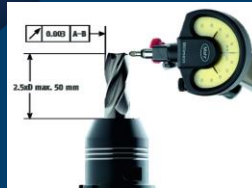
A importância do porta-ferramenta em usinagem de alto desempenho

4 pilares importantes

Os 4 pilares

Batimento

Quanto o centro da ferramenta está distante da linha de centro do porta ferramenta



01

Força de Fixação

Qual a força exercida sobre a haste da ferramenta fixada no porta ferramenta



02

Balanceamento

Qual o grau de balanceamento do conjunto



04

03



Absorção de Vibração

Como o porta ferramenta absorve as vibrações geradas na usinagem

Os porta ferramentas disponíveis no mercado



Mecânicos

- Porta Pinça
- Weldon
- Whistle Notch

Térmicos

- Porta Ferramenta de Indução Térmica

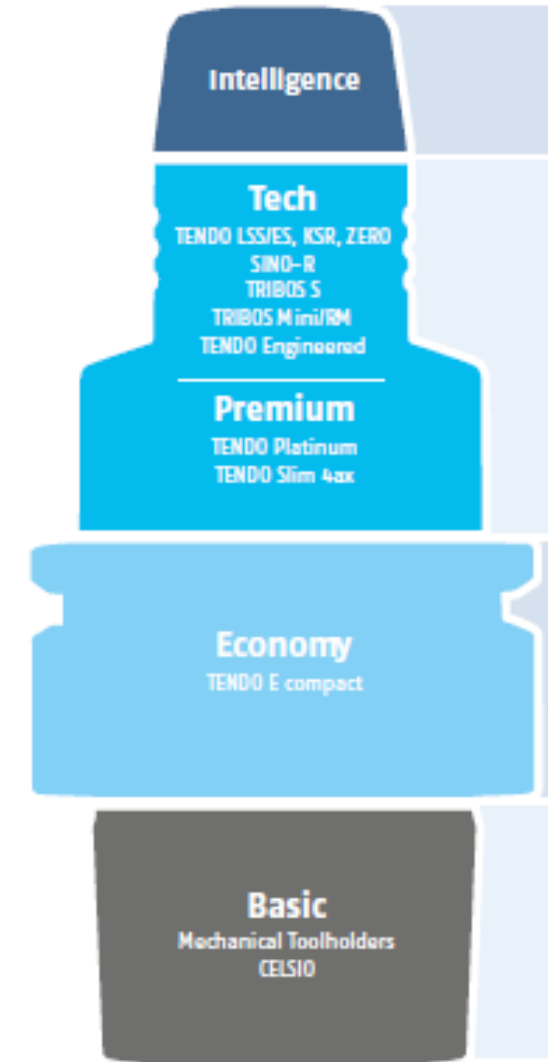
Hidráulicos

- Porta ferramentas com acionamento hidráulico

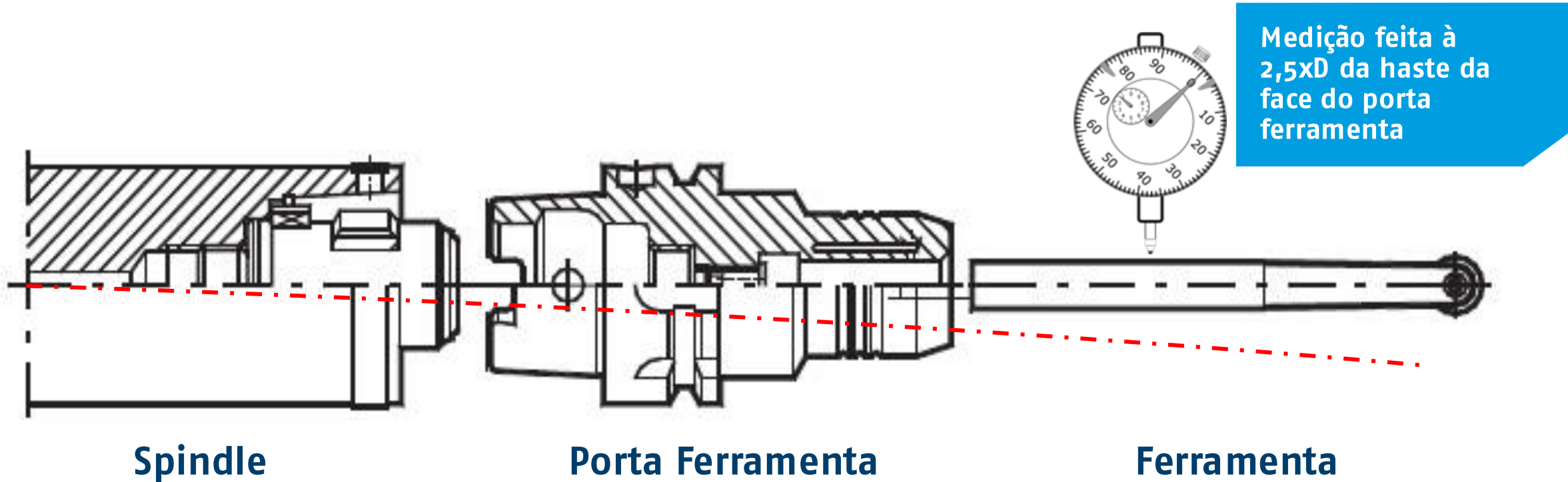
Outros

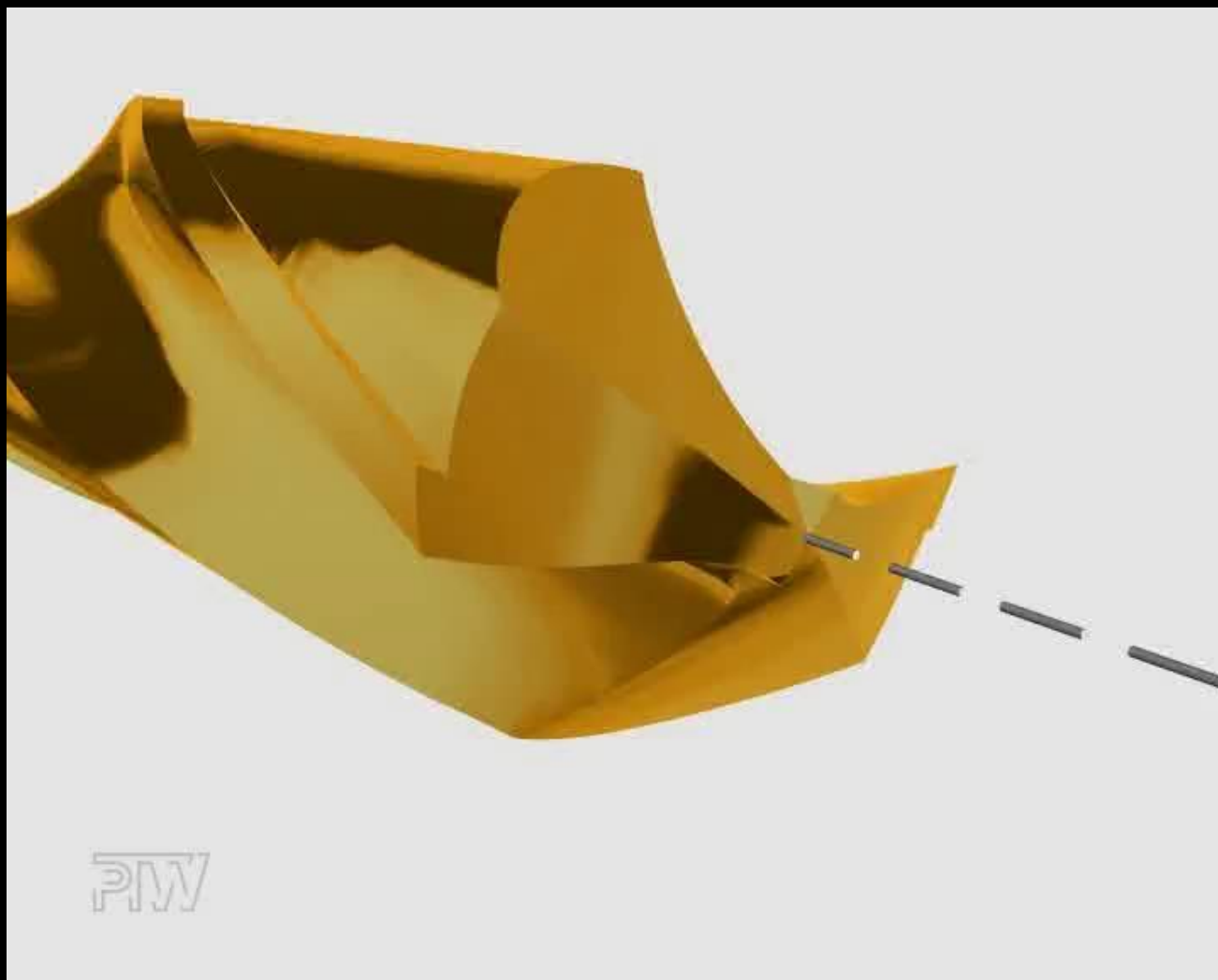
- Pinças de precisao
- TRIBOS
- SINO-R
- Outros

A família de porta ferramentas



1 – Batimento





PTW

1 – Batimento

Porta Pinça



Maior Batimento
Aprox. $>0,008\text{mm}$

WELDON



Térmico



Menor Batimento
 $\leq 0,003\text{mm}$

Hidráulico



2 – Força de Fixação

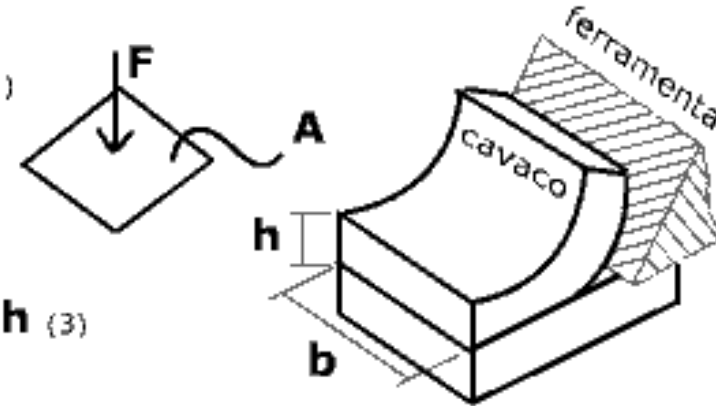


$$F_c = k_c \cdot A \quad (1)$$

$$A = b \cdot h \quad (2)$$

(2 cm 1)

$$F_c = k_c \cdot b \cdot h \quad (3)$$



Porta Pinça



$M_{\max}$ aprox.
350Nm

Térmico



$M_{\max}$ aprox.
700Nm

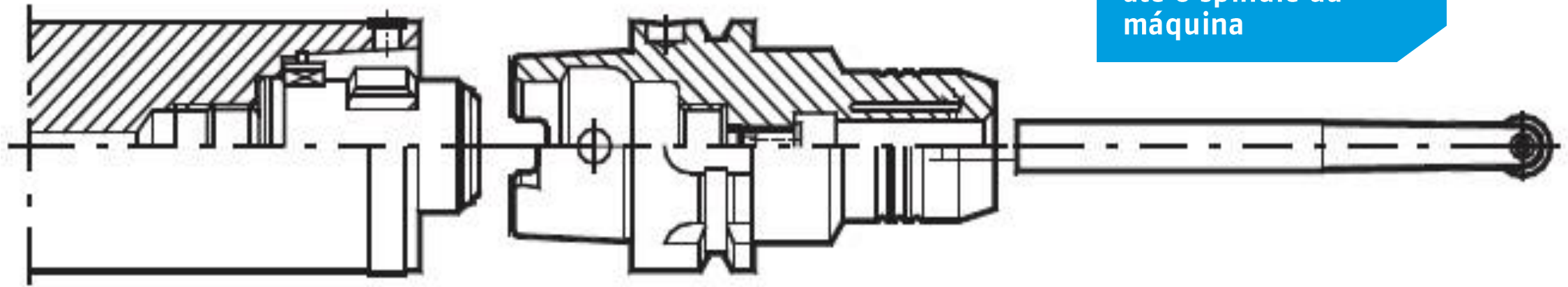
Hidráulico



$M_{\max}$ aprox.
900Nm

3 - Absorção de vibração

A vibração passa do ponto de usinagem até o spindle da máquina



Spindle

Porta Ferramenta

Ferramenta



Menor vida útil da ferramenta



Pior acabamento superficial



Menor vida útil do spindle

4 - Balanceamento

Geração de forças centrífugas

O desbalanceamento produz forças centrífugas no spindle



Desgaste ferramenta

Desbalanceamento gera um desgaste prematuro da aresta de corte da ferramenta.



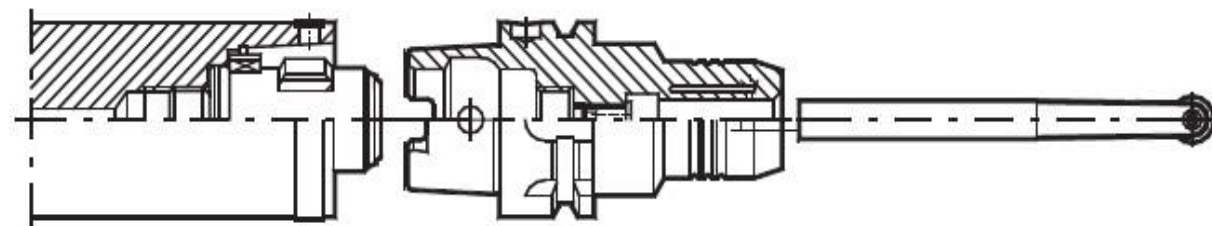
Redução vida útil spindle

O desbalanceamento gera uma redução da vida útil dos rolamentos do spindle



Impedem giro suave

As forças centrífugas impedem o giro suave da ferramenta



A família de porta ferramentas



ER Collet Chucks



WELDON End Mill Holders



Whistle Notch Mountings



Face Mill Arbors



CNC Short Drill Chucks



Morse Taper Mountings



Thread Shank Adaptors

Modelos de TRIBOS



- Tribos R



- Tribos S



- Tribos-mini



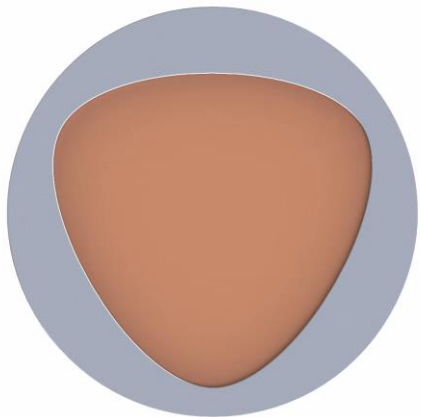
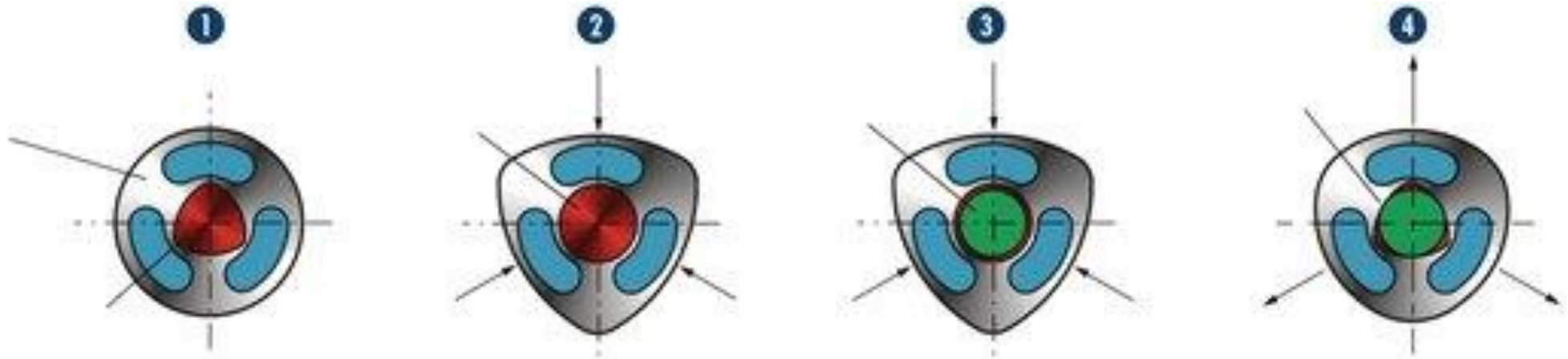
- Tribos SVL



- Tribos RM

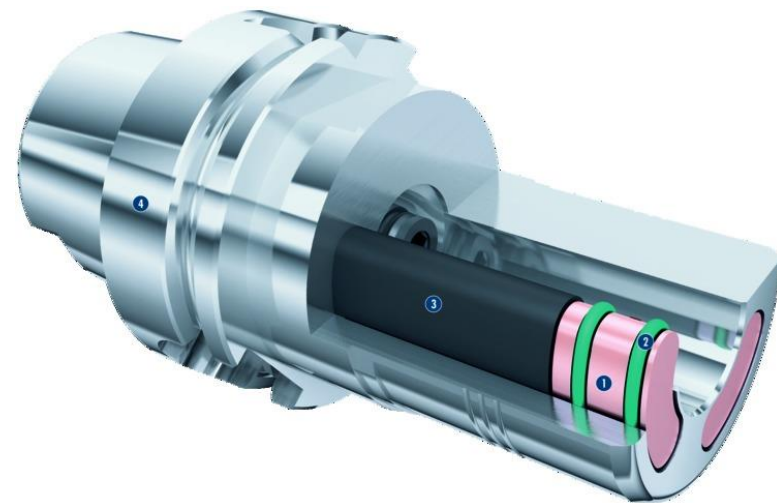
Principio de funcionamento

TRIBOS-R



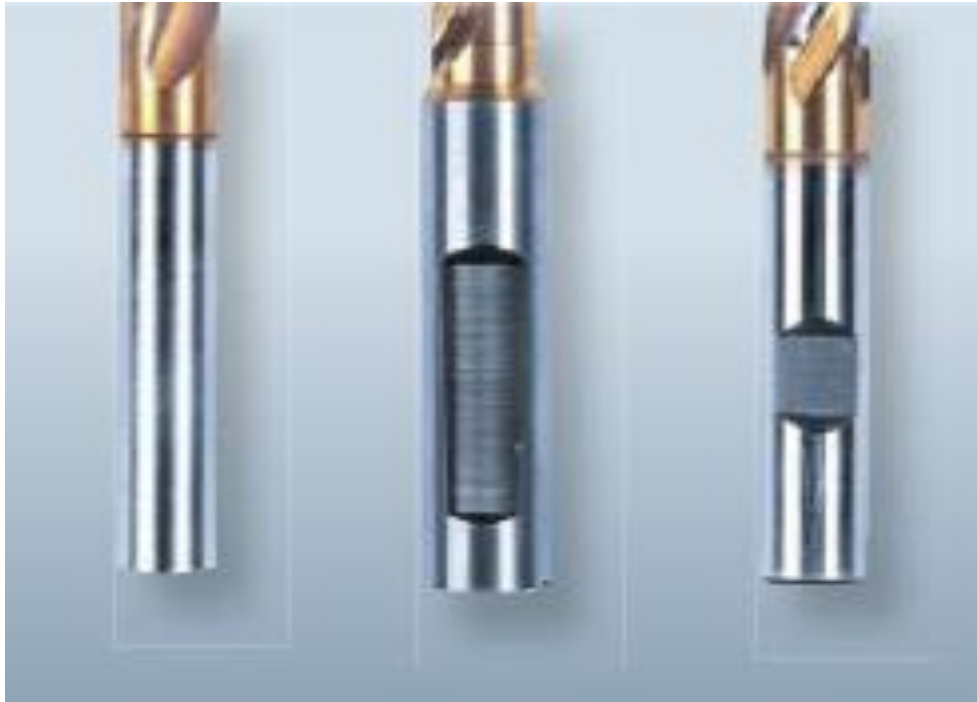
TRIBOS – fixação poligonal

- Batimento < 0.003 mm
- Design simétrico
- Isento de manutenção
- Possibilidade de uso de buchas
- Grande range de fixação – inclusive micro usinagem (0.3mm)
- Amortecimento de vibração Tribo R e RM



Range de fixação de 0.3 – 32mm

- Todos os tipos de haste



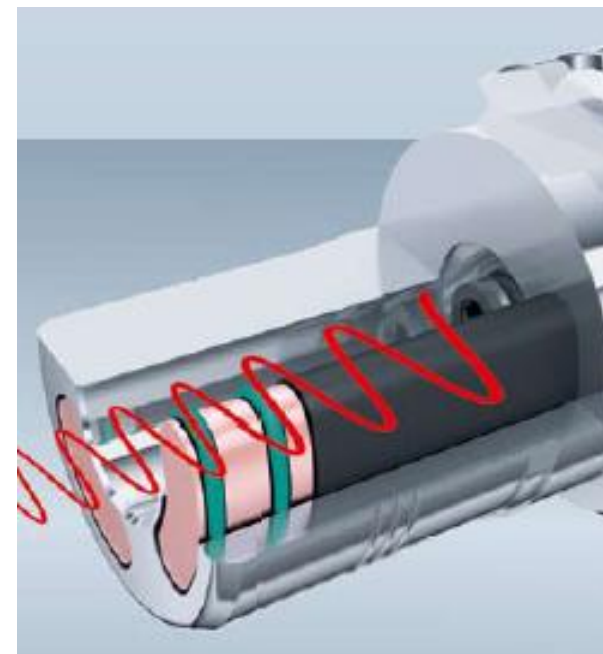
Desbaste e acabamento de peças

- Batimento $< 0.003\text{mm}$
- Melhor resultado em acabamento
- Perfeitamente simétrico
- Ótima estabilidade durante a usinagem



TRIBOS-R

- Estrutura interna para amortecimento de vibração
- Elevada rigidez radial
- Força de fixação distribuídas
- Rigidez lateral elevada resistência a deflexão
- Contorno externo otimizado



TRIBOS SVP

- Bomba hidráulica para deformação do PF
- Acessório para montagem das ferramentas no PF



- SVP-2

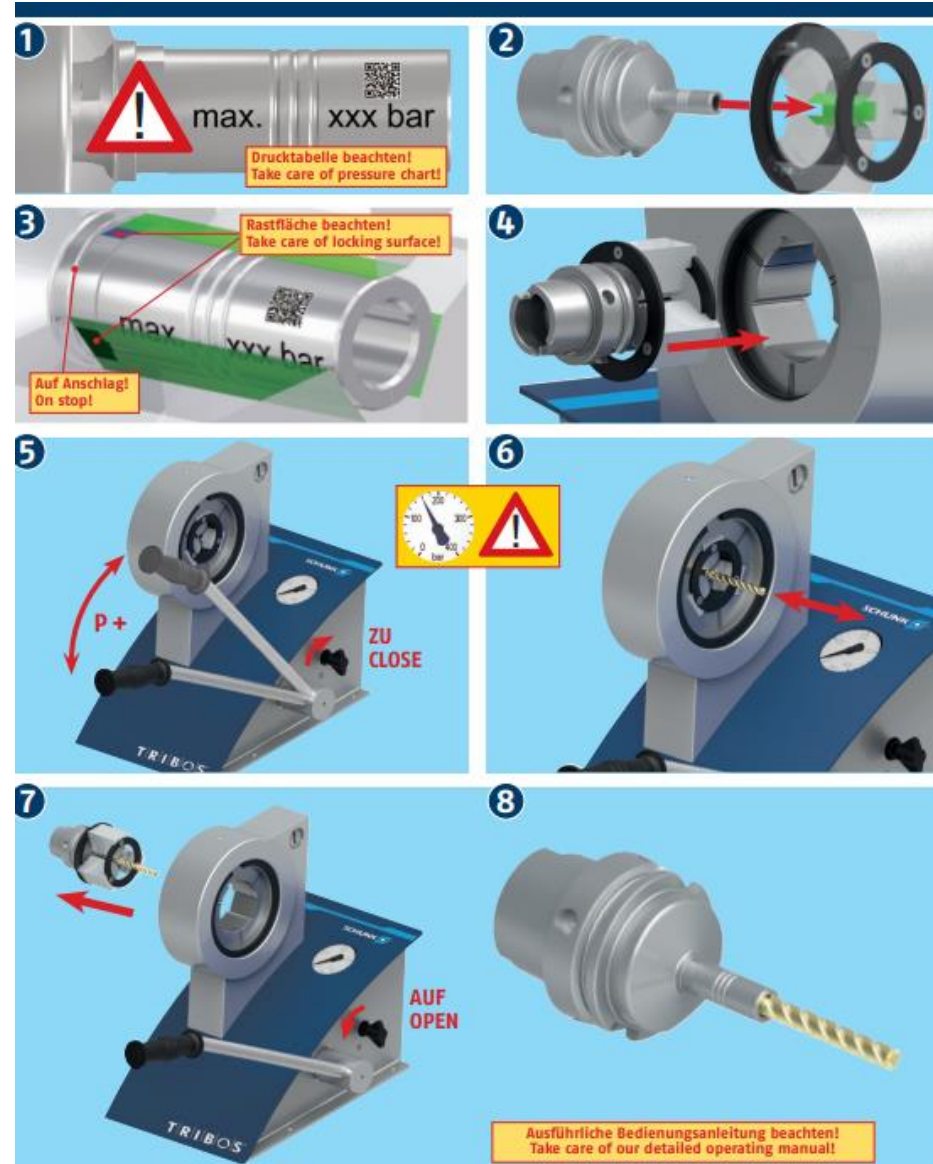


- SVP-2D



- TRIBOS SVP RM/mini

Guia rápido



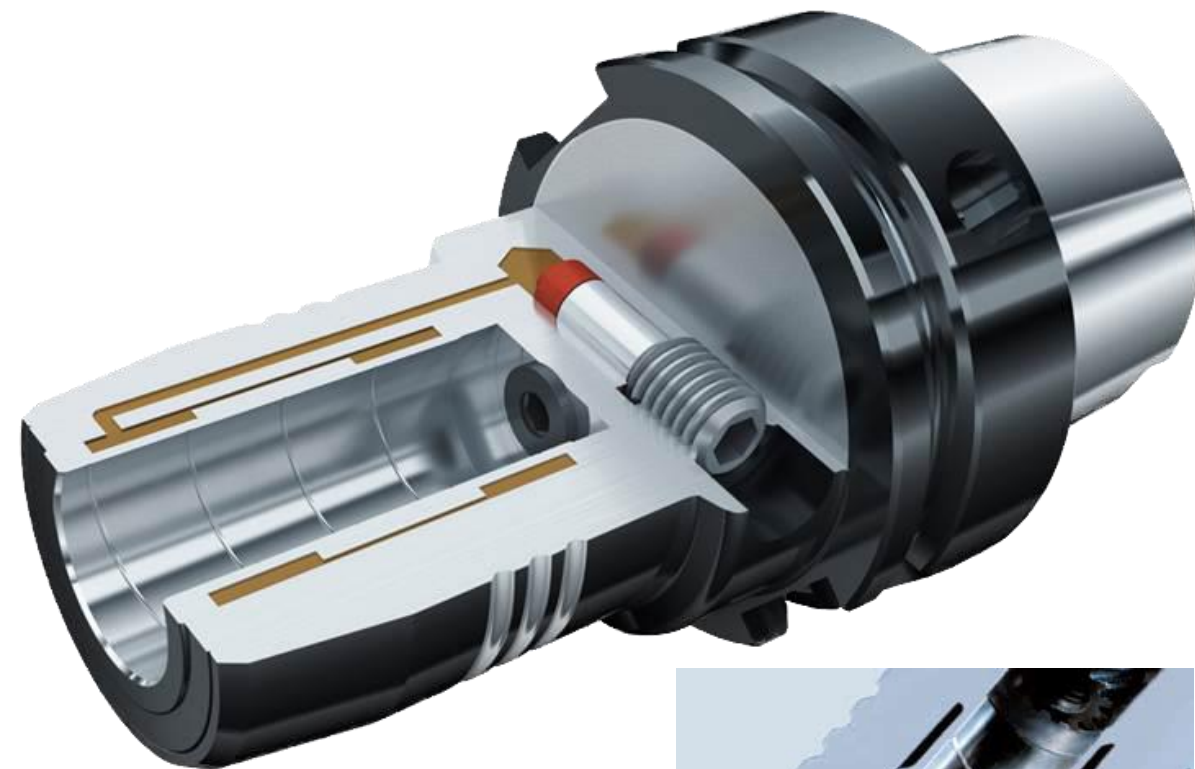
Hand in hand for tomorrow



Porta ferramentas Hydraulic



0 Mandril Hidráulico

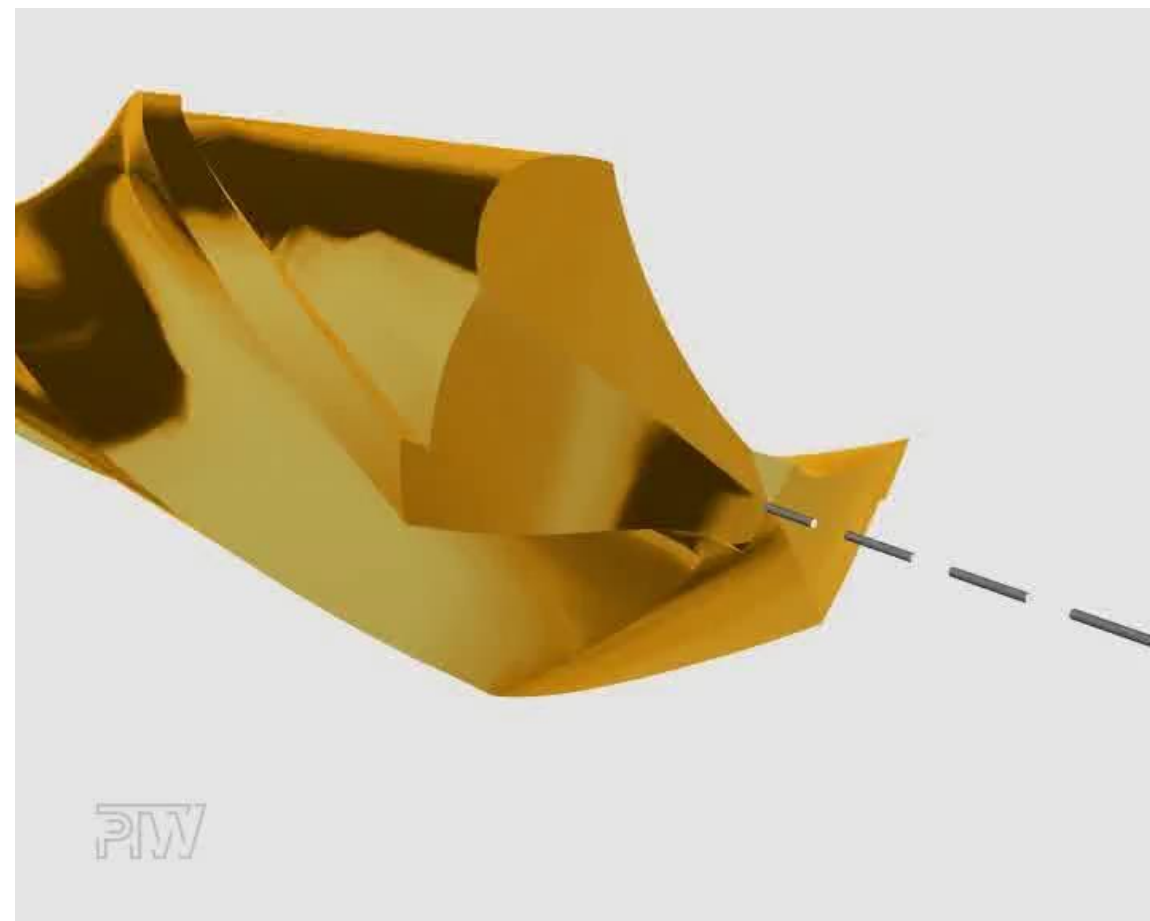
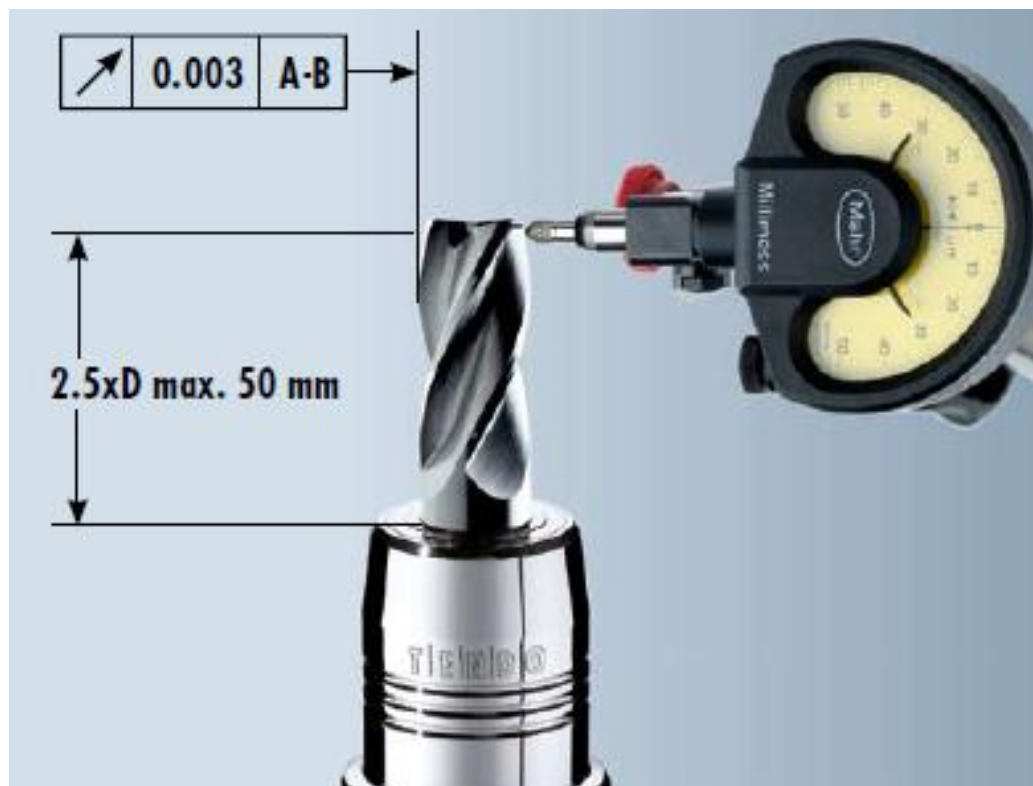


2000bar

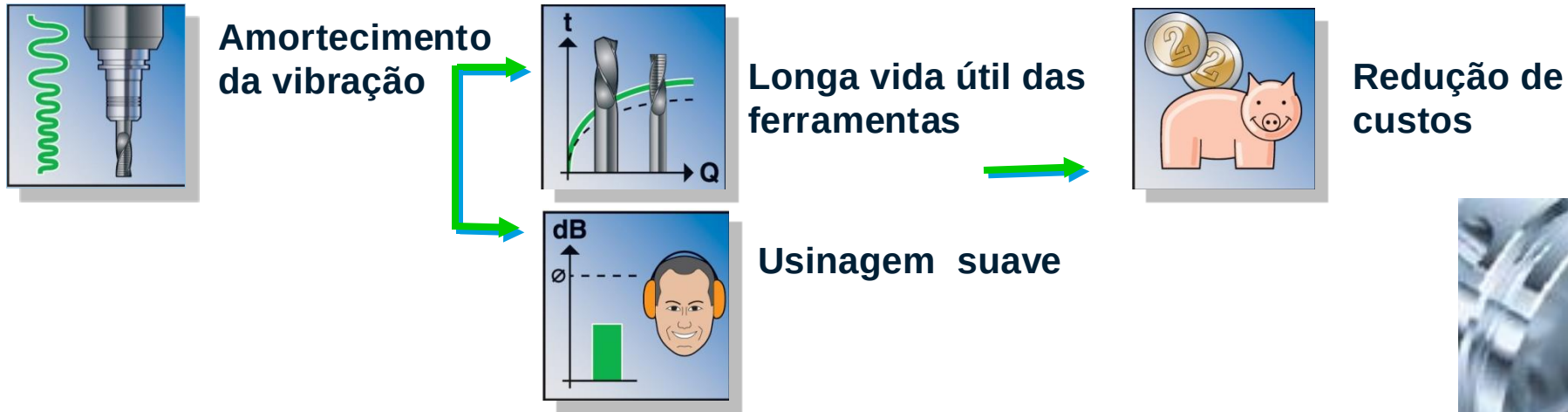


Funcionamento

0 Mandril Hidráulico



TENDO – O Mandril Hidráulico da SCHUNK



Melhor qualidade da superfície evitando marcas de usinagem.

O amortecimento se mostra positivo para a vida útil do fuso da máquina.

Economia de até 50% na vida útil da ferramenta de corte



Família TENDO



Classic



E compact



Slim 4ax



TENDOzero



ES



LSS



Porta ferramentas TENDO

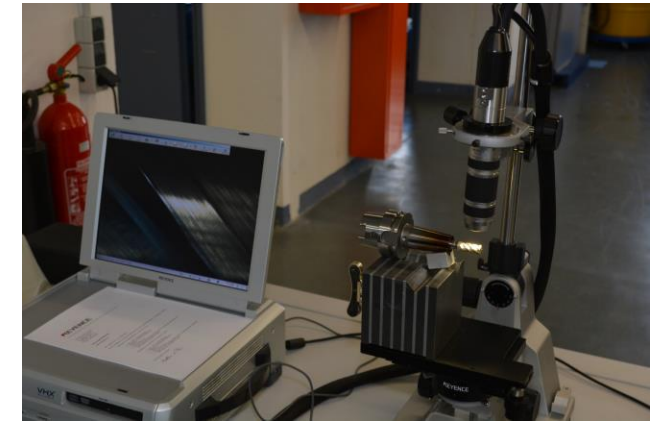
Celsio x TENDO



Superior Clamping and Gripping



TENDO x Celsio

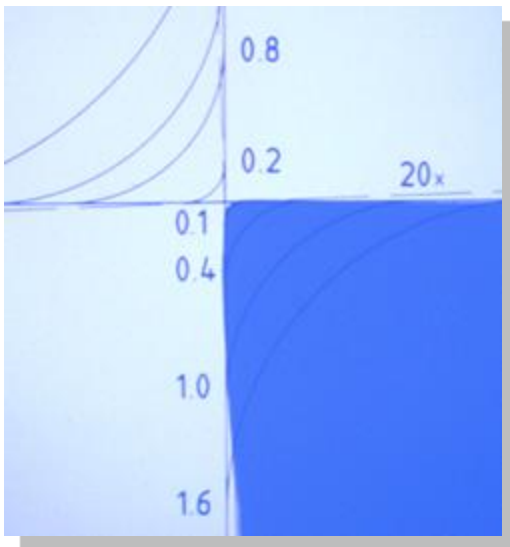


TENDO – O Mandril Hidráulico da SCHUNK

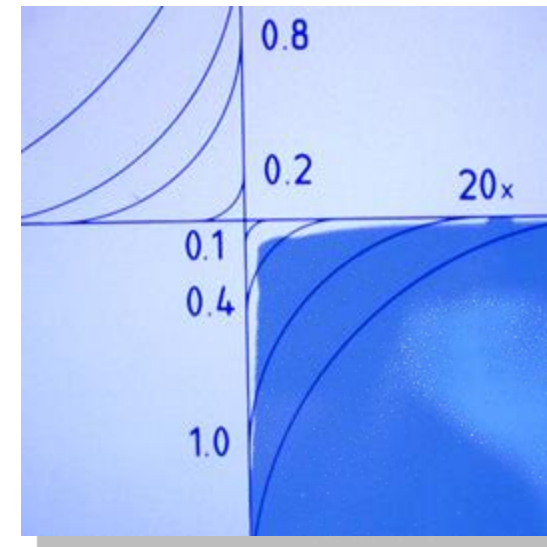


Amortecimento
de vibrações

Representação: ampliação em 20 vezes em *presetter*



Nenhum micro lascamento na aresta de corte
(devido amortecimento)



Micro lascamento na aresta de
corte (sem amortecimento)

Trochoid milling

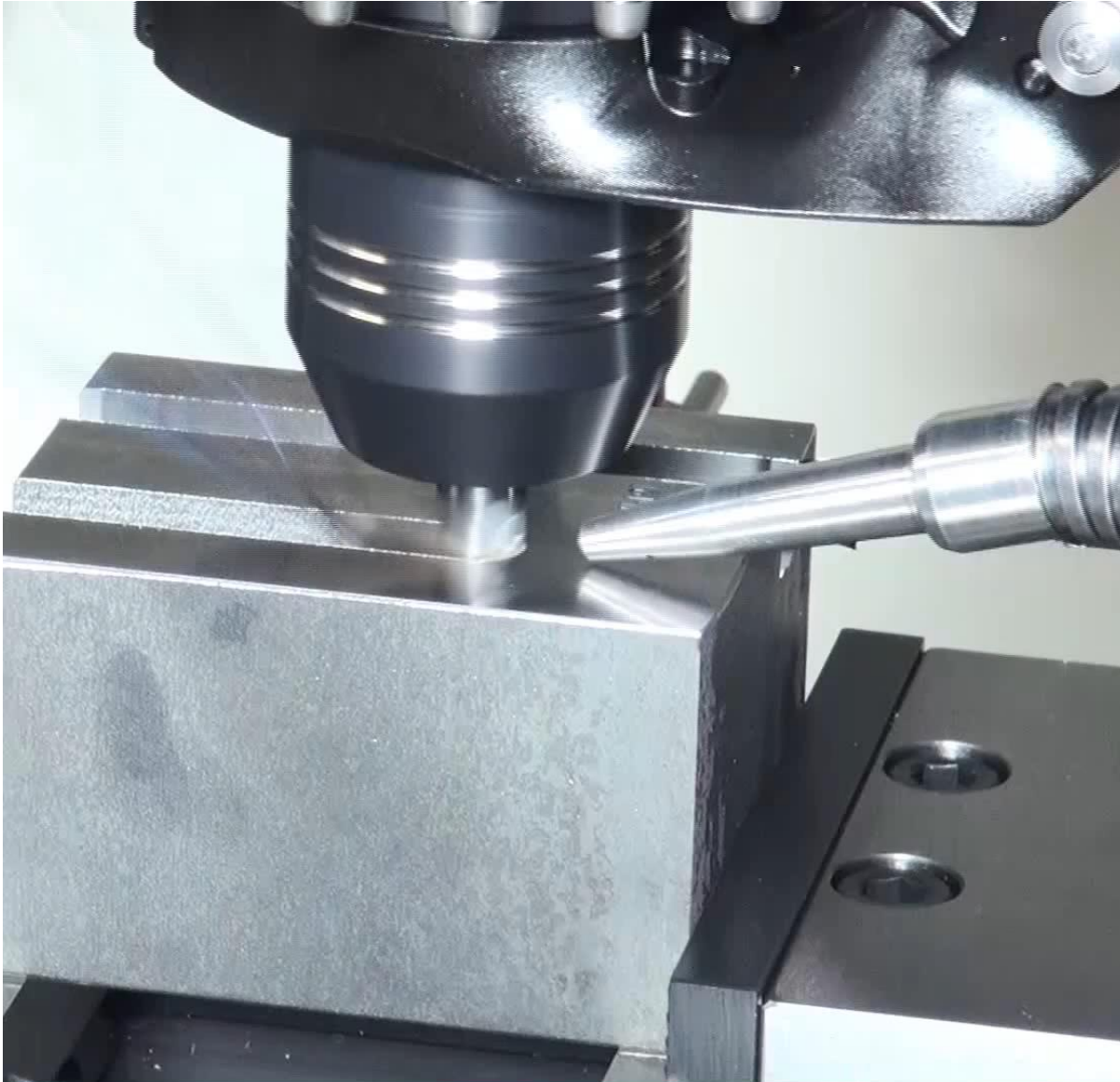


Trochoides Fräsen

Trochoid Milling

SCHUNK 

Tendo-EC – 2x D

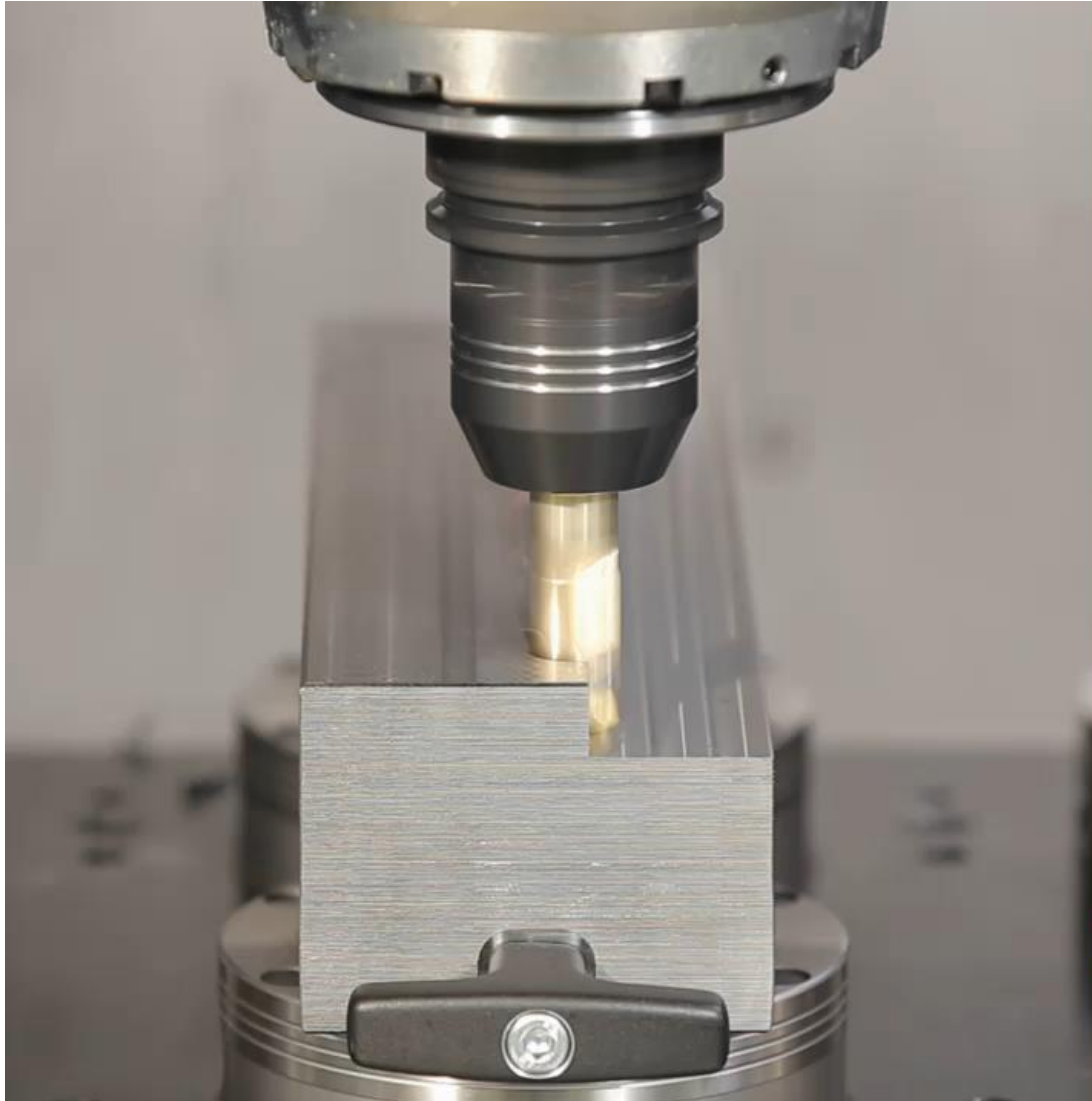


*Tendo-EC fräst mit
Tiefe 2x D*

*Tendo-EC mills at
depth of 2x D*

SCHUNK 

Slot Milling



T | E | N | D | O® E compact
The ultimate in milling!

TENDO SVL

ripheriegeräte

erzeughalter,

- Clamping in seconds without peripheral equipment
- Proven hydraulic expansion technology
- Excellent vibration damping
- Suitable for nearly every precision toolholder, commercially available shank types can be clamped
- Option to use intermediate sleeves

Optimierte Störkontur:
Ideal für Bohrungen an tief liegenden Stellen im Vorrichtungsbau.

Optimized interfering contour:
Ideal for bores on deep parts in fixture construction.

Sekundenschneller und μ -genauer
Werkzeugwechsel garantiert - auch in der Maschine. Spannschraube mit einem Sechskantschlüssel auf Anschlag eingedreht - das Werkzeug ist gespannt.

Micron precise tool changes in seconds guaranteed - even in the machine. Clamping screw actuated to a dead stop using an Allen key, and the tool is clamped.



TENDO – O Mandril Hidráulico da SCHUNK



TENDO Holders



TENDO EC & Slim 4ax



REPAIRABLE

iTENDO²



+ 30,000 RPM
make a wide range of applications possible

+ 3 customized product packages
offer a suitable solution for any task or complexity level

Intelligent real-time sensor system
for easy process monitoring and maximizing tool service life **+**



iTENDO²

Superior Clamping and Gripping





Hand in hand for tomorrow