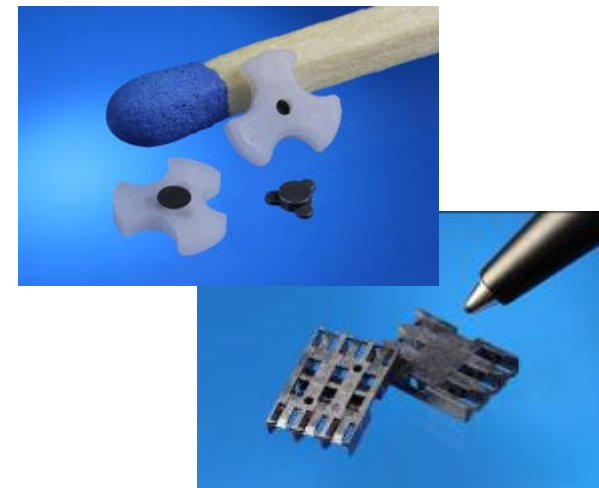


MicroPower

Micro injection molding in new perfection



The standard machine for small and micro parts

market trend miniaturizing of products

Everything gets smaller:

- more functions within less space
- weight reduction
- smaller dimensions
- lower energy consumption
- new products design
- need of higher precision



cell phone
development

1983



2010



future

markets, which need micro- and precision-parts

micro parts are needed in all markets :

- | | |
|-----------------------------|---|
| ■ medical industry | hearing aids, instruments, implants |
| ■ telecommunication | connectors, mobile phones |
| ■ micro-mechanics | gears, latches, motors, actuators, valves |
| ■ automotive | micro switches, sensors, valves, security systems |
| ■ optics | lenses, optocouplers, sensors, glass fiber conductors |
| ■ electronics | cameras, laptops, displays |
| ■ diagnostics | microstructures, lab on a chip, data carriers |
| ■ institutes & universities | material and technological researches |

what is the *MicroPower*

standard machine for high-precision and micro injection molding

- all-electric standard injection molding machine
- separate machine series
- extendable to a production cell - modular and flexible
- holistic solution with a high customer benefit
- designed for short cycles
- optimal for clean-room and medical applications
- modest space requirements and reduced noise emission
- solid mechanical engineering at an attractive price
- a clear sign of technology leadership



main application

flexible manufacturing of high-quality parts at low cost

- standard molding,
for high precision molding and
for micro molding
- up to 3cm³ injection volume
- up to 15t clamping force
- single and multi cavities
- range from a standard machine up to a
manufacturing cell
- inline quality control by vision system
- for subsequent operations
- insert molding



overview of all-electric machines



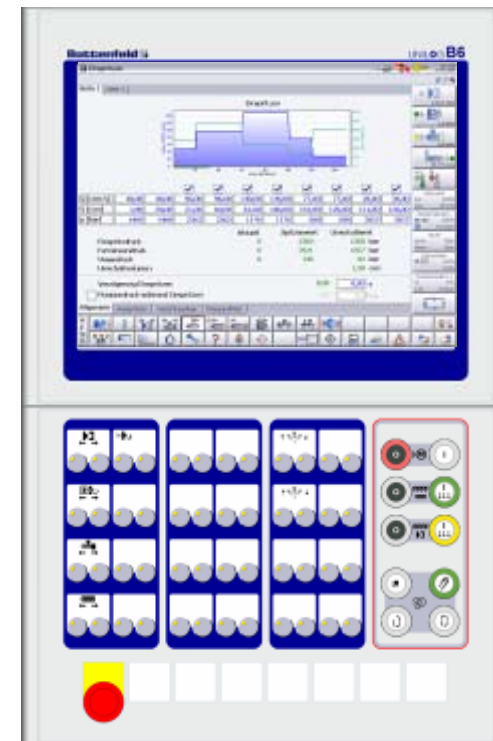
MicroPower

EcoPower

- *MicroPower* completes line below 55tons
- universal UNILOG B6 control system concept
- interfaces to Wittmann equipment like dryers, temperature control units, or robots are integrated into the UNILOG B6 machine controller

UNILOG B6 control system

- high-performance control system **Windows XP** embedded
- high user-friendliness and functionality
 - easy to read
 - powerful
 - quick and easy to learn
- simple connection to IT and customer networks
- WEB service, remote diagnostics, service, training
- 15" color TFT touchscreen
- complete event log – quality record – online help system – online language selection – access control via USB – online user manual – envelope curve monitoring – cycle time analysis – user page functions
- guaranteed future



Facts

- 5 and 15 t clamping force
- injection unit with 1 cm³ and 3 cm³
- optimized injection concept for real micro molding
- integration of dryer, temperature controller unit and robot
- rotary plate optional
- Unilog B6 control system
- attractive price
- small footprint
- space for further applications in the machine
- prepared for handling applications, insert molding, assembly injection molding



technical data

MicroPower

Clamping Unit		MicroPower 5	
Clamping force	kN	50	
Platen size (h x v)	mm x mm	240 x 400 (170)	
Minimum mould height	mm	100	
Maximum mould height	mm	220	
Opening stroke / force	mm / kN	100 / 15	
max. distance between platens	mm	320	
Ejector stroke / force	mm / kN	30 / 2	
Dry cycle time 1)	s - mm	1,2 - 100	1,2 - 100

MicroPower 15	
150	
240 x 400 (240)	
100	
300	
100 / 15	
400	
40 / 5	
1,2 - 100	1,2 - 100

1) according to Euromap 6

Injection Unit		3	7,5
Screw diameter	mm	14	14
Screw L/D ratio		20	20
Injection plunger diameter	mm	5	8
Theoretical shot volume	cm ³	1,2	3
Specific injection pressure	bar	3000	2500
Injection speed	mm/s	750	750

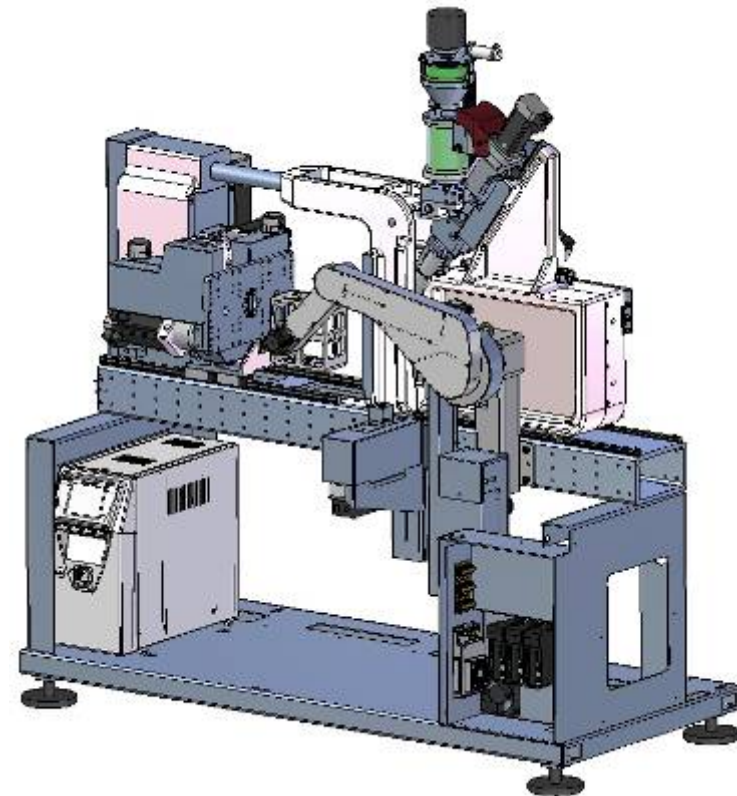
3	7,5
14	14
20	20
5	8
1,2	3
3000	2500
750	750

design concept and main features

- central main beam serving as the base
- modules are attached to the central main beam
- transmission of power decoupled
- extremely slim design
- design suitable for clean-room applications

Advantages:

- large accessible free space
- easy access for operator
- individual arrangement of handling compartment
- high flexibility
- quick and easy retrofitting of modules
- reliable parts handling
- full clean room capable



design concept

- standard machine without rotary plate
 - for free falling parts
 - standard applications
 - ejector opposite injection side
-
- rotary plate as an option
 - for two mould halves on B side
 - for sensitive parts with downstream operations
 - parallel movements for a faster cycle
 - ejector on rotary plate (on the swiveled-out side)
 - for insert technology
 - for inline quality control

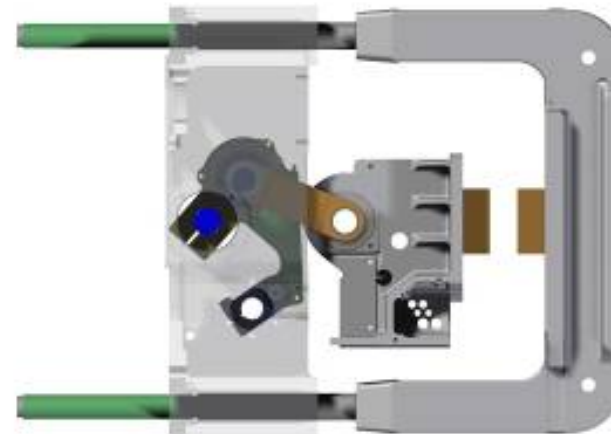
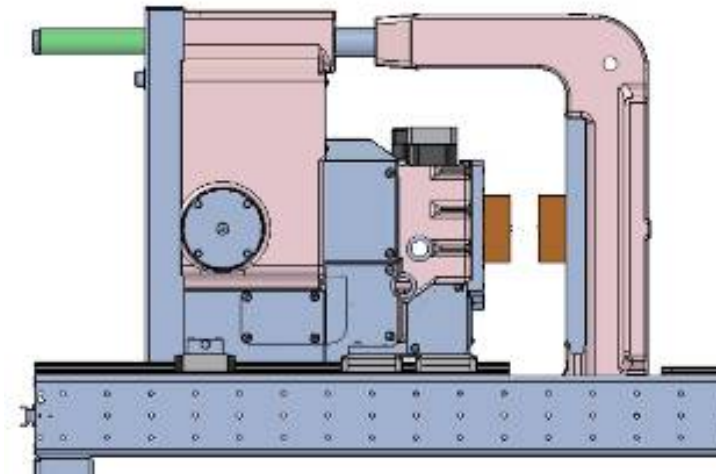


clamping unit

- 5 t and 15 t clamping force
- free-of-gap 5-point toggle clamping unit
- fast closing and opening movements
- moving platen bearings via linear guides
- optimized platen design
- 400 mm max. distance between platens
- symmetrical clamping force transmission

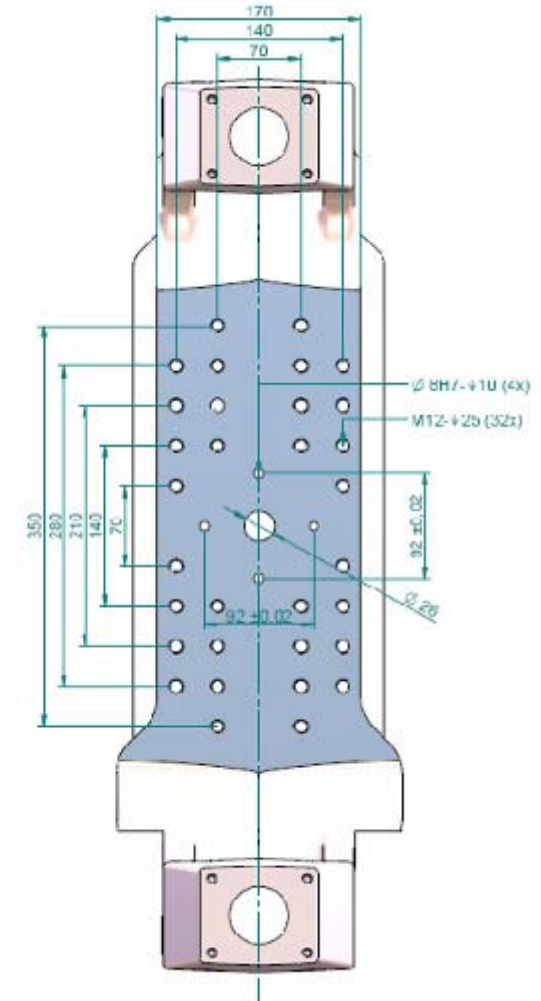
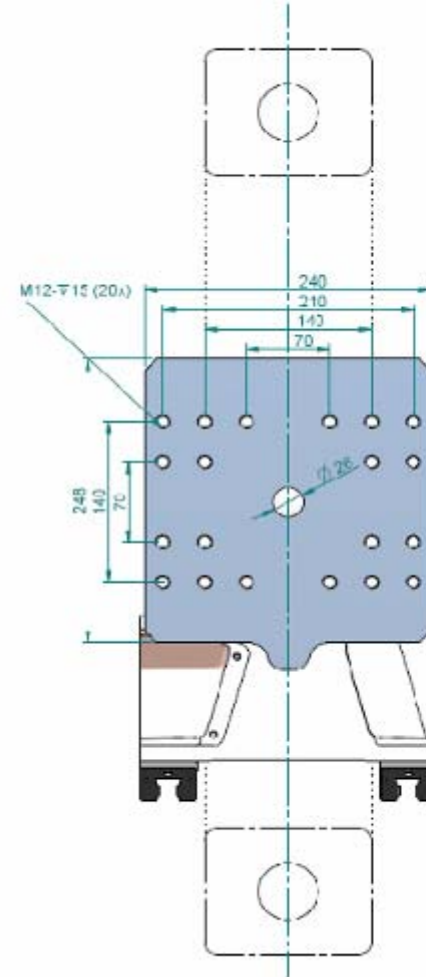
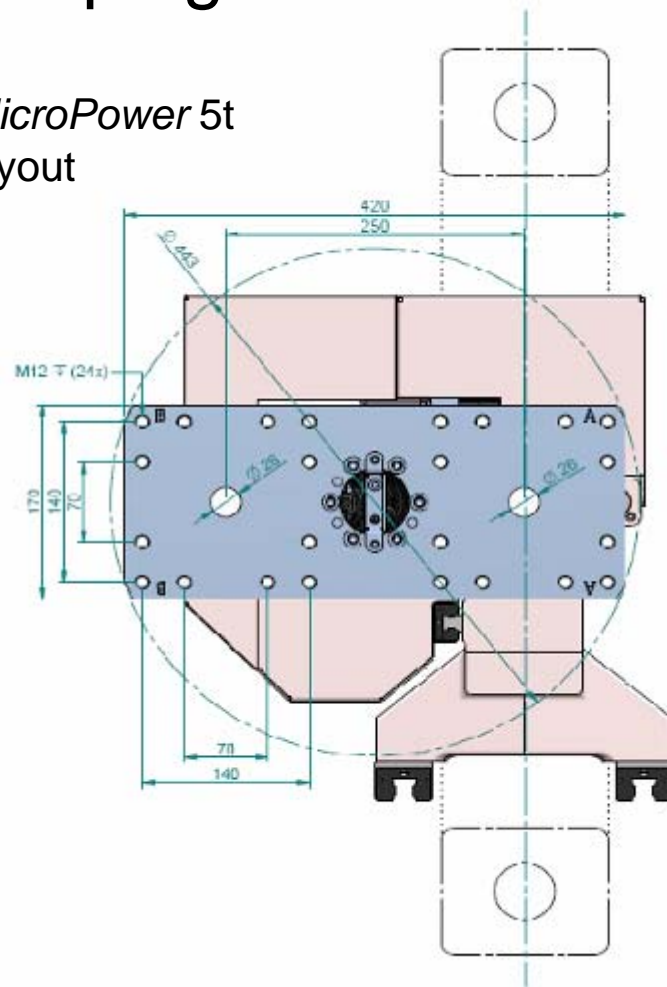
Ejector:

- servo-electric
- speed 500 mm/sec



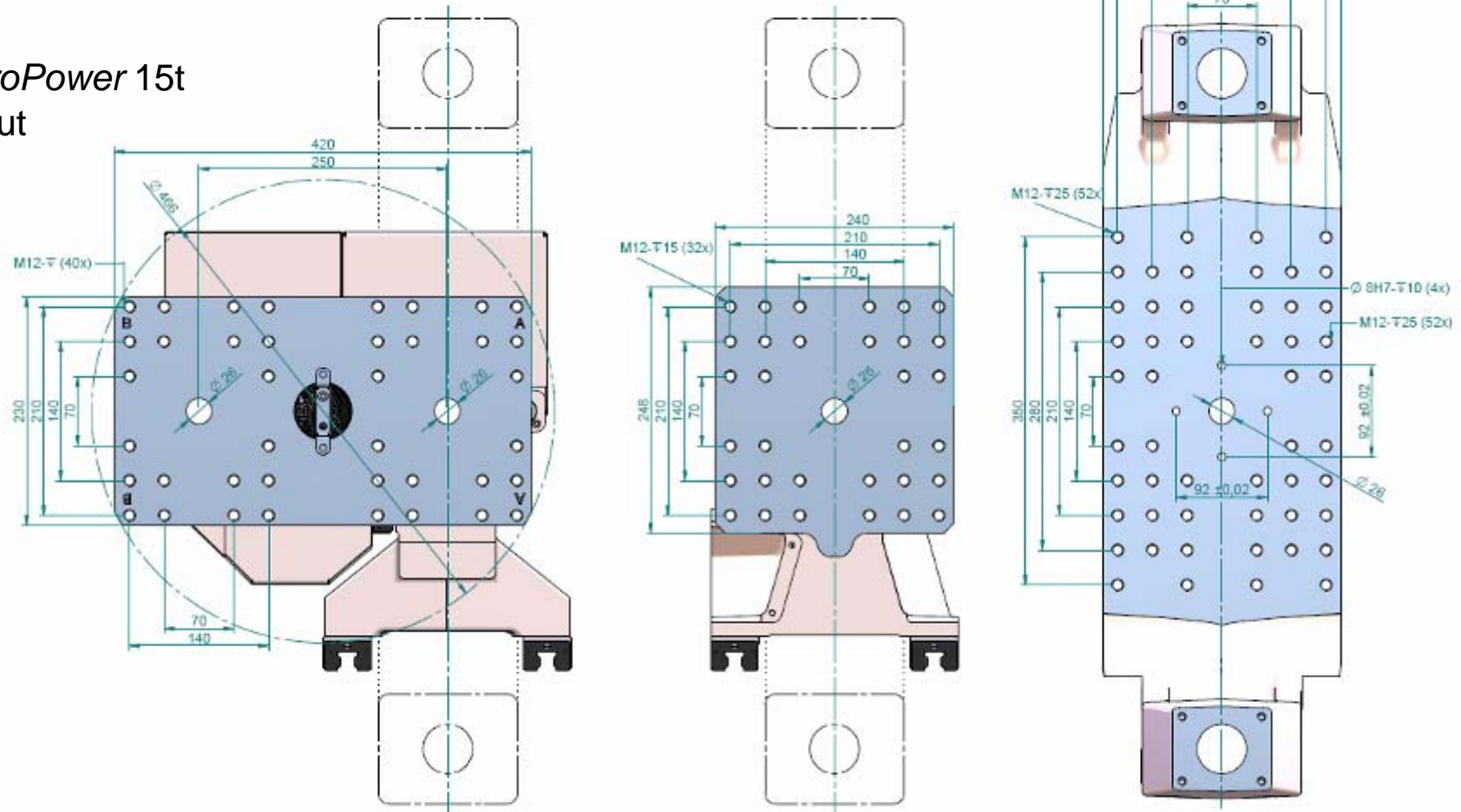
clamping area

MicroPower 5t
layout



clamping area

MicroPower 15t
layout



injection unit

- compact, stable system
- two-step plunger injection
- plunger diameter 5 mm or 8 mm
- 750 mm injection speed
- up to 3000 bar injection pressure

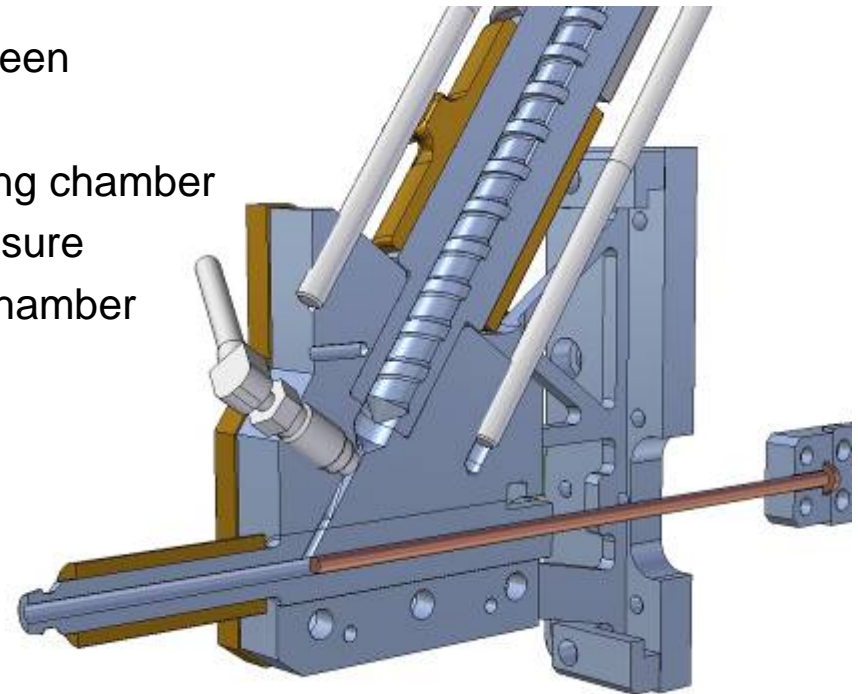
Advantages:

- good, easy access
- easy cleaning and maintenance
- fast material change
- optimal back pressure monitoring
- ultra fast acceleration



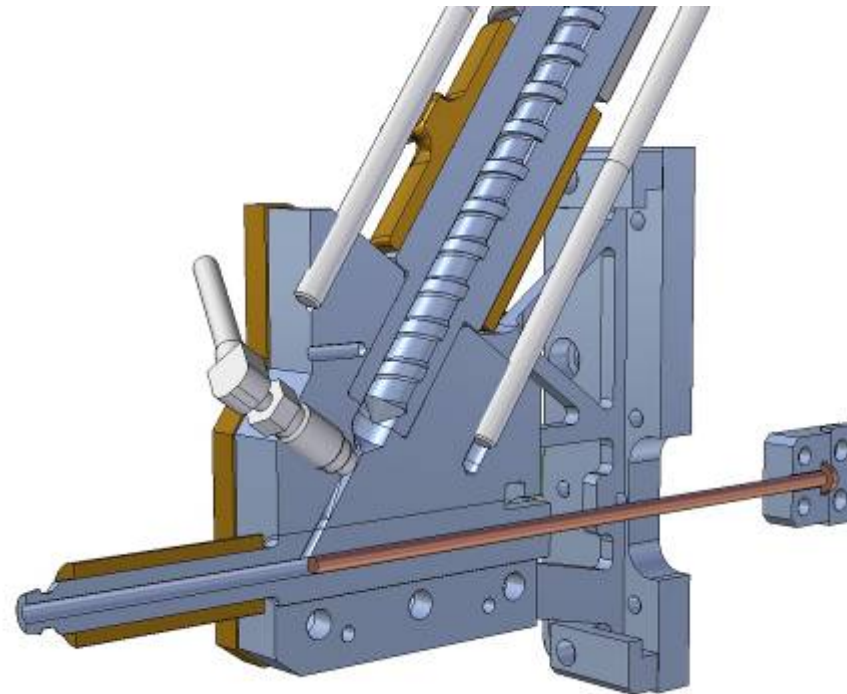
injection process

- 2-step plunger injection with optimized process:
 - plasticizing and injecting are separated
 - dosing is done by the axial screw stroke
- injection plunger closes the changeover bore between dosing chamber and injection nozzle
- 14 mm screw plasticizes the material into the dosing chamber and is moved back in accordance to the back pressure
- back pressure is controlled directly in the dosing chamber
- injection plunger unlocks the changeover bore
- material is transferred to the plunger by means of the stroke of the screw
- the plunger closes the changeover bore and injects the material
- injection pressure is measured directly behind the injection plunger



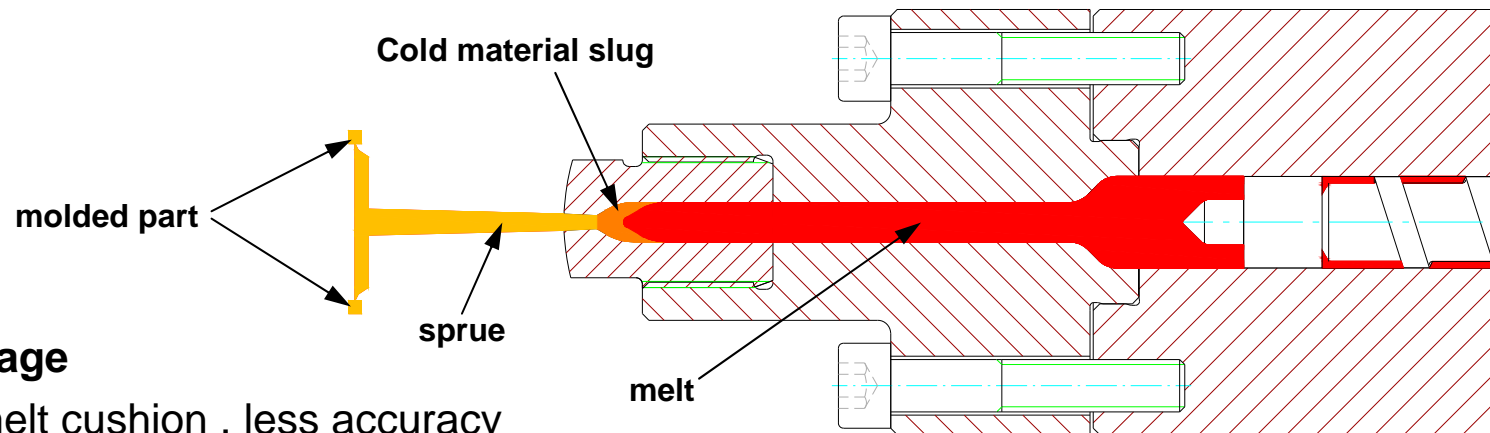
advantages of the injection process

- injection of thermally homogeneous material
- no cold material slug
- extremely small melt cushion
- extremely short flow length
- injection pressure loss minimized
- all standard granulates can be processed
- low-stress plasticizing
- low-stress metering at low pressure
- shot weights below 50 mg possible
- material leakage drastically reduced
- acceleration to injection speed inside the unit
- highly dynamic braking without overshooting
- high process reliability and repeatability



single step system

downscaled standard technology



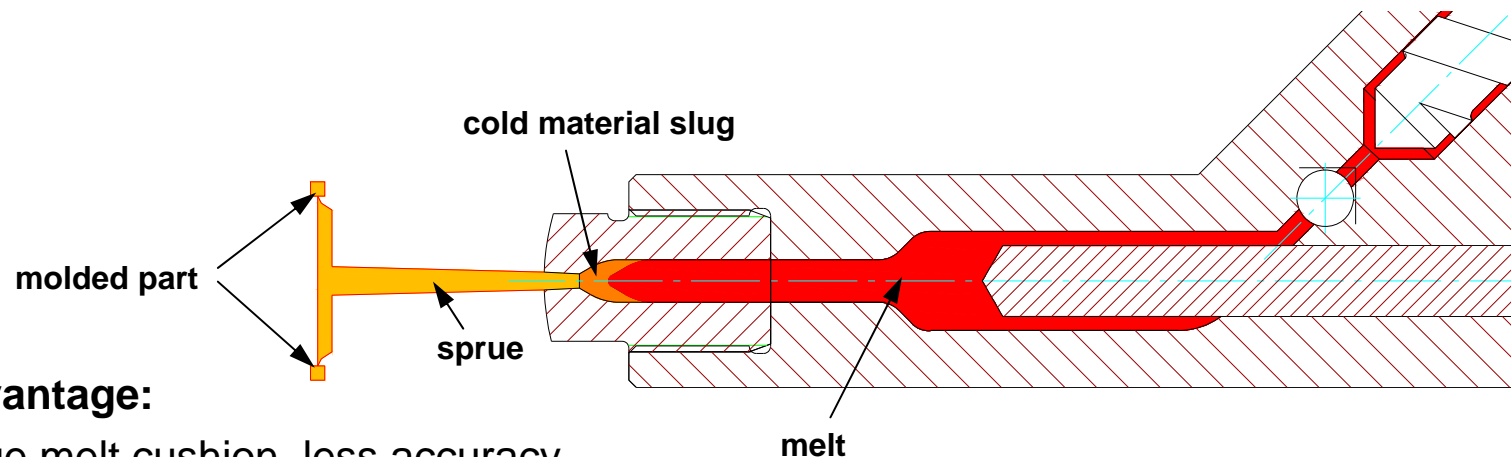
Disadvantage

- Large melt cushion , less accuracy
- Deviations in shut-off of non return valve
- Thermal separation of sprue and melt cushion creates each cycle a cold material slug in the nozzle tip
- Long flow length
- 1 mg shot weight needs only 0,0056 mm stroke on a 14 mm screw
- No control of small parts, IMM controls sprue
- Large sprue and material waist



Two step competitor system

split plasticizing and injecting
dosing function on the **injecting plunger**



Disadvantage:

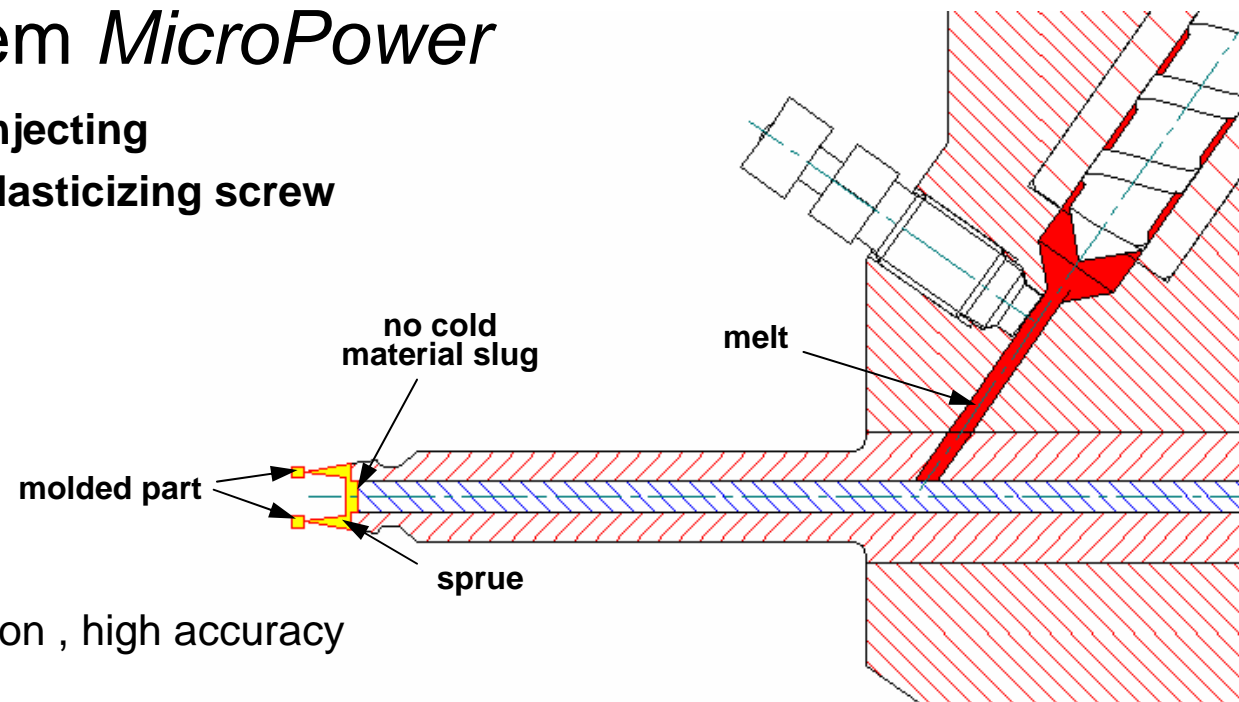
- Large melt cushion, less accuracy
- Cold material slug on the nozzle
- Injection of thermal inconsistent material
- Long flow length
- Additional Shut off valve needed (leakage)
- No control of small parts , IMM controls sprue
- Large sprue and material waist



two step system *MicroPower*

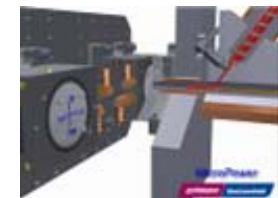
split plasticizing and injecting

dosing function on the **plasticizing screw**



Advantage:

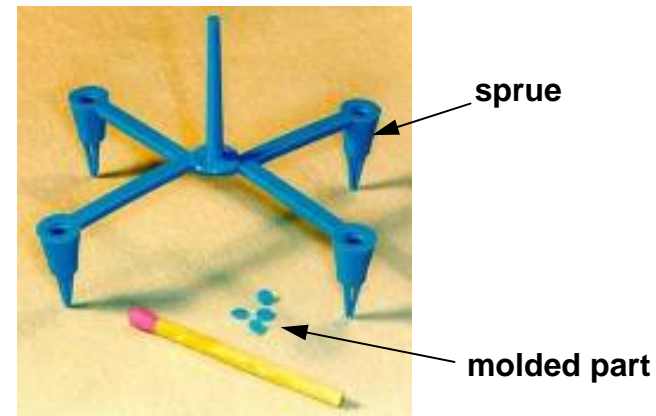
- very small melt cushion , high accuracy
- no cold material slug
- thermal homogeneous material (first in first out)
- very short flow length
- shot volume below 50mg possible
- shut off function combined by injection plunger
- high accuracy by direct melt pressure sensor
- IMM closed loop control with high influence direct to part



comparison of molding methods

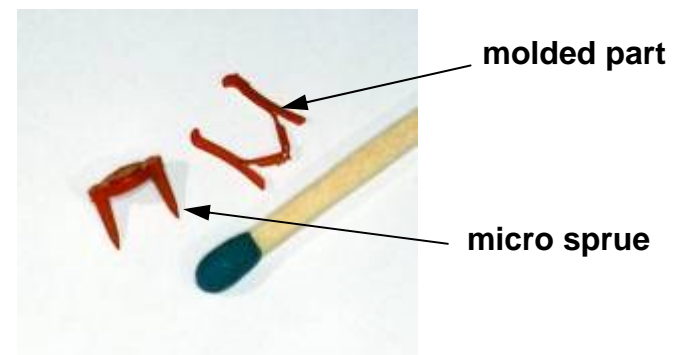
standard molding machine

- slow process
- large moulds
- large sprues
- micro parts quality limited
- high energy consumption
- part free falling
- quality check afterwards



MicroPower

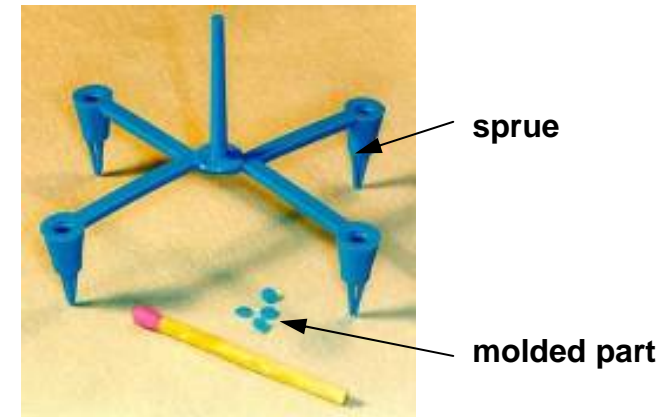
- high dynamic process
- optimized mould technology
- small sprues
- micro parts high quality
- efficient energy consumption
- integrated part handling
- quality check integrated



comparison of sprue sizes

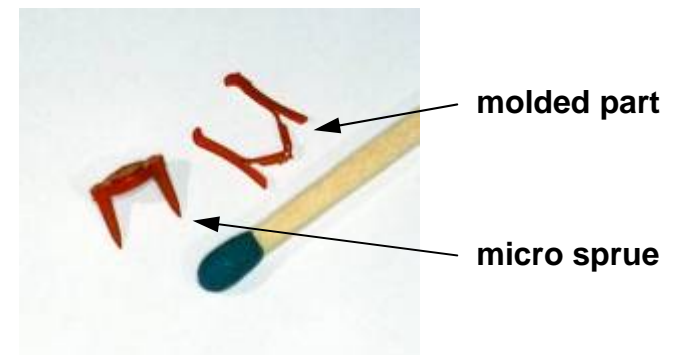
conventional molding technology

- sprue weight: 1.000 – 2.500 mg
- part with 10mg just 1% of total shot
- very limited influence of IMM control to part



MicroPower technology

- sprue weight: 50 – 200 mg
- part with 10mg is 20% of total shot
- good influence of IMM control to part



sprue weight ratio: standard / MicroPower = 20 / 1

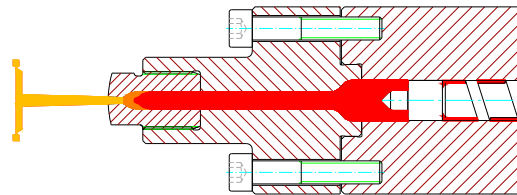
material savings and outstanding part control

comparison injection process

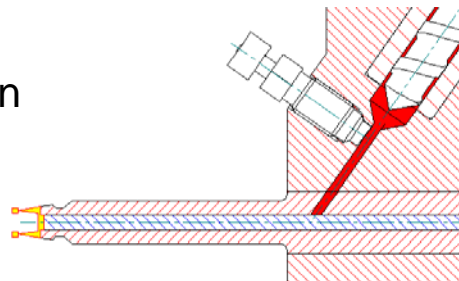
Quality comparison in the production of dental braces:



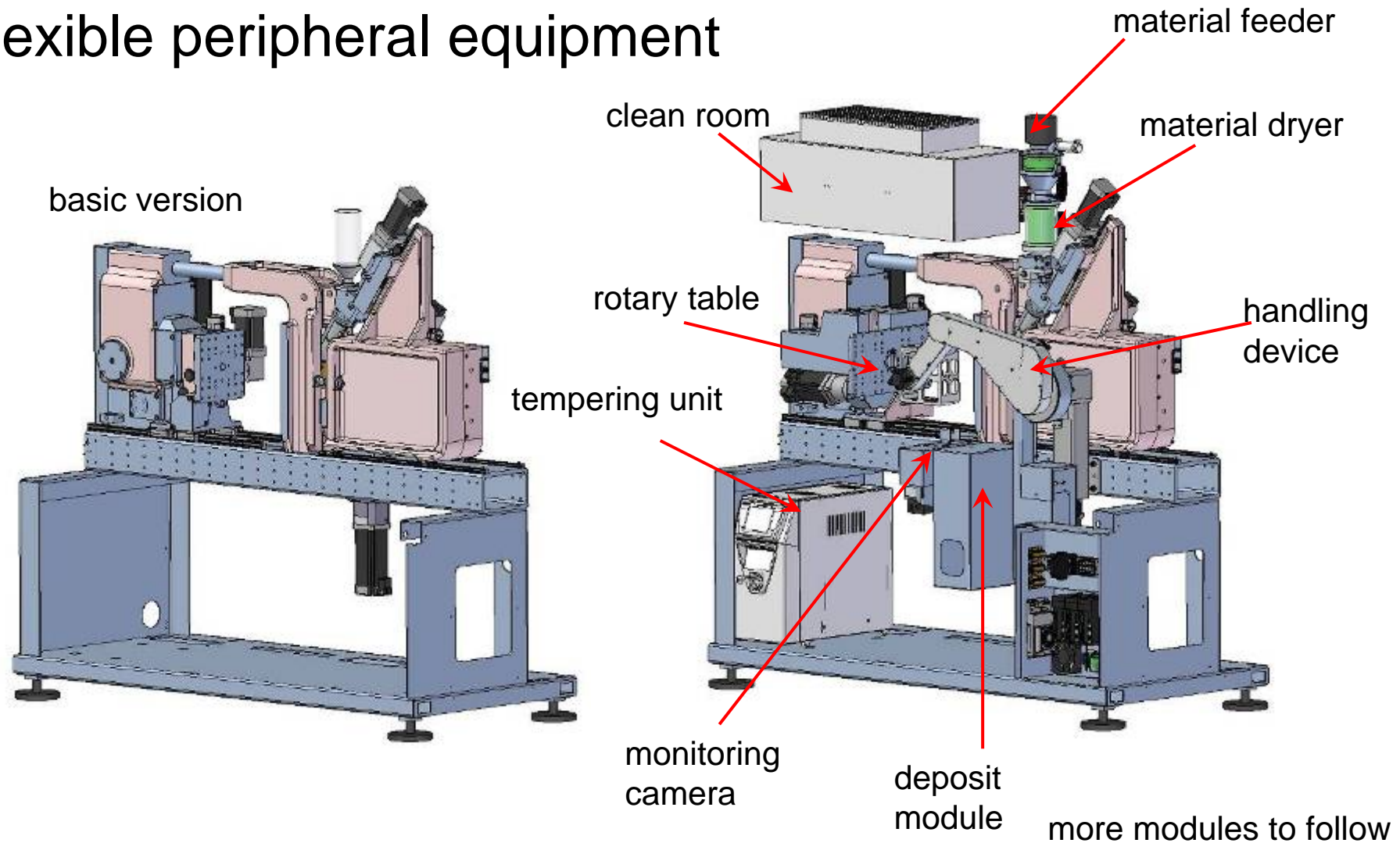
standard injection molding process



MicroPower injection molding process



flexible peripheral equipment

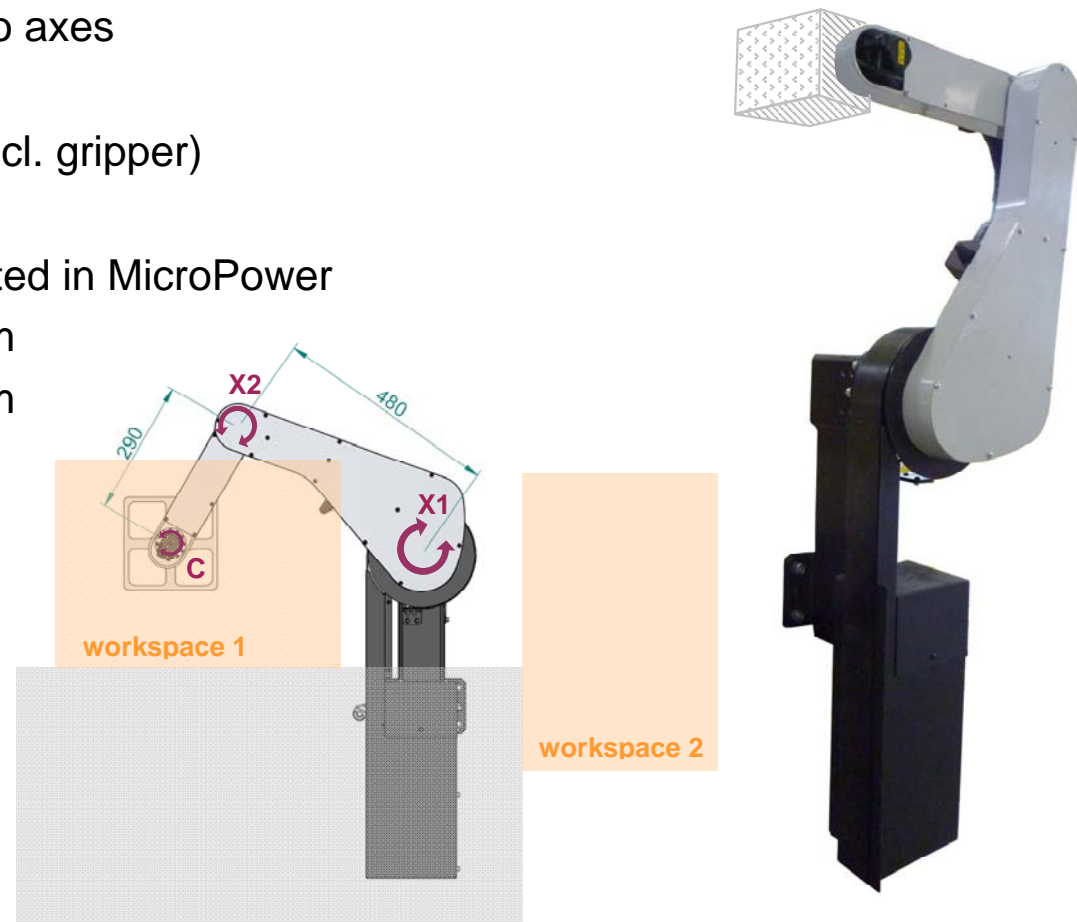


W8VS2 robot

- Vertical SCARA robot with 3 servo axes
- handling weight 2 kg (incl. gripper)
- control system CNC 8
- control cabinet integrated in MicroPower
- X1 axis (servo) 480 mm
- X2 axis (servo) 290 mm
- C axis (servo) 270°

Standard version:

- 1 vacuum circuit (Venturi)
- 1 gripper circuit 5/2 mono-stable
- emergency shut-off block for Teachbox



Drymax Micro 2 material dryer

- maximum drying temperature 180°C
- capacity 1.2 liters
- compressed air dryer 200 W
- number of regeneration cartridges 2
- air compression performance max. 2m³/h
- control system NET8
- interface to the machine CAN



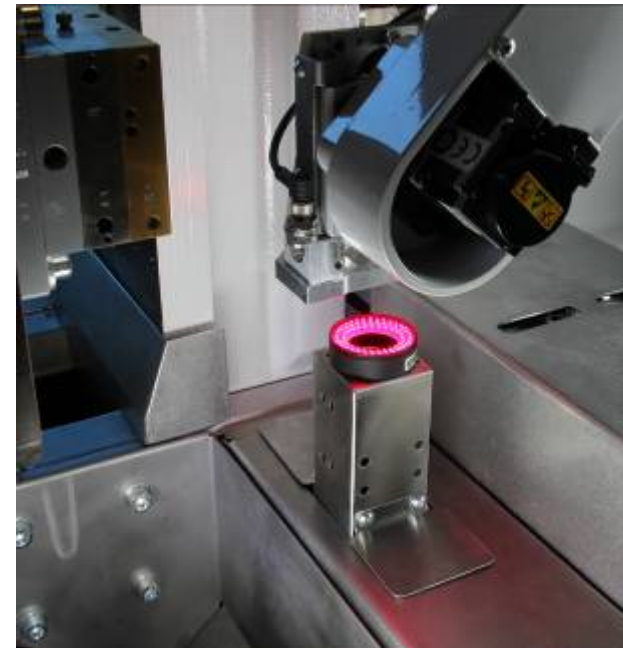
TEMPRO +D MICRO 100 temperature controller

■ medium	water
■ number of circuits	2
■ control system	NET8
■ heating output	1,000 – 6,000 W
■ pump output	120 – 500 W
■ pump displacement	12 – 30 l/min
■ pump pressure	3.5 – 5.2 bar
■ cooling performance	indirect or direct
■ cooling booster	double helix



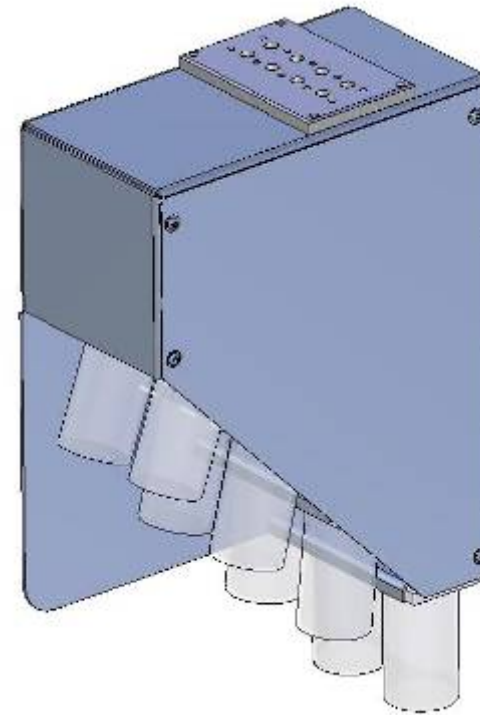
vision system

- high resolution camera 1600 x 1200
- speed up to 14 pictures per second
- camera dimension 30mm x 30mm x 60mm
- camera travel 100mm
- adjustable height
- suitable for standard Lenses
- LED lighting



deposit module

- number of glass boxes 8
- volume of glass box 200ml
- adjustable height
- ionization of deposit box possible



process-competence for precision and micro molding

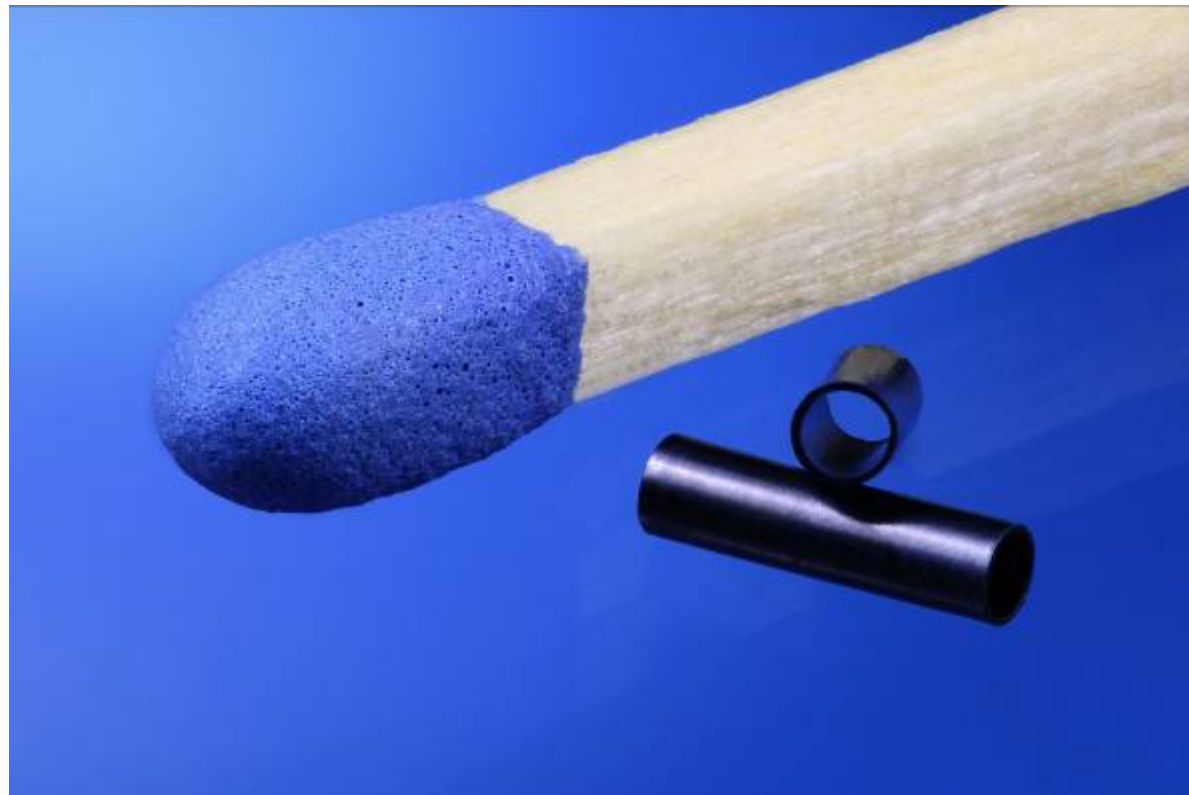
- precision and micro injection molding
- powder injection molding PIM
- elastomere injection molding
- LIM
- insert technology
- assembly injection molding
- multi-component technology
- micro-structures
- Variotherm
- molding compression
- process combinations



applications

the right machine size for small parts

material: LCP
partweight: 3mg



applications

reliability of process and production in the medical industry

material: bioresorbable
partweight: 2mg



applications

100% quality checked - with the vision system

material: POM
partweight: 3mg



applications

Insert parts / highly flexible and economic due to the production cell concept

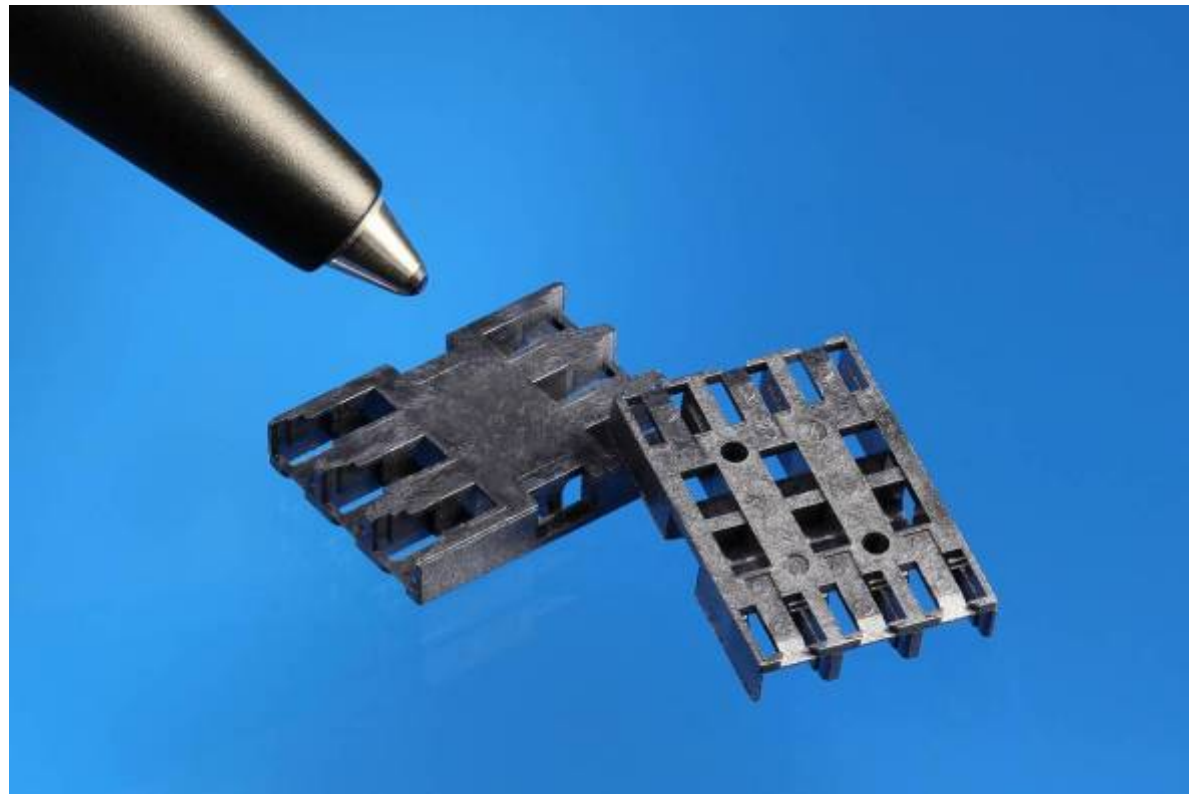
material: POM
partweight: 17mg



applications

small parts cost-efficient processed / with high-tech materials easily done

material: LCP
partweight: 0.12gr



applications

processing high temperature plastics

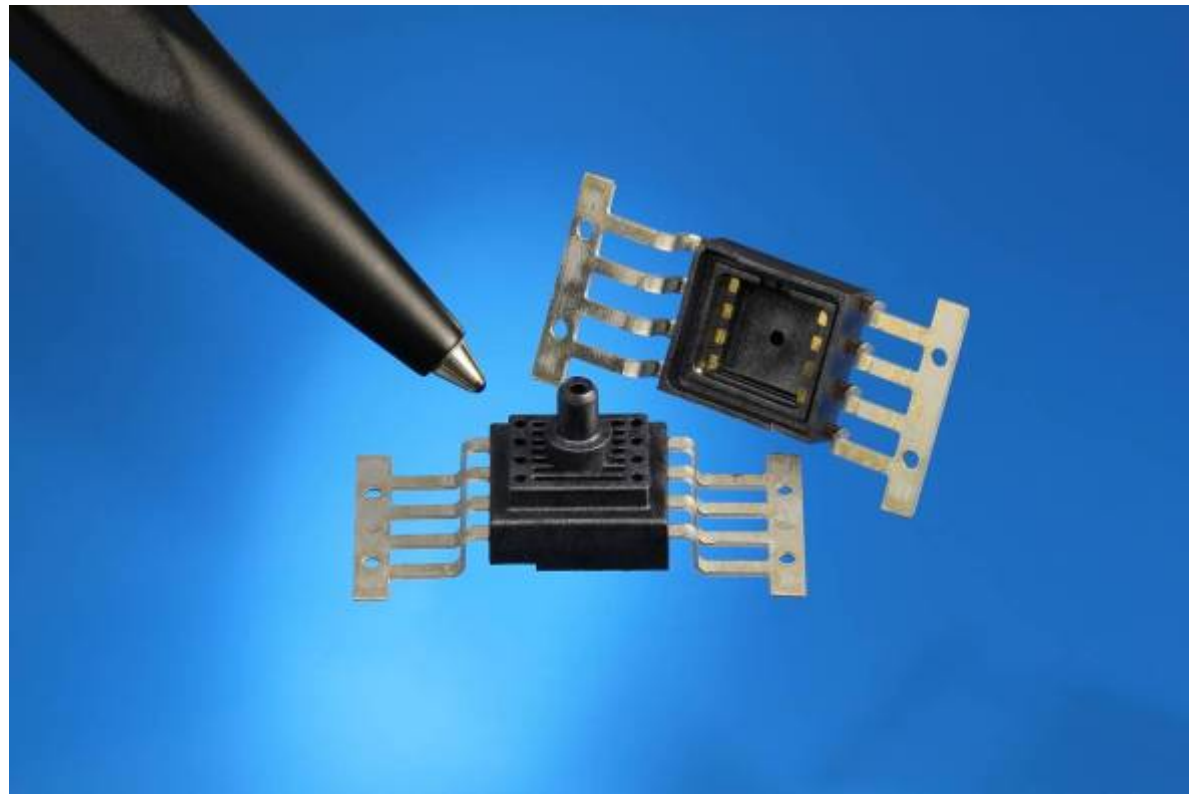
Material: PEEK



applications

Metalbands, overmolded with plastic and inspected

material: LCP GF30%
partweight (plastic): 0,38gr



applications

a maximal process window ensures high quality parts

material: LCP
partweight: 0,52mg



applications

2 component parts: hard core – soft overmolded

material: PA66 / TPE
partweight: 1mg / 16mg



applications

the optimal process for all materials - from standard up to the exotics

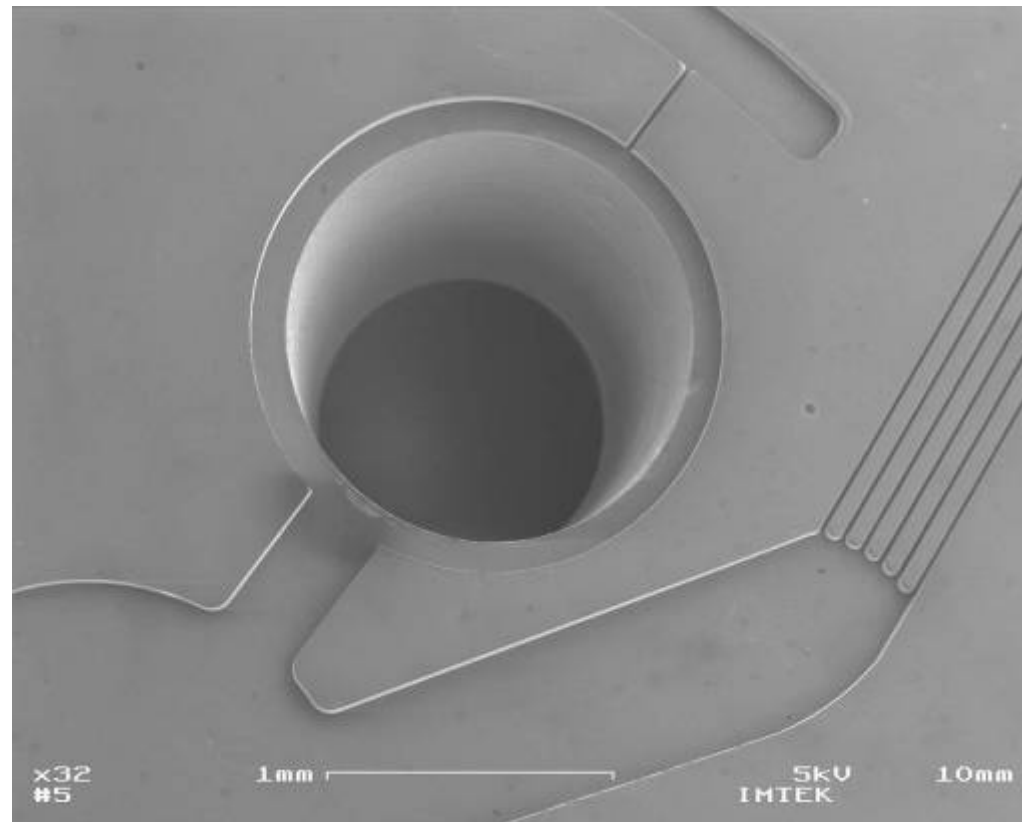
material: steel 316L
partweight: 9mg



applications

microstructures – functional surfaces

material: PC
partweight: 558mg



customer benefit: flexible manufacturing of high-quality parts at low cost

- Simple and cost-efficient production of high-precision and micro parts, thanks to:
 - cycle times reduced by up to 50%
 - up to 90% material savings in gating
 - up to 60% less energy consumption with appropriate manufacturing equipment
 - less rejects through optimized process
 - reaching stable injection parameters more quickly

- The injection system ensures injection of thermally homogeneous melt and consequently:
 - wider processing windows
 - more stability of part-dimensions
 - less deformation of parts
 - less degradation of plastic materials
 - less rejects
 - more stable production

- The **MicroPower** is a modular injection molding machine, but one that can be extended individually up to a complete manufacturing cell.

SIMPLY THE BEST.



**from 0 to 1000ton clamp size
from 0,1mg to 8kg parts**

Perfect solutions for each application !