

***MacroPower* COMBIMOULD**

400 – 2000 t

The flexible large-molding machine

world of innovation



MacroPower COMBIMOULD SERIES

Extra functionality and more freedom for design

COMBIMOULD is the multi-component technology from WITTMANN BATTENFELD. It ensures optimal product coordination through a great diversity in process variants.

Based on the *MacroPower* model with 2-platen technology, the *MacroPower COMBIMOULD* series comes with a wide range of options and an extensive choice of different combinations, thus offering the right package for every multi-component technology. In this way the machine, mold and automation technologies can be optimally adapted to each individual product.

The WITTMANN BATTENFELD know-how covers all process variants, such as multi-color, 2-component, assembly, multi-component and sandwich injection molding.





Photo: Haidlmair GmbH



MacroPower COMBIMOULD Applications

» Hard-soft combinations and overmolded sealing components

The use of thermoplastic elastomers allows direct overmolding of sealing components. Moreover, the surface touch can be improved by adding a soft component. The bonding strength can be increased by mechanical anchoring. Multi-component technology is also frequently used in LIM processes (liquid silicon processing).

» Multi-color injection molding

Several parts made of the same material but in different colors are combined into one component. Classic examples are multi-colored bottle cases with soft-handles and the frames for flat screens (LED TV sets, computers, laptops etc.) with piano finish effect. Multi-color injection molding improves the appearance of parts with guaranteed colorfastness.

» In-Mold Assembling

Parts consisting of two halves can be joined together directly in the mold. For example, to make this two-component oil closure, its two halves are injected in separate stations with the help of cube molds, then, following rotation, brought together in the 3rd station by closing the mold. But jointed connections can also be injected in one production step. Non-adhesive materials are chosen for this purpose. Ball joints and hinges can easily be formed in this way.

» Sandwich injection molding

With two independent injection units, two materials are injected one after the other into a conventional mold through a specially designed nozzle. The result is a so-called sandwich structure, normally in three layers, i.e. one core and two surface layers. The core can be foamed or reinforced, thus improving the mechanical properties of the product. Or cost advantages may be achieved by using reclaim material to produce the core. The surface layers made of high-grade materials provide the desired surface quality. A special two-channel nozzle head connecting two injection units with each other is used, which allows separate opening and closing of the two channels, so that the injection process can be optimally coordinated.

CLAMPING UNIT

Fast rotation units

The optional, adaptive rotary table comes with a servo-electric drive and is laid out for a rotation angle of 360° or +/-180°. In addition, it is characterized by extremely low installation height, high dynamics, flexibility, safety and gentle treatment of the mold.

- » **Highly dynamic servo motor**
 - Minimal rotation times
 - Parallel movements
 - Shorter cycle times
- » **Short changeover times**
 - Very low installation height
 - Easy and flexible installation and removal
 - Unit can be deactivated via control-system
- » **Safety and mold protection**
 - Dampened end position control
 - Indexing device
- » **Extension of the standard version by various options**
 - 3-station (120°) or 4-station (90°) processes
 - Additional media circuits
 - Individual ejector positions
 - Magnetic clamping plate



Best access for rotation devices

Rotation devices for the required media, for temperature control, hydraulics and pneumatics can be supplied with up to 12 circuits.

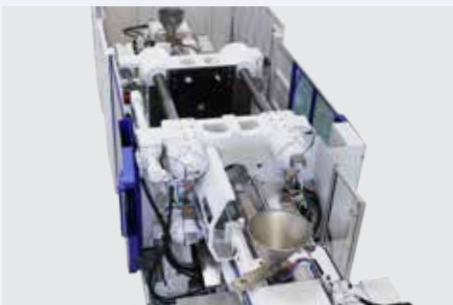
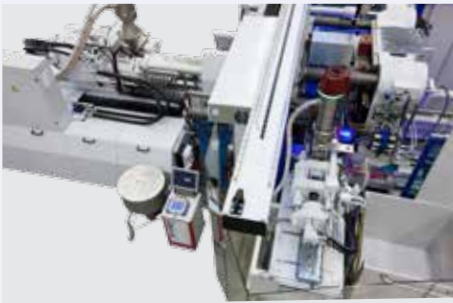
The 2-platen technology design of the *MacroPower* machines ensures optimal access to its media supply connections.



INJECTION UNIT Configurations

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Injection unit Configuration

The *MacroPower* COMBIMOULD offers a choice of V, S and L configurations as standard. Special configurations, such as the Y, B or H-H configuration, are available upon request.

» V configuration

Injection from above, also into the mold parting line

- Generous adjustment range
- Sliding unit with linear guides
- Easy horizontal adjustment
- Complete V aggregate can be moved back to provide an absolutely free mold space

» S configuration

Slanted above horizontal injection unit

- Compact machine design
- Small footprint
- S and H aggregates can be moved independently
- Independent, adjustable, torque-free nozzle contact pressure
- Excellent access to the nozzle

» L configuration

Injection from the non-operator side, also into the mold parting line

- Sliding unit freely mounted on the back of the fixed platen
- Injection unit supported by linear guides
- Long adjustment path
- Access to the nozzle and to the mold from the rear via large operator safety gate
- Fixed platen kept free for standard linear robot

» B configuration

Injection unit on the moving platen

- For cube technology
- Injection into the moving mold half

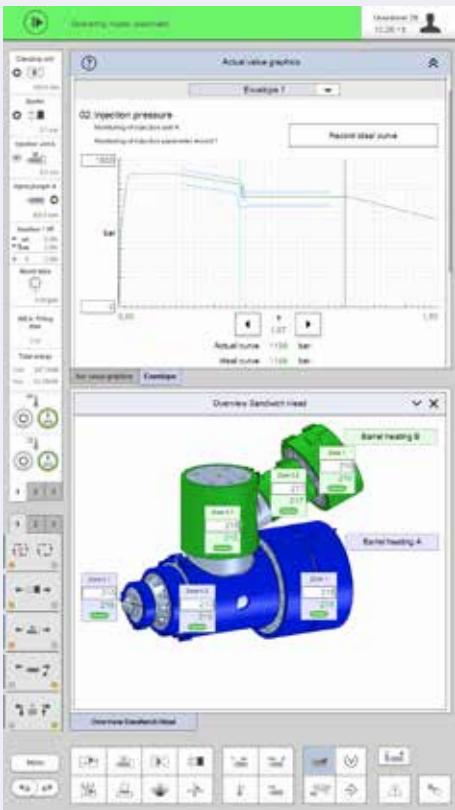
» H-H configuration

2 parallel horizontal aggregates

- Both aggregates can be moved independently
- For sandwich technology
- Excellent thermal insulation of each aggregate

SANDWICH TECHNOLOGY

Attractive parts with the right core



Sandwich technology

Features

The *MacroPower* with sandwich technology comes with all the features of the well-known *MacroPower* series. Thanks to the arrangement of its injection units in Y configuration, it is flexible and suitable for a wide range of applications. With a few simple adaptations, the machine can be used not only for sandwich injection molding, but also for 1C and 2C applications. With a higher drive performance in combination with servodrive technology, even the most complex sandwich parts can be manufactured with low energy consumption.

» Compact Y configuration of the injection unit

Compared to conventional 2C injection molding, the sandwich process requires a larger and a 2nd injection unit. Due to its size, the second injection unit is therefore placed lying horizontally at an angle behind the main aggregate in the Y configuration. The main injection unit is located at the center, in the standard position (H), to enable use of the machine for conventional compact injection molding.

For the frequently used process of foaming the core component, the main aggregate can also be equipped as a CELLMOULD® unit.

» Advantages

The Y configuration offers many advantages:

- Small footprint of the machine
- Easy exchange of barrels
- Compatibility with standard conveyors
- Extremely easy access to the nozzles from both sides
- Short flow paths within the nozzle
- Reduced nozzle distance when the aggregates are separated for traditional COMBIMOULD operation
- Easy assembly and cleaning of the sandwich nozzle
- Nozzle head rotatable by 180° – allocation of the nozzle channels to the injection units freely selectable

» Sandwich nozzle for freely selectable intervals

Switching over from the surface material A to the core material B is controlled by injection pressure. Via the sandwich page of the control system, freely selectable intervals can be set easily and clearly for conventional sandwich injection molding (A-B) and sealing (A-B-A), as well as multiple intervals to obtain marbling effects

» Combination options¹⁾

	400 450	XL 450 500 550	XL 550 650 700	XL 700 850 900	XL 900 1000 1100
Injection unit H	Injection unit Y				
2250	1330	1330	1330	-	-
	2250	2250	2250	-	-
3400	2250	2250	2250	2250	-
	3400	3400	3400	3400	-
5100	3400	3400	3400	3400	3400
	5100	5100	5100	5100	5100

¹⁾ more combination options on demand

COMBINATION OPTIONS

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<i>MacroPower COMBIMOULD 400 / 450</i>					
Injection unit H	130	210	350	525	750
2250	V-L	V-L-S	V-L-S	V-L-S	V-L-S
3400	V-L	V-L-S	V-L-S	V-L-S	V-L-S
5100	V-L	V-L-S	V-L-S	V-L-S	V-L-S

<i>MacroPower COMBIMOULD XL 450 / 500 / 550</i>					
Injection unit H	130	210	350	525	750
2250	V-L	V-L-S	V-L-S	V-L-S	V-L-S
3400	V-L	V-L-S	V-L-S	V-L-S	V-L-S
5100	V-L	V-L-S	V-L-S	V-L-S	V-L-S

<i>MacroPower COMBIMOULD XL 550 / 650 / 700</i>					
Injection unit H	210	350	525	750	1000
3400	V-L-S	V-L-S	V-L-S	V-L-S	V-L-S
5100	V-L-S	V-L-S	V-L-S	V-L-S	V-L-S
8800	V-L-S	V-L-S	V-L-S	V-L-S	V-L-S

<i>MacroPower COMBIMOULD XL 700 / 850 / 900</i>						
Injection unit H	350	525	750	1000	1330	2250
3400	L-S	L-S	L-S	L-S	L-S	L-S
5100	L-S	L-S	L-S	L-S	L-S	L-S
8800	L-S	L-S	L-S	L-S	L-S	L-S

<i>MacroPower COMBIMOULD XL 900 / 1000 / 1100</i>						
Injection unit H	350	525	750	1000	1330	2250
5100	L-S	L-S	L-S	L-S	L-S	L-S
8800	L-S	L-S	L-S	L-S	L-S	L-S
12800	L-S	L-S	L-S	L-S	L-S	L-S

<i>MacroPower COMBIMOULD 1300 / 1500 / 1600</i>						
Injection unit H	350	525	750	1000	1330	2250
8800	L-S	L-S	L-S	L-S	L-S	L-S
12800	L-S	L-S	L-S	L-S	L-S	L-S
16800	L-S	L-S	L-S	L-S	L-S	L-S
19000	L-S	L-S	L-S	L-S	L-S	L-S

Further combinations and B or H-H configuration available upon request.

H	horizontal
V	vertical

S	slanted from above
L	horizontal from rear

B	horizontal on clamping unit
HH	horizontal parallel

Bonding of hard-soft material combinations

	TPE based on polyamide	TPE-polyester-elastomers	TPE based on polyolefin	TPE based on styrene	TPE thermoplastic polyurethane	TPE types with modified adhesive properties
ABS	■	□	■	■	▲	△
ASA		▲			▲	
CA						▲
PA 6	△		■	■	▲	△
PA 6.6	△			■	▲	△
PA-Blend	△		□	□		△
PBTP	■	□		▲	■	△
PC	■	□	■	□	▲	△
PC/ABS	■	□	■	□	▲	△
PC/PBT	■	□	■	□	▲	△
PC/PET	■	□	■	□	▲	△
PE	■		□	□		▲
PETP	■					▲
PMMA				□	□	▲
POM	■				▲	▲
PP	■	■		▲		△
PPO	■					▲
PS	■	■	■			△
PAN	■				▲	△

Due to the great variety of TPE types, the bonding strength must be checked in each individual case.

The bonding strength also depends on the part geometry, process conditions and processes involved.

Bonding of thermoplastic materials in multi-component injection molding

	ABS	ASA	CA	PA 6	PA 6.6	PA-Blend	PBTP	PC	PC/ABS	PC/PBT	PC/PET	PE	PETP	PMMA	POM	PP	PPO	PS	SAN	TPE/TPU
ABS	△	▲	▲	▲	▲		▲	▲	▲	▲	▲	□	▲	▲	■		■		□	□
ASA	▲	△	▲		▲		▲	▲	▲	▲	▲	■	▲	▲	■	■	■	■	▲	□
CA	▲	▲	△				▲					■			■	■	■			
PA 6	▲			△	△	▲	▲	□	▲	▲	▲	□			■	□	■	■		□
PA 6.6	▲	▲		△	△	▲	□		▲	▲	▲	□			■	□	■	■		□
PA-Blend				▲	▲	△									□	□	■			□
PBTP	▲	▲	▲	▲	□		△	▲	▲	▲	▲	□	▲	□	□	□		□	▲	□
PC	▲	▲			▲		▲	△	▲	▲	▲	■	▲		□	■		■	▲	□
PC/ABS	▲	▲		▲	▲		▲	▲	△	▲		■			□	■		■		□
PC/PBT	▲	▲		▲	▲		▲	▲	△	▲	▲	■	▲	▲	□	■		■		□
PC/PET	▲	▲		▲	▲		▲	▲	▲	△	▲	■	▲	▲	□	■		■		□
PE	□	■	■	□	□		□					△				▲			□	▲
PETP	▲	▲					▲	▲		▲	▲	■	△							□
PMMA	▲	▲					□			▲	▲	■		△		■	■	■	▲	□
POM	□	■	■	■	■	□	□	□	□	□	□	■			△					□
PP		■	■	□	□	□	□	■	■	■	■			■		△	□			□
PPO	■	■	■	■	■	■								■		□	△			□
PS	■	■		■	■		□	■	■	■	■			■				▲	△	□
SAN	□	▲	▲				▲	▲	□	□	□	□		▲			■	□	△	▲
TPE/TPU	□	□		□	□	□	□	□	□	□	□	▲	□	□	□	△	□	□	▲	△

In some cases, particularly where modified materials are involved, tests must be carried out to check the bonding strength.

- limited bonding
- no bonding
- ▲ good bonding
- △ excellent bonding



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