

***MacroPower* COMBIMOULD**

400 – 2000 t

The flexible large-molding machine

world of innovation



MacroPower COMBIMOULD

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.

COMBIMOULD stands for WITTMANN BATTENFELD's multi-component injection molding technology. In this process, a basic part is produced in the first injection molding station, then plastic components in different colors or made of different materials are added in one or several more injection molding stations, all in one cyclical sequence. In this way, various material attributes are combined with each other to create a composite part of better quality in terms of visual attractiveness and functionality. This material combination technology can be used to produce individual parts as well as integrated components joined together by assembly injection molding. Depending on the parts geometry in each case, this requires different process variants.

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 – conjection technology

This process serves to produce parts with a three-layer structure, consisting of two continuous outer surface layers and a core layer. This is achieved by consecutive injection of two materials through the same nozzle into a conventional mold. A foamed or reinforced core component improves the part's mechanical attributes. Costs can be reduced by using regrind and CELLMOULD® foam technology. The surface layers consisting of high-grade materials provide the desired high-quality surface attributes. In the packaging industry, barrier layers can be incorporated in the parts. Reproducible, attractive marbling effects can be achieved by switching several times between two materials of different colors. Depending on the area of application and the requirements to be met by the production equipment, a sandwich adapter plate, a sandwich and interval nozzle or a "monosandwich" process is used.

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.

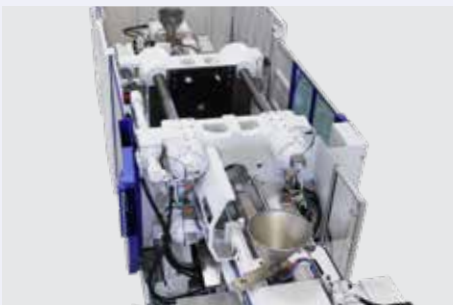
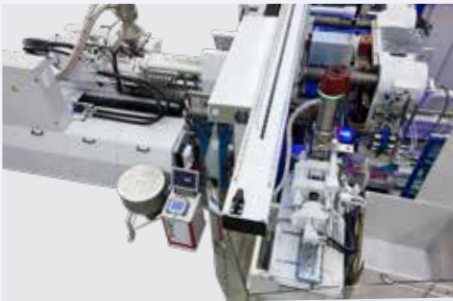
The 2-platen technology design of the *MacroPower* machines ensures optimal access to its media supply connections.



INJECTION UNIT Configurations

Wittmann

Battenfeld



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

COMBINATION OPTIONS

MacroPower COMBIMOULD



<i>MacroPower COMBIMOULD 400 / 450</i>					
Injection unit H	130	210	350	525	750
1300	V-L	V-L-S	V-L-S	V-L-S	V-L-S
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
1300	V-L	V-L-S	V-L-S	V-L-S	V-L-S
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
2250	V-L-S	V-L-S	V-L-S	V-L-S	V-L-S
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

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

MacroPower COMBIMOULD XL 700 / 850 / 900

Injection unit H	350	525	750	1000	1330	2250
2250	V-L-S	V-L-S	V-L-S	V-L-S	L-S	L-S
3400	V-L-S	V-L-S	V-L-S	V-L-S	L-S	L-S
5100	V-L-S	V-L-S	V-L-S	V-L-S	L-S	L-S
8800	V-L-S	V-L-S	V-L-S	V-L-S	L-S	L-S

MacroPower COMBIMOULD XL 900 / 1000 / 1100

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
12800	L-S	L-S	L-S	L-S	L-S	L-S

MacroPower COMBIMOULD XL 1100 / 1300 / 1500 / 1600

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

MacroPower COMBIMOULD XL 1600 / 1800 / 2000

Injection unit H	350	525	750	1000	1330	2250
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
23300	L-S	L-S	L-S	L-S	L-S	L-S

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

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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