

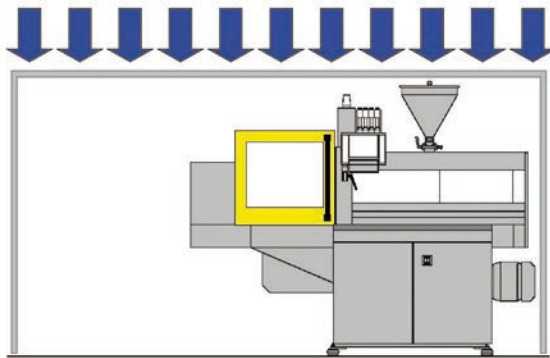
Innovative into the Future – BOY-Injectioneering



Economic Clean Room – Technology

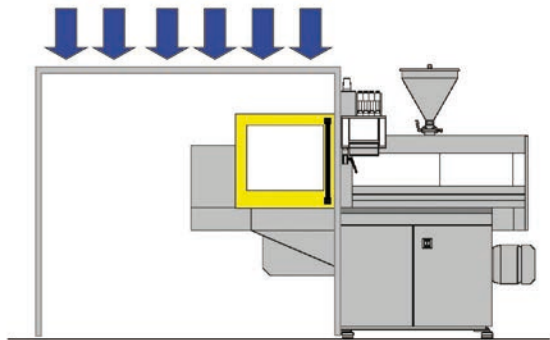
Modular Clean Room Concepts

Clean Room
Concept
I



The more the size of the clean room can be reduced, the technical expenditure and production cost for the medical parts production under clean room conditions are considerably reduced as well. The compact BOY injection moulding machines with the smallest space requirement helps to reduce the clean room size. Thus, the required space of a BOY XS is only 0.77 m². The BOY 100 E, with 4.67 m², is more compact than the average for similar competitive machines by approximately 25%.

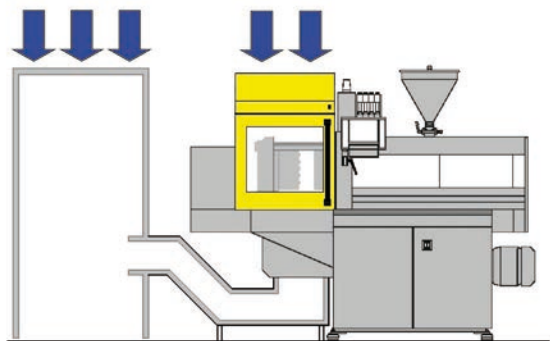
Clean Room
Concept
II



If the complete injection moulding machine is located within the clean room (**Concept I**), the investment and operating costs of the clean room are significantly larger than with the concepts presented as follows.

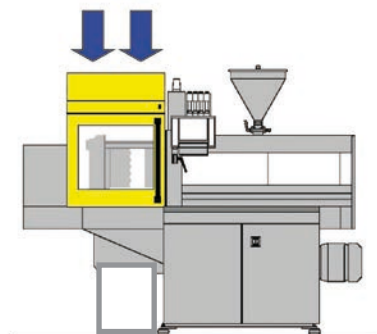
Injection moulding machines from BOY with a cantilevered clamping unit enable clean room production in a particular way. With this concept, only the clamping unit produces into the clean area. This enables a significantly smaller design of the clean room (**Concept II**).

Clean Room
Concept
III



The hydraulic drive unit is located outside the clean room; thus, there are no lubrication-intensive points within the clean room. These construction advantages of the BOY injection moulding machines, for example, is used by the moulding company Semadeni (www.semadeni.com) for manufacturing medical-technical parts under clean room conditions (refer to Figures next page).

Clean Room
Concept
IV



A further development for the production of sterile plastic parts is demonstrated by the compact **Clean Room Concept IV** designed by BOY. For a less expensive alternative, when compared to the conventional systems, the investment subsequent costs for operating the clean rooms are reduced to a minimum.

Air ionization, sprue removal and optional packaging unit – all functions required for highly-automated clean room production – can be integrated within the foot print of the machine, space saving.

Compact & Clean



For the company Semadeni, only the cantilevered clamping unit of the injection moulding machines protrudes into the clean room.

Due to the design of the hydraulically two platen clamping system, featured by all BOY injection moulding machines no lubrication-intensive points and components (e.g. toggle closing system / knee lever) are inside the clean room area.



For Medical Device and Technology manufacturers, the control elements, hydraulics, drive motor and material feed is located outside the clean room. Also the thermodynamic effects generated by heating up the plasticising unit have no influence as this takes place outside the actual clean room.

This shows the advantages of [Concept II](#) compared to positioning of the entire machine inside the clean room ([Concept I](#)).



The new BOY clean room concept is distinguished by a minimum size of the clean room. All functions required for automated clean room production can be facilitated within the foot print of the machine.

Because only a comparatively small space is sealed from the ambient air, the result is significant cost advantages. The particular key feature of this clean room application meeting **ISO Class 6** conditions, is that the parts are already packaged within the clean room area and, thus, no other sterilization processes are required.

Clean Room Classes in Accordance with ISO 14644–1

Classification number	Highest value / number of the concentration of particles (particle per cubic metre of air) in μm					
	0.1 μm	0.2 μm	0.3 μm	0.5 μm	1.0 μm	5.0 μm
ISO Class 1	10	2	-	-	-	-
ISO Class 2	100	24	10	4	-	-
ISO Class 3	1.000	237	102	35	8	-
ISO Class 4	10.000	2.370	1.020	352	83	-
ISO Class 5	100.000	23.700	10.200	3.520	832	29
ISO Class 6	1.000.000	237.000	102.000	35.200	8.320	293
ISO Class 7	10^7	$2,37 \times 10^6$	$1,02 \times 10^6$	352.000	83.200	2.930
ISO Class 8	10^8	$2,37 \times 10^7$	$1,02 \times 10^7$	3.520.000	832.000	29.300
ISO Class 9	10^9	$2,37 \times 10^8$	$1,02 \times 10^8$	35.200.000	8.320.000	293.000

When applying the US-FEDERAL Standard 209 E, the values stated for the concentration of the particles must be divided by the factor 35.2 (for example, particle size 0.3 μm , ISO Class 6: 102.000 particles : 35.2 = 2898 particles).

ISO Class 1	on request
ISO Class 2	
ISO Class 3	Clean room concepts I to III
ISO Class 4	
ISO Class 5	
ISO Class 6	Clean room concept IV
ISO Class 7	
ISO Class 8	
ISO Class 9	



Space Saving
Laminar Air
flow box, above
the cantilevered
clamping unit.

Machine-control
with integrated
start-up procedure
for separation of the
first-off mouldings.

Integration of
sealed parts boxes /
packing machine
beneath the clamping
unit.

As an option with
greater ground
clearance – ideal
for application in
the clean room.

Useful Advantages



Dipl. Ing. Michael Greive
Greive GmbH & Co. KG
Ottmarsbocholt
www.greive.de

"For more than three decades, we use BOY injection moulding machines for manufacturing.

At present, we have more than 27 machines, which are used in three-shift operation. The majority operate under clean room conditions.

The cantilevered clamping units of the BOY injection moulding machines provide ideal preconditions for a safe reliable clean room solutions which, simultaneously, are also economic.

Amongst our customers are notable companies, such as Fresenius AG and Miele & Cie. KG."

"The lower the area that must be sealed from the ambient air, the lower the technical and financial production cost.

With BOY injection moulding machines, the complete clean room consists a ionization box assembled on top of the clamping unit, the mould area of the clamping unit with the parts box beneath and sealed, or a packaging machine integrated there.

Measurements for this machine configuration have proven that the requirements of the ISO Class 6 are sufficiently complied with.

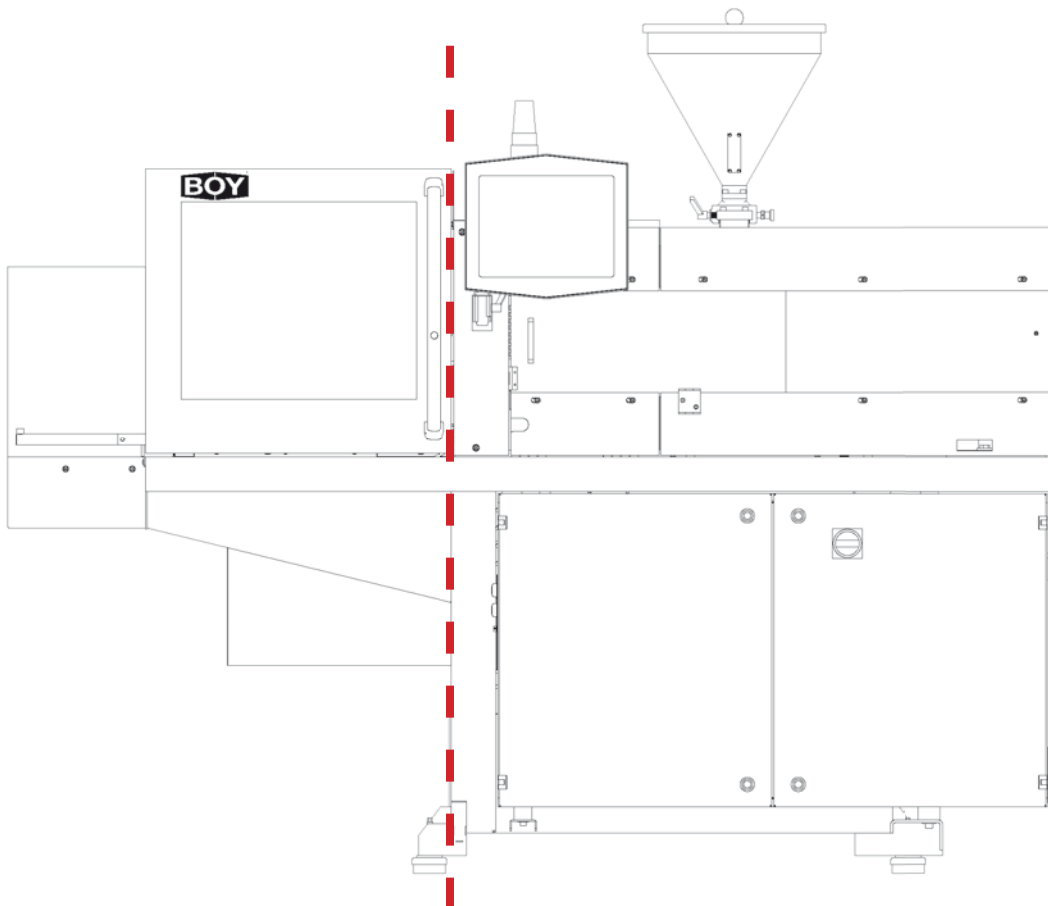
Because the hydraulic closing cylinders are located outside the cantilevered mould area, this classification can be attained with minimum technical expenditure.

The existing clean room solutions on the market are mostly complex and, thus, expensive. Here, the compact solutions from BOY provide inexpensive and efficient alternatives."



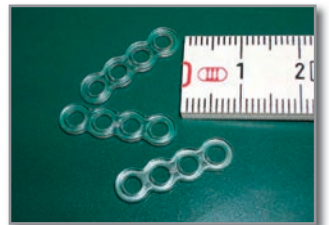
Dipl. Ing. Michael Kleinebrahm
Dr. Boy GmbH & Co. KG
www.dr-boy.de

Clean separation



The two-platen clamping unit of BOY injection moulding machines enable clean separation of the clean mould area from the hydraulic drive units, to the control elements and the material feeding. Thus, the clean room area requires no maintenance and is free of grease.

The numerous components that could severely affect the production of parts under clean room conditions – for example, components requiring intense lubrication – are located outside of the clean room area.





BOY injection moulding machines with integrated laminar air flow box and packaging machine (alternative) are inexpensive, efficient alternatives to conventional clean room systems.

Due to their construction, the cantilevered two-platen clamping unit of the BOY injection moulding machines provide advantages for clean room production. The requirements of ISO Class 6 are very well complied with due to conversion of the machine in accordance with **Clean Room Concept IV** (refer to Page 2).



Spritzgiessautomaten

Dr. Boy GmbH & Co. KG

Industriegebiet Neustadt / Wied
Neschener Str. 6
53577 Neustadt-Fernthal
Germany

Tel.: +49 (0)2683 307-0
Fax: +49 (0)2683 307-4555
E-Mail: info@dr-boy.de

www.dr-boy.de



BOY-APP
free of charge at
<http://app.dr-boy.de>