



**druckguss**  
**service deutschland GMBH**

# Shot sleeve extraction device

## A new possibility for quick and safe tool changing

Dipl.-Ing. (FH) Florian Zimmermann  
International welding engineer

# Agenda

- (1) Druckguss Service Deutschland GmbH
- (2) Die casting - Process costs
- (3) Improvement of machine setting
  - (1) Shot sleeve extraction device - basics
  - (2) Application
  - (3) Further opportunities to improve the machine setting

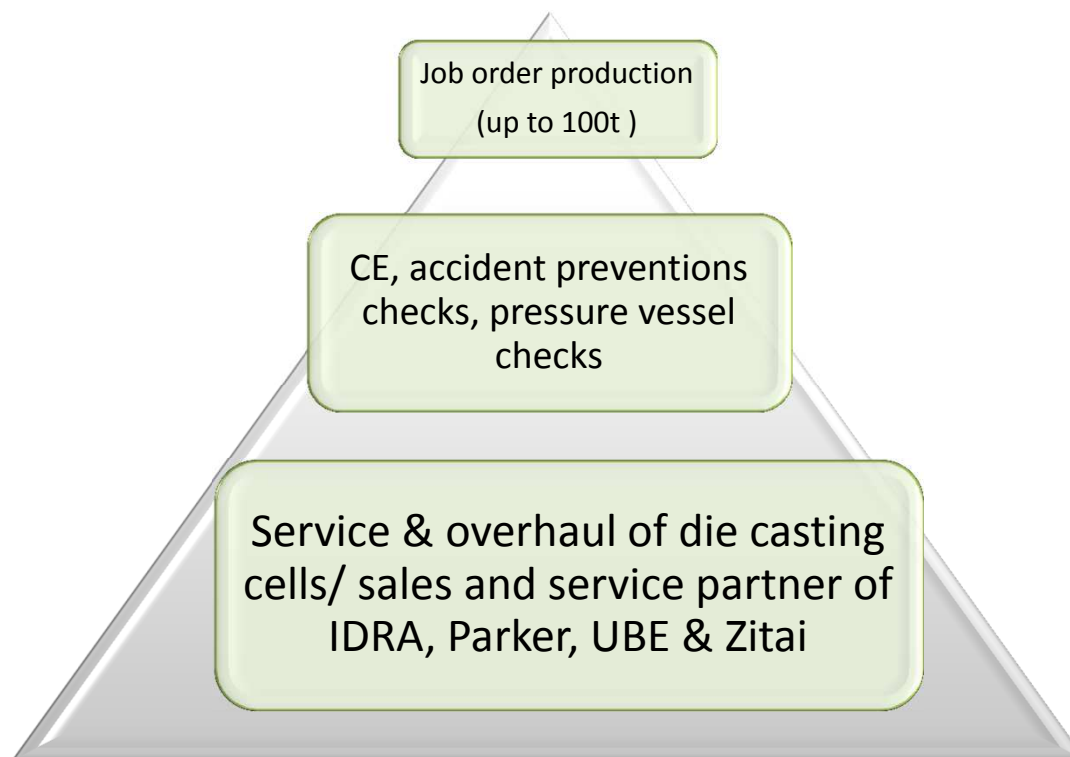
# Druckguss Service Deutschland GmbH

## - Company Information-

Location of the site	Luebeck, Germany
size:	approx. 10.000m <sup>2</sup> Production and stock
employees:	approx. 85 employees, thereof approx. 15 in administration approx. 30 service technicians approx. 25 mechanical technicians/5 welding technicians 3 project engineers/6 trainees
Quality assurance:	ISO 9001:2008, ISO 3834-2

# Druckguss Service Deutschland GmbH

## - Company Information -



# Druckguss Service Deutschland GmbH

- All under one roof -



# Druckguss Service Deutschland GmbH

- Hydraulics -



## Performance:

- Pressure vessel inspections (on-site)
- Pump repairs with performance tests
- Cylinder manufacturing and overhauls
- Hydraulic hose manufacturing

# Druckguss Service Deutschland GmbH

- Electronics -



## Performance:

- Switch cabinet manufacturing
- Software and electronic measuring equipment for casting process documentation
- PLC programming
- Machine wiring on-site
- Electronic service for your die-casting machines, diagnostics and troubleshooting



# Druckguss Service Deutschland GmbH

- „Heavy metal” machining -





# Druckguss Service Deutschland GmbH

- Service -

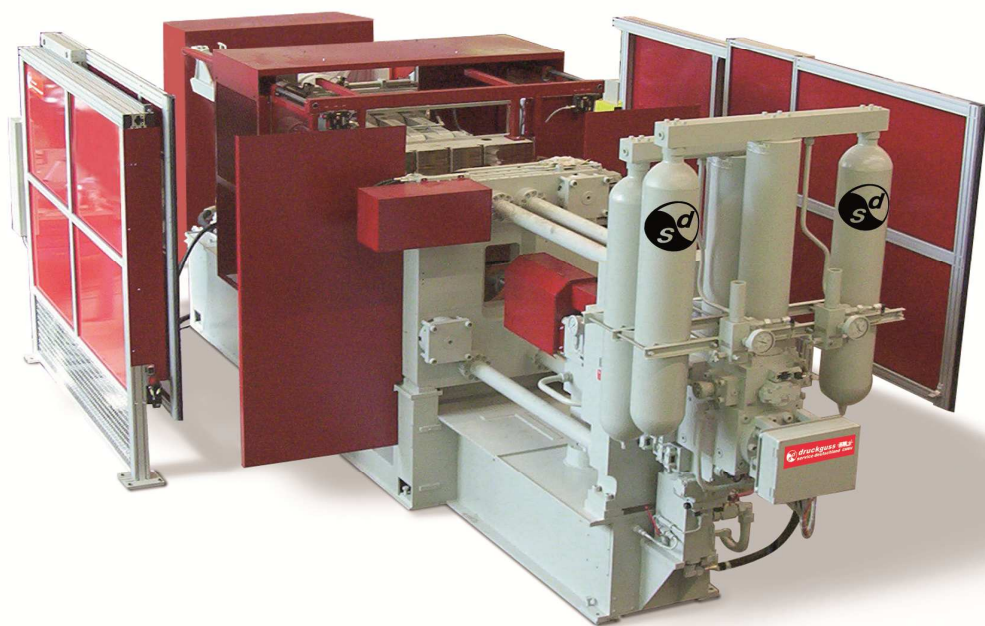


## Performance:

- Repair of die casting machines off all brands and sizes with a in-house production depth over 90%
- Repairs at customer site, in Germany, Europe and around the world

# Druckguss Service Deutschland GmbH

- DSD die casting machine -



# Agenda

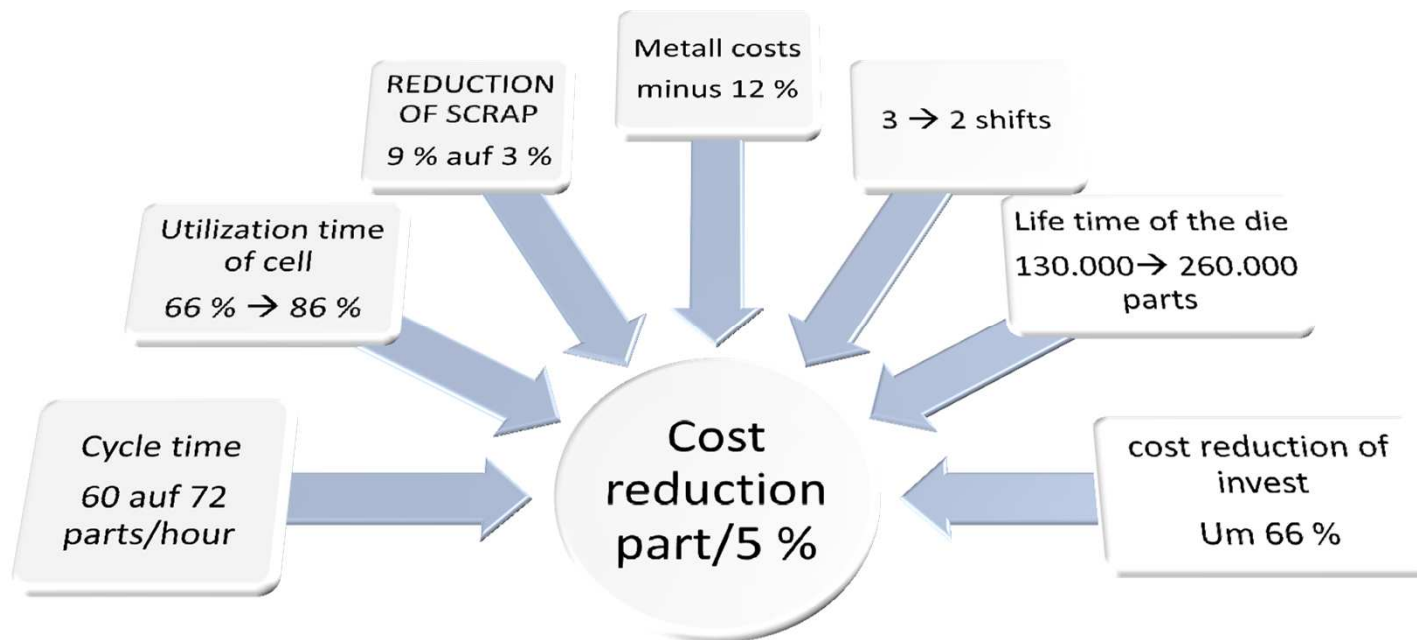
- (1) Druckguss Service Deutschland GmbH
- (2) Die casting - Process costs
- (3) Improvement of machine setting
  - (1) Shot sleeve extraction device - basics
  - (2) Application
  - (3) Further opportunities to improve the machine setting



**druckguss**  
**service deutschland GMBH**

# Die casting– Process Costs

- costs/part -



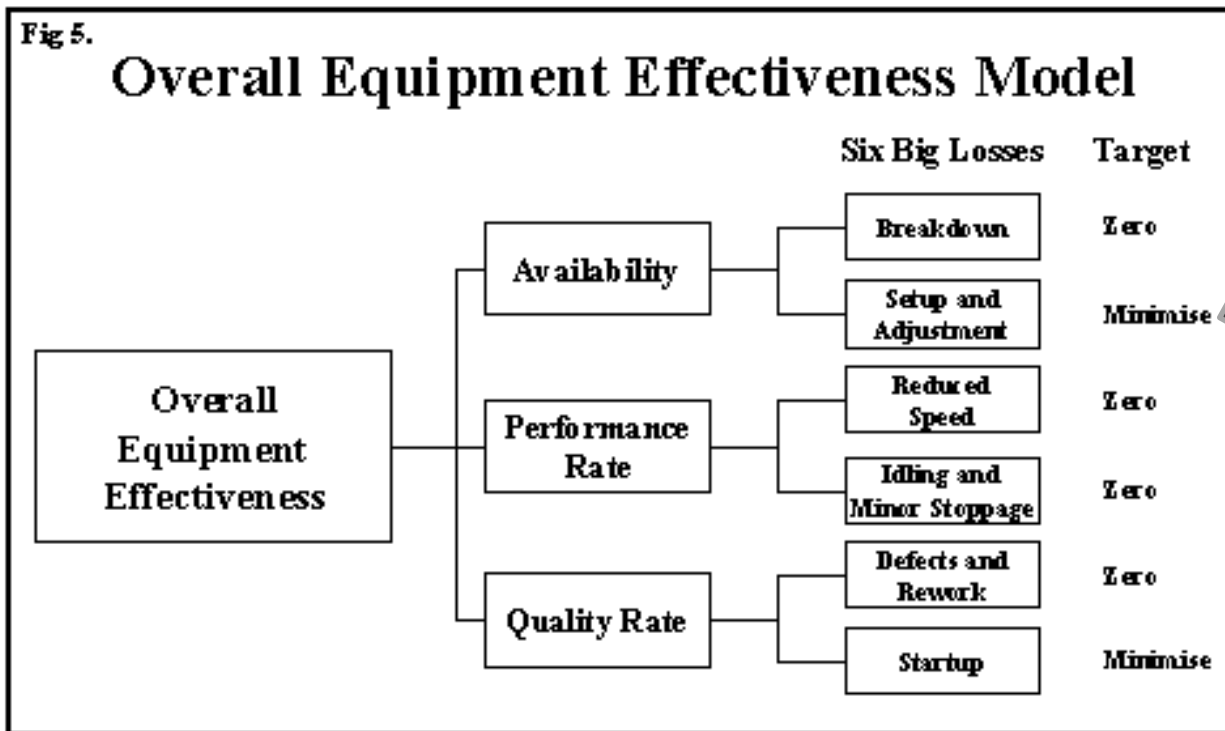
Source: Druckguss  
7/8 2010



**druckguss**  
**service deutschland GMBH**

# Die casting– Process Costs

OOE (Overall Equipment Effectiveness) = Availability x Performance x Quality



Source: <http://www.plant-maintenance.com>



# Agenda

- (1) Druckguss Service Deutschland GmbH
- (2) Die casting - Process costs
- (3) Improvement of machine setting
  - (1) Shot sleeve extraction device - basics
  - (2) Application
  - (3) Further opportunities to improve the machine setting



# Improvement of machine setting

- Shot sleeve wear -

Replacement of the shot sleeves needed by:

- Normal wear and tear (spotty wear)
- Misalignment income (shot adjustment!)
- Incorrect piston / chamber combination
- Incorrect piston lubrication / lack of maintenance
- Non-uniform temperature distribution of the shot sleeve/ deformation
- Form-sided expansion of the shot sleeves at high metal pressures

Replacement of the shot sleeve is complicated because of:

- Dirt / bonding
- Corrosion
- Deformation of the casting chamber / chamber holder

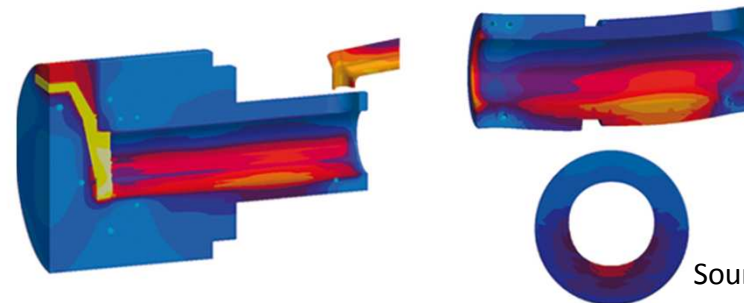
# Improvement of machine setting

- Shot sleeve extraction device



Known issues: steel-aluminum interactions with formation of the aluminum-rich phases  $\text{Fe}_2\text{Al}_5$  or  $\text{FeAl}_3$  causes spotty wear

Deformation of the shot sleeve by irregular temperature distribution



Source: Magmasoft



# Improvement of machine setting

- purpose of the Shot sleeve extraction device -

... simplifies the complicated change of the shot sleeve:

- Fast and secure change of shot sleeves directly on the machine (horizontal) or at tool shop (vertical)
- Increase the overall plant efficiency by minimizing the setup times / reduction of machine downtime
- No dismantling of the die/ no transport to the tool shop
- No other equipment (presses etc.) for removal of the shot sleeve is needed
- Applicable to all types of shot sleeves
- Better handling of the resource "shot sleeve"
- Optimization of the storage situation of shot sleeves

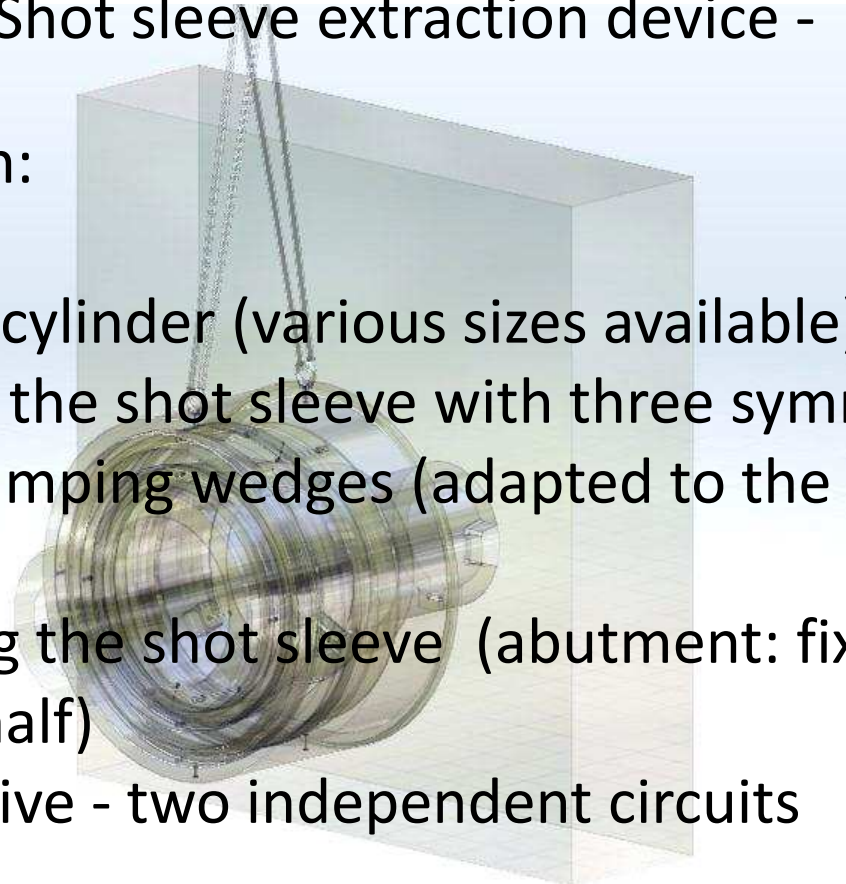


# Improvement of machine setting

- Shot sleeve extraction device -

Basic operation:

- Double ring cylinder (various sizes available)
- Clamping of the shot sleeve with three symmetrically arranged clamping wedges (adapted to the chamber outer diameter)
- Withdrawing the shot sleeve (abutment: fixed plate or fixed mold half)
- Hydraulic drive - two independent circuits





# Agenda

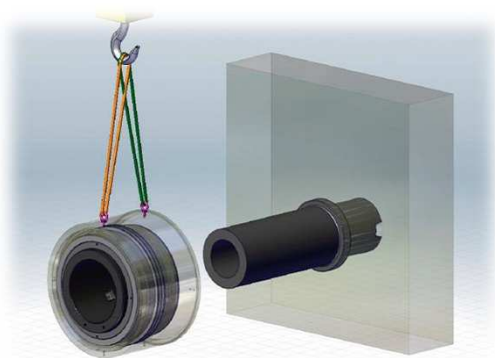
- (1) Druckguss Service Deutschland GmbH
- (2) Die casting - Process costs
- (3) Improvement of machine setting
  - (1) Shot sleeve extraction device - basics
  - (2) **Application**
  - (3) Further opportunities to improve the machine setting

# Improvement of machine setting

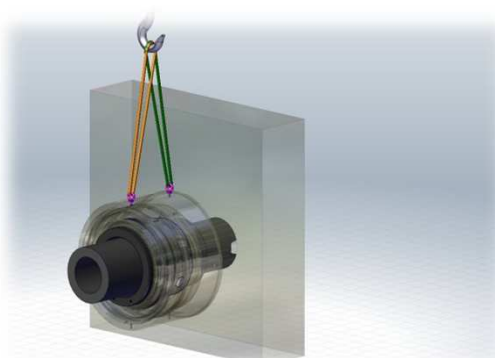
- Shot sleeve extraction device/application-

Output state: shot sleeves is stuck in fixed mold side.

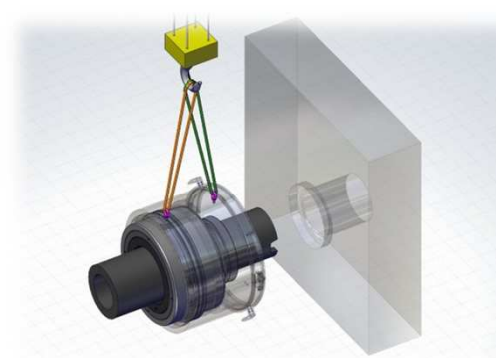
The withdrawal of the shot sleeve is performed in three steps:



1. Device on the crane



2. Clamping and pulling

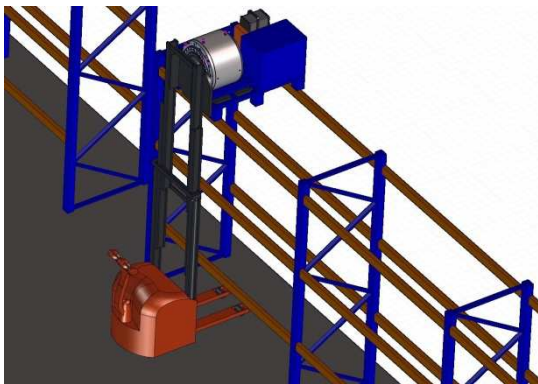


3. Dissolved shot sleeve

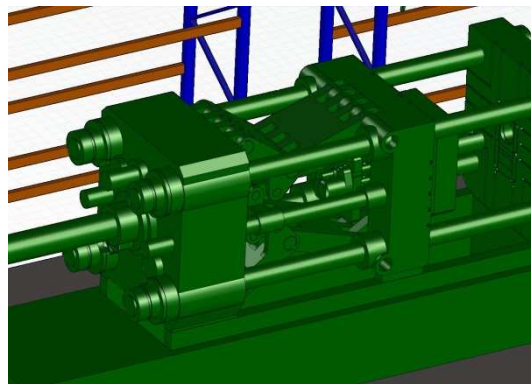
# Improvement of machine setting

- Shot sleeve extraction device/application-

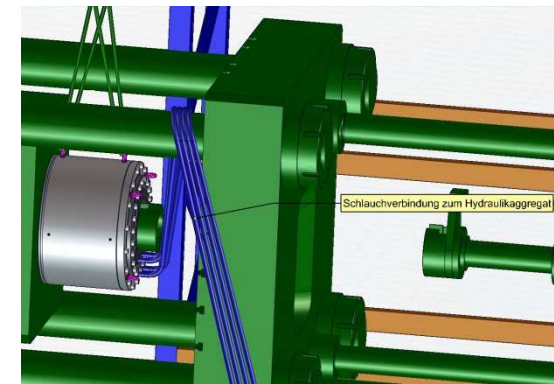
Horizontal application – Removing the shot sleeve directly on the machine



1. Providing the device



2. Driving die height  
and toggle system

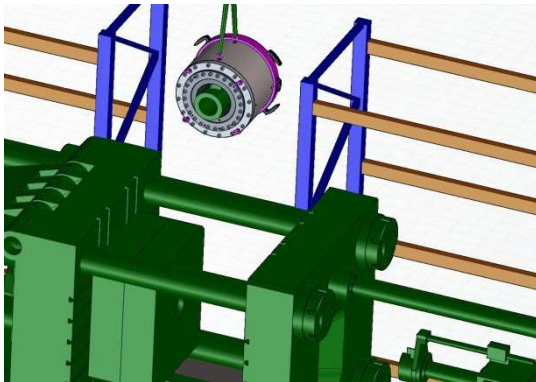


3. Attaching the device  
on the shot sleeve,  
clamping and pulling

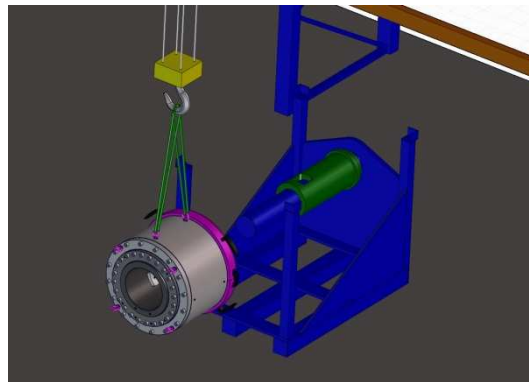
# Improvement of machine setting

- Shot sleeve extraction device/application-

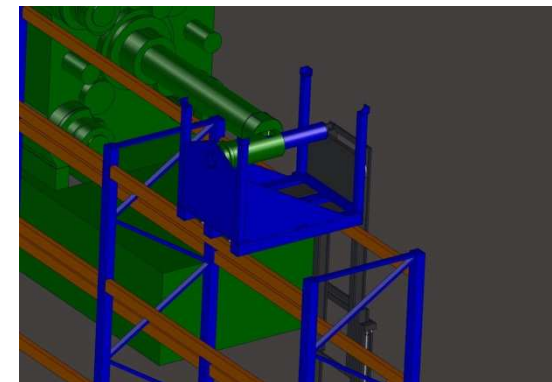
Horizontal application - Removing the shot sleeve directly on the machine



4. Device with sleeve



5. Loosen clamping

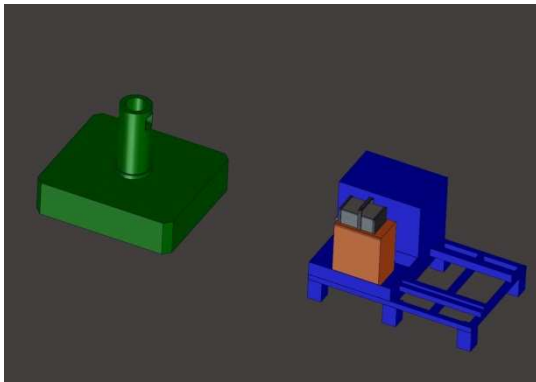


6. Storing of shot sleeve

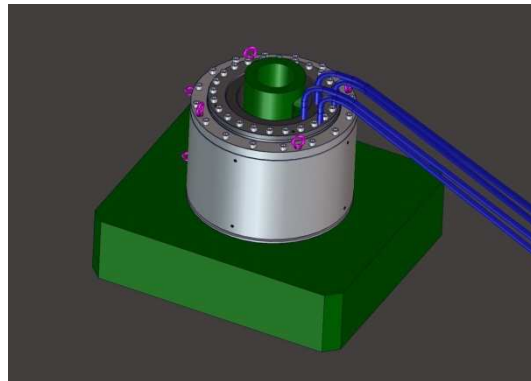
# Improvement of machine setting

- Shot sleeve extraction device/application-

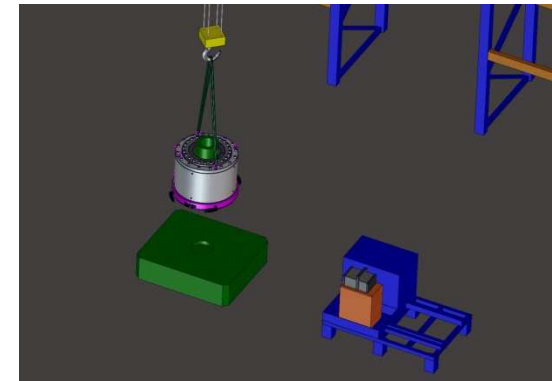
Vertical application - Remove the shot sleeve from the lying die



1. Die is positioned at tool shop



2. Putting the device on the shot sleeve



3. Clamping, pulling and removing of the sleeve

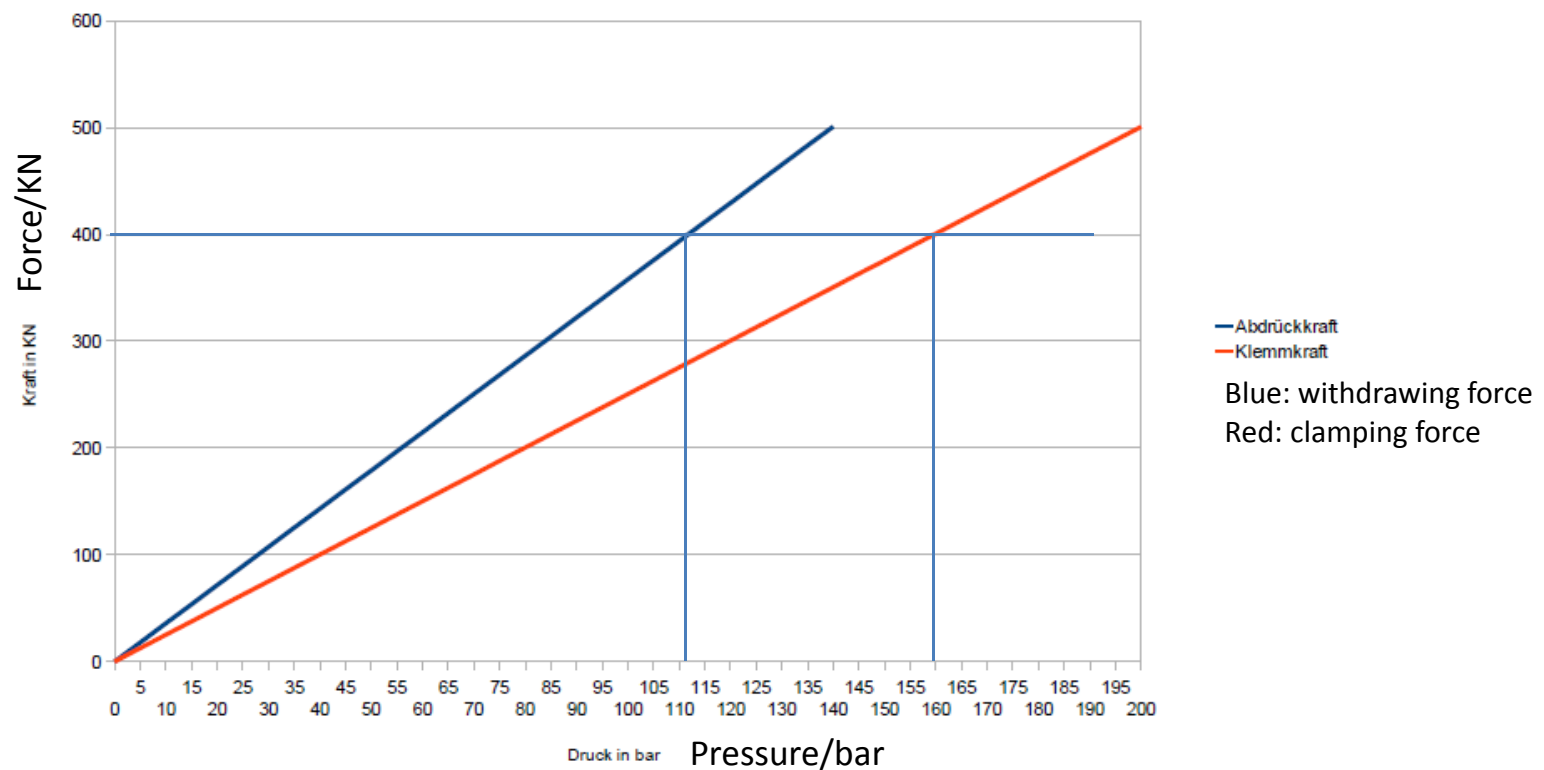




**druckguss**  
**service deutschland GMBH**

# Improvement of machine setting

- Shot sleeve extraction device -





**druckguss**  
**service deutschland GMBH**

# Improvement of machine setting

- Shot sleeve extraction device -

Benefits of the shot sleeve extraction device:

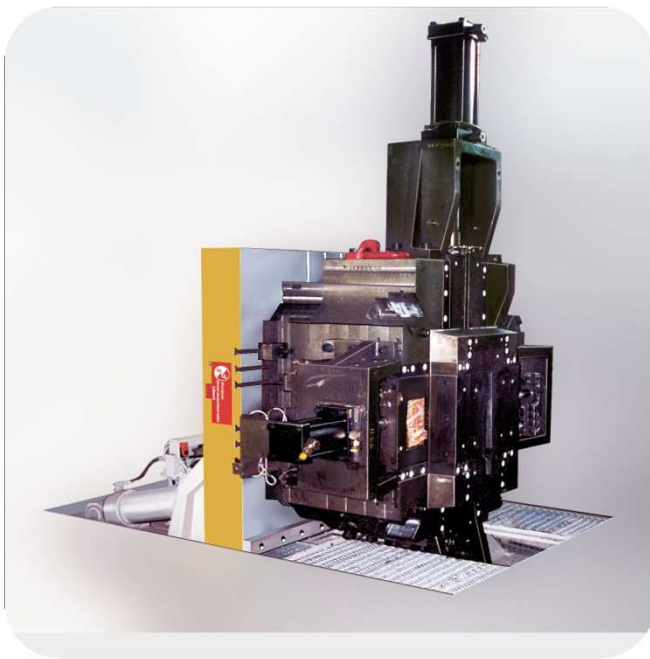
- Accident prevention
- Simplifies the exchange process
- Avoids damages during shot sleeve exchange
- Applicable to all types of shot sleeves
- Horizontal and vertical pulling is possible
- Increased efficiency of the casting cell
- Fast payback

# Agenda

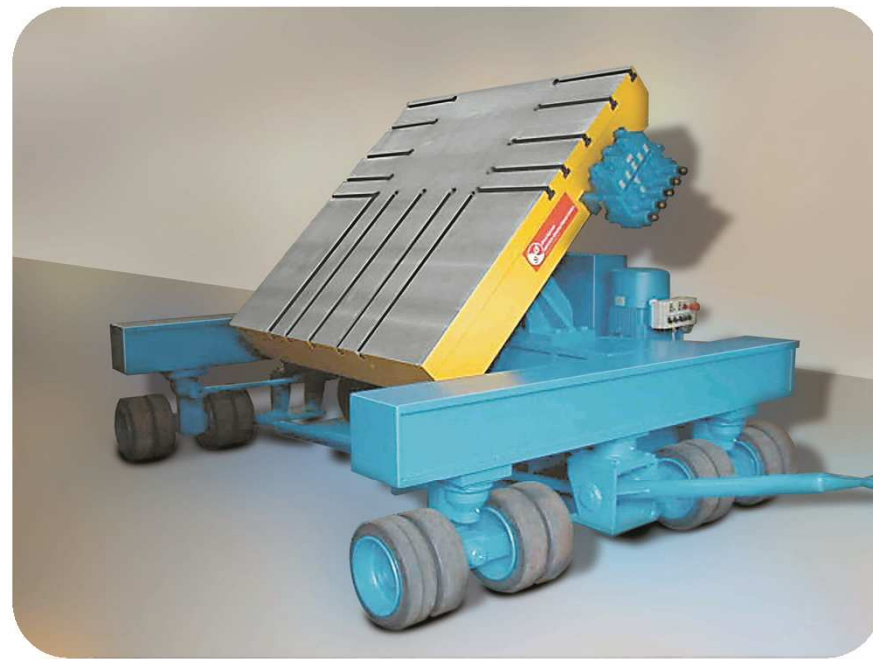
- (1) Druckguss Service Deutschland GmbH
- (2) Die casting - Process costs
- (3) Improvement of machine setting
  - (1) Shot sleeve extraction device - basics
  - (2) Application
  - (3) Further opportunities to improve the machine setting

# Improvement of machine setting

- Further opportunities-



Stationary device for tilting dies



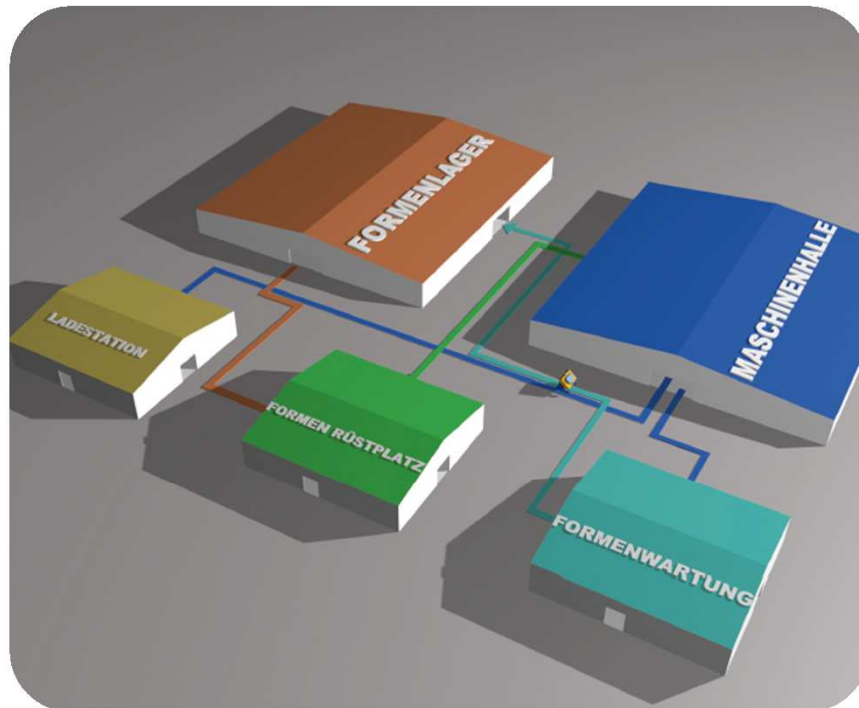
Mobile device to transport and tilt dies



**druckguss**  
**service deutschland GMBH**

# Improvement of machine setting

- Mold handling -



## Benefits:

- Accident prevention
- Simplifies the tool handling
- Increases effectiveness
- Prevention of damage
- Fast payback

## Perspective:

- Self driven device
- AGV (*Automated Guided Vehicle*)



# Thank you for your attention

## Any Questions?

Druckguss Service Deutschland GmbH  
Wesloer Str. 112  
23568 Luebeck/Germany

Telefon: 0049 451 619990  
Fax: 0049 451 62554  
[www. dgs-hl.de](http://www.dgs-hl.de)  
[info@dgs-hl.de](mailto:info@dgs-hl.de)