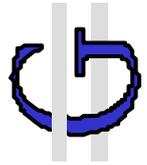


# Tilting Technology: The New Precise and Reproducible Centering Method for Ring Shaped Dies



*Dr.-Ing. Heinz Gross, Gross Kunststoff Verfahrenstechnik, Rossdorf, Germany*

**My vision**

**Questions to experts**

**Conventional centering solution**

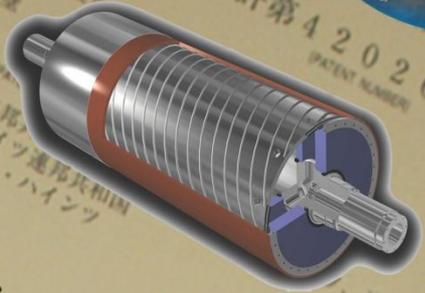
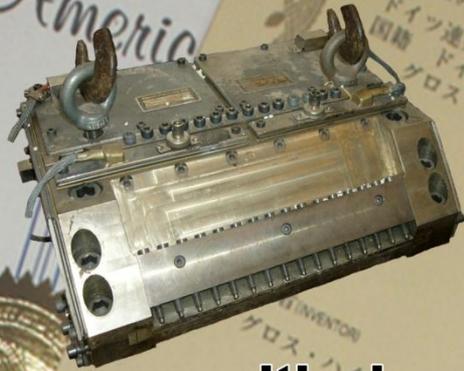
**The tilting solution in pipe extrusion**

**The tilting technology in extrusion blow molding**

**Conclusion**



# We develop benefits

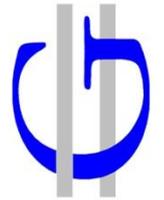


**sensitively adjustable extrusion components**

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# How do you centre a pipe die?



**Silly question! Naturally by shifting the die**

**My goodness ! The die has to be shifted!**

**But I have to struggle with those existing systems as they are not **precise enough** and not **reproducible!****



*Pipe Expert 1*

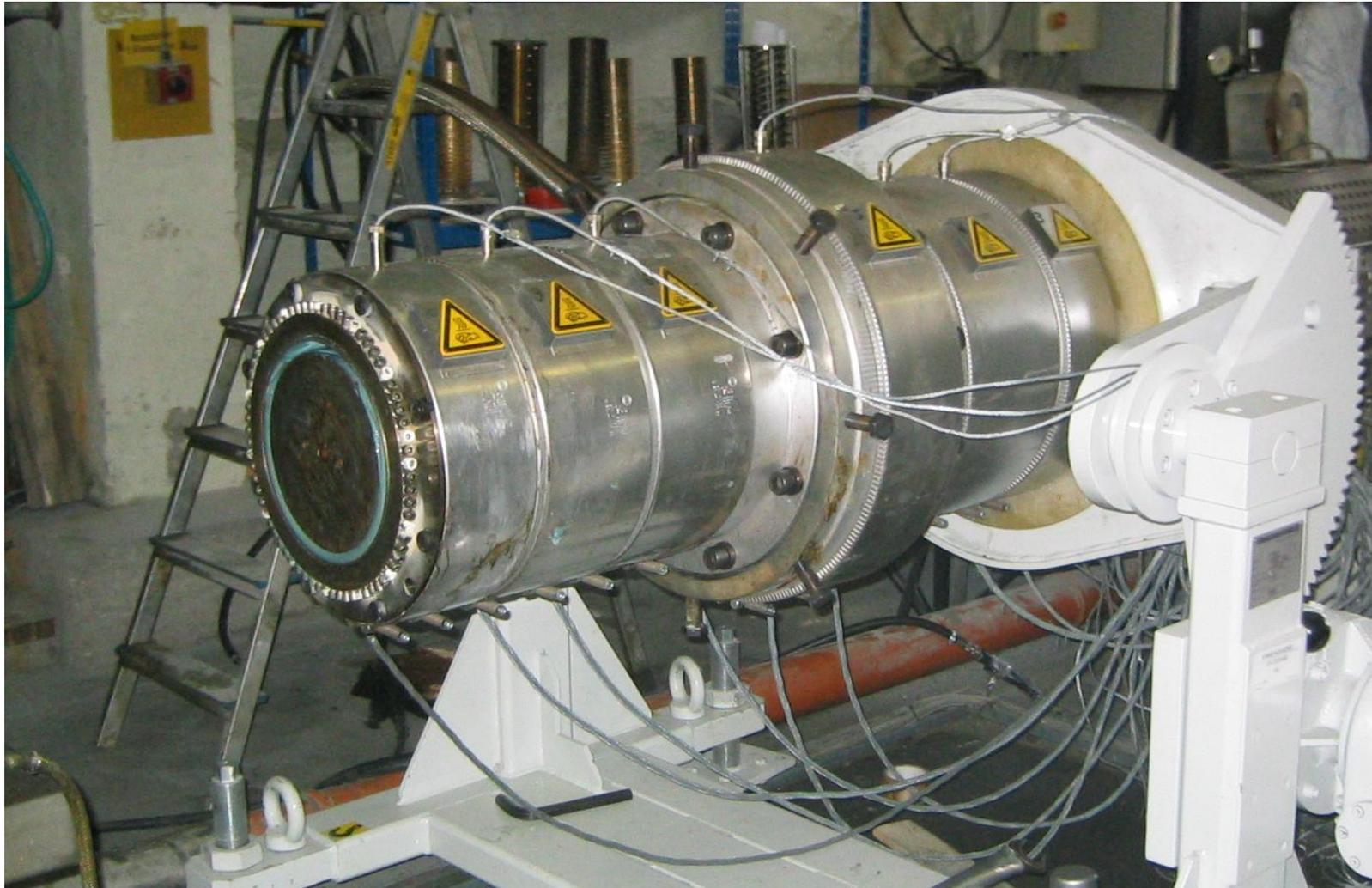


*Pipe Expert 2*



*Clever operator*

# Actual centring solution

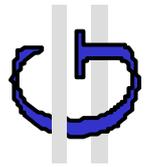


# Video centring of a „conventional die“



# Conventional centering uses screws that are positioned radially to shift the die

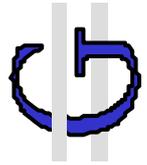
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- **It is impossible to center the dies precisely and sensitively**
- **A position that once has been existed can not be reproduced**
- **It can not avoided that wear will occur in the sealing planes**
- **The fabrication of the centering solution is costly**
- **Dies have to be precentered before starting the machine**
- **It is nearly impossible to automate existing solutions. In the case it is possible it is extremely costly**

# Important requirements for a good centering solution

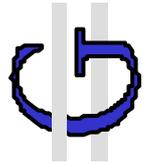
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- It must be possible to adjust the relative position between the die and the pin in a very **sensitive** and **precise** manner!
- It must be possible to **exactly reproduce** every position that once has been existed during the centering procedure!

# New centering solution

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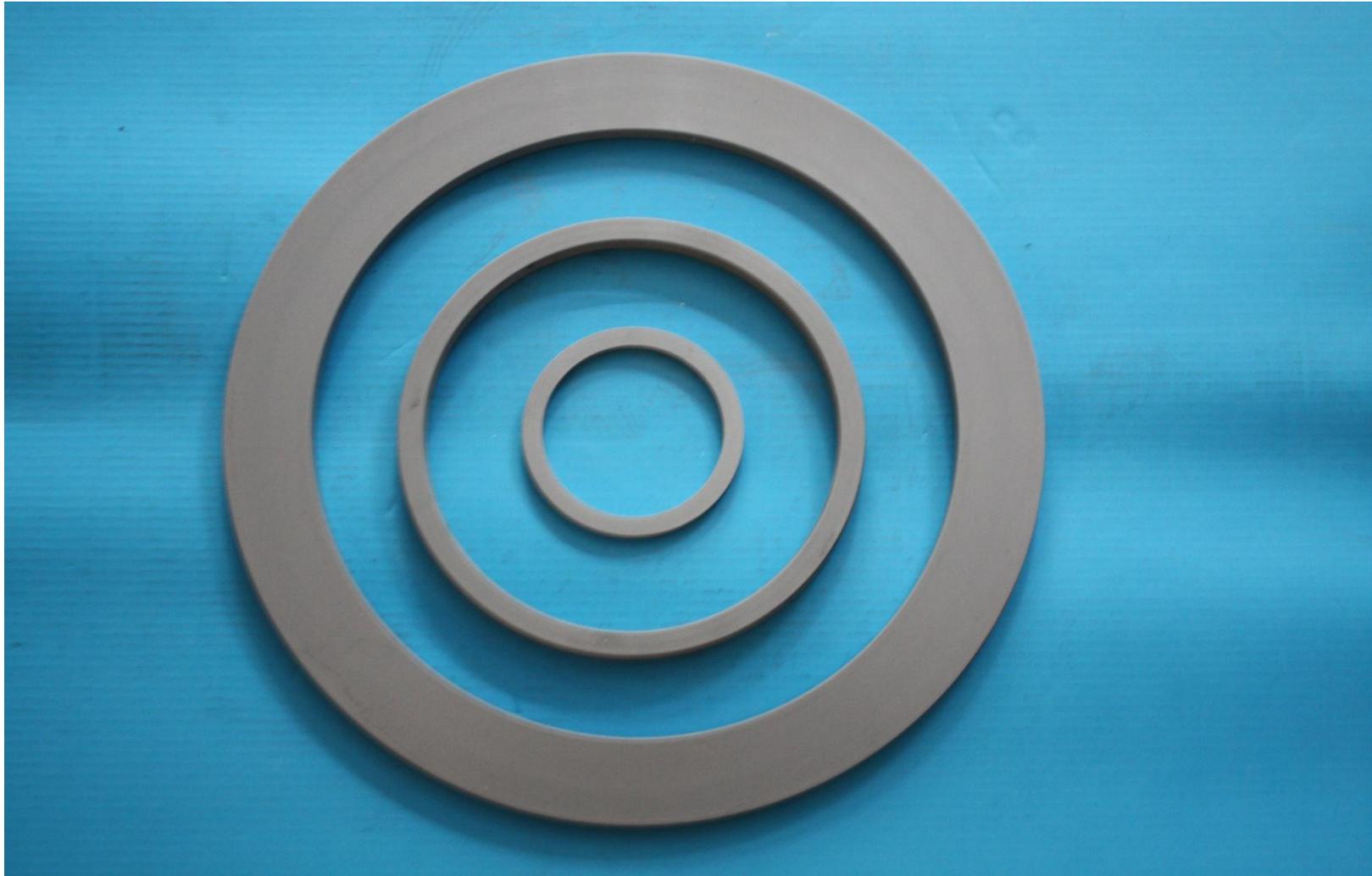
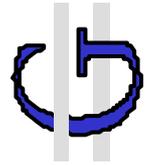
**Use of a very simple elastic tilting joint**

**The tilting joint has two functions:**

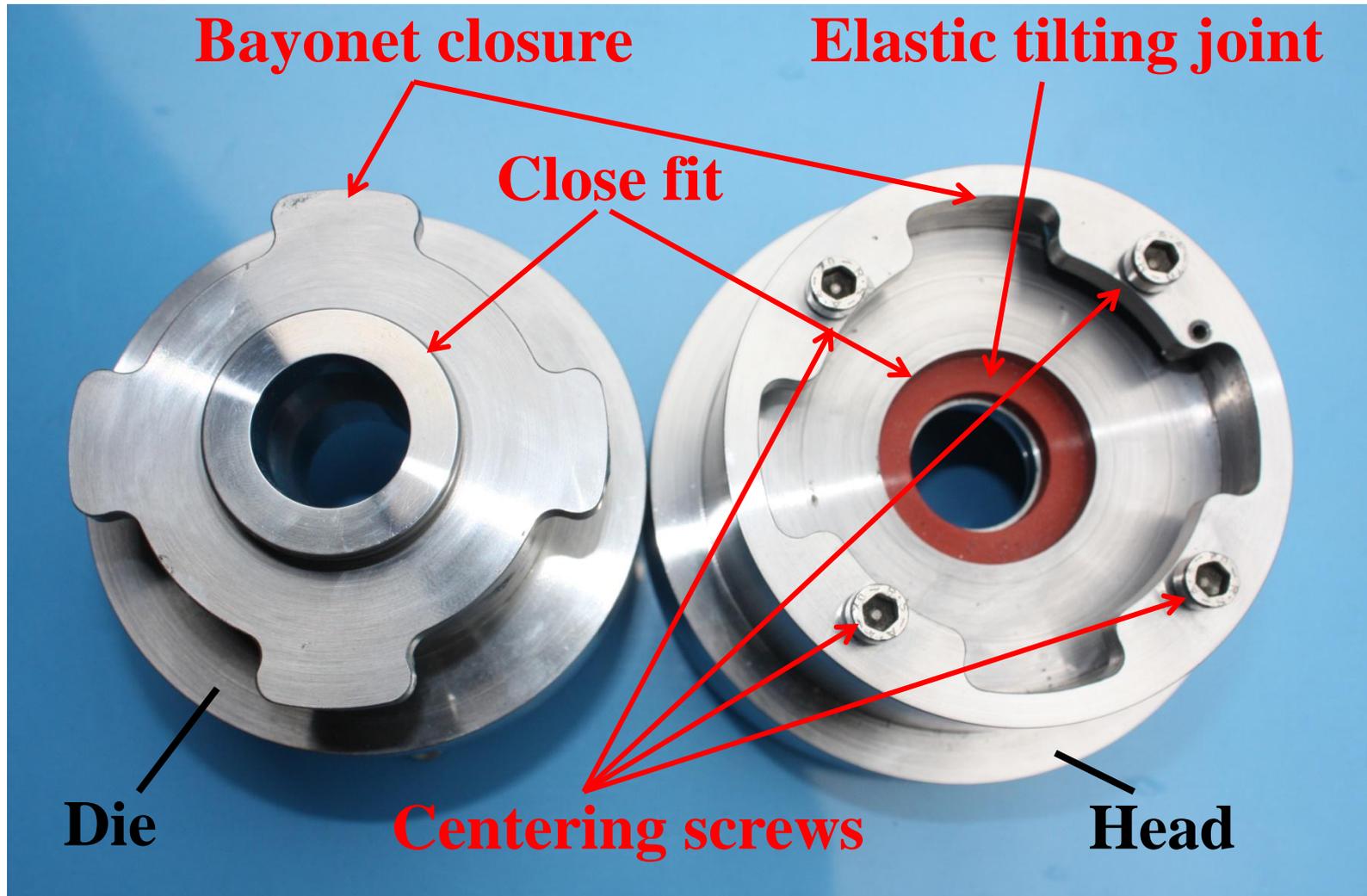
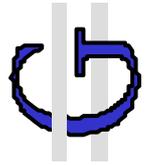
**Sealing function**

**Tilting function**

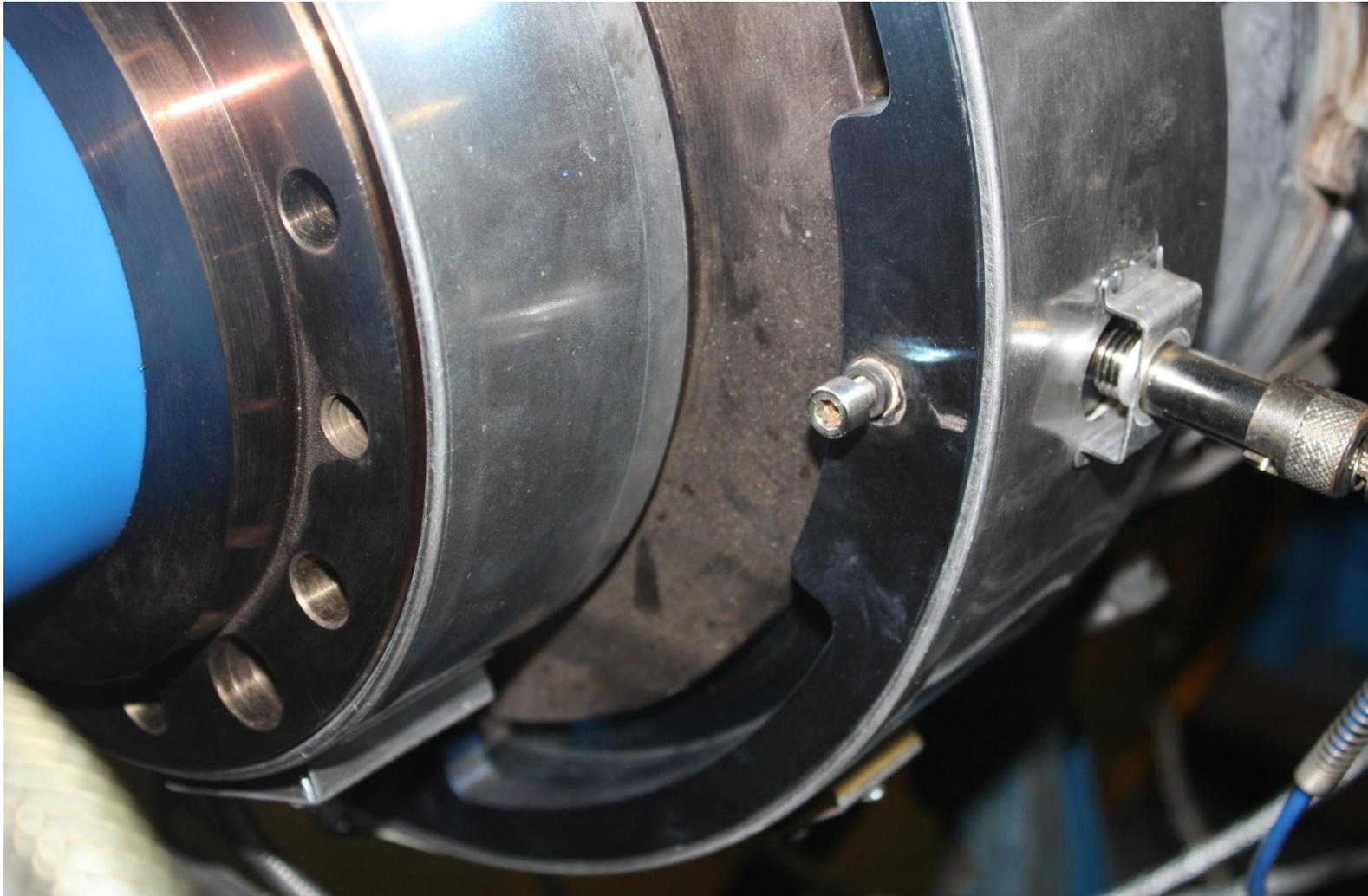
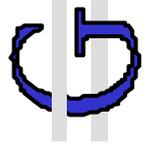
# How looks an elastic tilting joint like?



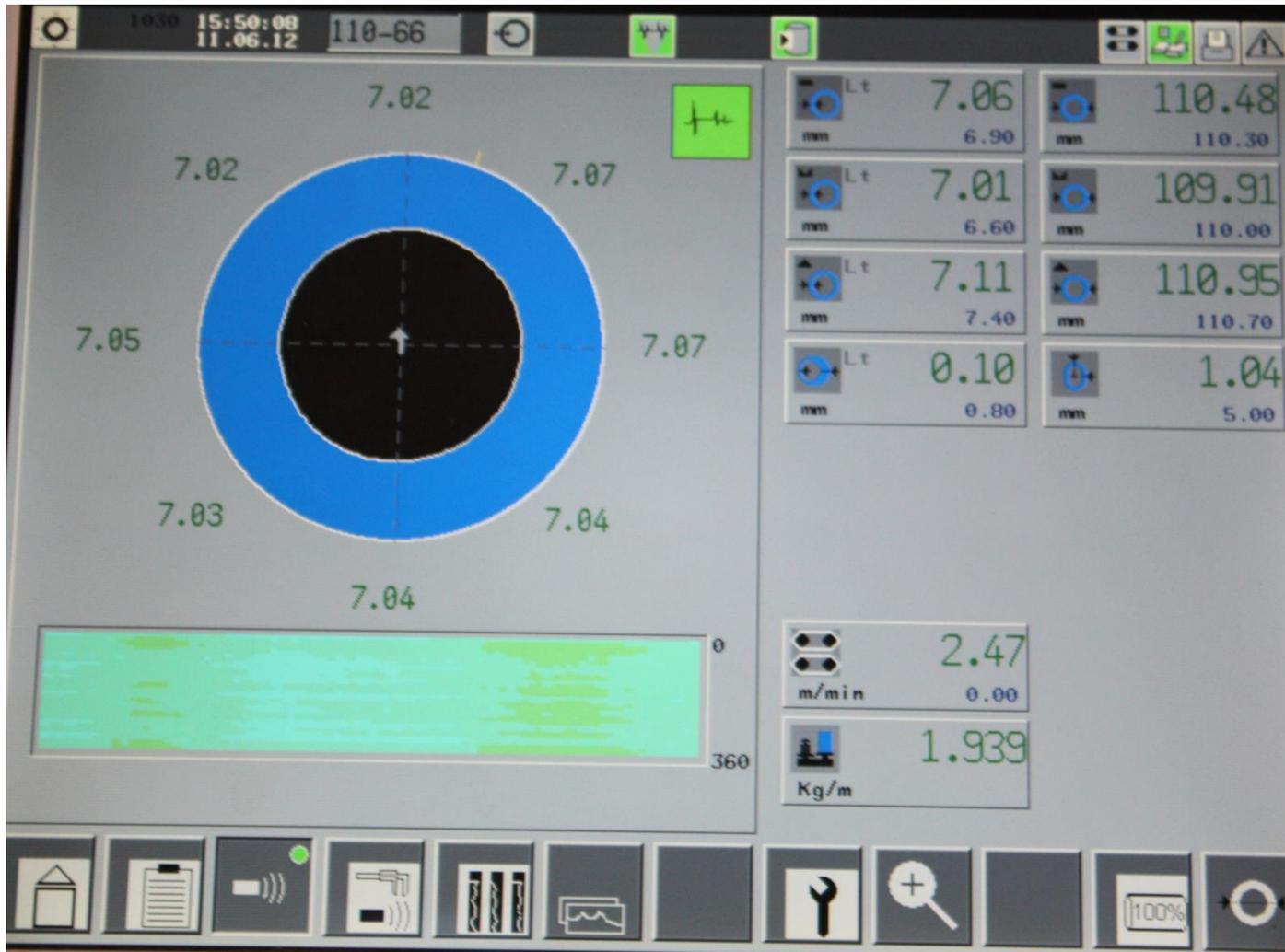
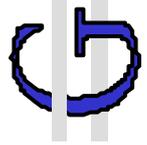
# Tilting pipe die having a bayonet closure and small adjusting screws

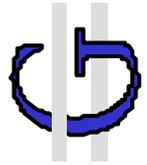


# Tilting die in operation



# Achieved excentricity





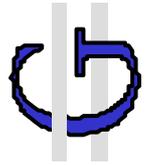
# Advantages of the tilting solution

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The two central requirements are fulfilled without **any restrictions**:

- The die can be centered in the range of one micrometer if this is necessary
- A position that has been achieved can be exactly reproduced at any time

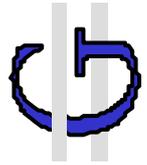
**This technical functionality is reached on a surprising easy manner**



# Advantages of the tilting solution

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- **No precentering is necessary due to a close fit between the die and the pin**
- **It is possible to fine-tune the position of the die to the optimum**
- **Centering is possible with two fingers; no elongation**
- **Changing of the die by a turn, no screws are necessary**
- **Easy to be automate, dynamic tilting is possible**
- **No interruption of the process in extrusion blow molding**
- **Low manufacturing cost due to fewer parts**
- **Safe during operation and easy to maintain**

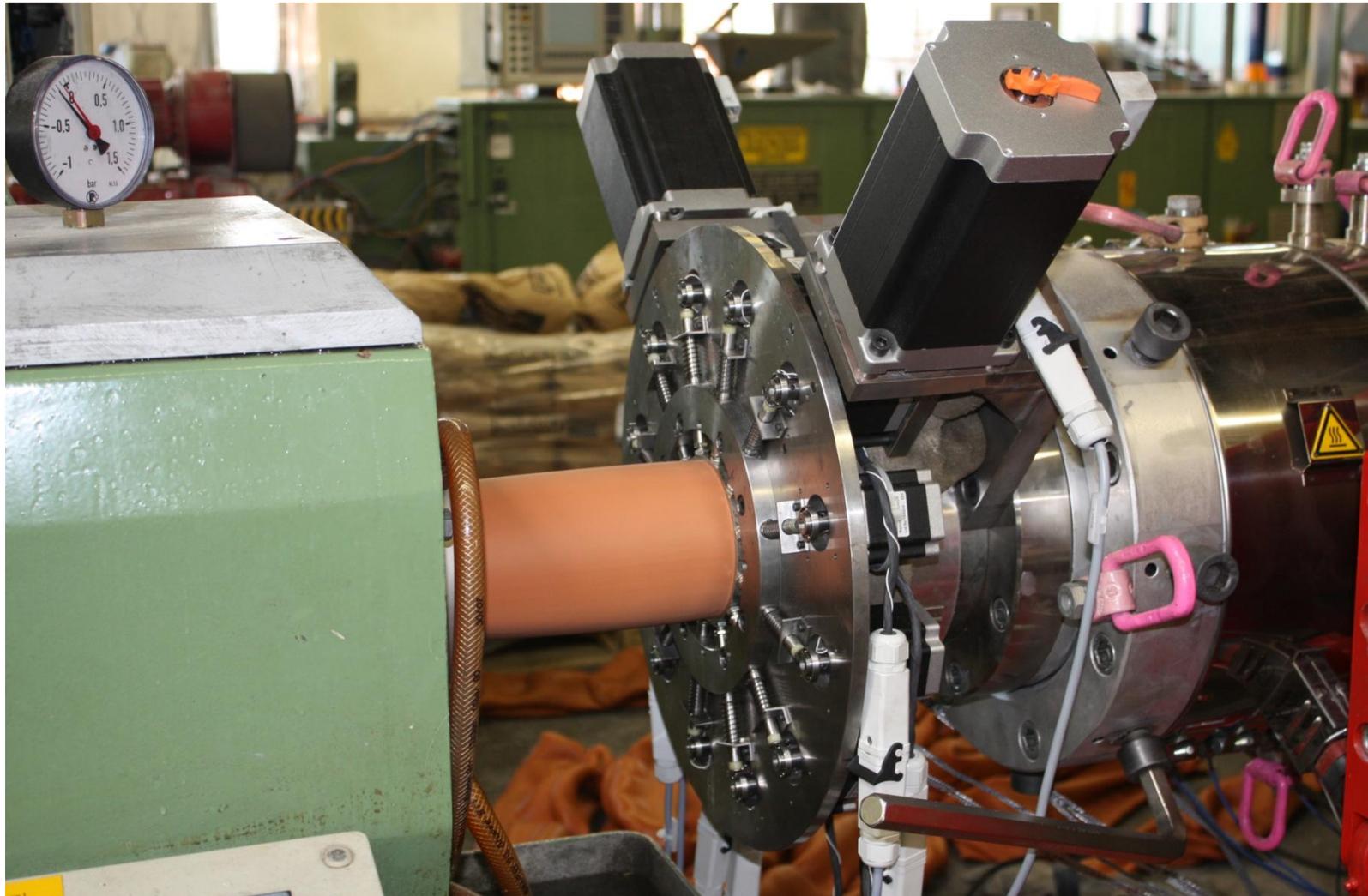


# Advantages of the tilting solution

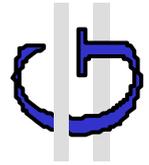
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**The quality of pipes can be further improved while at the same time the production costs are reduced**

# Closed-loop control of excentric and asymmetric thickness differences

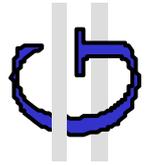


# Online wall thickness measuring system for core-foamed pipes



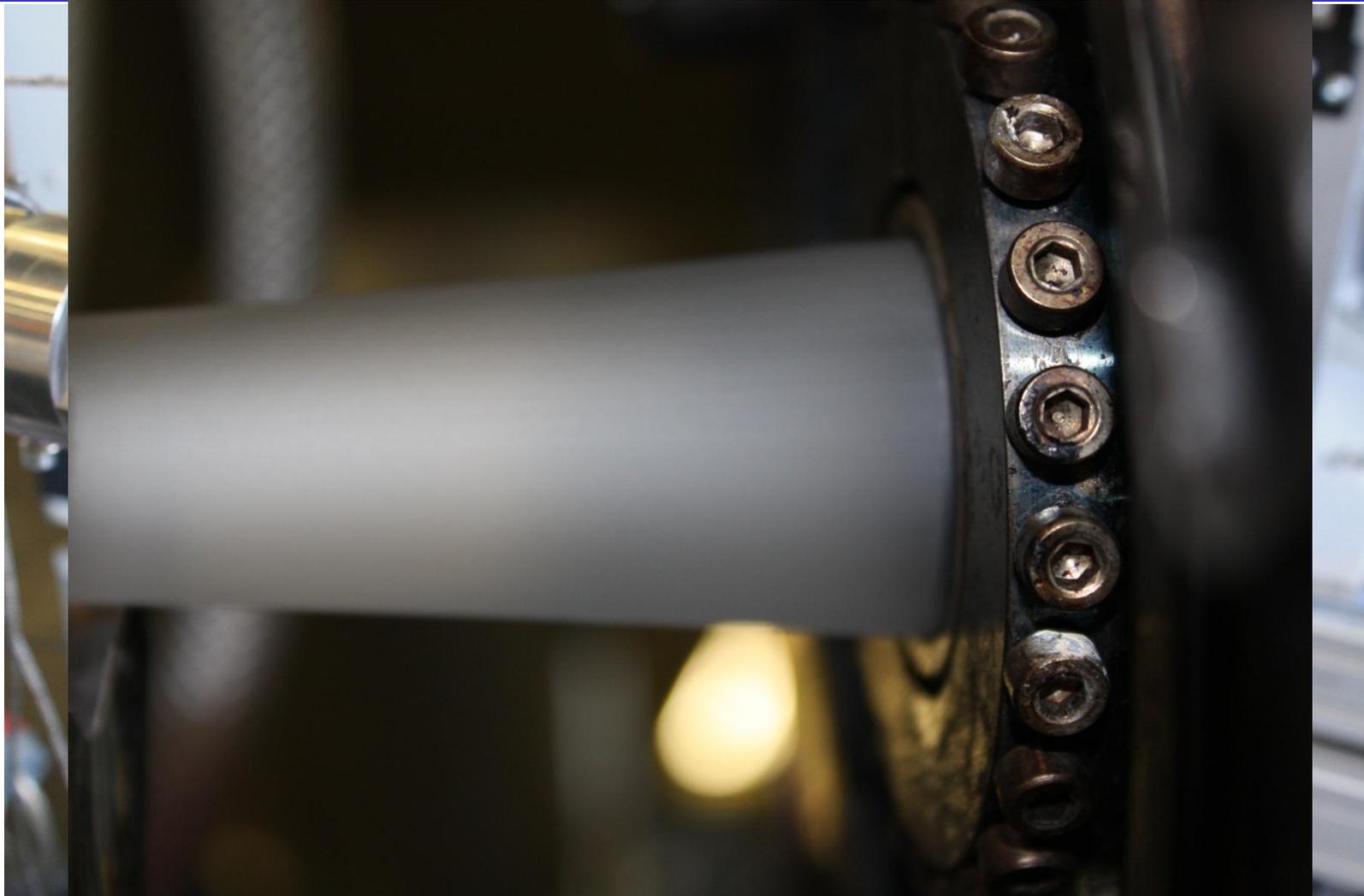
# Advantages of the tilting solution

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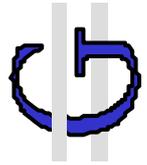
**Pipe production processes can  
be established where the  
thickness over the  
circumference of the pipe can  
be closed-loop controlled**

# Flex Ring die with tilting joint and adjustable flow channel gap for irrigation tubes



# Advantages of the tilting solution

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**Pipe dies can be built which allow for a steady change of the die gap size at the exit of the die while the line is running**

# How do you optimise the flow channel gap when starting the line?



**Naturall manually by shifting the die!**

**Manually there is no other solution!**

**But I would like to do it from the control cabinet of my machine much more precise and reproducible!**



*Blow molding Expert 1*

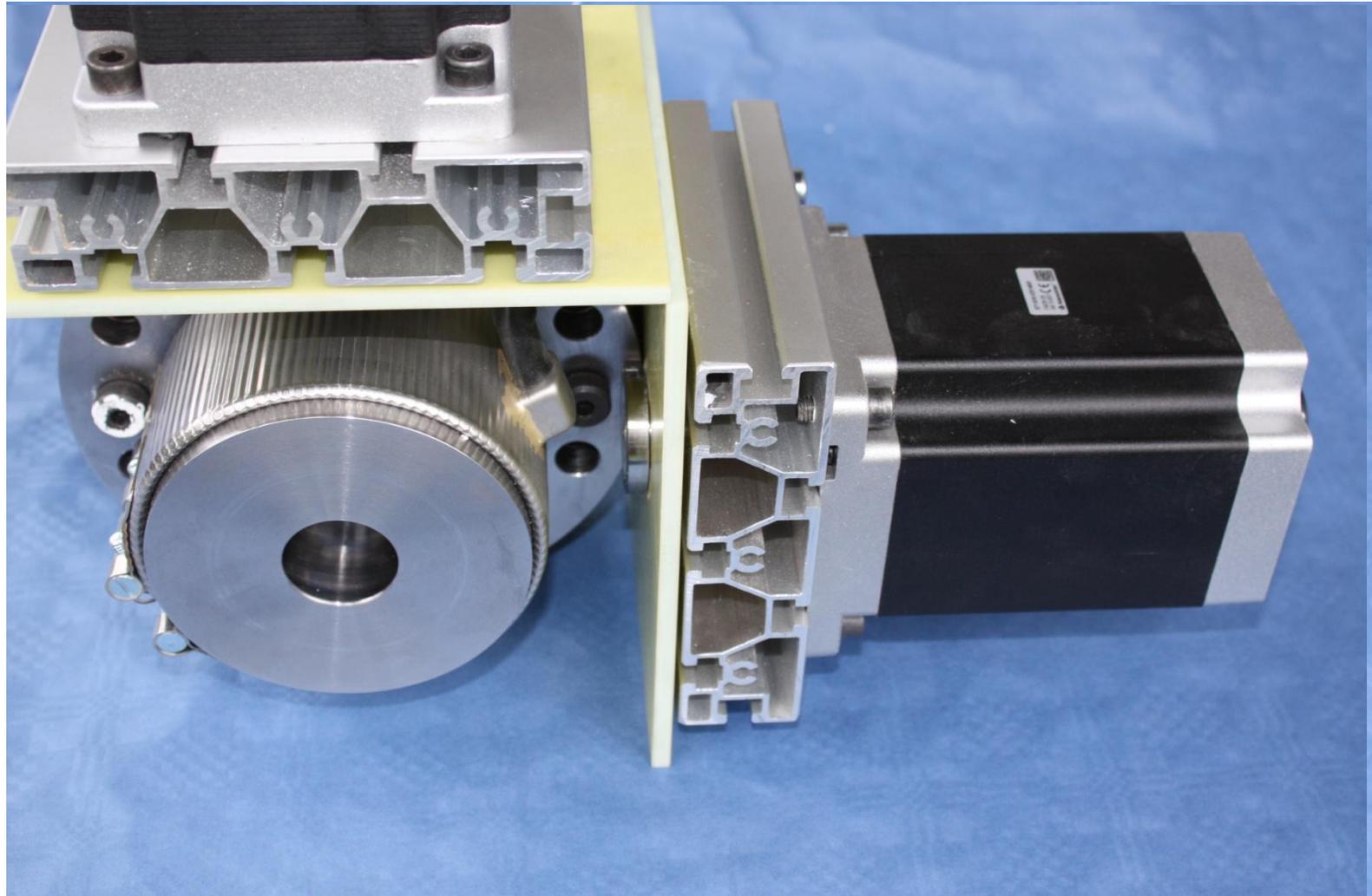
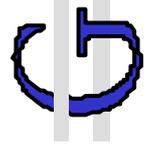


*Expert 2*

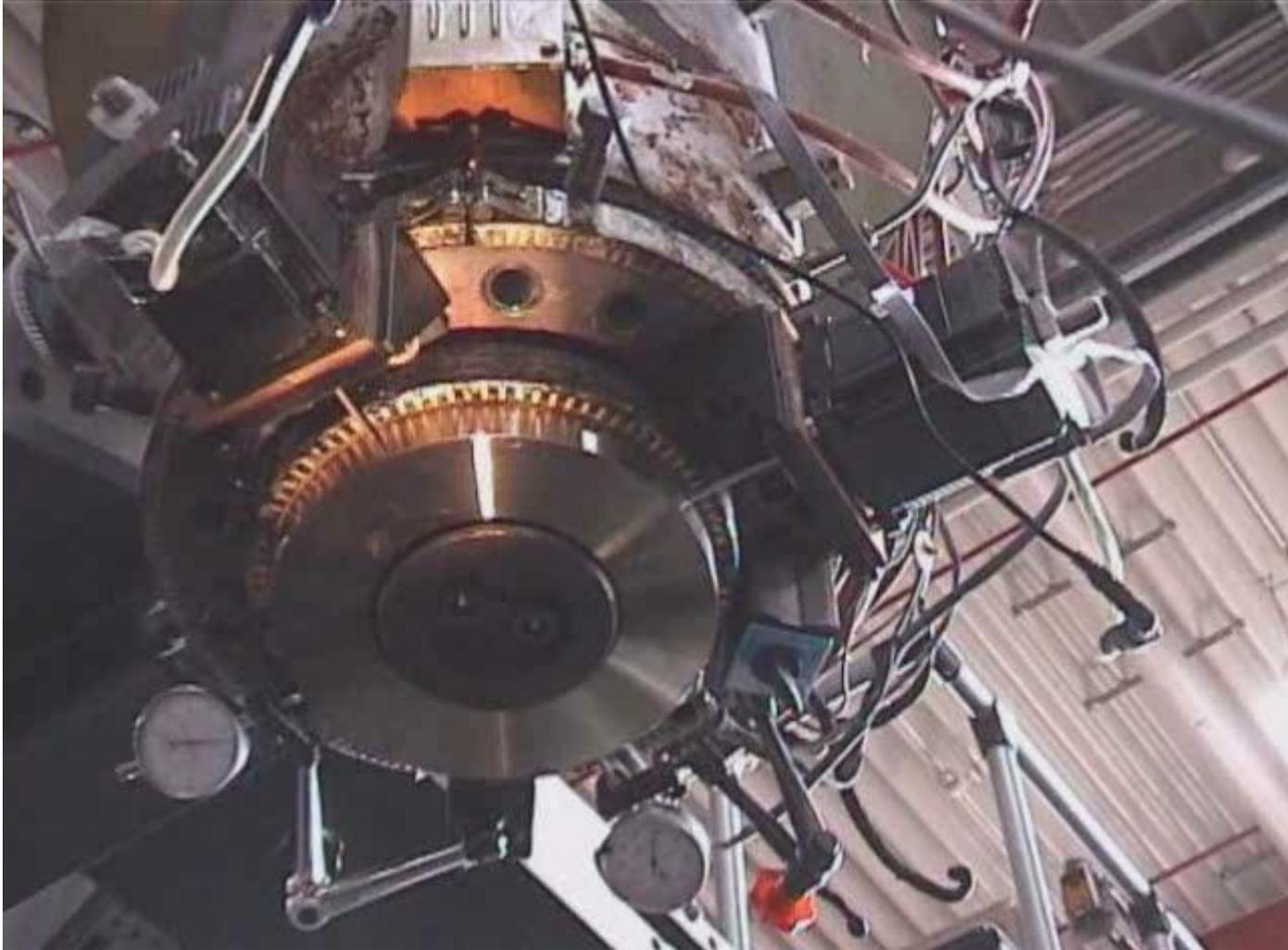


*Clever operator who has visited the EUROTEC 2013 and who has listened to this presentation*

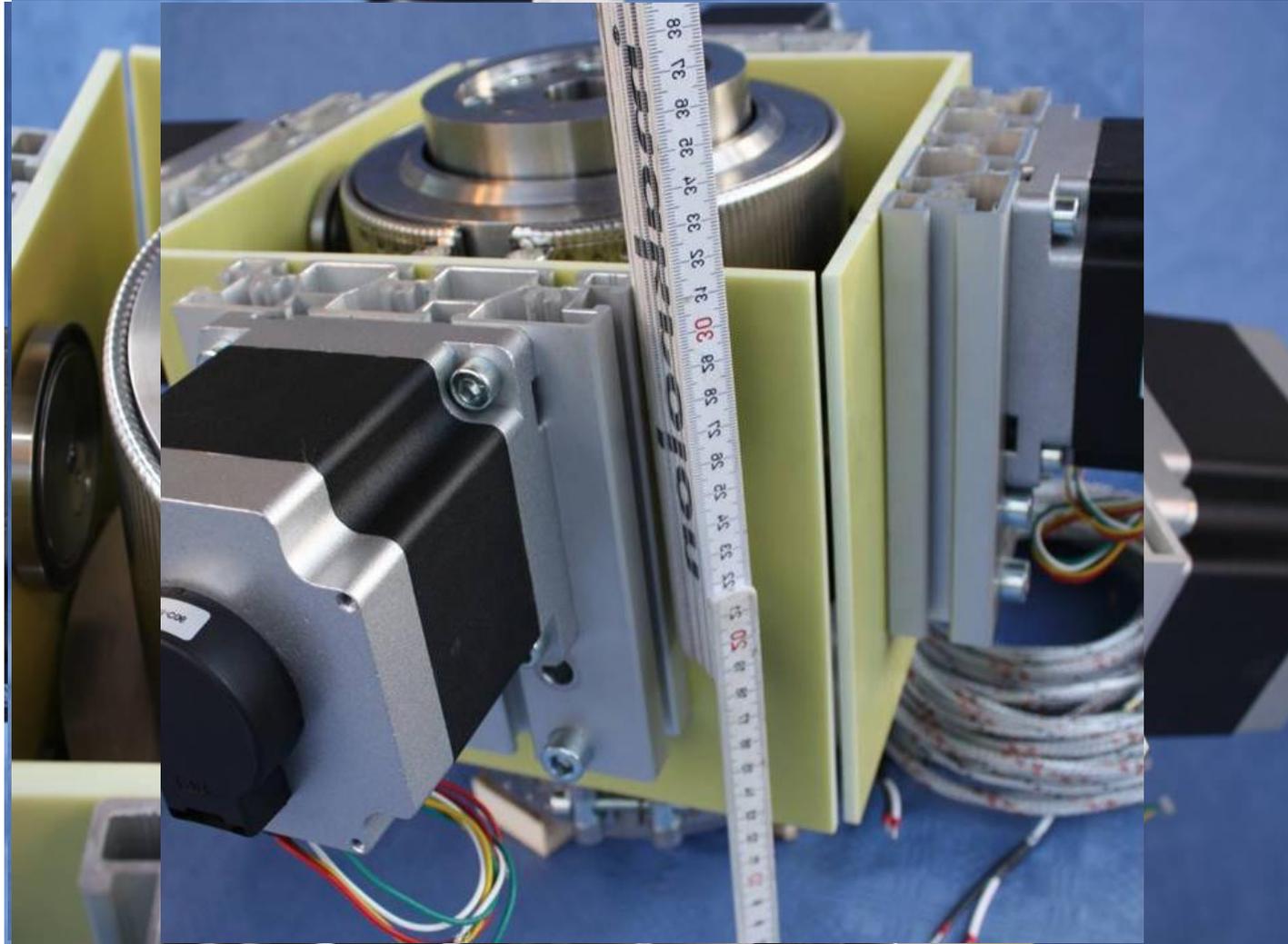
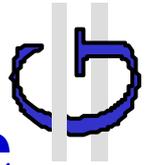
# New blow molding die with tilting joint



# Blow molding die equipped with an elastic tilting joint and two stepper motors



# New GWDS blow molding head with an integrated patented three functional device



# A tilting joint in combination with a GWDS die opens up new processing possibilities



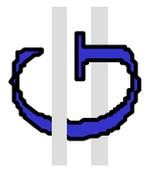
- The head consists of only six solid parts
- The head can be easily cleaned and affords no maintenance
- The head is ready to use and can be operated on every machine
- The melt distribution is independent from the operating point
- It has extreme short residence times
- Colours can be changed very quickly
- The die can be tilted while the parison is extracted
- A very precise dynamic radial wall thickness programming is possible for all die diameters



**Better part qualities can be produced at lower costs**

# Use of an elastic tilting joint in combination with the GWDS

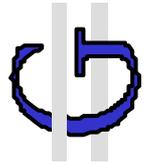
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## New processing possibilities are opened up

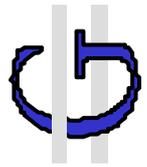
- Every die position can be exactly reproduced at any time
- Change of the parison thickness in radial direction possible for every die diameter
- Centering with the help of motors
- Change of the die position during the extraction of the parison is possible

# Summary



- **The tilting technology is the first solution that enables a sensitive and reproducible centering of dies from the control cabinet of the machine**
- **A bayonet closure accelerates the die changing and reduces the ease of failures and breakdowns during operation**
- **A dynamic as well axial as also radial wall thickness programming is possible for small die diameters when using the GWDS technology**
- **A combination of the tilting solution and the GWDS technology opens up new processing possibilities which could not be realized up to now**
- **The quality of the products can be further improved while saving raw material and while in the same time increasing the capacity of the machine**
- **All presented technologies can be easily retrofitted to any existing head without too high costs**
- **The return of investment times are extremely short as well for the tilting solution as also for the GWDS technology**

# Conclusion



**The best developments are those which completely solve a technical problem by reducing the costs, by reducing the complexity and thus also by reducing the danger of malfunction during the process.**

**The tilting-technology and the GWDS-technology are ideal examples**