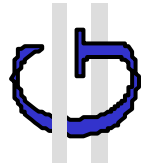


Tilting Technology: The New Precise and Reproducible Centering Method for Ring Shaped Dies



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

My vision

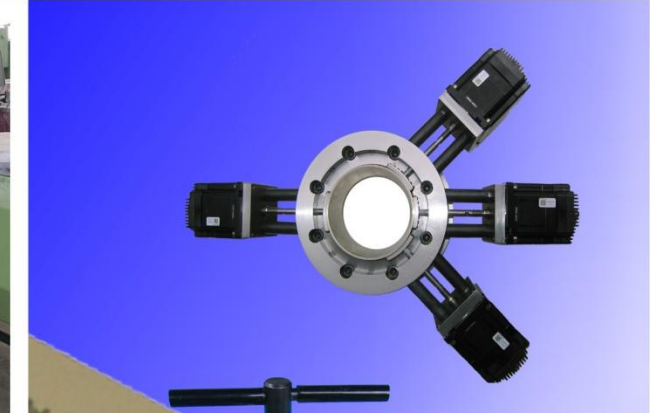
Questions to experts

Conventional centering solution

The tilting solution in pipe extrusion

The tilting technology in extrusion blow molding

Conclusion



We develop benefits



sensitively adjustable extrusion components

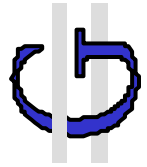
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How do you centre a pipe die?



Silly question! Naturally by shifting the die

My goodness ! The die has to be shifted!

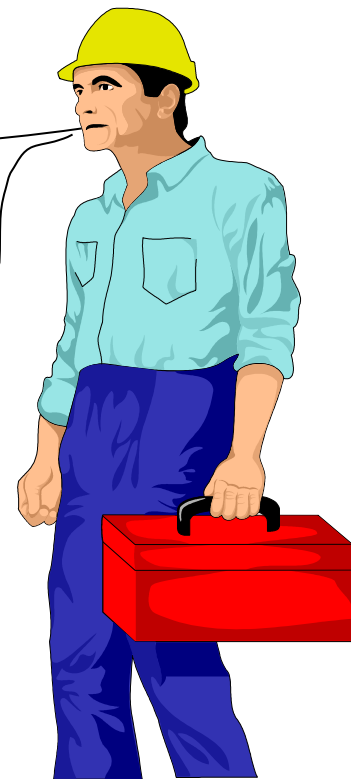
But I have to struggle with those existing systems as they are not **precise enough and not **reproducible!****



Pipe Expert 1

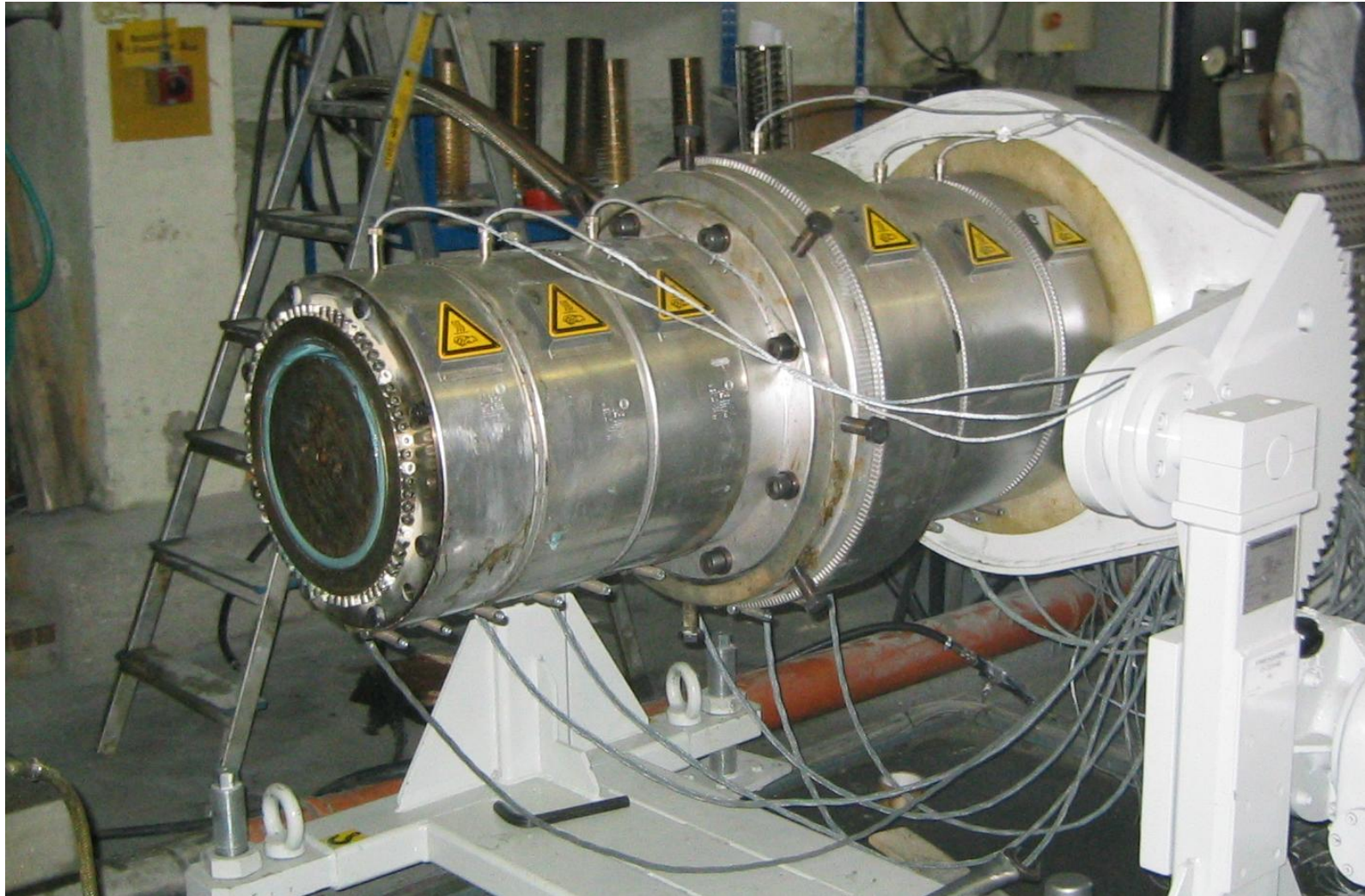
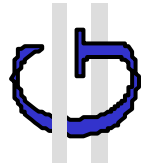


Pipe Expert 2



Clever operator

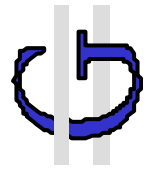
Actual centring solution



Video centring of a „conventional die“

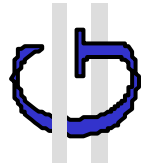


Conventional centering uses screws that are positioned radially to shift the die



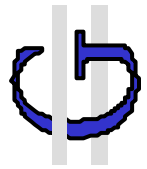
- **It is impossible to center the dies precisely and sensitively**
- **A position that once has been existed can not be reproduced**
- **It can not avoided that wear will occur in the sealing planes**
- **The fabrication of the centering solution is costly**
- **Dies have to be precentered before starting 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



- 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



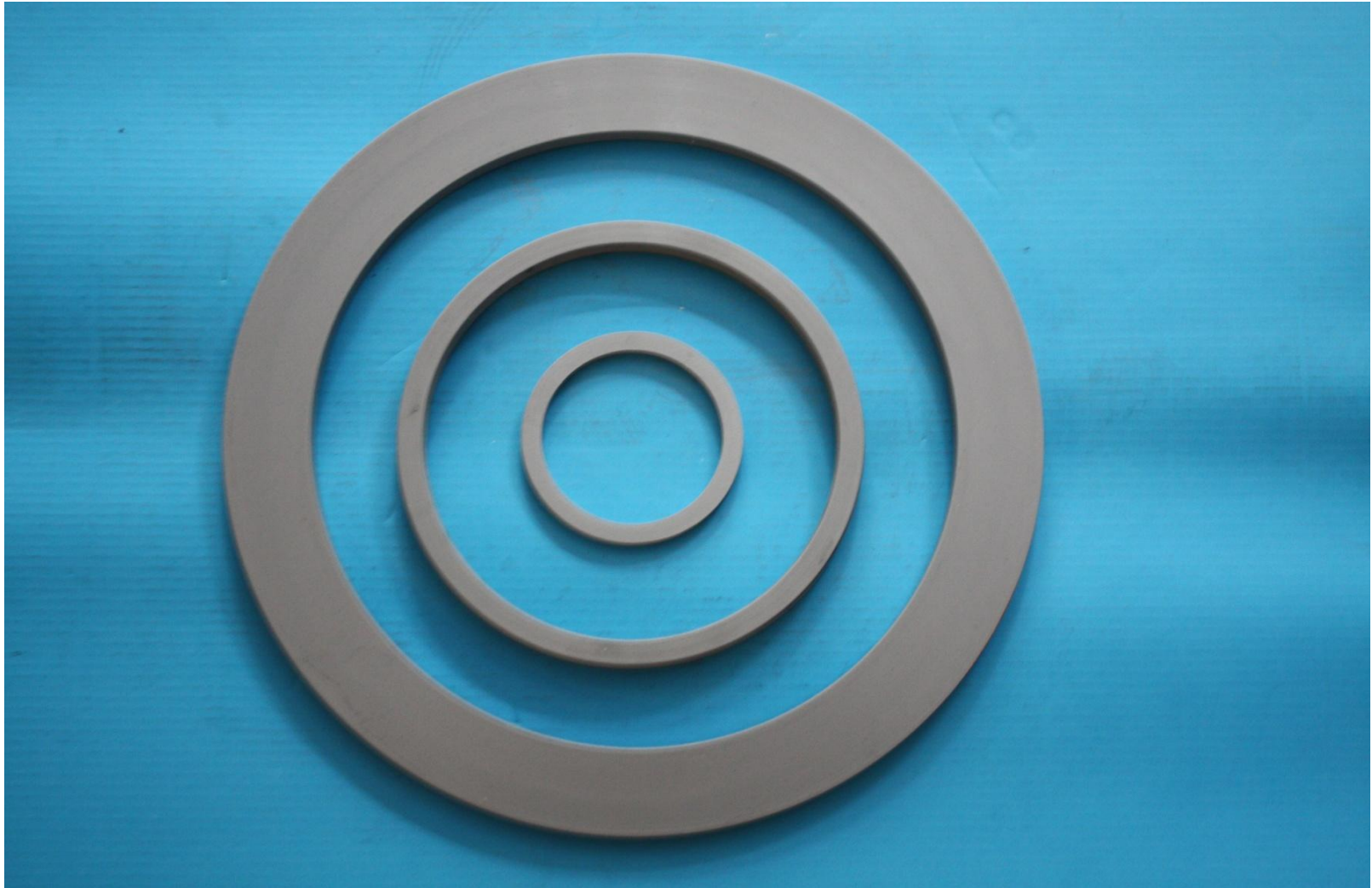
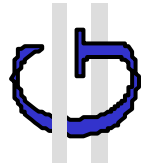
Use of a very simple elastic tilting joint

The tilting joint has two functions:

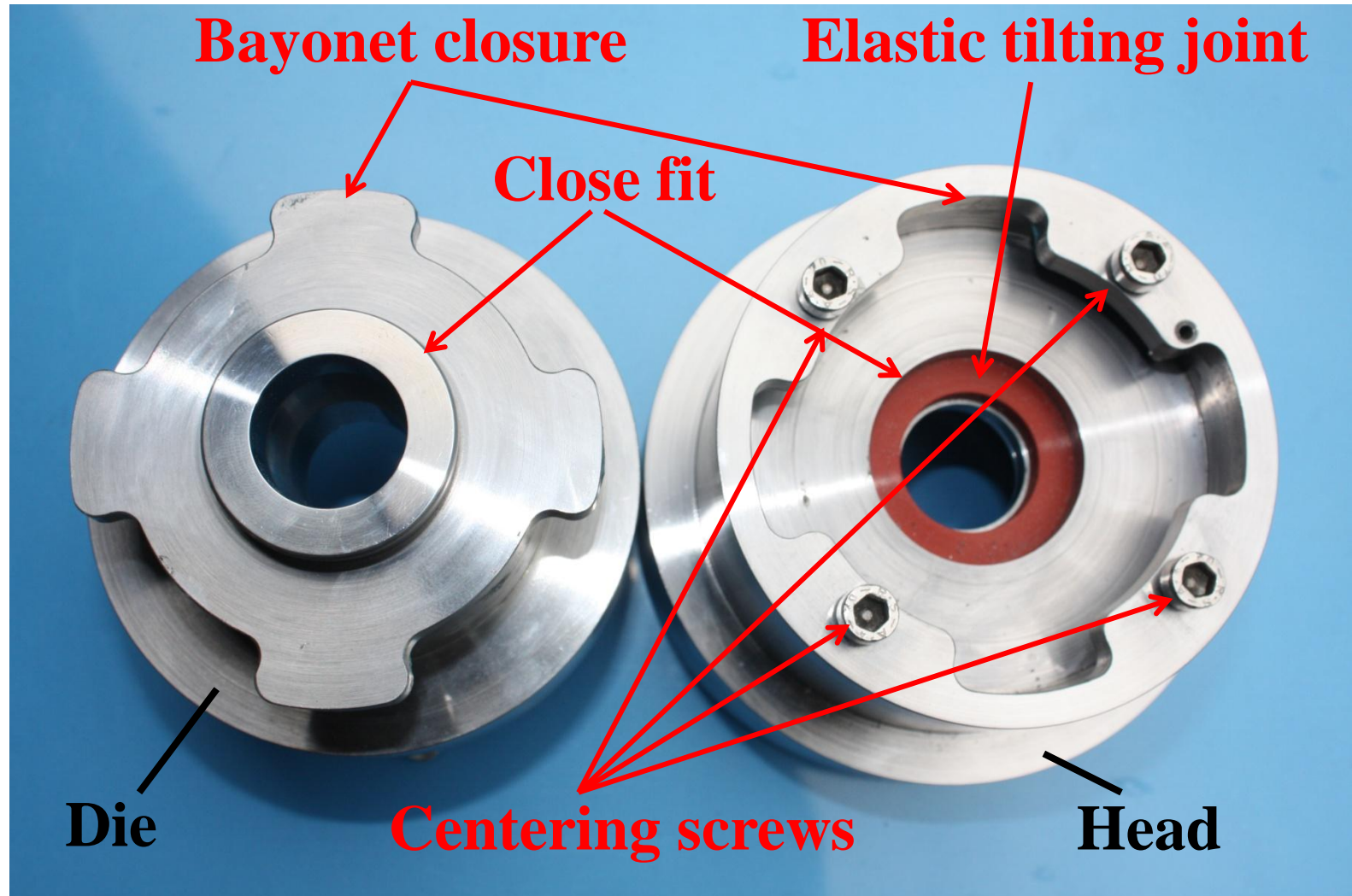
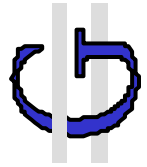
Sealing function

Tilting function

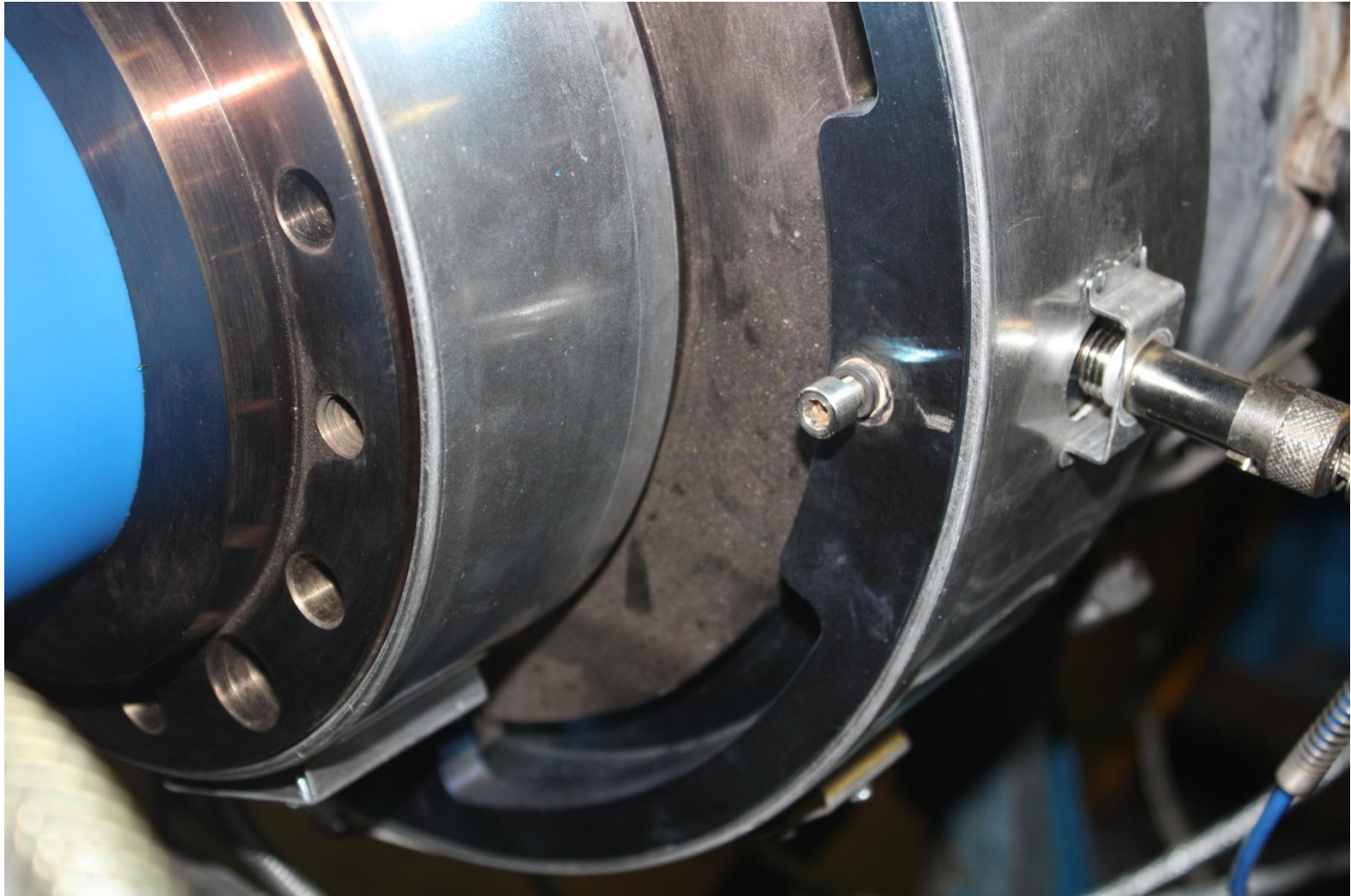
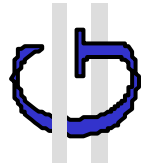
How looks an elastic tilting joint like?



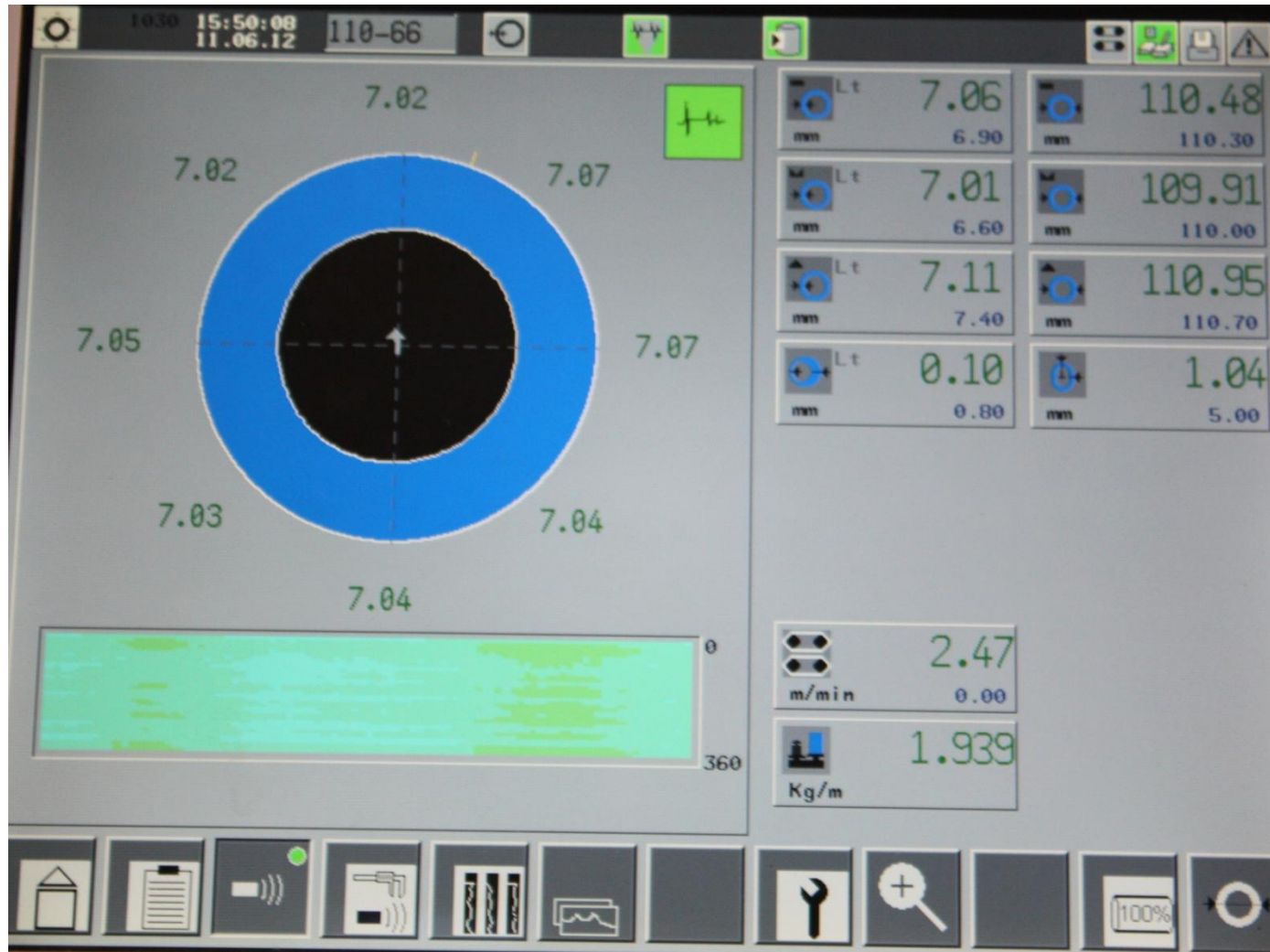
Tilting pipe die having a bayonet closure and small adjusting screws

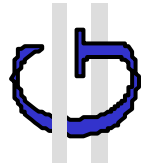


Tilting die in operation



Achieved excentricity



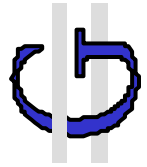


Advantages of the tilting solution

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

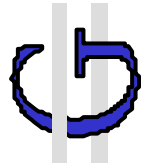
- The die can be centered in the range of one micrometer if this is necessary
- A position that has been achieved can be exactly reproduced at any time

This technical functionality is reached on a surprising easy manner



Advantages of the tilting solution

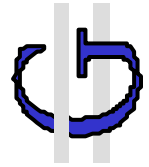
- **No precentering is necessary due to a close fit between the die and the pin**
- **It is possible to fine-tune the position of the die to the optimum**
- **Centering is possible with two fingers; no elongation**
- **Changing of the die by a turn, no screws are necessary**
- **Easy to be automate, 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**



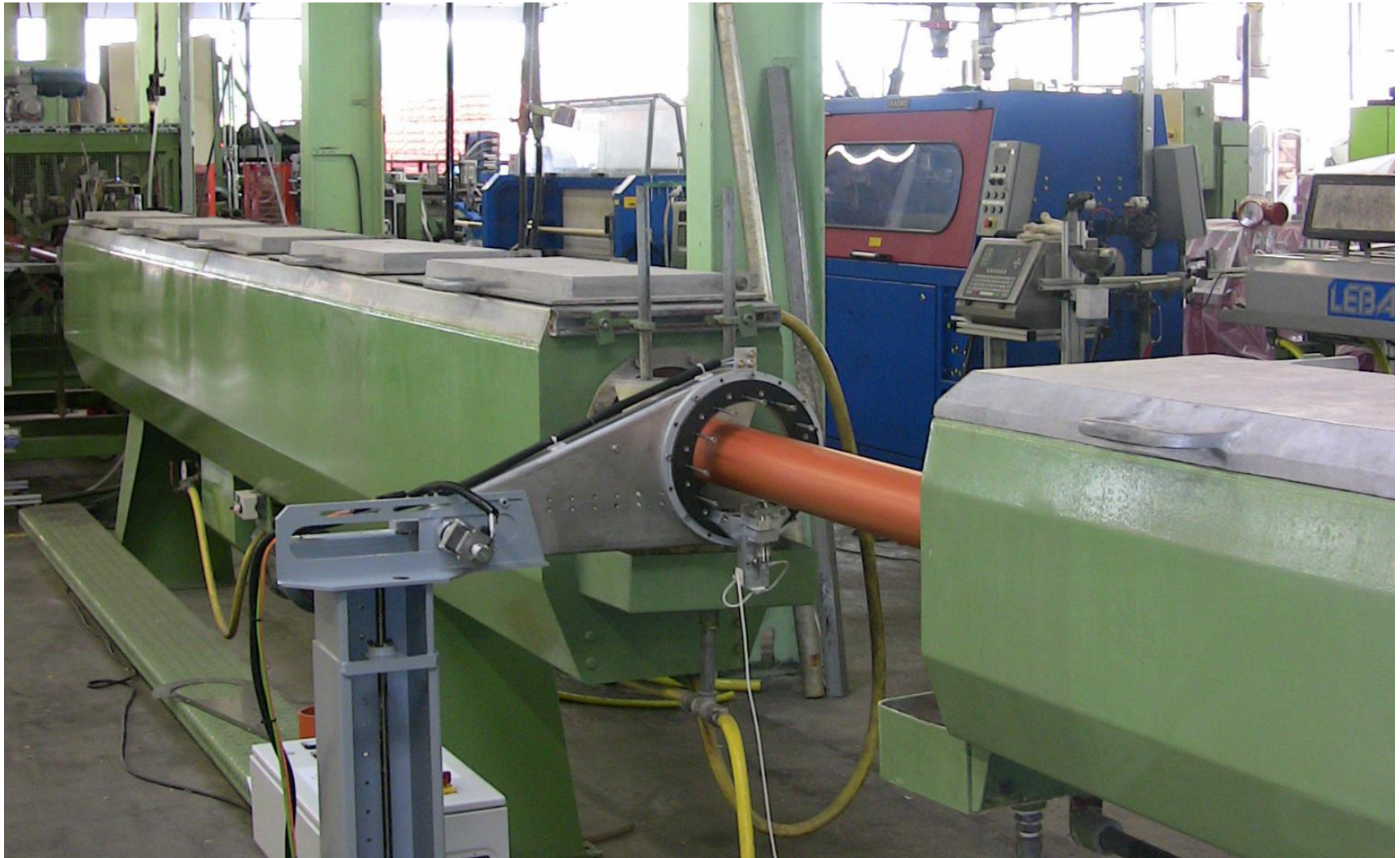
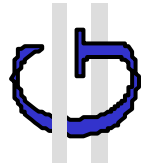
Advantages of the tilting solution

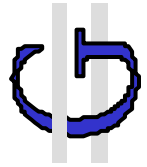
The quality of pipes can be further improved while at the same time the production costs are reduced

Closed-loop control of excentric and asymmetric thickness differences



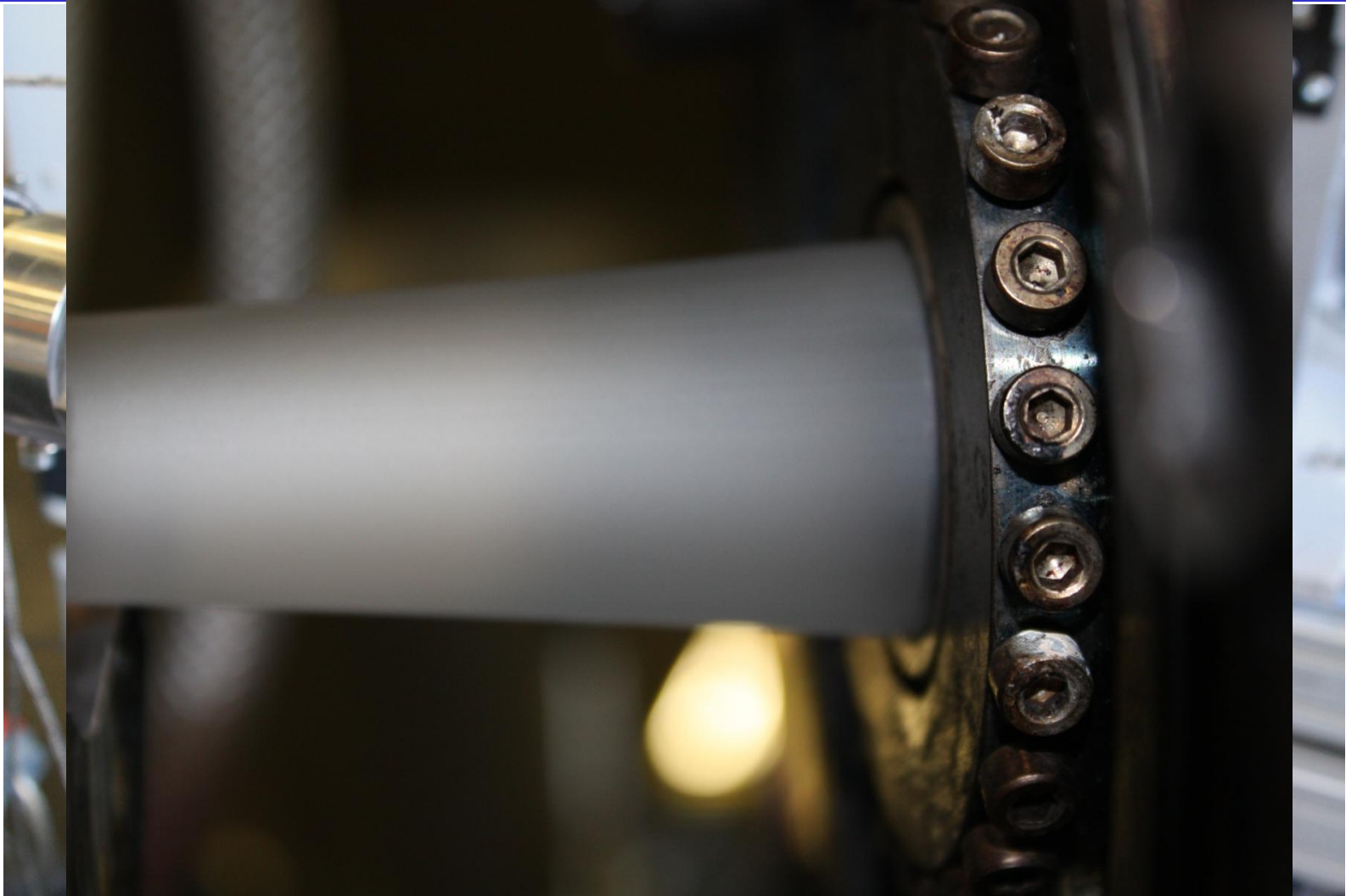
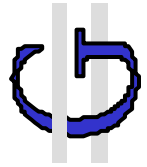
Online wall thickness measuring system for core-foamed pipes



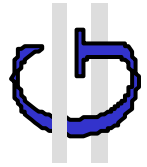


**Pipe production processes can
be established where the
thickness over the
circumference of the pipe can
be closed-loop controlled**

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

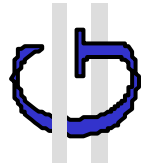


Advantages of the tilting solution



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

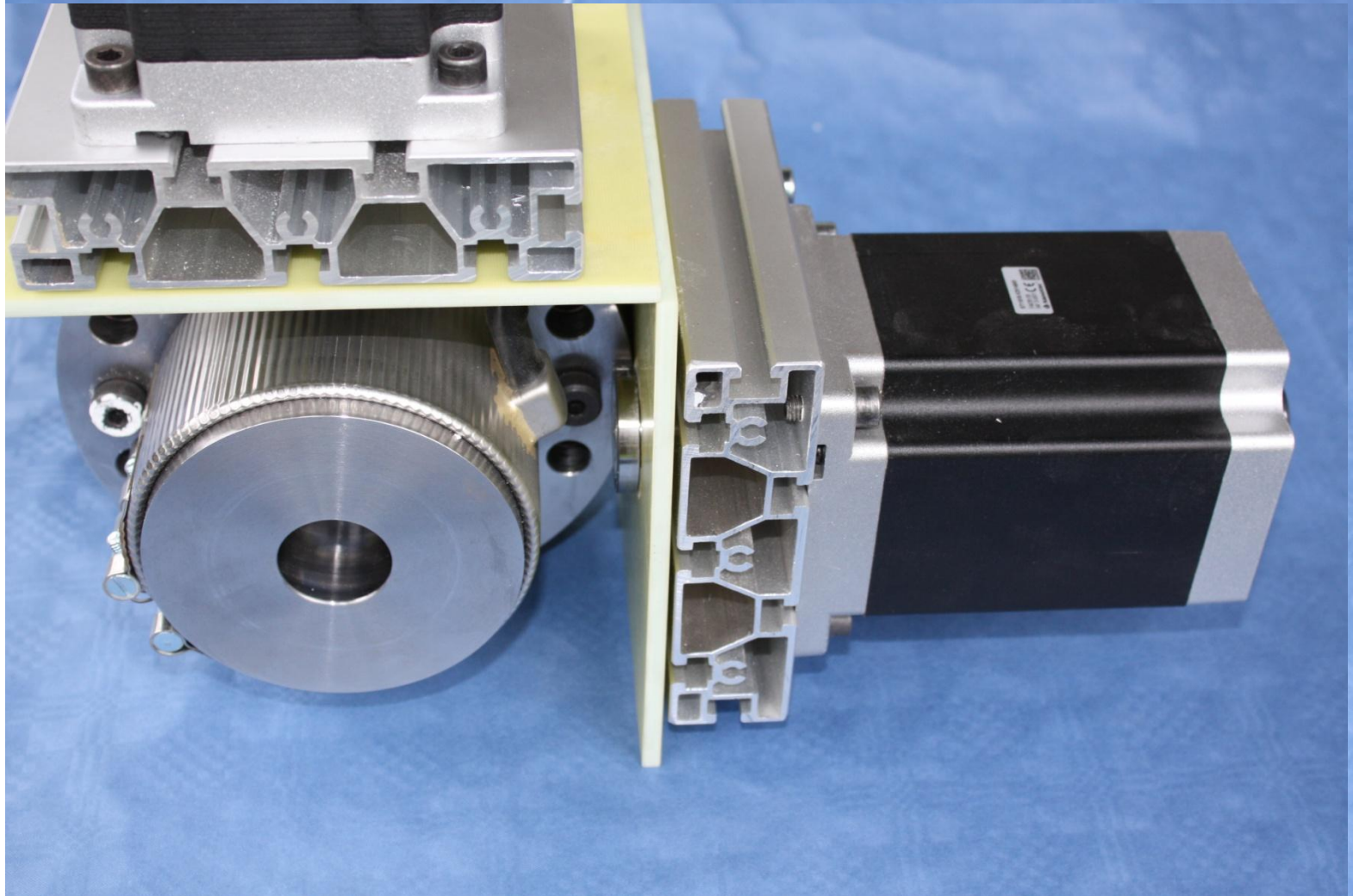


Expert 2

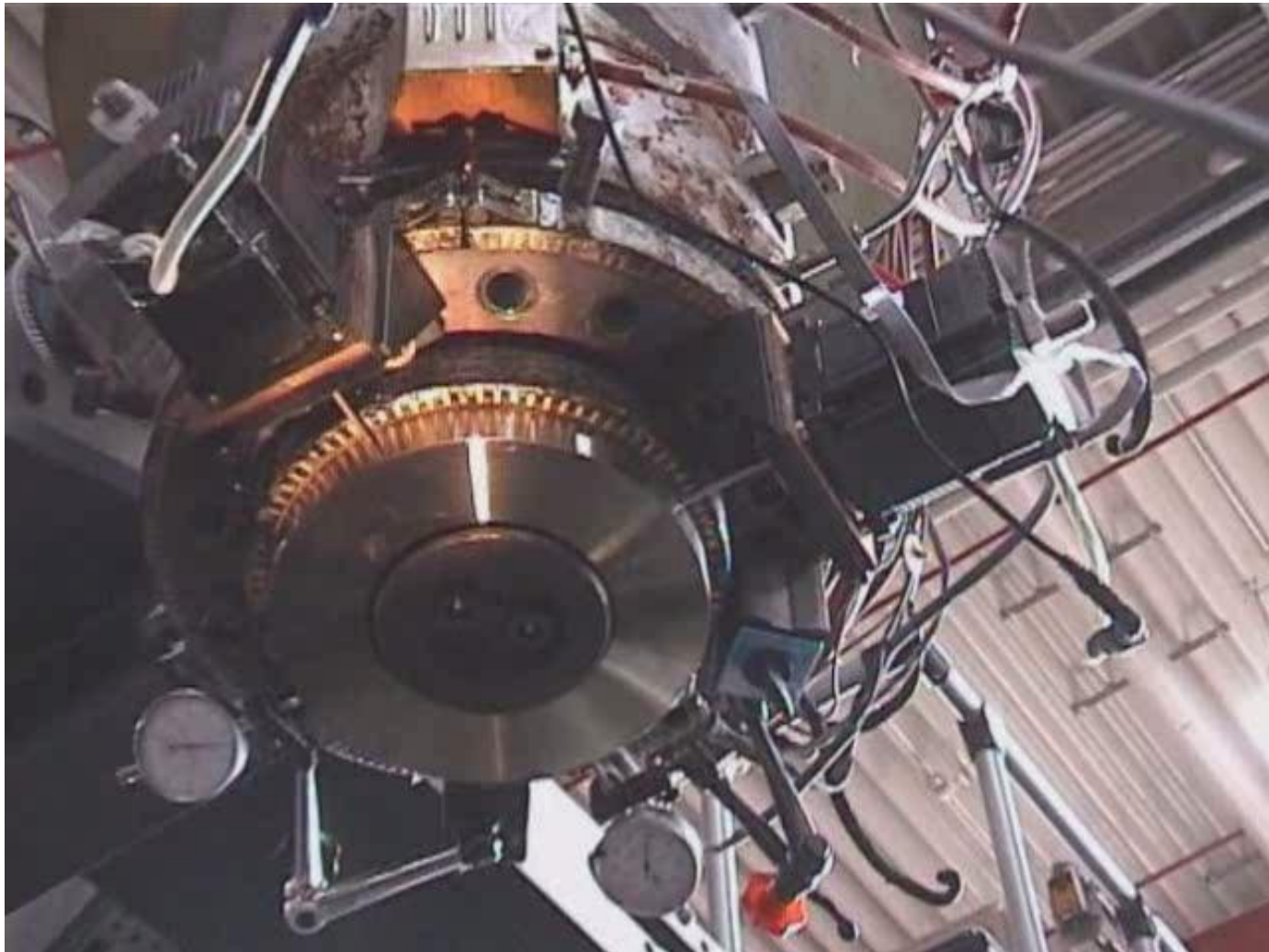
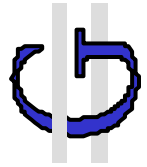


Clever operator who has visited the EUROTEC 2013 and who has listened to this presentation

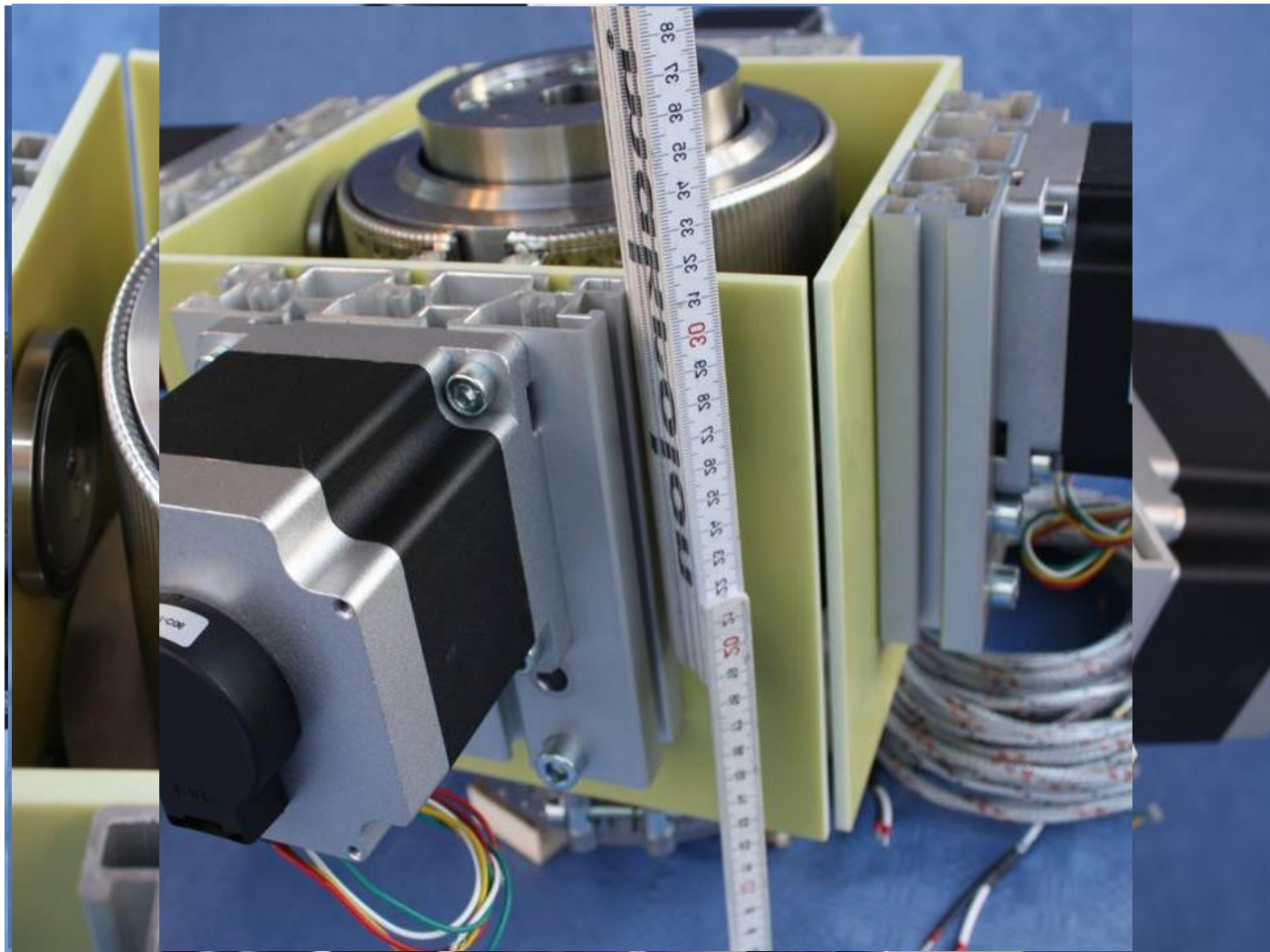
New blow molding die with tilting joint



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

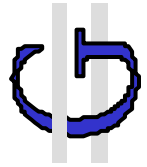


- The head consists of only six solid parts
- The head can be easily cleaned and affords no maintenance
- The head is ready to use and can be operated on every machine
- The melt distribution is independent from the operating point
- It has extreme short residence times
- Colours can be changed very 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

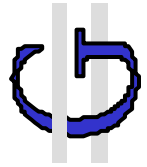
Use of an elastic tilting joint in combination with the GWDS



New processing possibilities are opened up

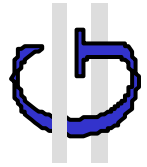
- Every die position can be exactly reproduced at any time
- Change of the parison thickness in radial direction possible for every die diameter
- Centering with the help of motors
- Change of the die position during the extraction of the parison is possible

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