

THICKNESS CONTROLLED PROFILE PRODUCTION: ILLUSION OR FUTURE?

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Actual situation in profile extrusion

Why control the thickness of a profile at all?

On-line measuring systems

Adjustable profile dies

Conclusion

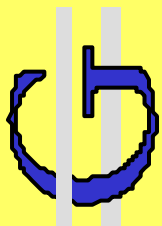
Forecast



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Actual situation in profile extrusion

- Profile lines are normally the less automated extrusion lines which are in operation
- Systems to measure the thickness of the profile on-line are usually not installed
- Profile dies where the flow channel geometry can be sensitively adjusted are not available and therefore are not used at all



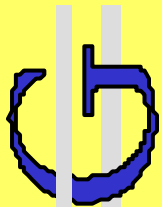
Actual situation in profile extrusion

To ensure that the delivered profile meets the specification the producer has to:

- Periodically cut special test samples to be able to inspect them off-line**
- Transport, to measure and afterwards to store, to recycle or even to dispose the samples**

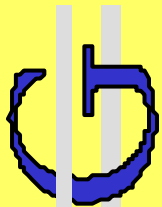


This causes needless internal cost !



Actual situation in profile extrusion

- There exists a danger of longer off-spec production
- More crucial: off-spec profiles might be delivered to the customer
- The capacity of the line is reduced
- Additional personnel is necessary for quality inspection
- Material is wasted and cost for recycling or even for disposal is generated



Effect of thickness deviations

As the material contributes by far over 60 % to the cost of a profile it is obvious that:

- **The larger the thickness deviations the worse is the economic of the production (as long as the thickness does not drop below the necessary minimum value!)**
- **Great excess of the thickness reduces the competitiveness of the business**
- **Great deviations reduce the quality of the profile**



Why control the thickness of a profile at all?

- 1. Reduce material consumption**
- 2. Improve the quality of the profiles**
- 3. Reduce labor cost**
- 4. Avoid the production of off-spec material**
- 5. Increase the capacity of the line**
- 6. Make sure that only in-spec profiles are delivered to the customer**
- 7. Be a reliable supplier for the customer**



Prerequisite to be able to establish a close-loop thickness control

- 1. You need a system which measures the thickness on-line in order to be able to compare the set value with the existing value**
- 2. You need a profile die which gives rise to a sensitive adjustment of small regions of the flow channel**



Techniques to measure the wall thickness on-line

1. Needing a cross cut:

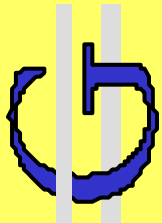
CCD-camera after the saw-cut

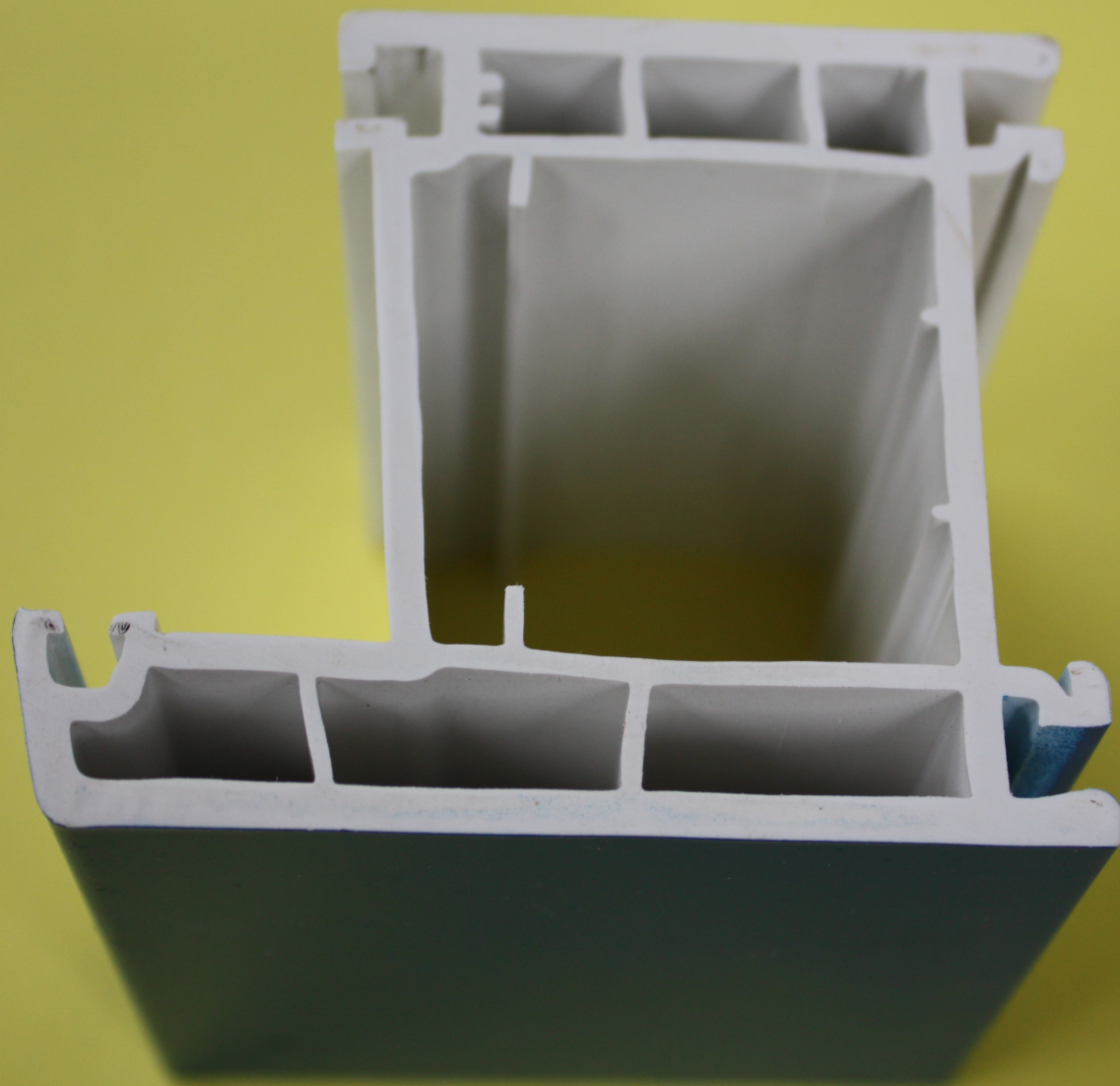
Disadvantage: values are measured alternating

2. Without contacting no cross cut necessary:

- Ultrasonic
- Radiometric

Advantage: values are measured continuously





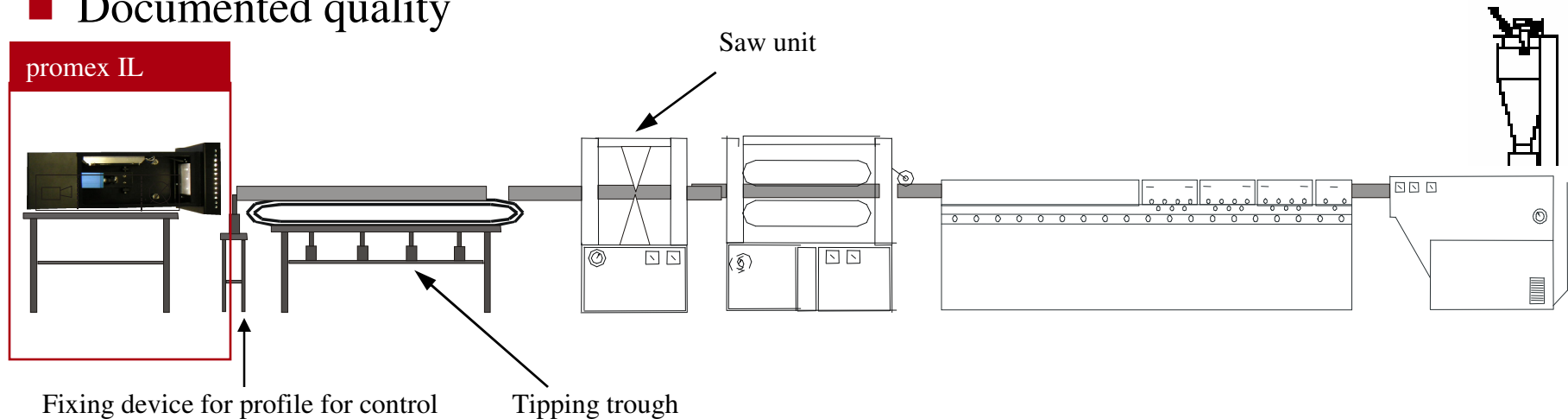
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promex IL - integrated into the extrusion line.

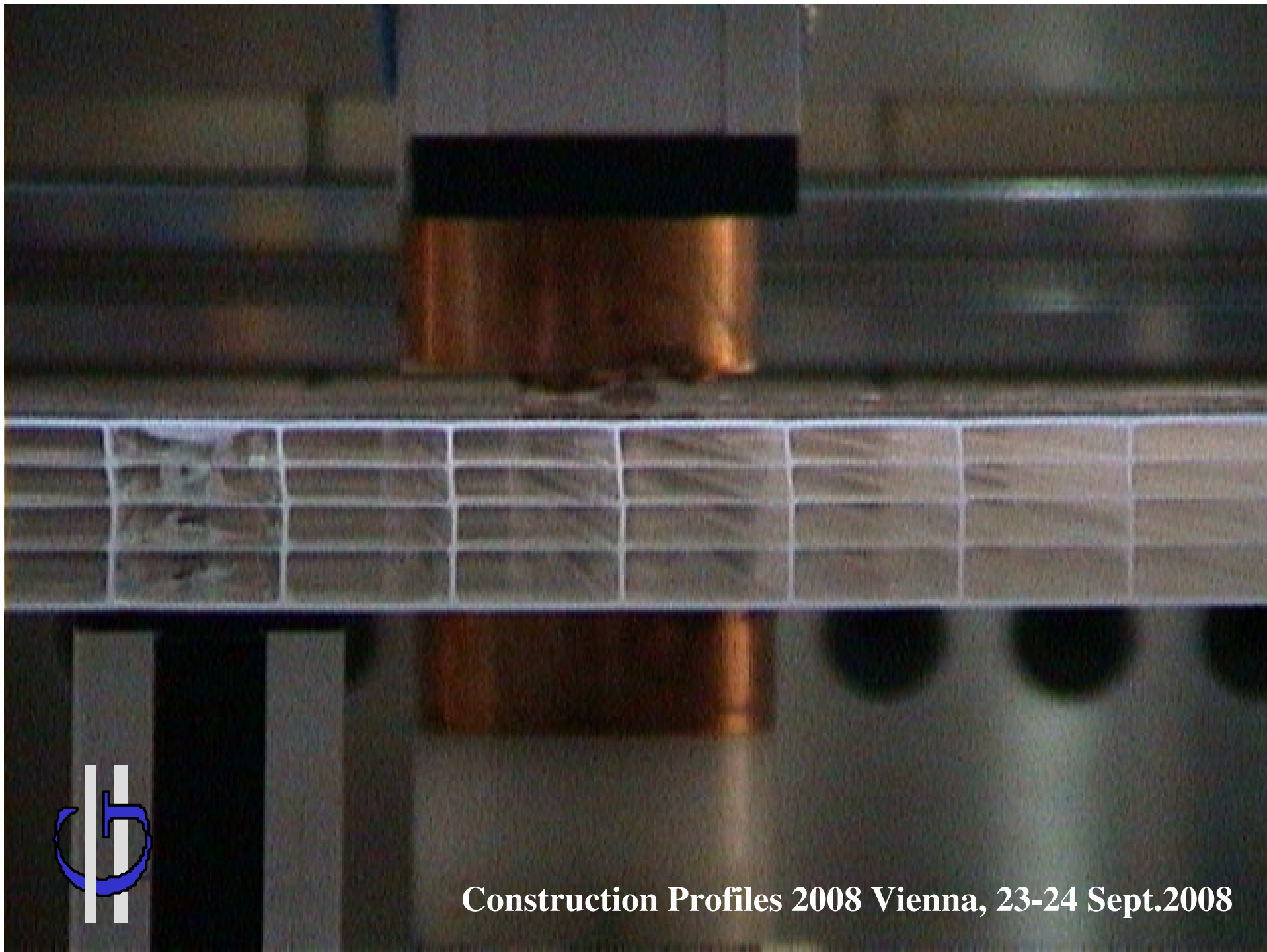


Your benefit

- Installed behind the saw unit, promex IL measures each profile rod and therefore performs a 100 % check during production
- Production and quality information in one spot - no separate measuring location for profile sections
- Corrective intervention can be made in good time
- Documented quality



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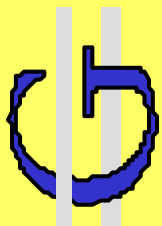
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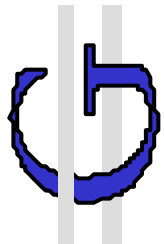
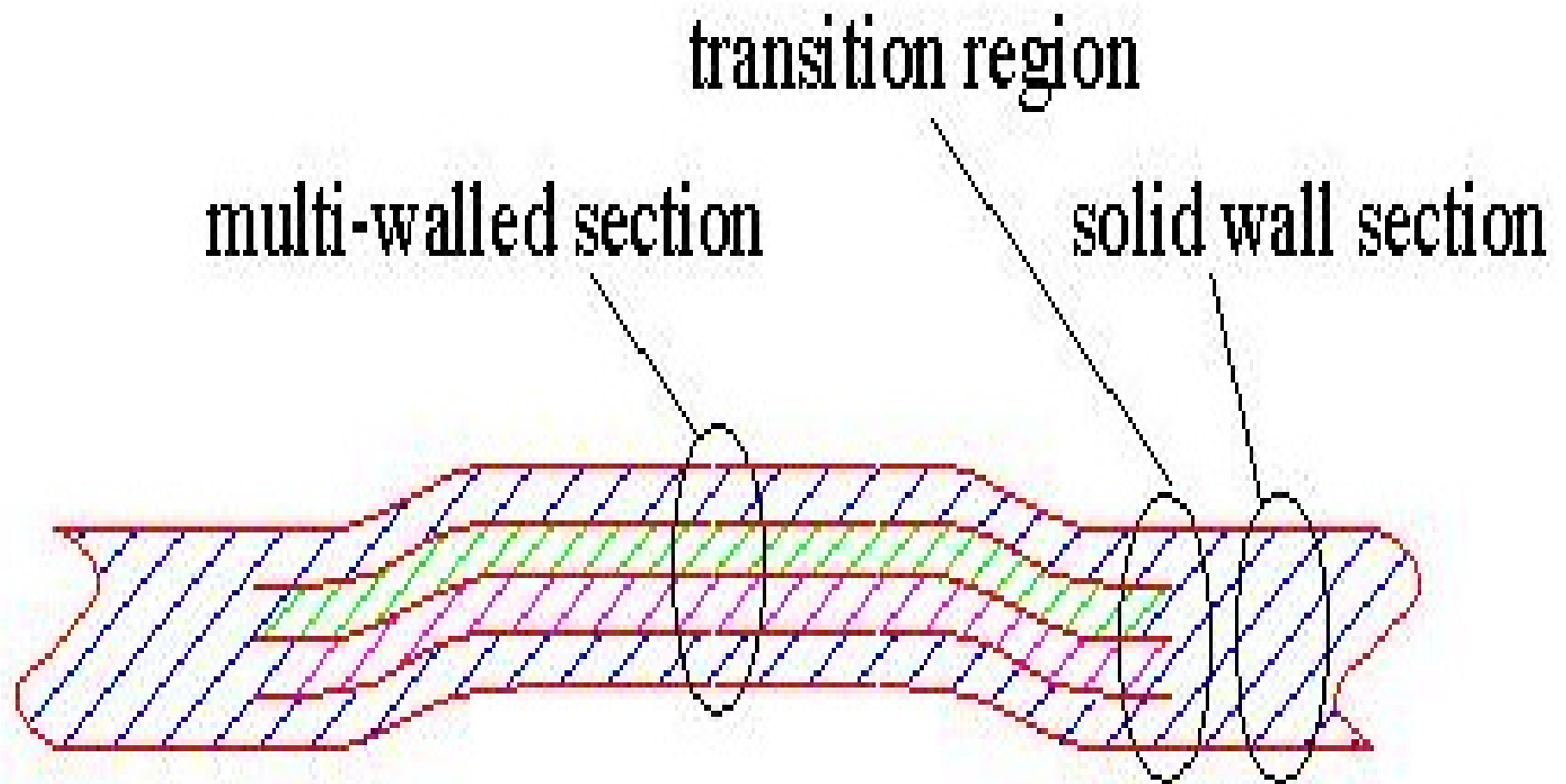


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Condition to adjust the flow channel geometry in a die while the line is running

Need a flow channel wall in the die which can be sensitively adjusted in a linear elastic manner!



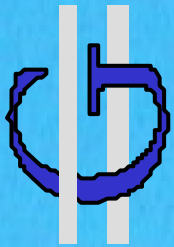


herausgeschliffener Streifen
mit aufgespreiztem dreiwandigen
Mittenbereich

dreiwandiger Mittelbereich,
Einzelwanddicke 0,6 mm

umlaufender, einwandiger, massiver Bereich (Dicke 1,8 mm)





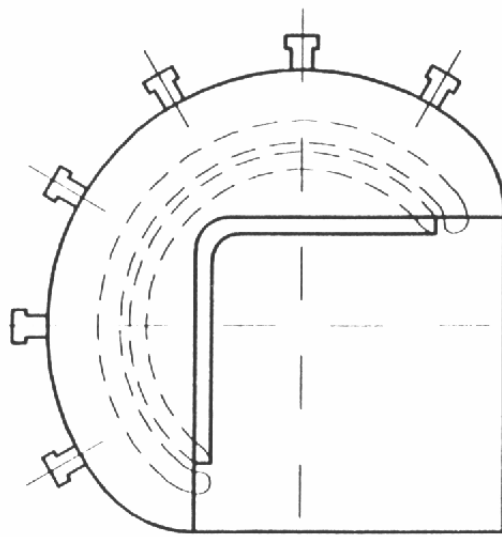
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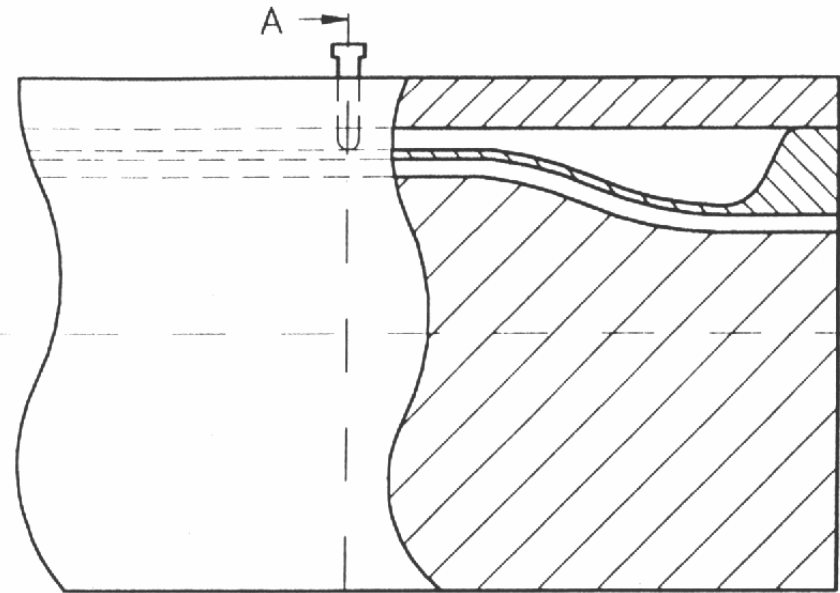
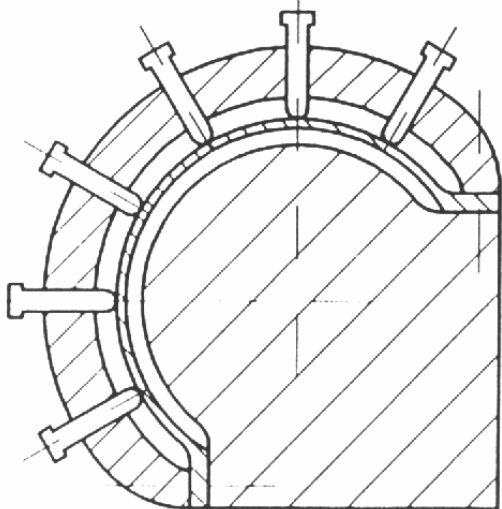
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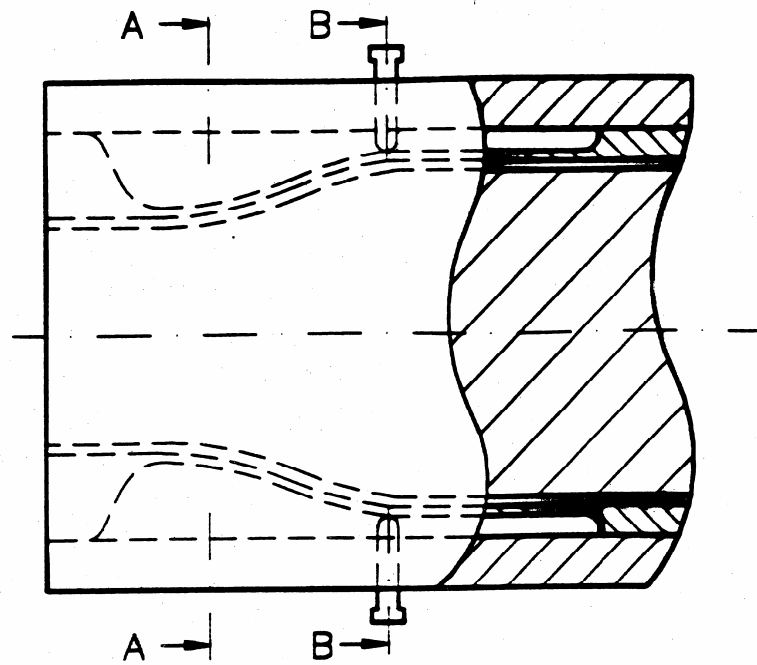


Schnitt A-A

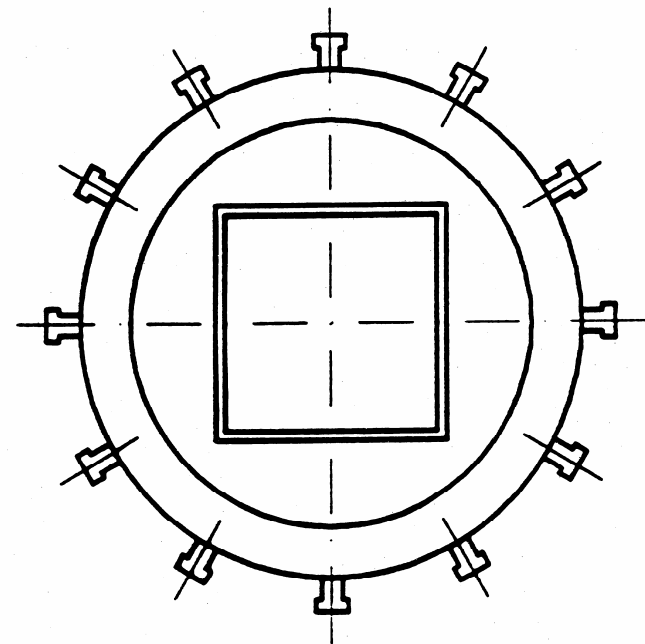
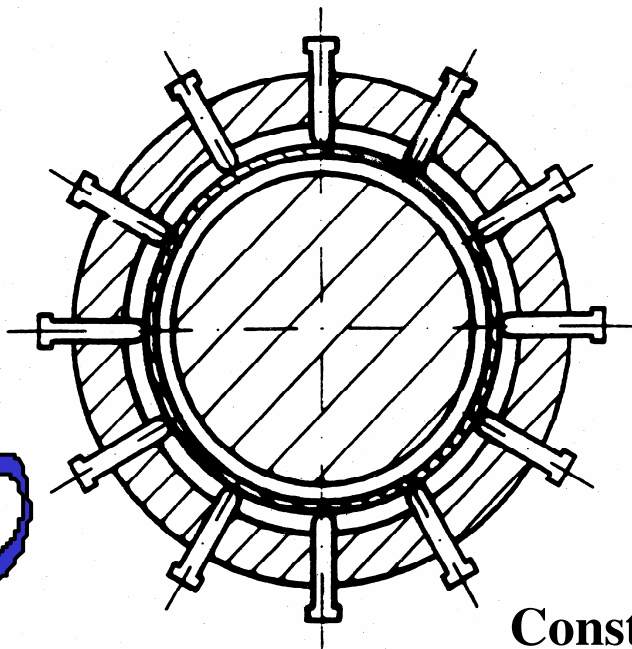


A →

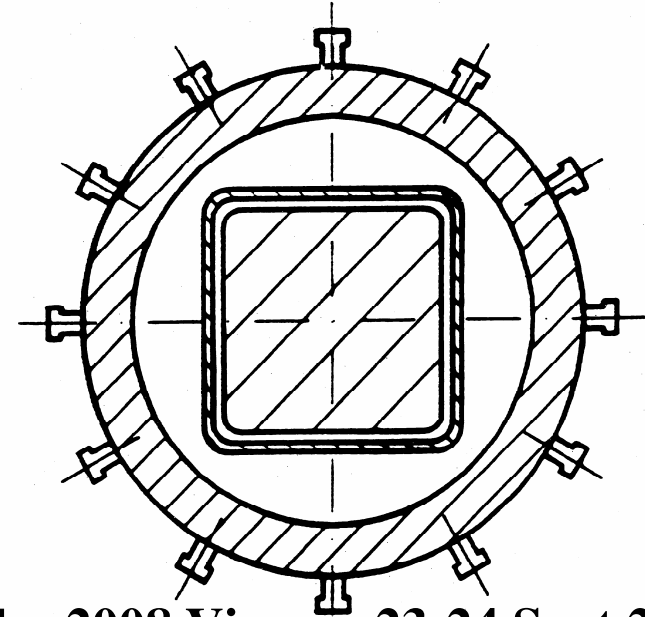




Schnitt B-B

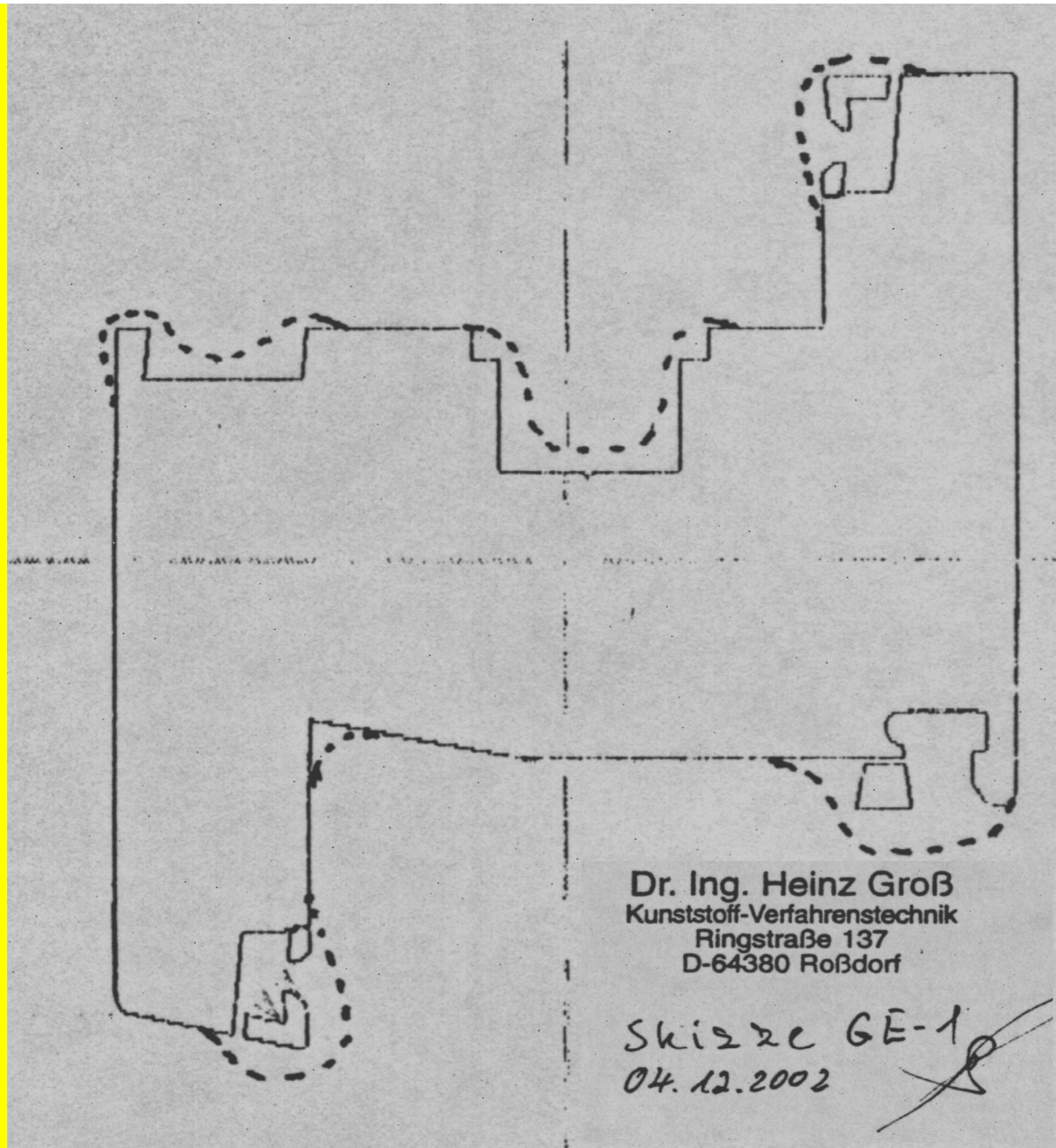


Schnitt A-A





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Conclusion

Close-loop thickness control during profile extrusion would:

- **reduce material consumption**
- **improve the quality of the profile**
- **increase the capacity of the line**
- **reduce labor cost**
- **ensure a constant quality of the product**
- **reduce the risk to produce off-spec profiles**



Help to improve the economics and thus competitiveness of profile production



Conclusion

Close-loop thickness control during profile extrusion can be established for outer walls of simple profiles

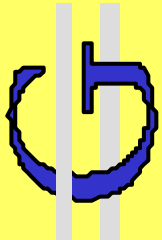
- **Necessary on-line thickness measuring systems are available**
- **Necessary die technologies are also available**

Close-loop thickness control during profile extrusion can still not be established for interior walls and for complex profiles



Forecast

Close-loop thickness control during profile production will certainly come up. But most profile producers even do not know that it is already possible at least for simple profiles. So it will last a long time until the first profile producers will use it. In the far future close-loop thickness control during profile extrusion will be an absolute must to keep competitive!



Heinz Gross, Vienna 2008

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