# Presentation of CoolCheck

## New usage of light section for sample measurement

… for long products

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# Presentation parts

- Comparision of methods
- Measurement results
- How to use? Benefits

# Methods I want to compare

- Manual check
  - Time consuming
  - User dependent
  - Only basic data




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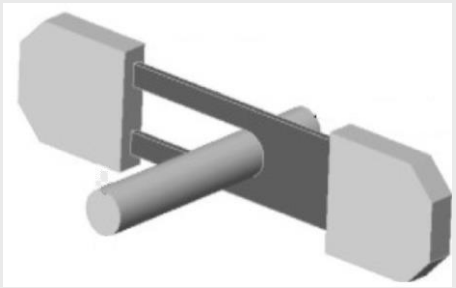
# Methods I want to compare

- Shadow measurement
  - You cannot see concave structures
  - Lack of 3D info

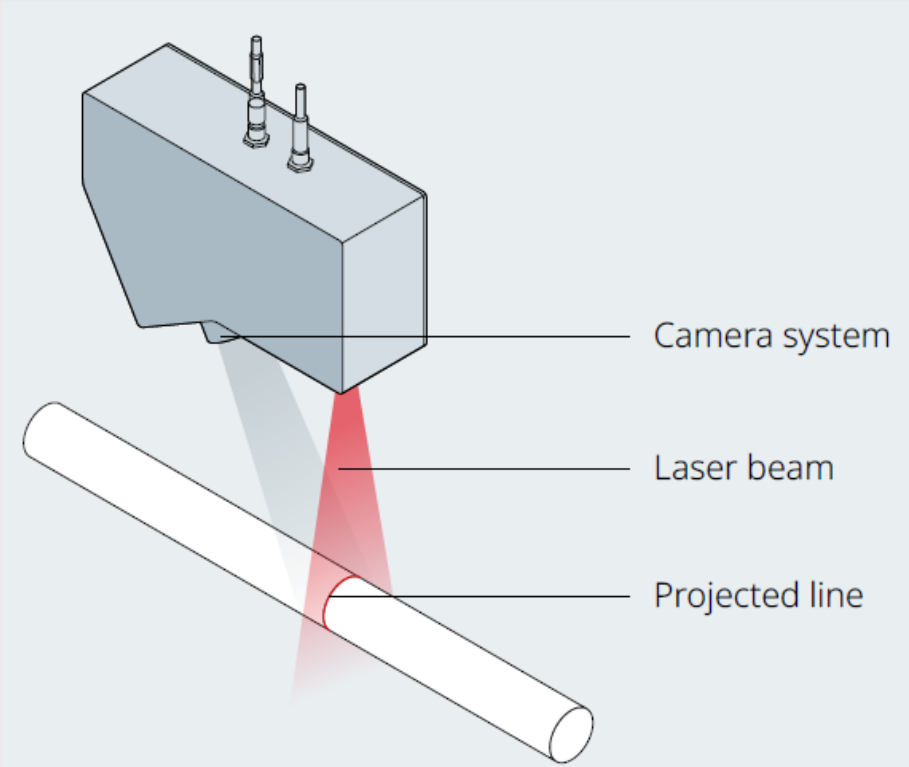


# Methods I want to compare

- Camera view
  - Flat world

# Methods I want to compare

- Light section
  - Real profile data
- Method
  - Laser line projection
  - Camera at an angle
  - CMOS chip position tell the distance

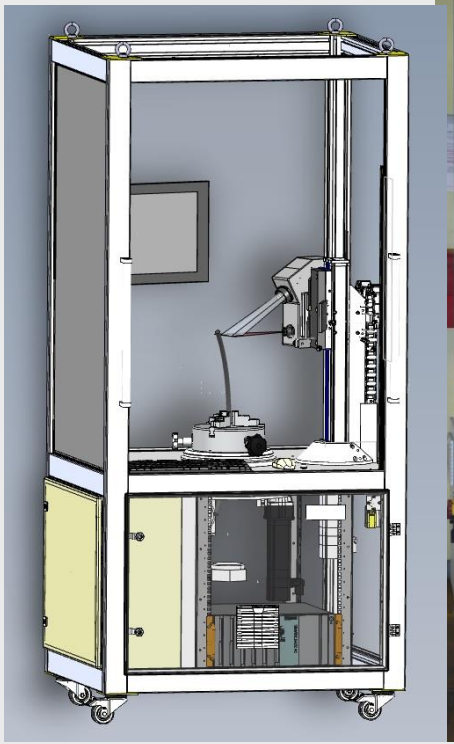


# Comparison

- Manual
  - Time
  - User dependent
- Shadow
  - Miss concave structures
- Camera view
  - Can measure only in combination
  - Identify “edges”
- Light section
  - 3D model
  - Highly detailed

# CoolCheck: Integrated device

- Complete integrated “all in one” device
  - Cabinet with all electrical components
  - All mechanical components
  - Server industrial PC
  - Need only:
    - Power
    - Network





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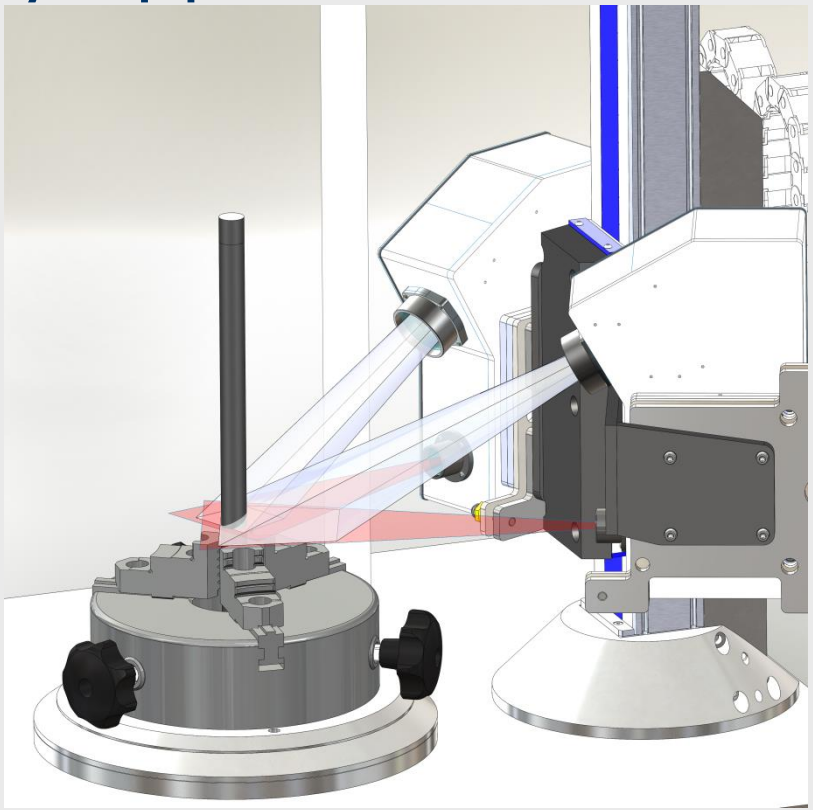
# CoolCheck revolutionary approach

1 Laser sensor sufficient!

- Step 1: Rotate
- Step 2: Linear vertical axis

2 Laser sensor are possible for different material ranges



# Video CoolCheck

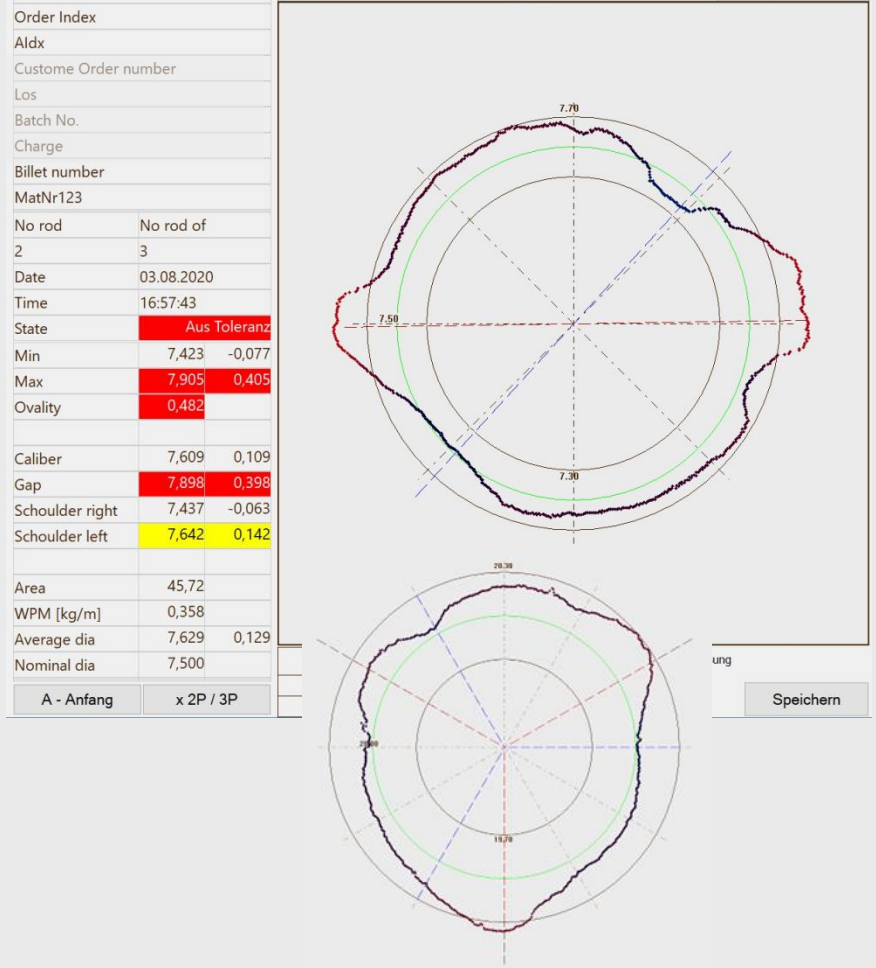
- 3D measurement
  - 360° rotate
  - 4 times z-axis
  - measurement time around 35-40 sec
- Simple measurement (for round) ~3 sec.

# Rolling long products

- Shapes
  - Round
  - Hexagon
  - Ribbed
  - Threaded
  - …more
- Bar or Coils

# Round measurement

- Profile
  - High precision profile
- Dimensions
  - 2P and 3P dimensions
- Measurement duration
  - Straight ~3 sec.
  - Bent < 10 sec.



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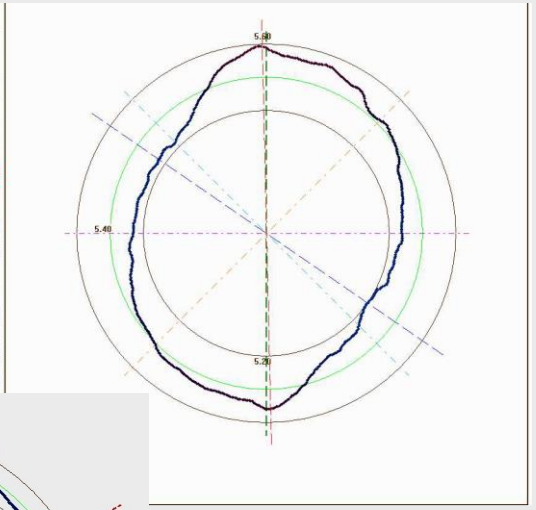
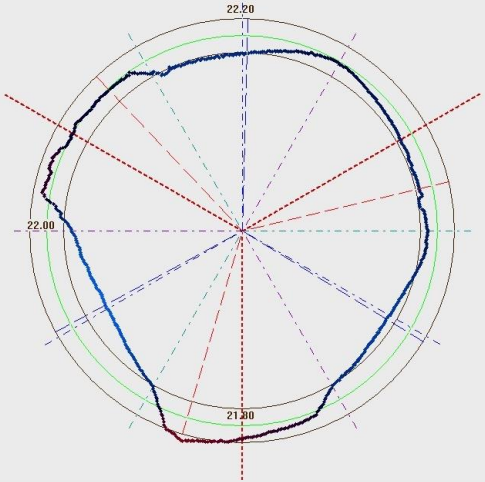
# Round measurement

- Detection of failures possible, to improve production process. For ex.
  - Overfill /underfill
  - Roller shift
  - 3P defects

| Knüppellauf-Nr | | |
|---|---|---|
| Manuell | | |
| | | |
| #Ist | #Soll | |
| 1 | 1 | |
| Datum | 29.08.2022 | |
| Uhrzeit | 14:03:07 | |
| Status | Aus Toleranz | |
| | | |
| Min 2P | 5,221 | -0,179 |
| Max 2P | 5,554 | 0,154 |
| Ovalität | 0,333 | |
| | | |
| Höhe/Kaliber | 5,548 | 0,148 |
| Breite/Spalt | 5,270 | -0,130 |
| Schulter rechts | 5,420 | 0,020 |
| Schulter links | 5,242 | -0,158 |



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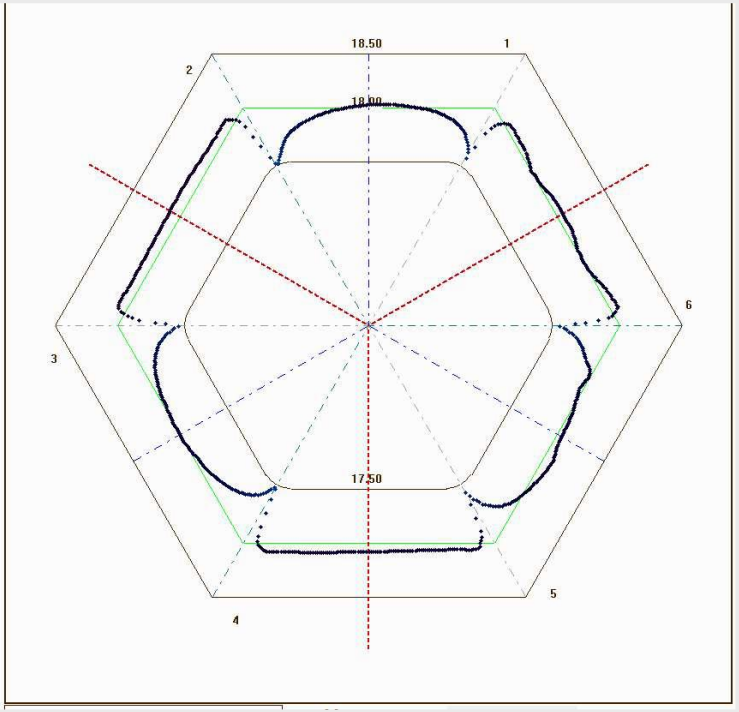
# Hexagon measurement

- High precision profile
  - Improve production
- Dimensions
  - 2P and 3P dimensions
  - Special hexagon evaluation

| | | |
|---|---|---|
| Knüppellauf-Nr | | |
| Manuell | | |
| | | |
| #Ist | #Soll | |
| 1 | 1 | |
| Datum | 29.08.2022 | |
| Uhrzeit | 14:10:02 | |
| Status | | Gut |
| | | |
| Min 3P | 18,027 | 0,027 |
| Max 3P | 18,080 | 0,080 |
| Ovalität 3P | 0,053 | |
| Max-Spitze 3P | 20,346 | -0,654 |
| SW-1 3P Kaliber | 18,080 | 0,080 |
| SW-2 3P Spalt | 18,027 | 0,027 |
| | - | - |
| SW Rand 3P Min | 17,700 | -0,300 |
| Bew. Kantenradius | 0,307 | |
| Fläche[mm²] | 279,54 | |
| MG [kg/m] | 2,189 | |
| SW-Mittelwert 3P | 18,054 | 0,054 |
| Nominal | 18,000 | |



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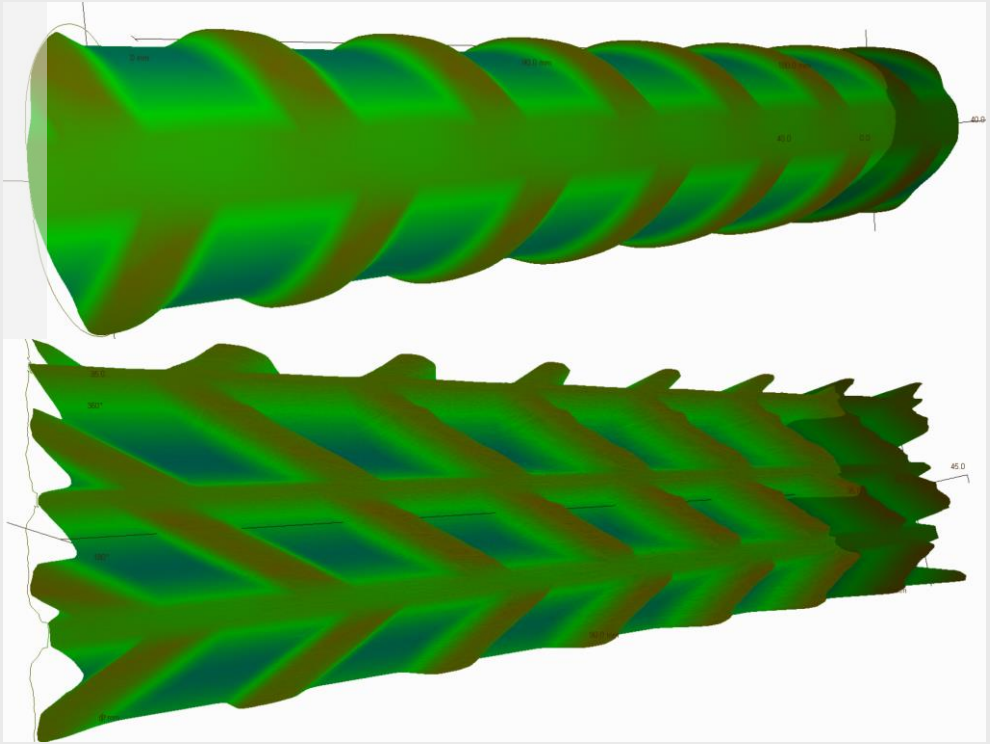
# Rebar measurement, 3D

- 3D view
- Also unrolled possible for detailed data visualization





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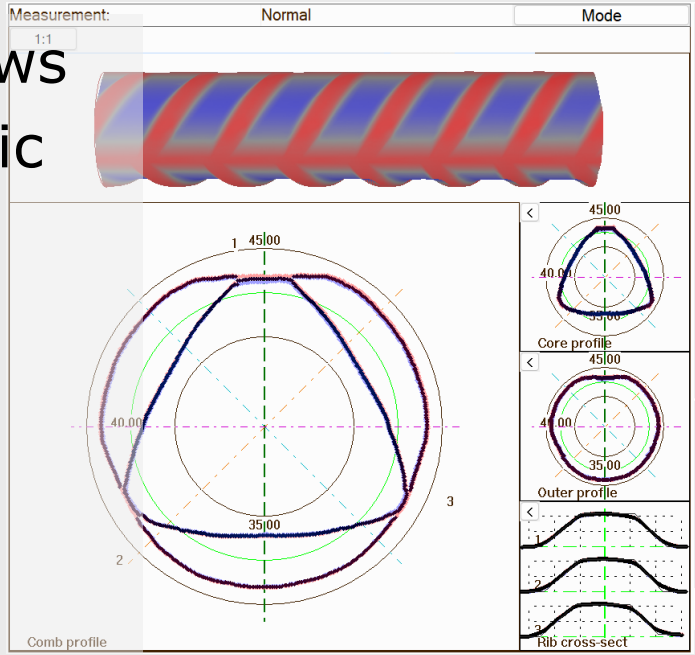
# Rebar measurement

- Up to 4 rib rows
- Fully automatic measurement
- Really user independent
- Fast: < 40 s
- All needed dimensions




| Rib-Row | 1 | 2 | 3 | 4 | Avg |
|---|---|---|---|---|---|
| Free distance e | 7,773 | 4,429 | 3,723 | - | 5,308 |
| Rib height 1/4 | 2,515 | 2,325 | 2,221 | - | 2,354 |
| Rib height Mid | 3,038 | 2,938 | 2,863 | - | 2,946 |
| Rib height 3/4 | 2,470 | 2,328 | 2,560 | - | 2,453 |
| Rib distance c | 25,764 | 25,734 | 25,764 | - | 25,754 |
| Rib length | 43,998 | 47,863 | 44,609 | - | 45,490 |
| Angle ß | 58,506 | 58,658 | -58,582 | - | |
| Angle ß-2 | - | - | - | - | |
| Long.Rib height | - | - | 0,151 | - | |
| Long.Rib width | - | - | 2,789 | - | |
| Angel α lft | 40,715 | 40,889 | 43,096 | - | 41,567 |
| Angel α rgt | 45,563 | 47,364 | 46,883 | - | 46,603 |
| Head width | 5,321 | 5,227 | 5,462 | - | 5,336 |
| Foot width | 12,262 | 11,735 | 11,606 | - | 11,868 |
| Radius foot lft | 2,601 | 3,809 | 3,902 | - | 3,437 |
| Radius foot rgt | 2,125 | 4,576 | 1,994 | - | 2,898 |

| | Core | Aver.Prof. | Outer Hull |
|---|---|---|---|
| Min 2P | 38,767 | 40,227 | 42,309 |
| Max 2P | 40,051 | 41,134 | 43,364 |
| Ovality | 1,284 | 0,907 | 1,056 |
| Hgt/Caliber | 39,393 | 40,431 | 42,330 |
| Width/Gap | 38,817 | 40,298 | 43,354 |
| Shoulder r | 39,320 | 40,620 | 43,051 |
| Shoulder l | 39,105 | 40,477 | 43,127 |

Print protocol
Export csv



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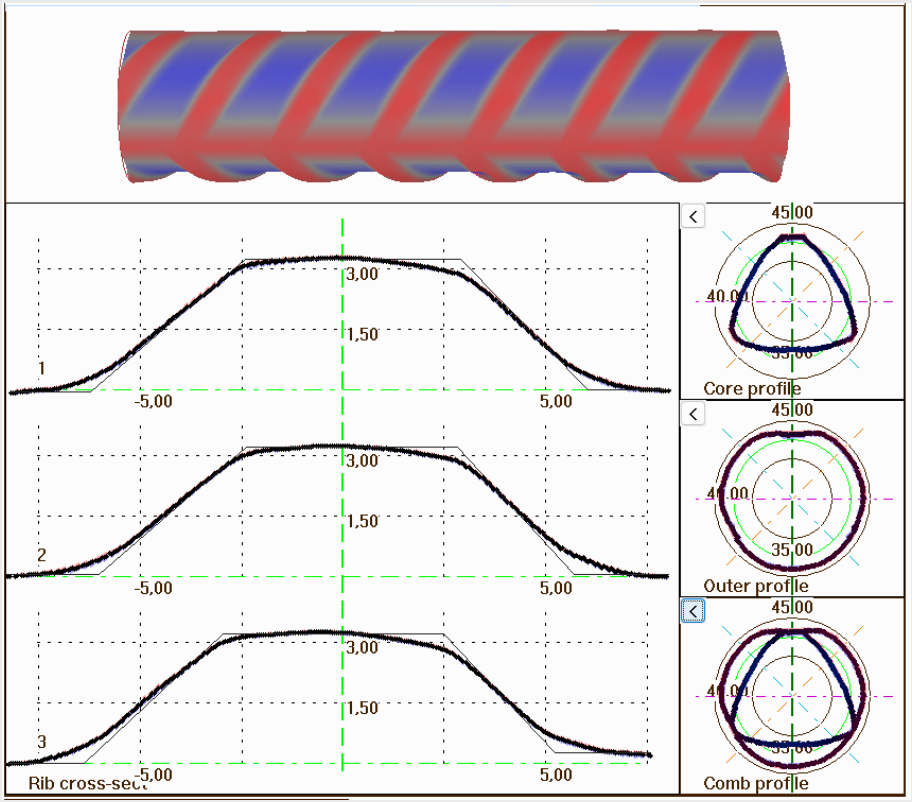
# Rebar measurement, 2nd

- Cross profile and also rib profile in very high accuracy



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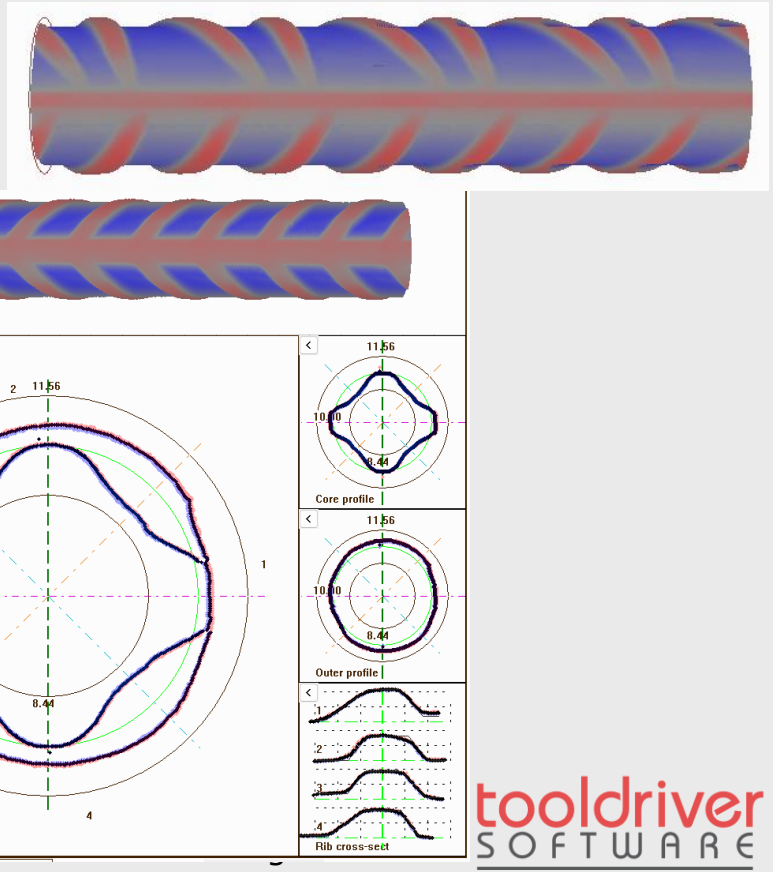
# Rebar measurement, 3rd

- All needed data
- WPM
- Relative rib area
  - multiple formula supported
- International standards support

| | |
|---|---|
| Nominal | 40,000 |
| Average | 40,534 |
| Ribbed steel | |
| | |
| Count rib-rows | 3 |
| Rib-free angle | 43,500 |
| Rib-free [mm] | 15,925 |
| Angle α Avg | 44,085 |
| Rotation [°/m] | 2,1 |
| Intern.Standard | EU 15630 |
| Formula fR | Integration |
| Rel. rib area fR | 0,0731 |
| Re. rib diff% | 30,5 |
| WPM [kg/m] | 10,135 |
| WPM Diff[%] | 2,7 |

# Rebar measurement, more examples

- Different β angle
- Longitudinal rib
- Core shape independent
- Rib count detection
- Very good results on deformed material (after straightening)

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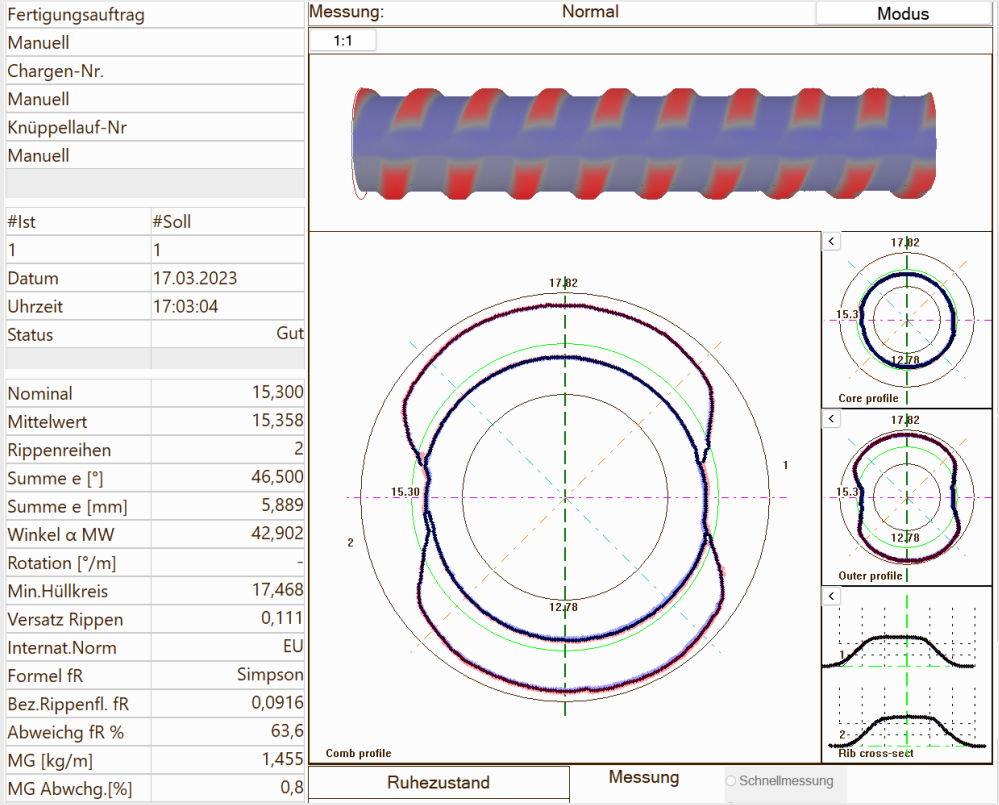
# Threaded rod measurement supported

- As rebar, plus…
- Additional values automatically measured
- Use your own rib area formula
- Also complete user independent results



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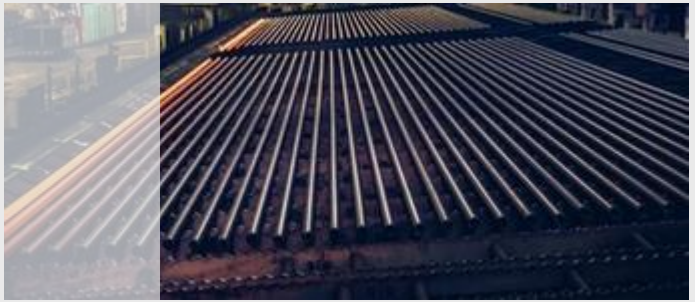
# How it’s used at Steeltec, Switzerland

- Steeltec mill
  - Special steel
  - A lot of size and material changes
  - Often has small batches
  - 80 % round, bars, coils
  - 20% Hex, rebar and threaded bars

| | |
|---|---|
| Steeltec | Steeltec AG<br>Switzerland<br>A member of the Swiss Steel Group |

# How it’s used at Steeltec, Switzerland

- Use direct in the production
  - At the end of rolling mill line
  - Mill samples cooled down and measured
  - Additional to online measurement
- Samples taken often
  - Check mill production
  - Check quality



# Advantages for Steeltec

- Direct correction of mill line
  - Avoid scrap rolling
  - Reach better quality

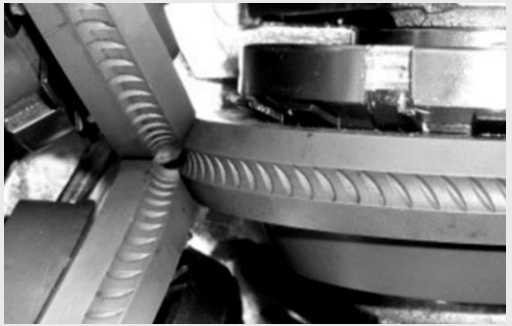
- Early stage correction
  - Direct in the mill → cost saving

- Direct decision good /fail
  - Early stage is cost saving against decision by Lab

# Usage at cold-rolling mill

- Adjustment of mill line
  - Adjustment of roller casette
  - Check result

- Check result direct after change
  - Faster adjustment
  - Faster start rolling
  - Start only if quality is ok
  - → cost saving



# Sample measurement. Done!

- Quality
  - Knowledge of real shape
  - Measure of bent material
- Productivity can increase
  - User independent results
  - Fast measurement
  - Avoid scrap rolling

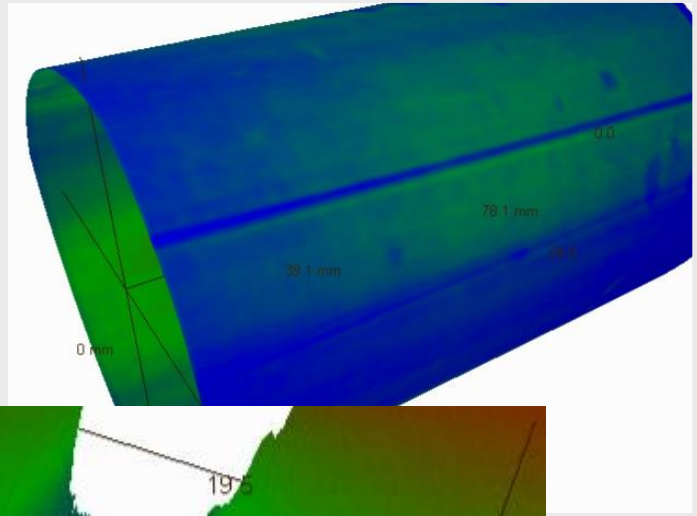
# Lead by CoolCheck technology

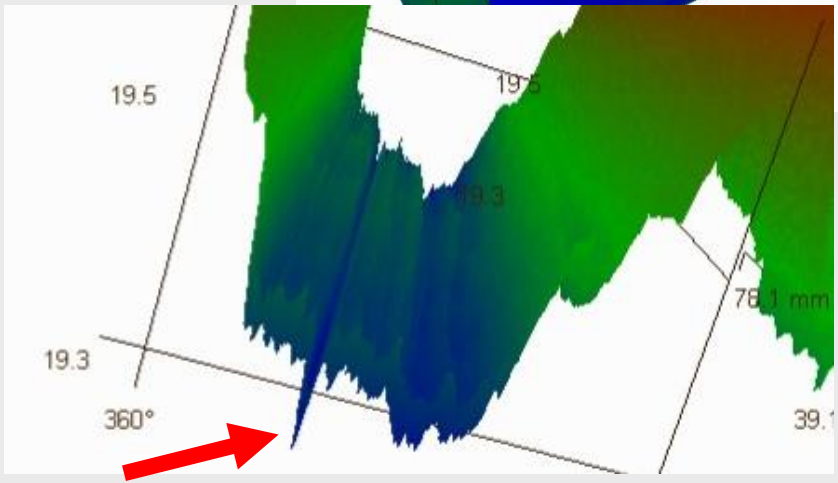
With light sectioning technology you get to the next level of knowledge!

- Added-value from technology is enormous
- Tremendous more information
- Much higher accuracy

# Future additions…

- Defect detection
  - Scratches
  - Seams
  - Of the hole
  - …



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