A series of five horizontal bars in red, green, blue, orange, and green, stacked vertically on the left side of the slide.

Potentials in the stamping and forming process through targeted process analysis to generate more profit

22. Juni 2022

Sascha Schäfer TRsystems GmbH business division

5th WORKSHOP Forming and Punching

Potential in the stamping and forming process

Definition

„Process analysis refers to the systematic examination (analysis) of processes and breaking them down into their individual parts in order to achieve an understanding of the process and to recognise weaknesses and potential for improvement.“

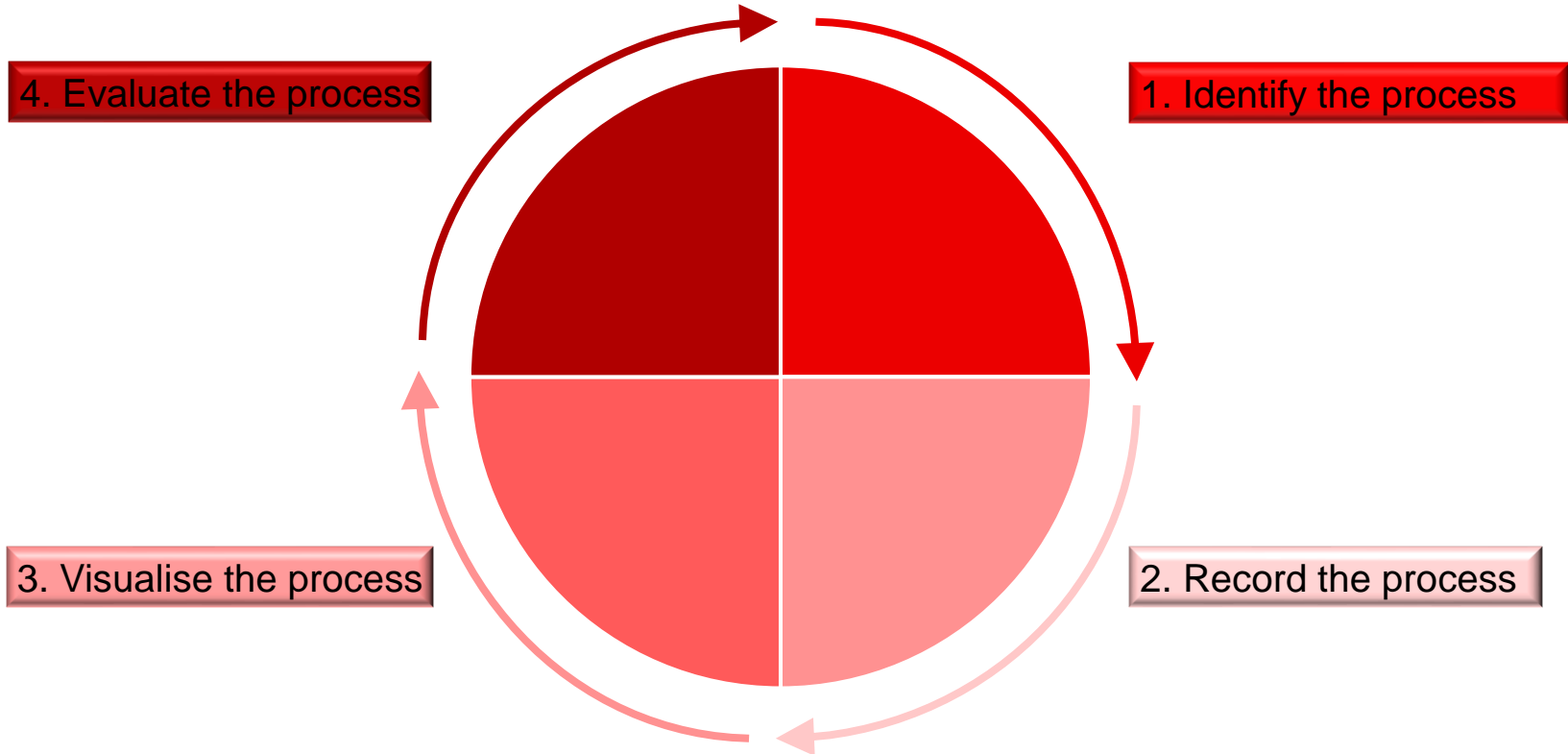


Source: Wikipedia

In the process analysis, the processes are visualised and evaluated for the first time.

Potential in the stamping and forming process

4 phases of the process analysis



Potential in the stamping and forming process

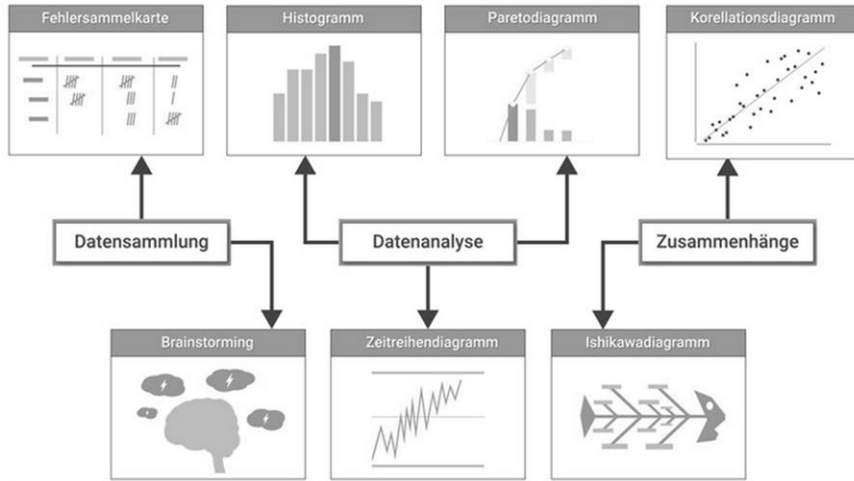
Goals of the process analysis



Source: krisanapong detraphiphat / Getty Images

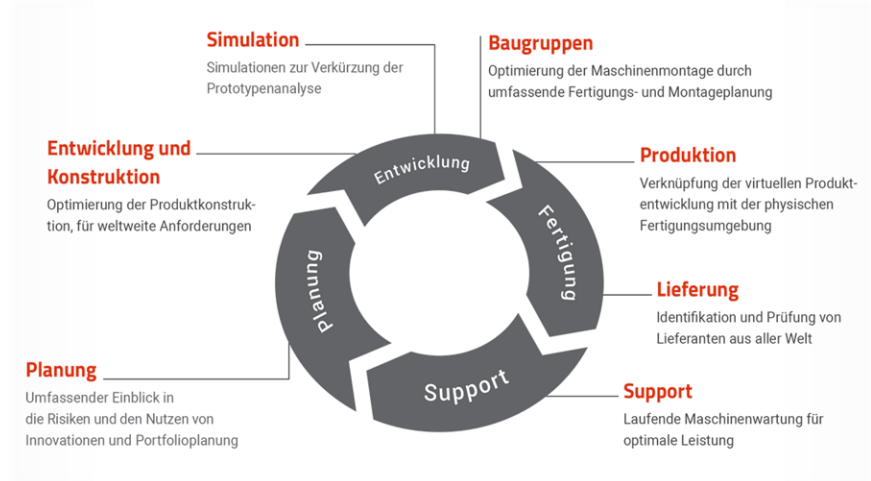
Potential in the stamping and forming process

Tools for process analysis



Continual Improvement Process (CIP)

- Process performance indicator compass
- ISHIKAWA method
- Turtle method
- SWOT analysis....



Process matrix

Potential in the stamping and forming process

Result of the classic process analysis

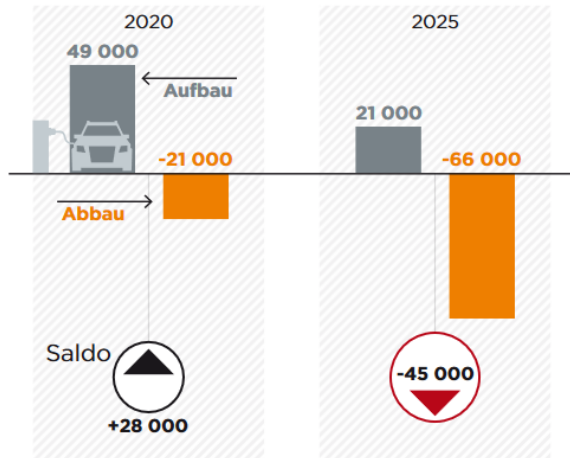


© BzSz

Potential in the stamping and forming process

The future of our business

Forecast increase and decrease in jobs due to the transition from conventional to electric engines in Germany



HANDELSBLATT-GRAFIK



Electric motor production at Bosch
Much bit fewer components than for a conventional engine

-13%

Source: Handelsblatt

Potential in the stamping and forming process

Controls in the car

Front camera:

- Turn assist left/right
- Adaptive cruise control(ACC)
- Active lane assist
- Pre sense front
- Pre sense city
- High beam assistant
- Traffic sign recognition
- Matrix LED headlights

Ultrasonic sensors at the front:

- ACC
- Parking assistant

Front - Radar sensors

- Turn assist left/right
- Adaptive cruise control (ACC)
- Active lane assist
- Pre-Sense Front
- Swerve Assist

Ultrasonic sensors on the side:

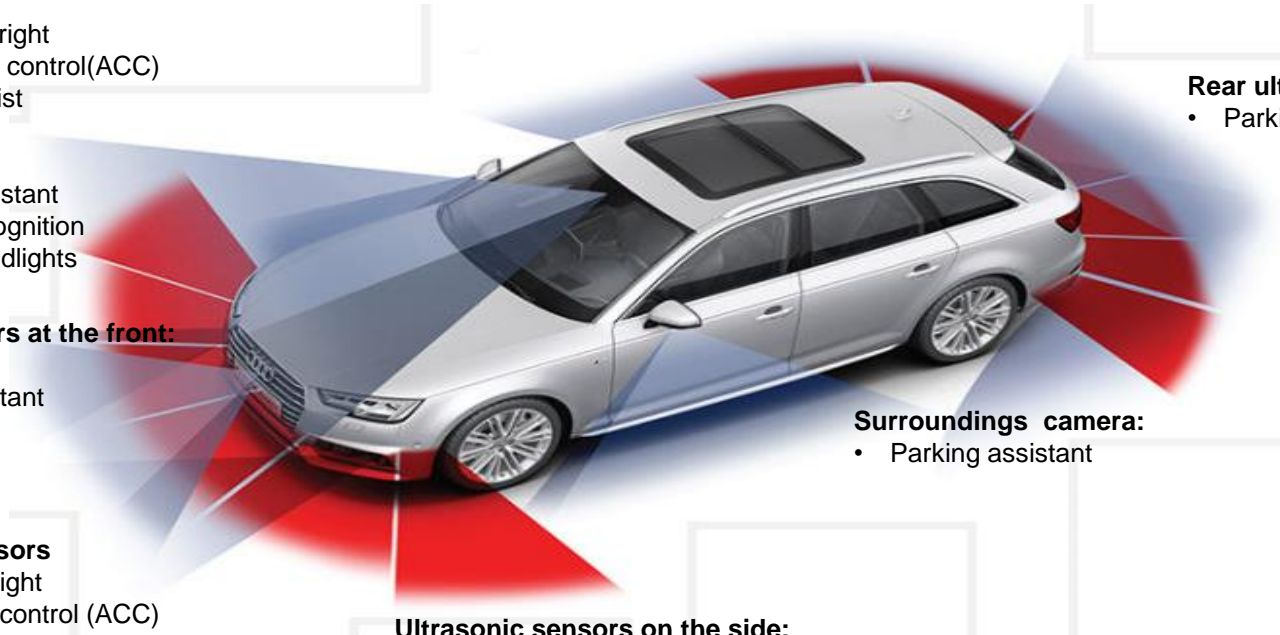
- Active lane Assist
- Parking assistant

Rear ultrasonic sensors:

- Parking assistant

Surroundings camera:

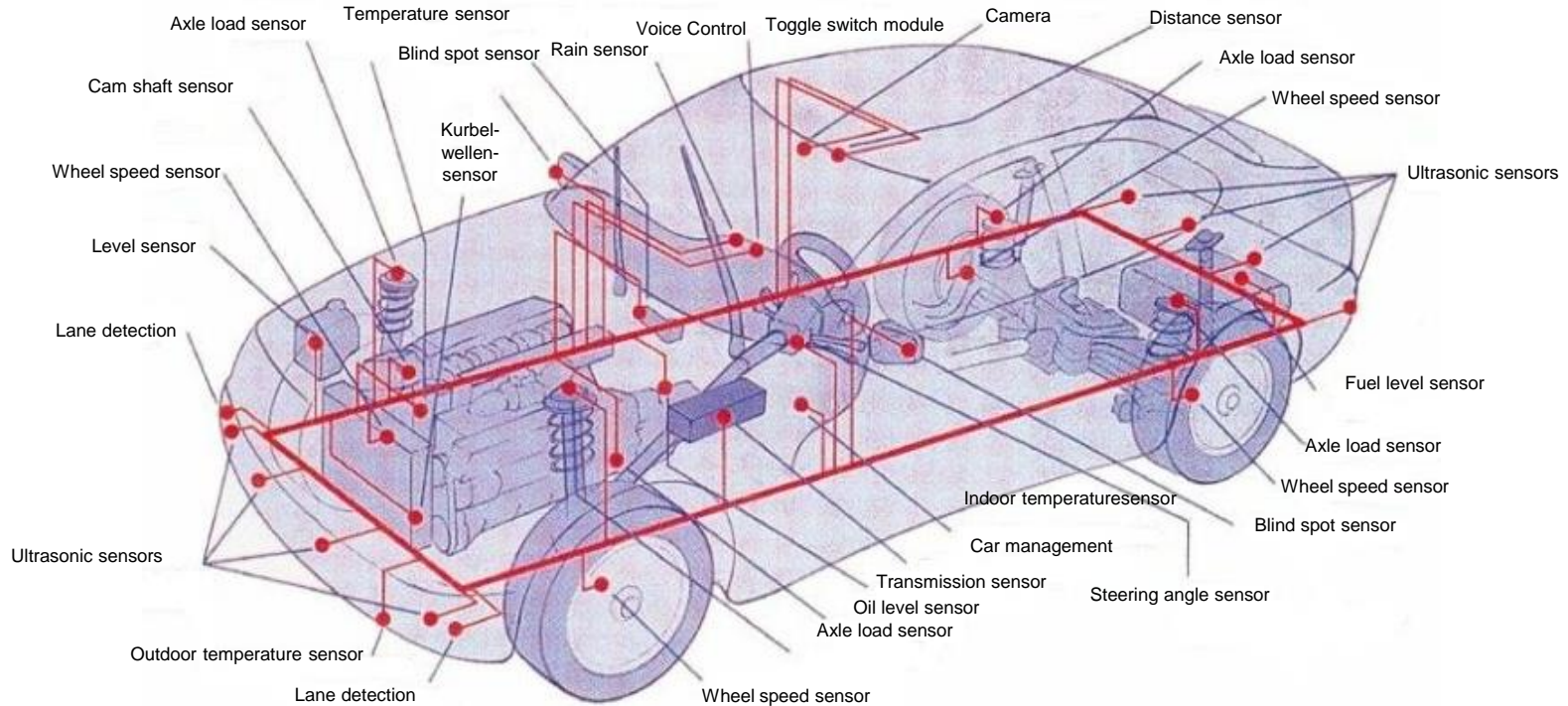
- Parking assistant



Source: Audi

Potential in the stamping and forming process

Sensors in the car

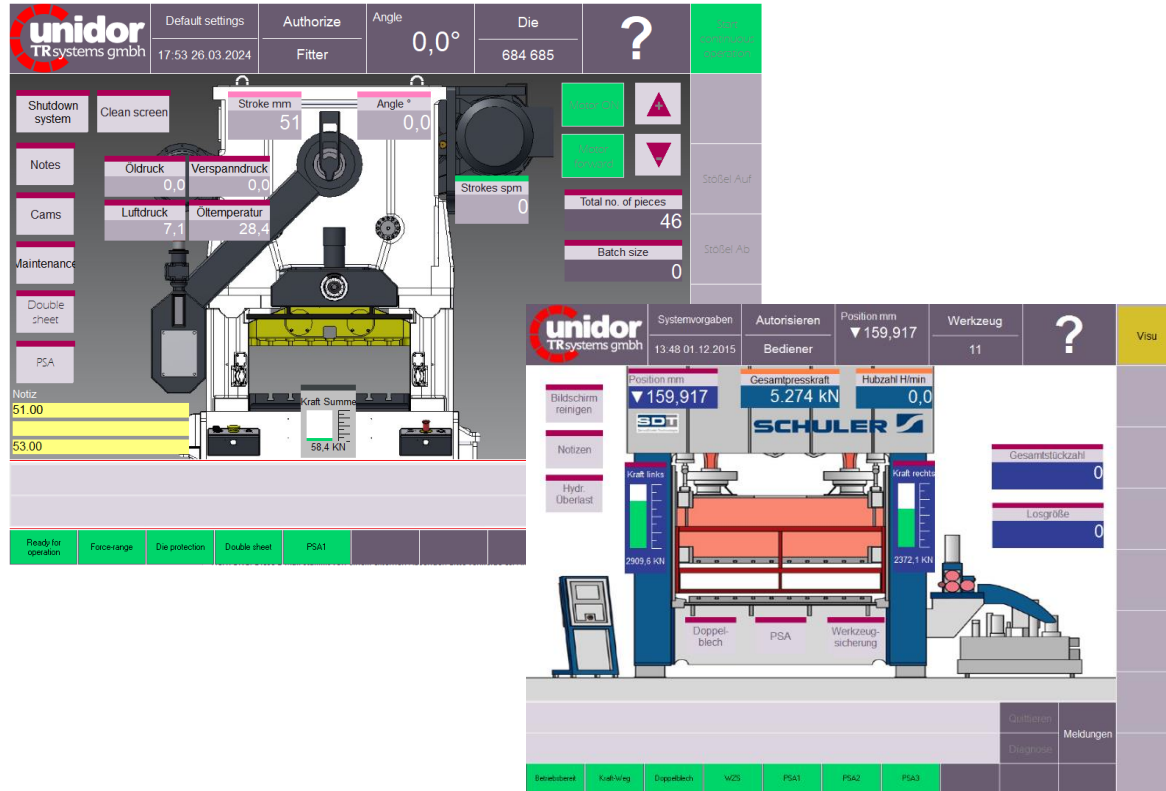


Source: Audi

Potential in the stamping and forming process

Controls in the stamping and forming process - The cockpit

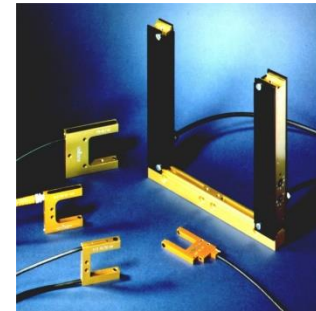
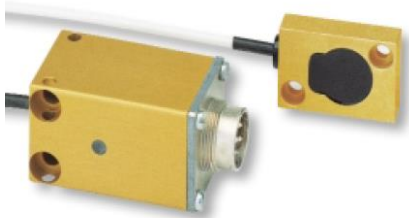
- Machine press force measurement
- Die protection
- Double sheet measurement
- Punching slug monitoring
- Piezo signal analysis
- Force measurement in the tool
- Cams
- Deformation monitoring
- Strip thickness measurement
- Measurement data acquisition
- Temperature measurement
- And much more...



Potential in the stamping and forming process

Sensors in the stamping and forming process

- Fork light barriers for feeder control / position control
- Analogue fork light barriers for metrology
- Frame light barriers for ejection control / counting function
- Bar light barriers for feeder control / position control
- Analogue red light barriers for metrology
- Sensor pins for presence control (e.g. riveting station)
- Proximity switches for position monitoring
- Piezoelectric sensors for force / vibration measurement
- Eddy current sensors for non-contact measurements



Source: TRsystems

Potential in the stamping and forming process

Advantages of process monitoring? Avoid unplanned stops

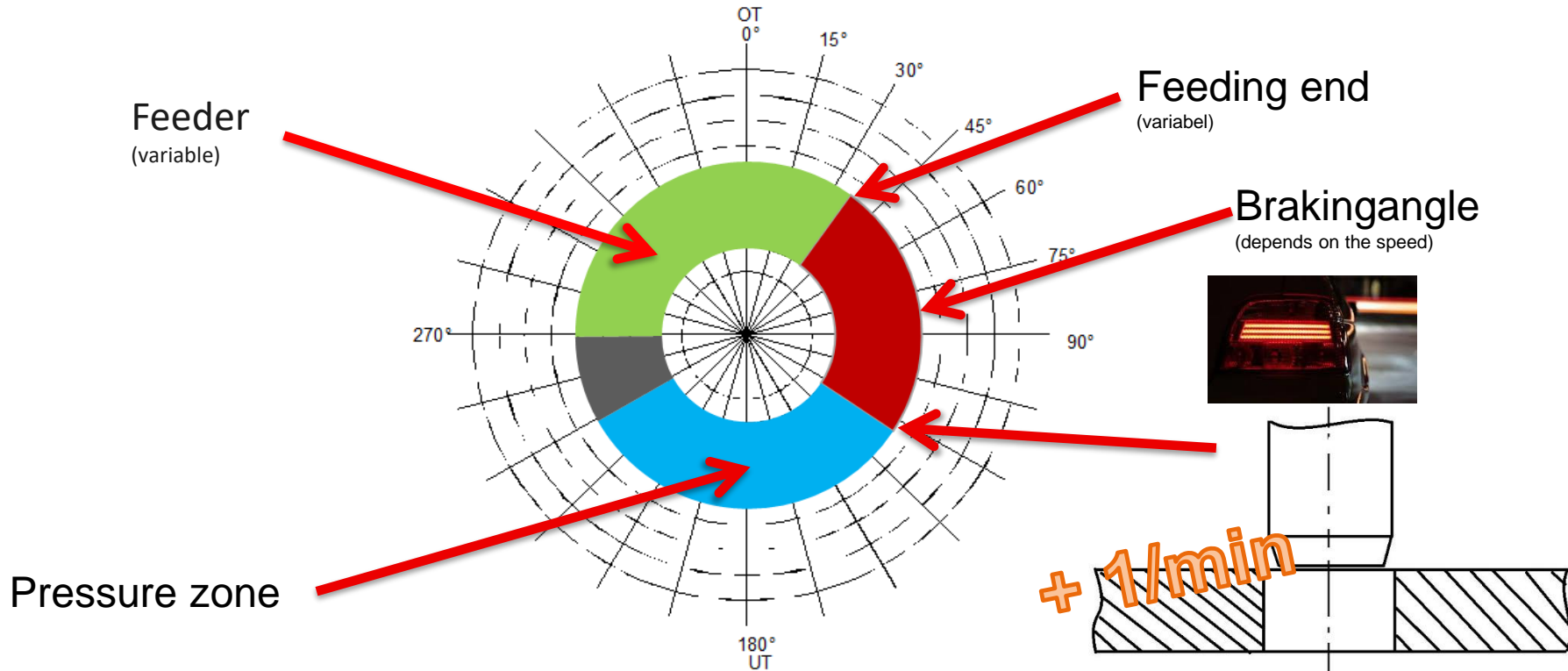
- Tool breakage
- Slug embossing
- Machine failure
- Feeder error
- Dimensional deviations
- Wear
-



Worst Case

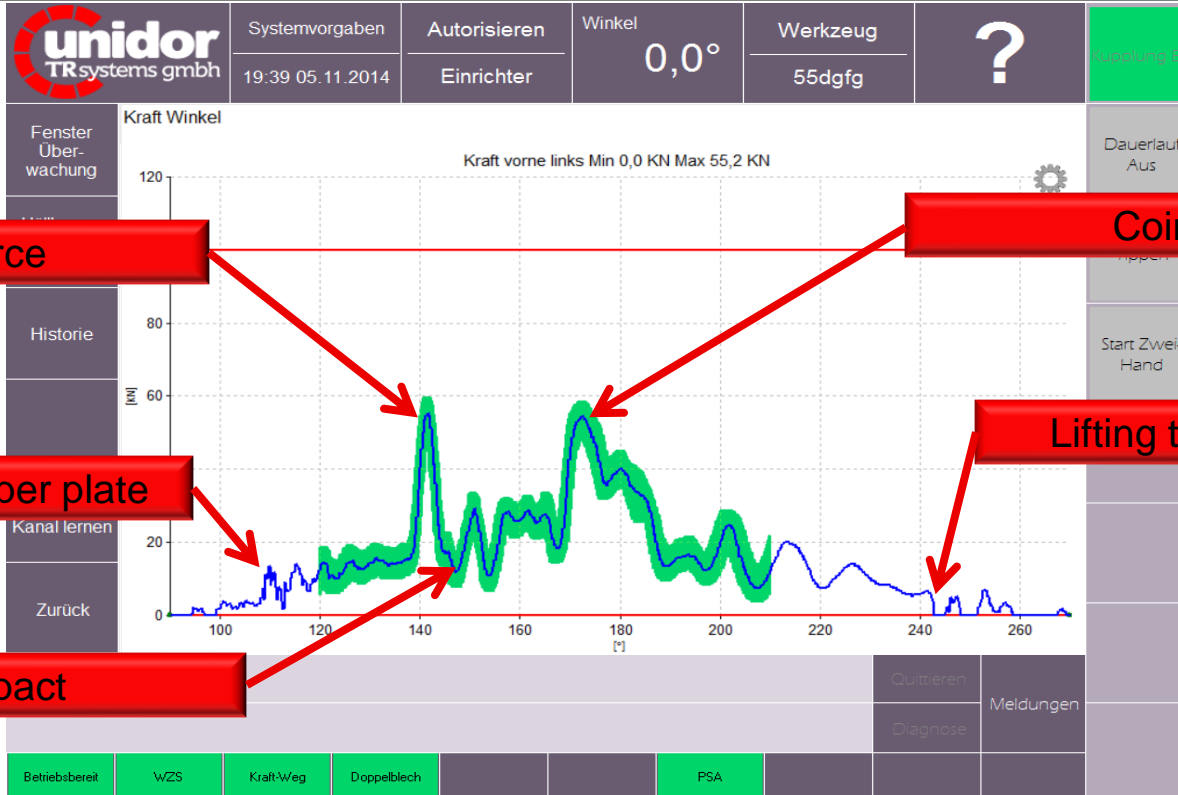
Potential in the stamping and forming process

The process



Potential in the stamping and forming process

Monitoring used correctly - cP Control Machine press force measurement



Cutting force

Coining

Attaching the stripper plate

Lifting the stripper plate

Cut impact



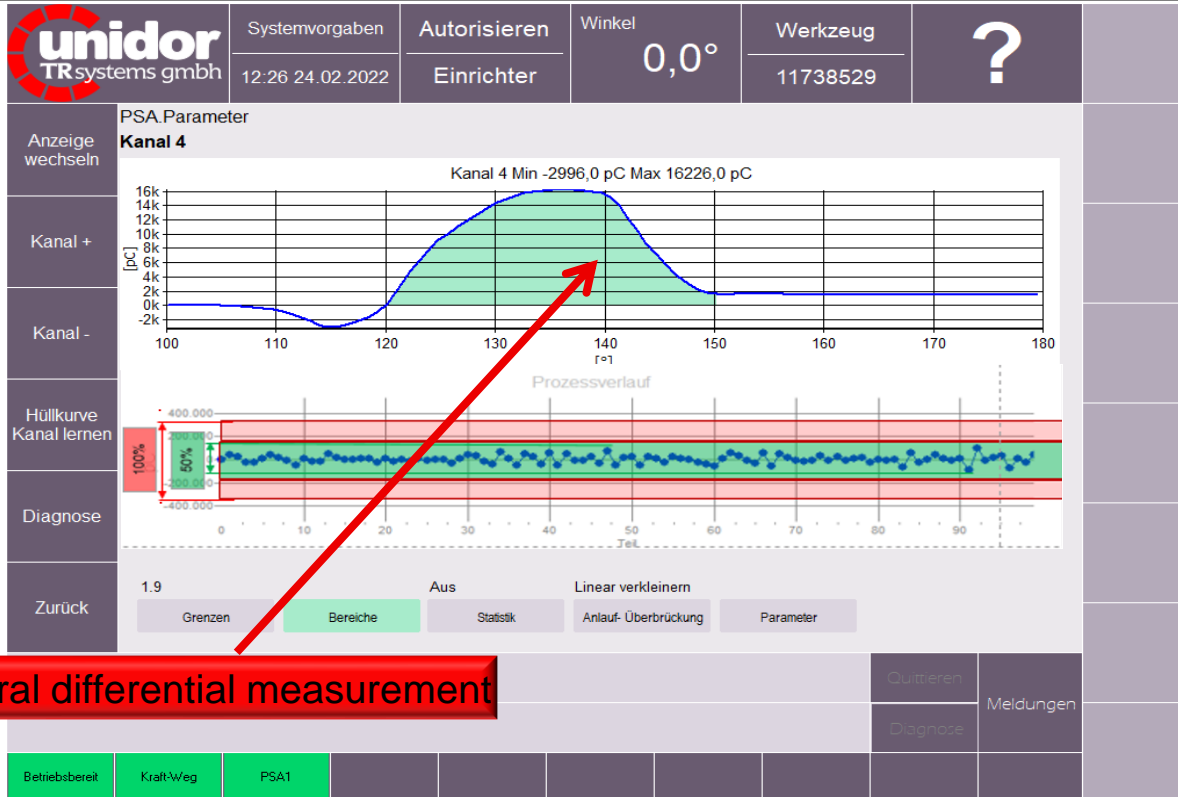
Potential in the stamping and forming process

Monitoring used correctly - cP Control Machine press force measurement



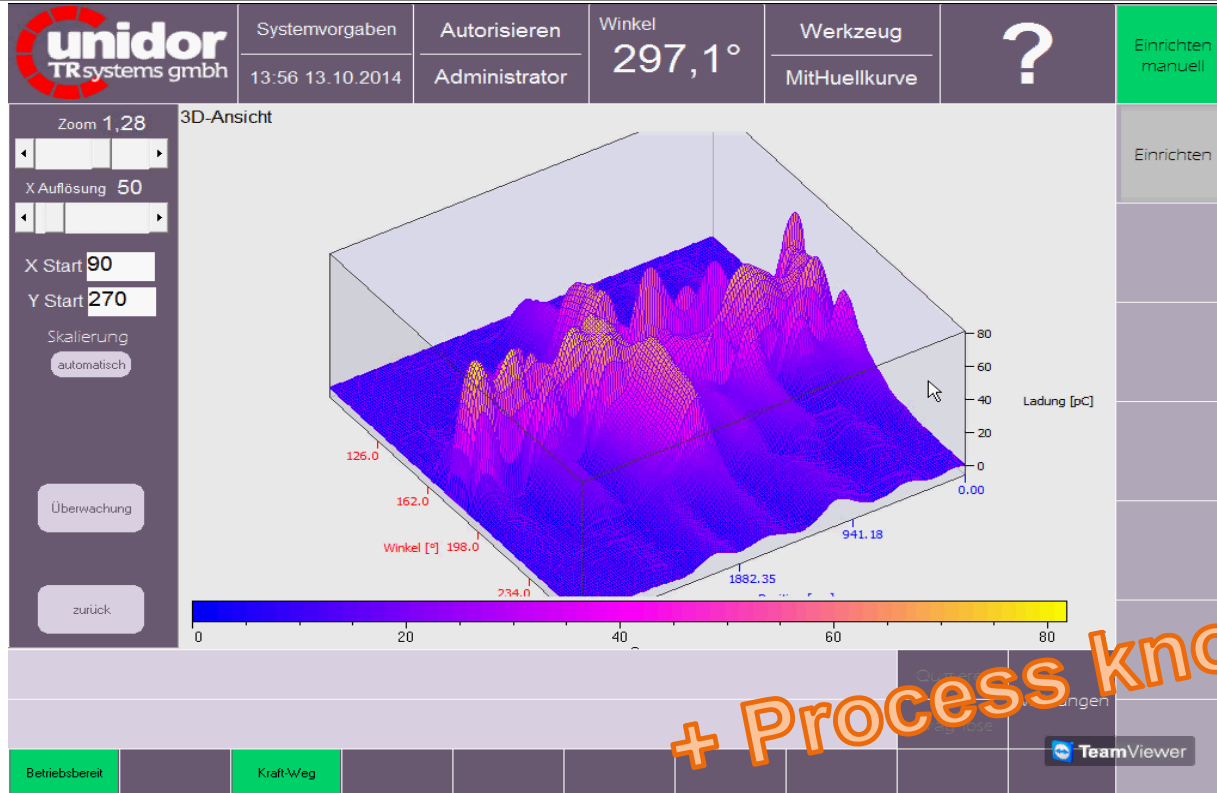
Potential in the stamping and forming process

Monitoring used correctly – cP Piezo signal analysis



Potential in the stamping and forming process

Monitoring used correctly – cP Piezo signal analysis



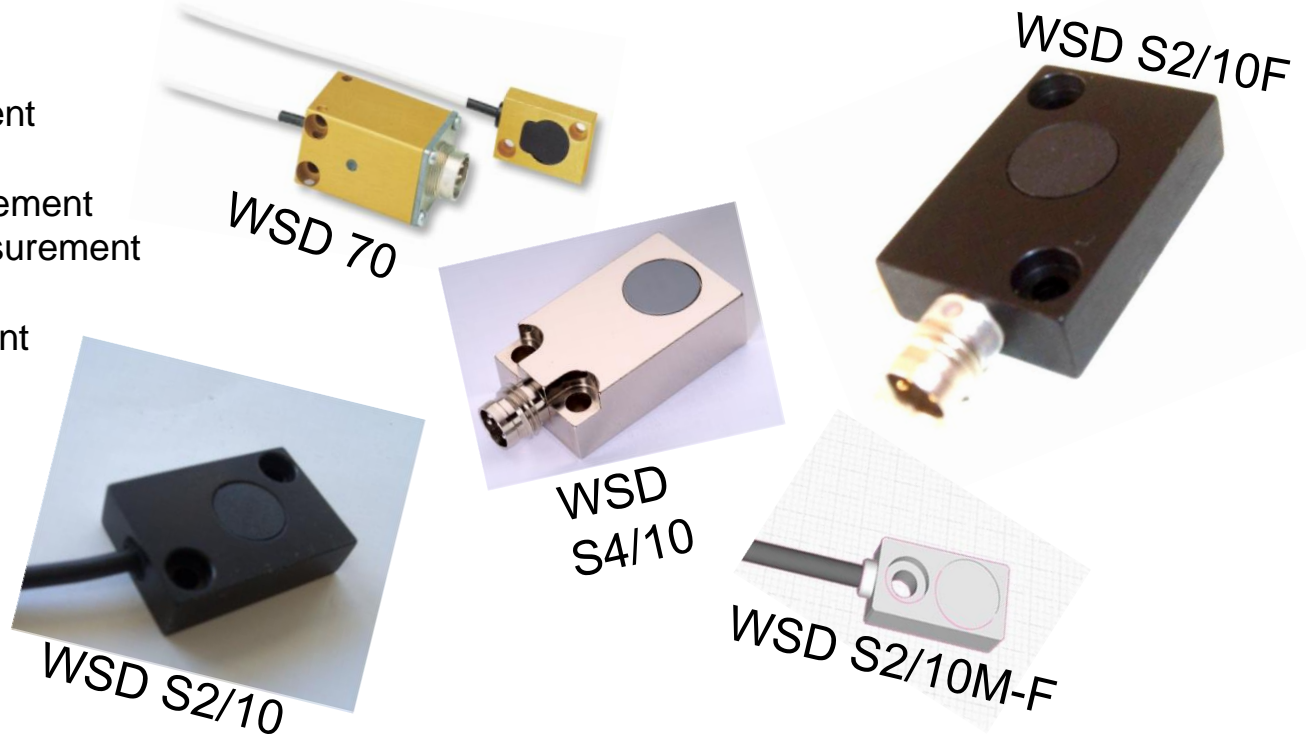
+ Process knowledge



Potential in the stamping and forming process

Monitoring used correctly – cP Double sheet measurement

- Slug monitoring
- Double sheet control
- Parallelism measurement
- Angle measurement
- Forming depth measurement
- Embossing depth measurement
- LDC measurement
- Active part measurement
- And much more...



Potential in the stamping and forming process

Monitoring used correctly – cP Double sheet measurement - measurement and control



unidor
TRsystems gmbh

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 Autorisieren: Einrichter
 Winkel: 187,0°
 Werkzeug: 1
 ?

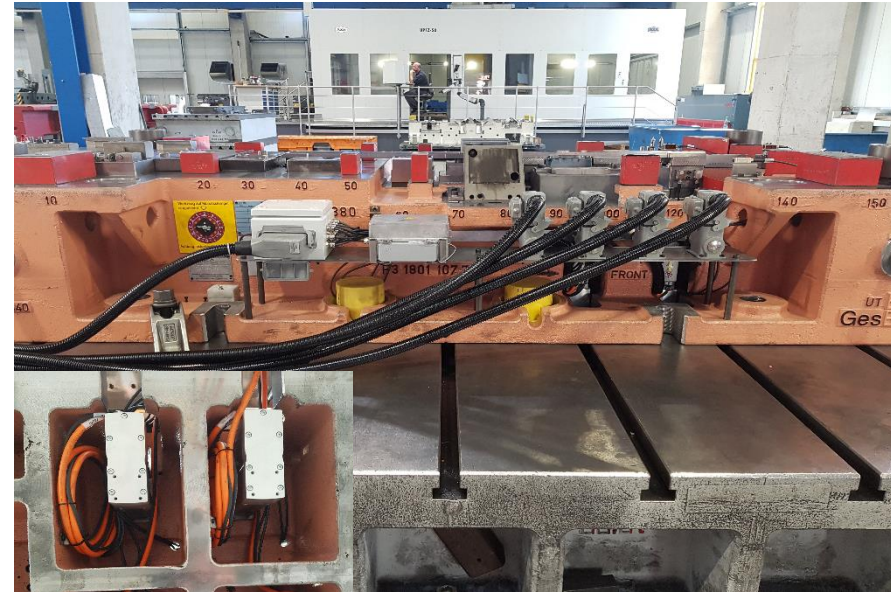
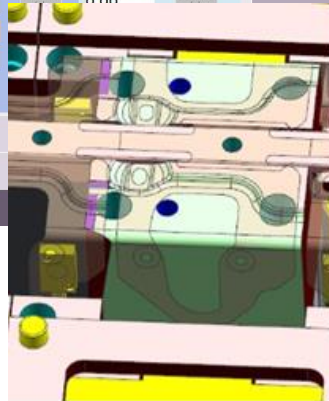
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 Verzögerung mm/s²: 5000,00
 Geschwindigkeit mm/s: Automatik 400,00, Manuell 5,00
 OTStopp
 Dauerlauf Aus
 Automatik

Schieber 1	Schieber 2	Schieber 3	Schieber 4
Regler ein: Ein	Ein	Ein	Ein
Istposition: 1,000	3,975	24,575	1,000
Sollposition: 10,000	5,000	20,000	10,000
Endlage oben: 29,00	29,00	29,00	29,00
Endlage unten: 0,00	0,00	0,00	0,00
EG oben: 15,00	12,50	17,00	29,00
EG unten: 5,00	7,50	13,00	0,00
Schrittweite: 0,50	1,00	0,10	
Regelbereich: 10,00	5,00	4,00	

Zurück

Betriebsbereit

Messung Einzelsensoren



- Complaints

Source: Daimler AG

Potential in the stamping and forming process

Monitoring used correctly – Die Protection

Teach -in



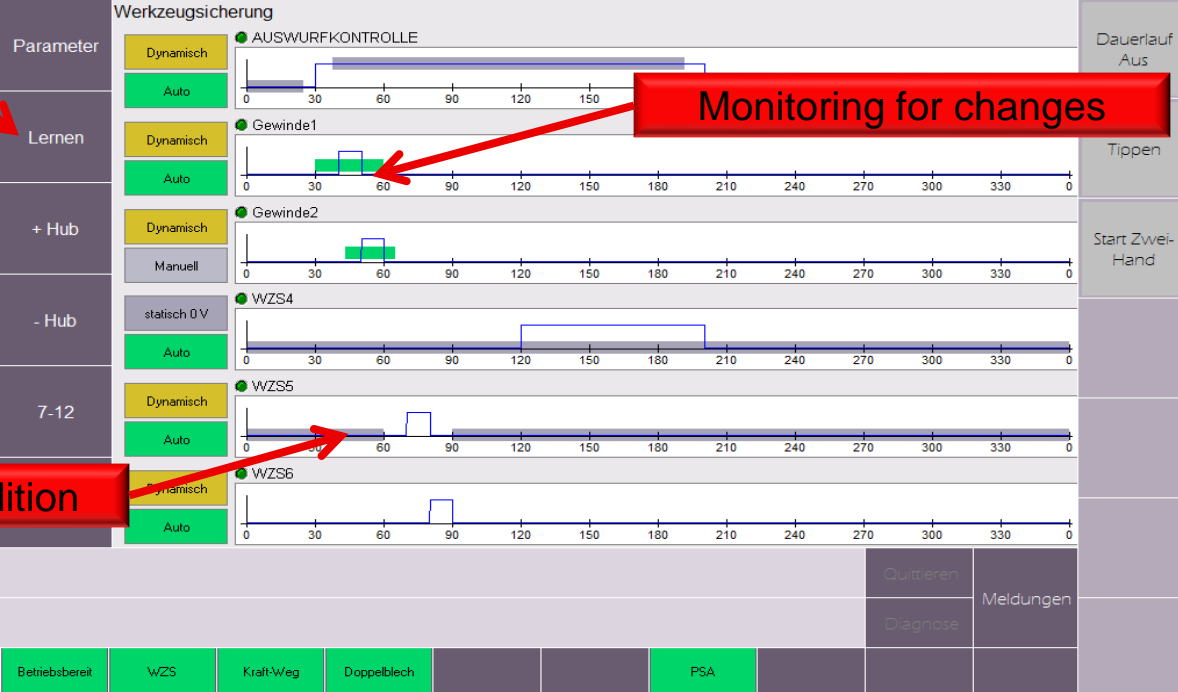
Systemvorgaben
19:57 05.11.2014

Autorisieren
Einrichter

Winkel
0,0°

Werkzeug
55dgg

Tool-specific saving

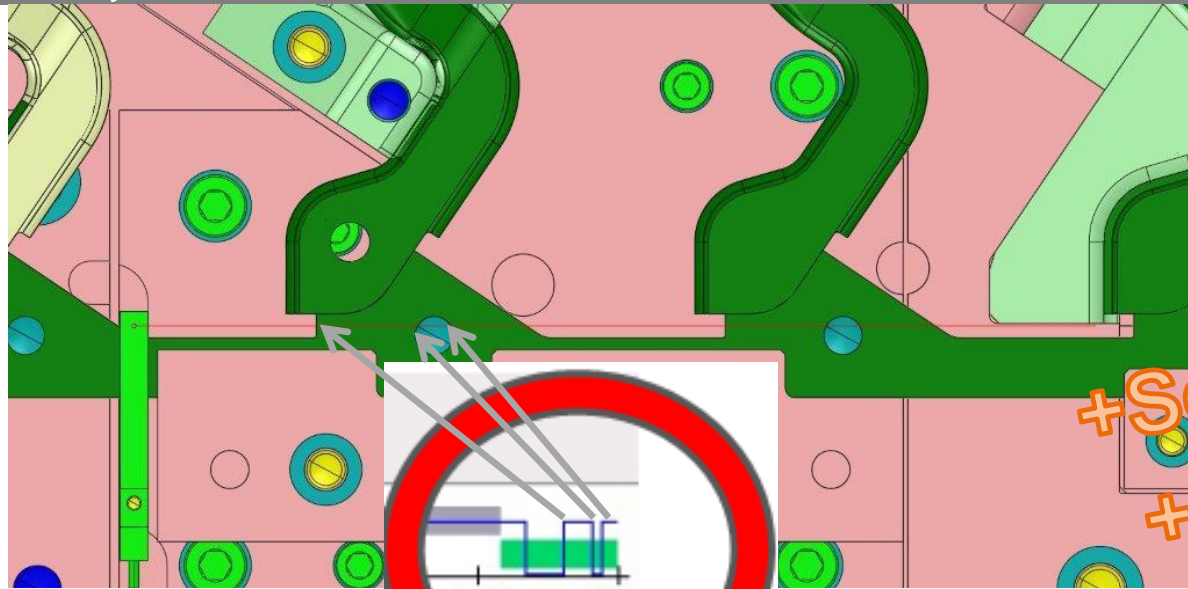


Monitoring for changes

Monitoring for condition

Potential in the stamping and forming process

Monitoring used correctly – Die Protection



+Security
+ OEE
+speed

Werkzeugsicherung

- Dynamisch
- Auto

VORSCHUB ÜBERWACHUNG



Potential in the stamping and forming process

Process monitoring - A conclusion

- Effects are directly measurable
- The process becomes understandable (weak point analysis)
- Optimise the process through targeted corrective measures
- Greater process stability
- Increased tool and machine availability
- Preventive maintenance of tool and machine
- Reduction of complaint costs
- Increase in component quality
- Lower part price
- Higher profit
- Job preservation
- Strengthening of the domestic market
- Innovative Toll technology e.g. autonomous measuring & control process



Potential in the stamping and forming process

We look forward to your questions



THANK YOU FOR YOUR ATTENTION



Interest in the lecture?