

GREAT DESIGNS IN
STEEL

TWENTY YEARS

SMART FACTORY – ROLL FORMING 4.0

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MEGATRENDS CHALLENGING INDUSTRY

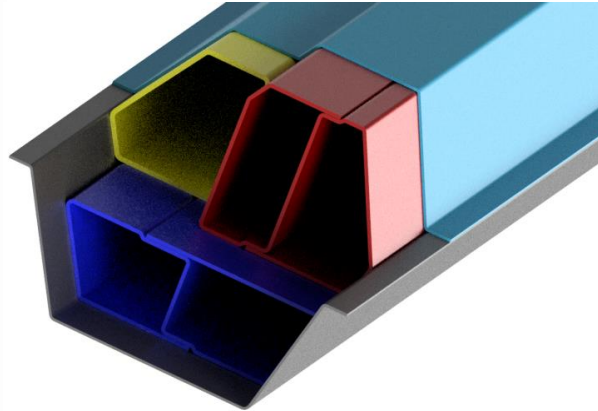
Sustainability



[1]

- Economically and ecologically
- Transparency and traceability
- E-Mobility

Complexity



- More variety
- Tighter tolerances
- More challenging material (MP1500)
- New geometries

Demography



[4]

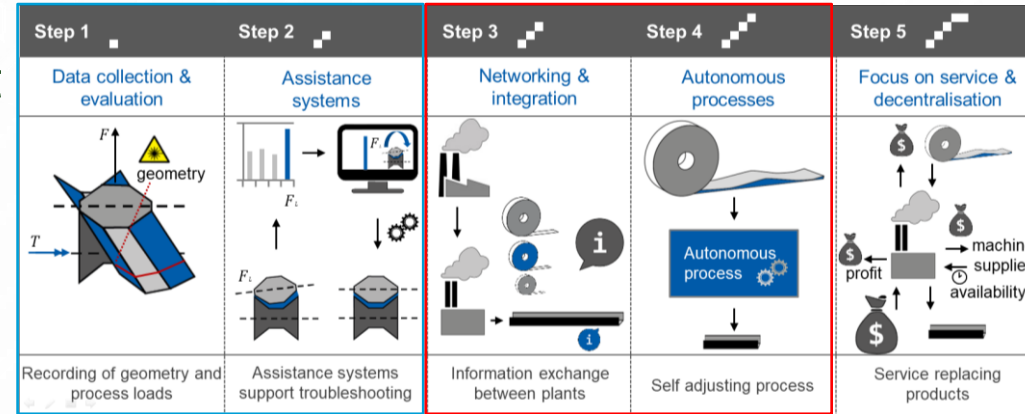
- Knowledge retention
- Missing experience
- Choice of suitable countermeasures

[1] Albert Elligsen: Nachhaltigkeit, <https://elligsen-landhandel.de/unsere-verantwortung> (20.10.2021)

[4] Carla Neuhaus: Welche Rechte leibliche Väter haben, <https://www.tagesspiegel.de/wirtschaft/umgangsformen-welche-rechte-leibliche-vaeter-haben/8559340.html> (20.10.2021)

HOW TO FACE THE CHALLENGES

- Roadmap to digitalize roll forming:
- Challenges
 - Mechanically influenced environment
⇔ Need for information
 - Each department has its own ideas which processes need to be supported
 - After step 3: Crosslinks between companies
→ Till step 3 in the own hands



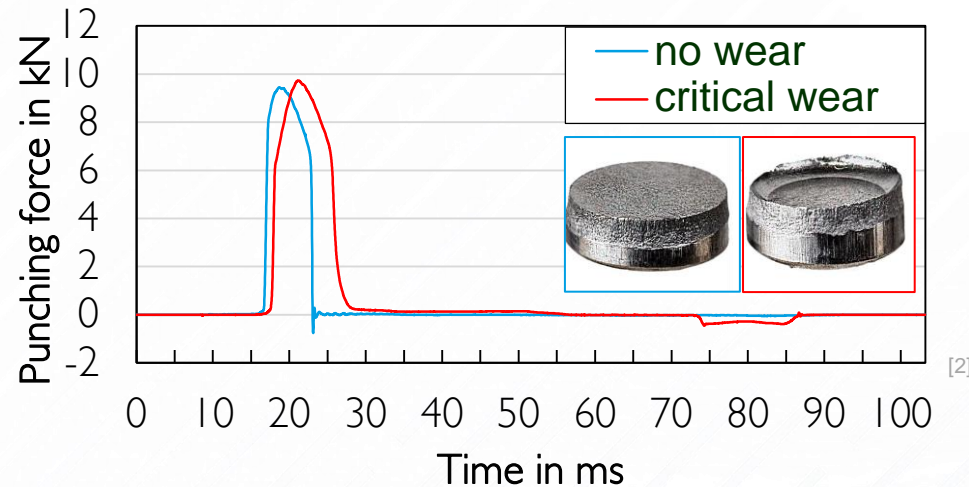
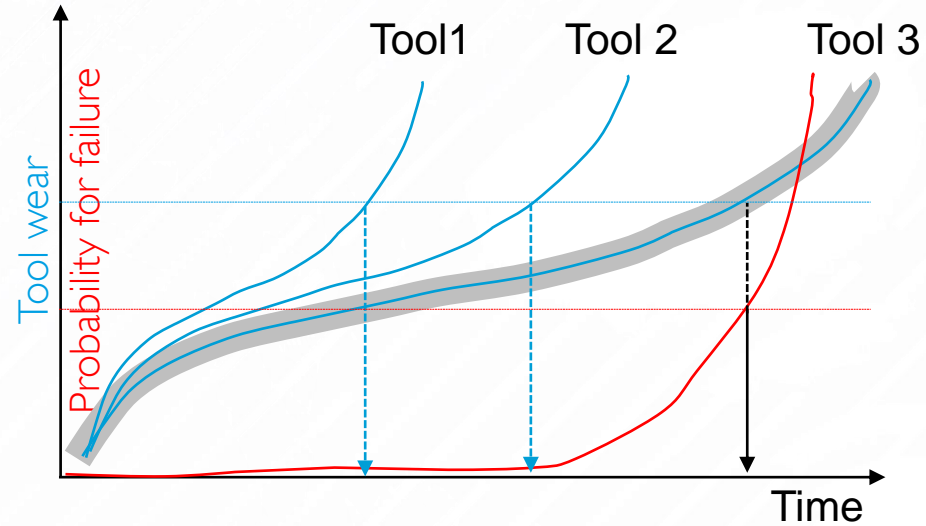
- Use Cases:

The machine turns into an assistant for

- maintenance
- line operators
- the production management

USE CASE 1 - MAINTENANCE

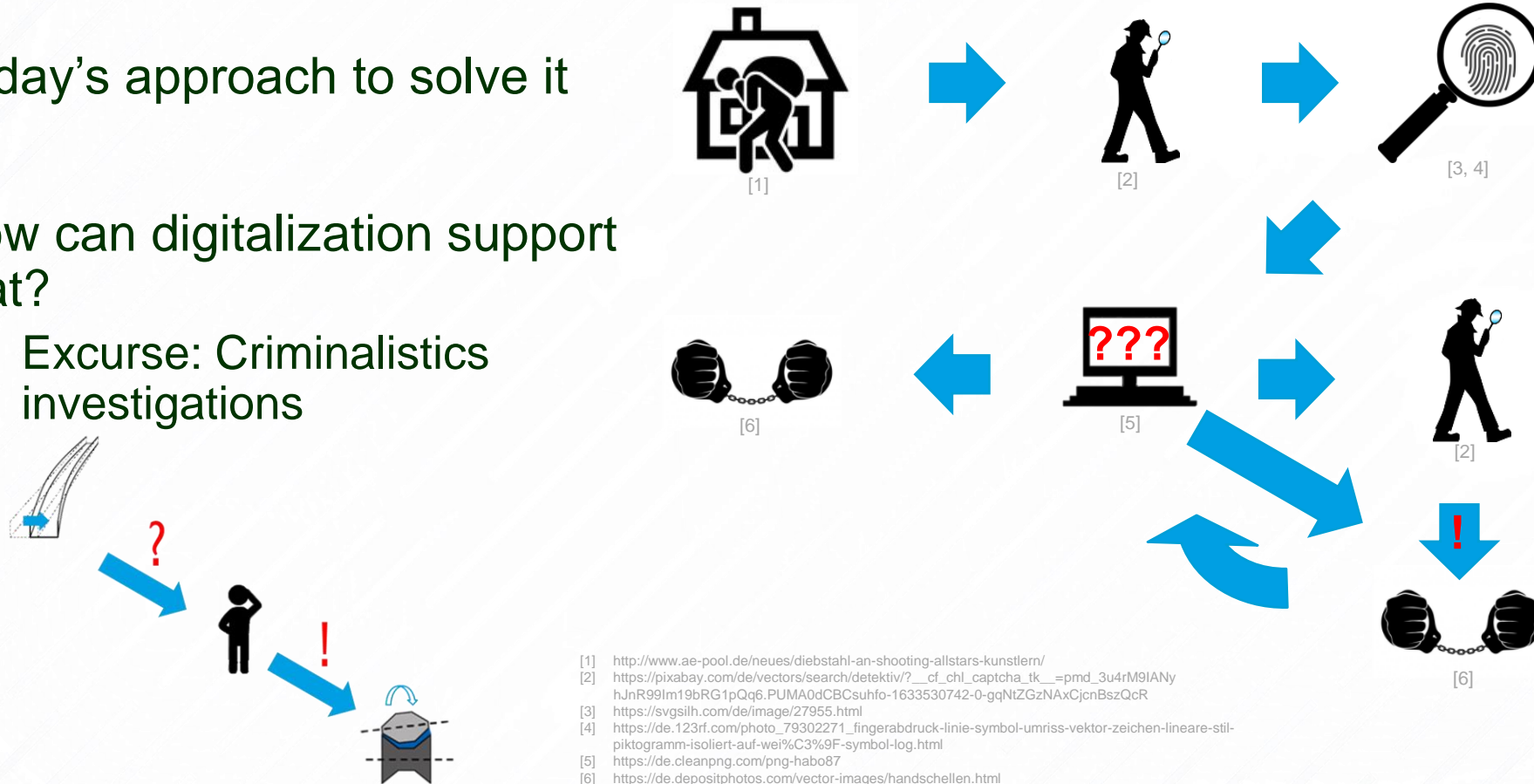
- When is the best time to act?
- Challenge: More high strength materials → higher loads on tools
 - Higher & less predictable wear
 - Time based approach fails
- Solution: Smart machine predicts the status of wear of a component
 - Replacement of the ideal point in time



[2] Kubik et al.: Exploitation of force displacement curves in blanking - feature engineering beyond defect detection. In: The International Journal of Advanced Manufacturing Technology 19 (6), S. 403, 2021

USE CASE 2 – LINE OPERATORS

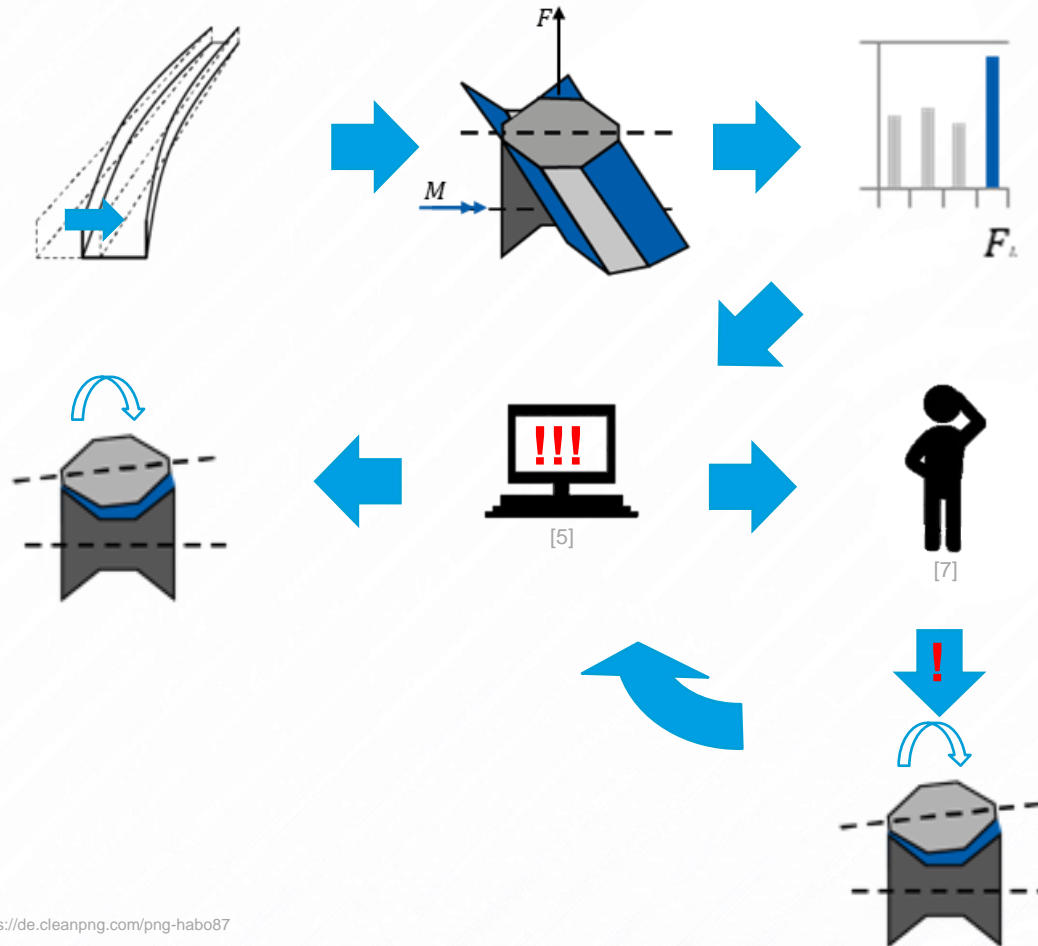
- Challenge in everyday use
- Today's approach to solve it
- How can digitalization support that?
 - Excuse: Criminalistics investigations



[1] <http://www.ae-pool.de/neues/diebstahl-an-shooting-allstars-kunstlern/>
 [2] https://pixabay.com/de/vectors/search/detektiv?__cf_chl_captcha_tk__=pmd_3u4rM9IANyhJnR99Im19bRG1pQq6.PUMA0dCBCsuho-1633530742-0-ggNtZGzNAxCjcnBszQcR
 [3] <https://svgsilh.com/de/image/27955.html>
 [4] https://de.123rf.com/photo_79302271_fingerabdruck-linie-symbol-umriss-vektor-zeichen-lineare-stil-piktogramm-isoliert-auf-wei%C3%9F-symbol-log.html
 [5] <https://de.cleanpng.com/png-habo87>
 [6] <https://de.depositphotos.com/vector-images/handschellen.html>

USE CASE 2 – LINE OPERATORS

- Challenge in everyday use
- Today's approach to solve it
- How can digitalization support that?
 - Excuse: Criminalistics investigations
 - Errors are linked to characteristic patterns in measurement signals
 - Support independent from experience and knowledge



[5] <https://de.cleanpng.com/png-habo87>

[7] <https://www.canstockphoto.at/illustration/kratzen-kopf.html>

USE CASE 2 - APPLICATION



SIEMENS SIMATIC HMI

*** DREIST

Settings

Error evaluation

Act

Set

Max

Mini

Filter

Cal

Ado

Selection

- Scali
- Scali
- Scali
- Scali

Comparison mode: Consideration of error

No. Error case no

1	1
2	2
3	3

Upper roll OS
Upper roll RS
Roll gap OS
Roll gap RS
Side roll OS
Side roll RS
Torque US
Torque LS

	2	4	6	8	10	12	16
Upper roll OS	↗	○	○	○	→	→	→
Upper roll RS	→	○	○	○	→	→	→
Roll gap OS	○	→	○	○	→	→	→
Roll gap RS	○	→	○	○	→	→	→
Side roll OS	○	○	→	○	→	→	→
Side roll RS	○	○	→	○	→	→	→
Torque US	○	○	○	→	→	→	→
Torque LS	○	○	○	→	→	→	→

14 20

Sensor1 OS
Sensor1 RS

Edit error case

Case2_Text

Add current error to error-database

TOUCH

10/2022 8:14:22 AM

Overview Tab

USE CASE 3 – MANAGEMENT

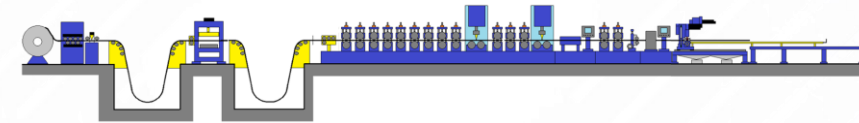
- Desire for transparency
 - Status of plant(s)
 - Status of machines
 - Efficiency of machines / lines
 - Status of a job / set up
 - Disturbances



- ➔ ▪ Decisions based on proper data
- Prerequisite for transparency across operational boundaries

CONCLUSIONS

- Roll forming is the most effective manufacturing method for profiles
 - Including steps like punching or welding
 - For various materials, e.g. high strength steels like MP 1500
- Current trends challenge roll forming
- Digitalization is one key to tackle these challenges
 - Assistance systems provide support as needed...
 - in maintenance
 - in line operation
 - in management



Sustainability	Complexity	Demography

Step 1	Step 2	Step 3	Step 4	Step 5
Data collection & evaluation	Assistance systems	Networking & integration	Autonomous processes	Focus on service & decentralisation
Recording of geometry and process loads	Assistance systems support troubleshooting	Information exchange between plants	Self adjusting process	Service replacing products

FOR MORE INFORMATION

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