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FACTORY Lean & sustainable

# Automotive Lean Production Award
# **Best Practices catalogue 2023**




All the Best Practices are available in web optimized versions accessible through QR-codes via mobile devices. **The stickers are located in the walkaround hotspots near the target-area of the respective measure.**

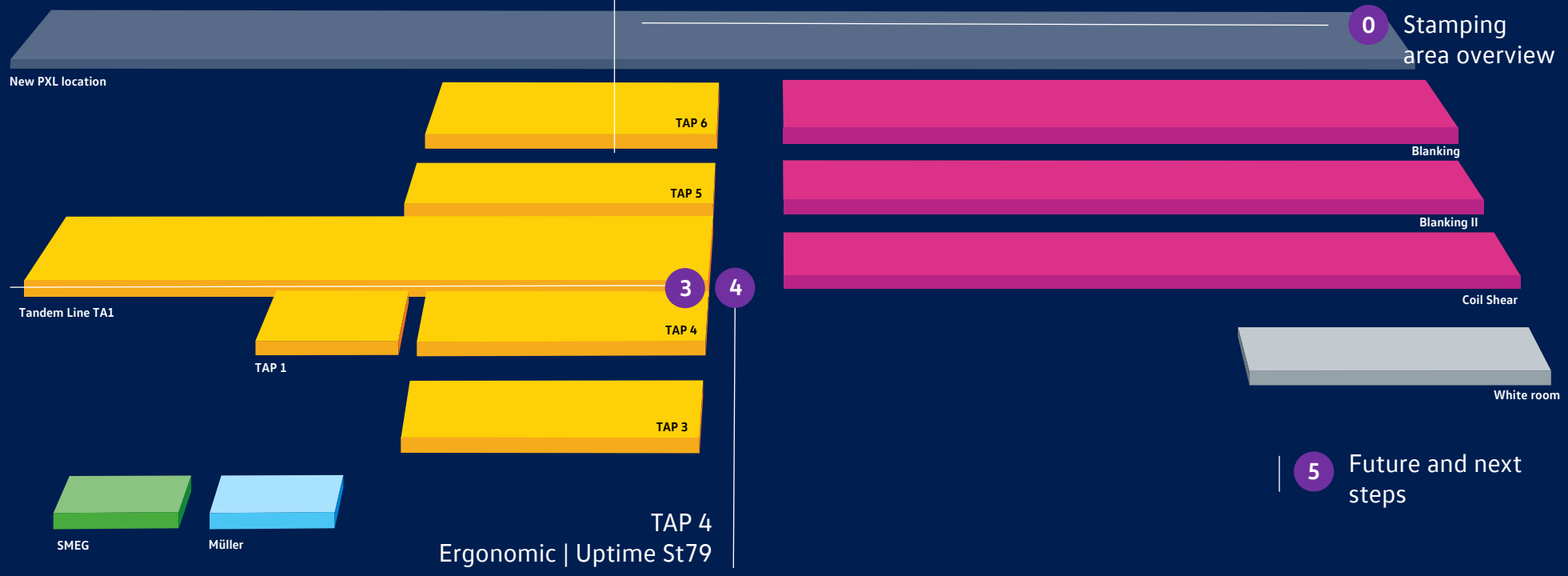
# FACTORY

Stamping
**Walkaround**

# FACTORY Lean & sustainable | Stamping

1 TAP6 | SMED Universal automation device

2 TAP6 | Poke Yoke Idle station St79




0 Stamping area overview

TA1 | SMED Universal automation device

TAP 4
Ergonomic | Uptime St79

5 Future and next steps

Check this Best Practice LIVE

# SMED
## Die Change: destacker universal automation device

### Before

### After

### Description

— Automation device for each part number

— Universal automation for all part numbers

| | Facts |
|---|---|
| **Stamping** | Tandem 1 |
| **Saving** | Die change time 3 min |
| **Investment** | 3 000€ |
| **Implementation date** | June 2023 |

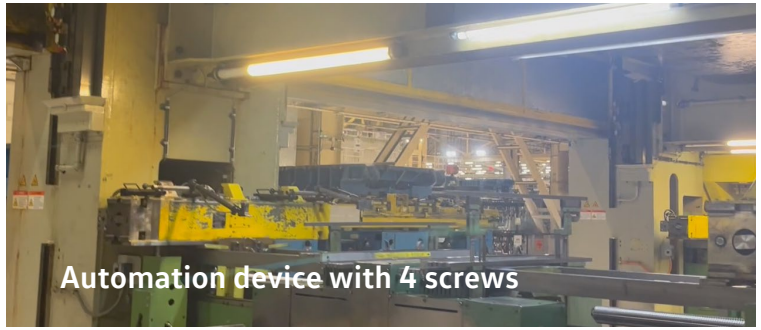
### Results and improvements

Reduce die change time 2 min (8%). Reduce operational complexity. Cost reduction (8.000€/year)

Check this Best Practice LIVE

# SMED
## TAP6 | Poke Yoke Idle station St79

### Before




### After


### Description

— Fix plates with screws

— Fast coupling

| | Facts |
|---|---|
| **Stamping** | TAP 5/6 (2) |
| **Saving** | Die change time 1 min |
| **Investment** | 2 500€ |
| **Implementation date** | January 2023 |

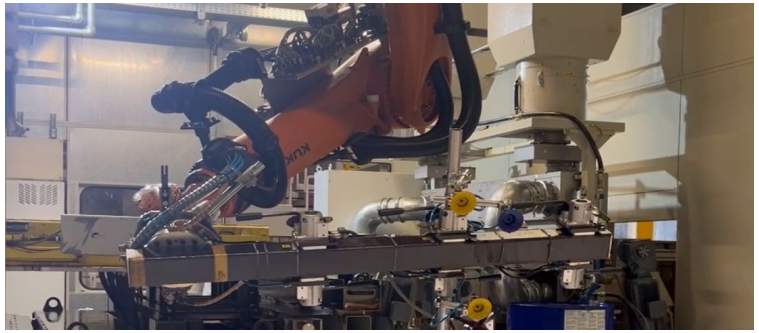
### Results and improvements

Reduce die change time 1min (5%). Reduce maintenance stoppages: Lifters system ( 930min/year). Reduce complexity Poke-Yoke implemented.

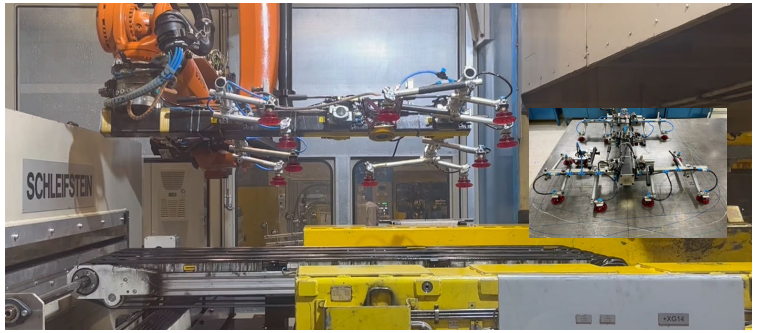
Check **this** Best Practice **LIVE**

# SMED
## TA1 | Universal automation device

### Before



### After




### Description

— 3 different types of automations devices for 9-part numbers

— Only one automation device for all parts

| | Facts |
|---|---|
| **Stamping** | TAP 5/6 (3) |
| **Saving** | Die change time 1min |
| **Investment** | 550€ |
| **Implementation date** | March 2023 |

### Results and improvements

Reduce die change time 1min (5%). Improve the ergonomic condition of operators. Reduce material costs and preventive maintenance (30%).

Check this Best Practice LIVE

# TAP4
## Ergonomic | Uptime St79

### Before

Manual dismantling and assemble inside the line

### After


### Description

**Before**

- Automation device for each parts number
- The hydraulic cylinder used to rotate the jigs was small and did not guarantee the final position
- In production it's vibrating a lot with the operation of the press.
- Jigs had to be assembled after the Dies were already inside the press to fit

**After**

- Universal automation for all part numbers
- Larger hydraulic cylinders were installed, to guarantee the final position
- That allow the jigs to be assembled on the tables even before they enter the Press.

| | Facts |
|---|---|
| **Stamping** | TAP 4 (4) |
| **Saving** | N/A |
| **Investment** | N/A |
| **Implementation date** | 2023 |

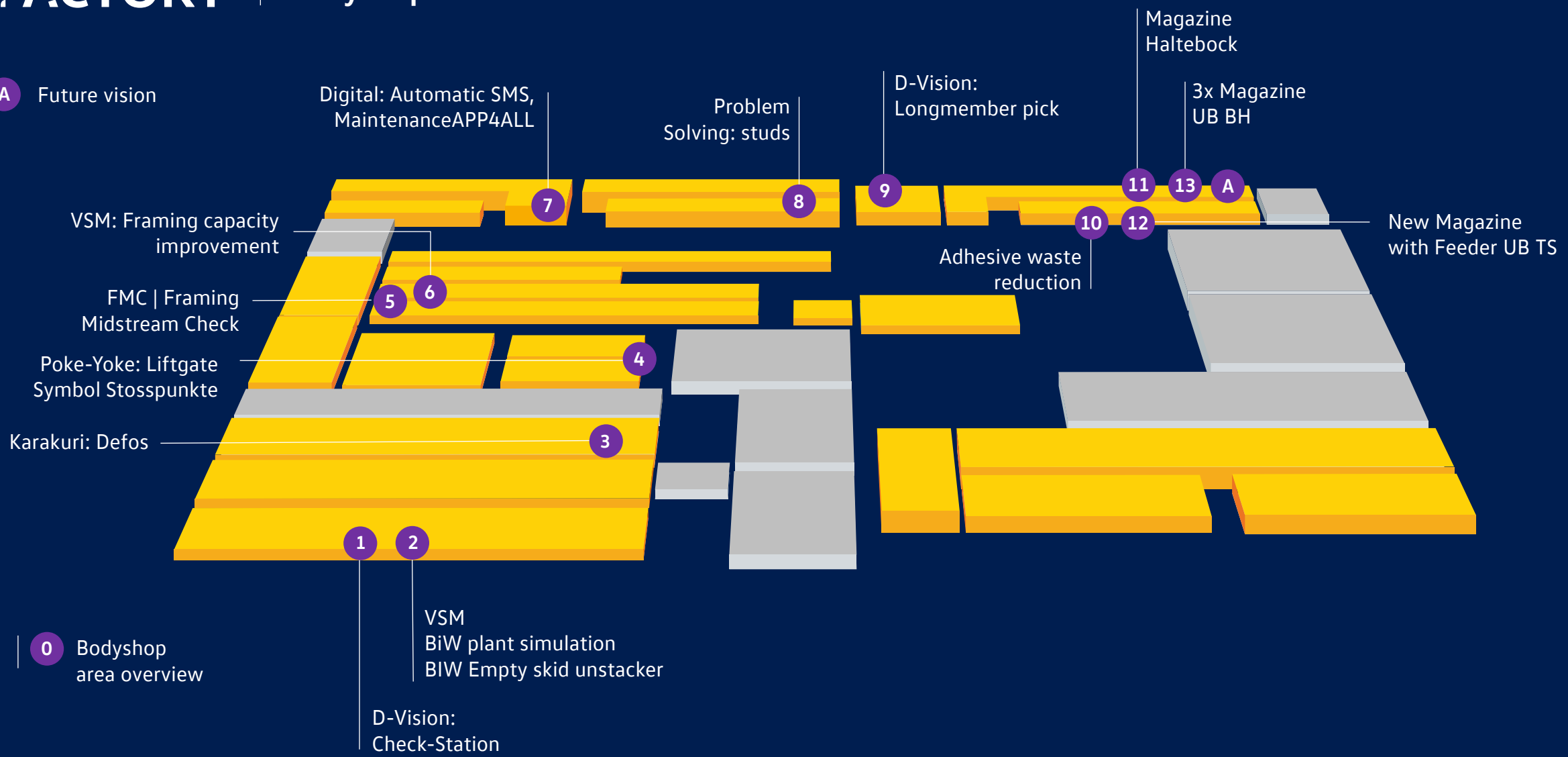
### Results and improvements

Ergonomic and shorter time for Die changes (4 min). More stability of the jigs during press operation

FACTORY

Bodyshop
**Walkaround**

FACTORY Lean & sustainable | Bodyshop



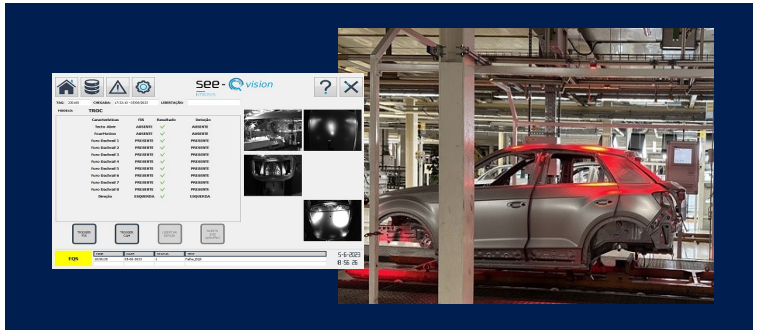
Check **this Best Practice LIVE**

# D-Vision
## Body Check Station

### Before

Picture not available

### After



### Description

- Each single body model's characteristics had to be visually checked by the Operators of the Metal Finish Line's, before going to the Buy-Off of Paint shop.
- Installation of a Checking station with cameras to detect all the body characteristics of the several options available (RHD/LHD, roof racks, Open roof).
- The detection is done through the digital image and the uses of a special software that compares the current body features with the customer order data.

| | Facts |
|---|---|
| **Area** | Bodyshop 1 |
| **Saving** | N/A |
| **Investment** | 21T € |
| **Implementation date** | 2021 |

### Results and improvements

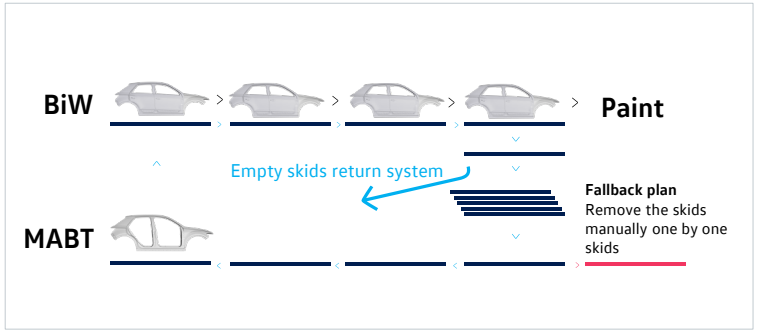
This system eliminates the possibility that mistakes contaminate the production beyond the Bodyshop.
Avoids order amendments and delayed vehicles.

Check **this Best Practice LIVE**

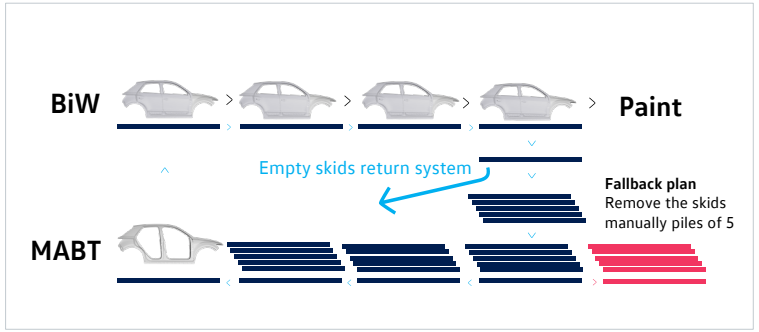
# New Empty Skid Unstacker
## BiW empty skid buffer increase

VSM

## Before




## After




### Description

- The BiW (Body in White) buffer supply P100 with bodies.
- If the system is full, the return of empty skids stops.
- The P100 cannot release the empty skid, and the production feed to Paint stops.
- Install a new unstack system to increase empty skid storage by 35.

| | Facts |
|---|---|
| **Area** | Bodyshop 2 |
| **Saving** | 1,1% uptime improvement |
| **Investment** | 125T € |
| **Implementation date** | 2023 |

## Results and improvements

The improvement will increase the flexibility of the line and will increase P100 uptime by 1,1% (currently 96%).

# Karakuri Bodyshop
## DTB 1 | Defos Jig part's car

### Before

### After

### Description

- The operators needed to pick parts from line side every cycle.
- With the speed increase (45JPH) this station could not reach the capacity with only one operator per side (8MA). Risk to have to add 8MA.
- Trilogiq car and structure was developed to be connected directly to the jig.
- The parts "follow" the car, always at best reach.
- Hood Hinge; Front + rear Defo; Strebbe; screws

| | Facts |
|---|---|
| **Area** | Bodyshop 3 |
| **Saving** | Avoidance 8MA (45JPH) |
| **Investment** | Est.€2.000 |
| **Implementation date** | 2022 |

### Results and improvements

With the parts being available directly in the reach of the operators, the time for the station reduced.
The target of productivity was reached (no increase of manpower).
This improvement also had a positive impact on ergonomics.

# Poke-Yoke Bodyshop
## LTG Symbol rotation

### Before

Picture not available

### After

### Description

— The symbol bracket position was only assured in the Paintshop oven, where the structural glue cured.

— Due to the manual handling operations during the construction process, there was a risk of rotating the symbol bracket unintentionally.

– Add a Weld point in the stosspunkten station

| | Facts |
|---|---|
| **Area** | Bodyshop 4 |
| **Saving** | N/A |
| **Investment** | N/A |
| **Implementation date** | 2022 |

### Results and improvements

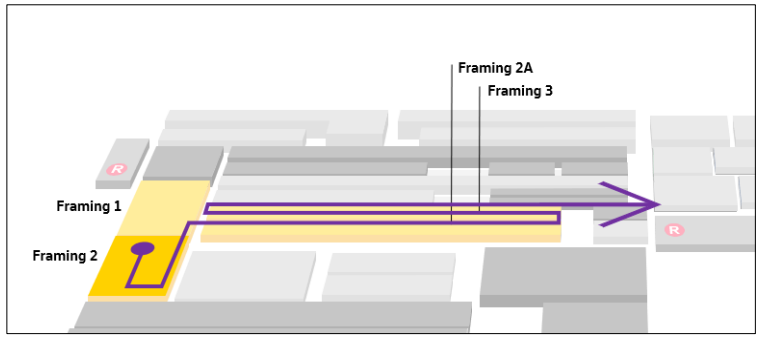
This improvement created a welding fix between the two parts, making it impossible to create rotation between them and cause a problem.

Check **this Best Practice LIVE**

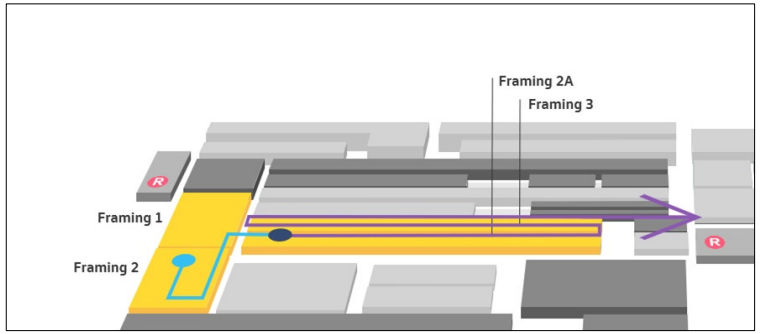
# Inline Measurement
## FMC | Framing Midstream Check

**Below** 30 hours

### Before




### After




### Description

- Not possible to detect problem before perceptron (120 bodies later).
- In the event of a major deviation, the risk is high to contaminate the system with non-conform product downstream.

- Implement a new, in-house developed, comprehensive system (measure, alarm and report) to control the most critical dimensions for the Liftgate in the beginning of Framing 2A.
- Reduce the propagation risk by 66% (from 120 unchecked bodies to 40).

| | Facts |
|---|---|
| **Area** | Bodyshop 5 |
| **Saving** | Potential Risk reduction |
| **Investment** | €20.000 |
| **Implementation date** | 2023 |

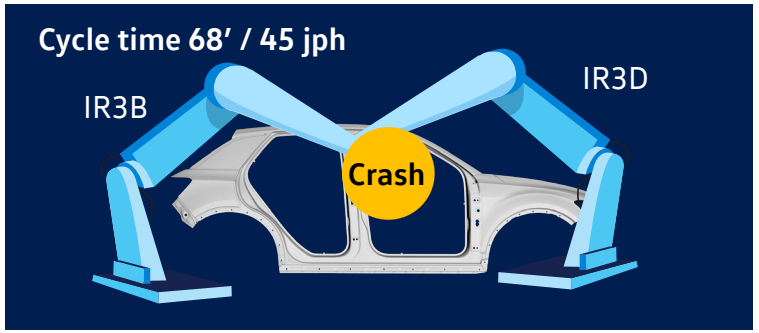
### Results and improvements

Risk reduction of major reworks / Scrap

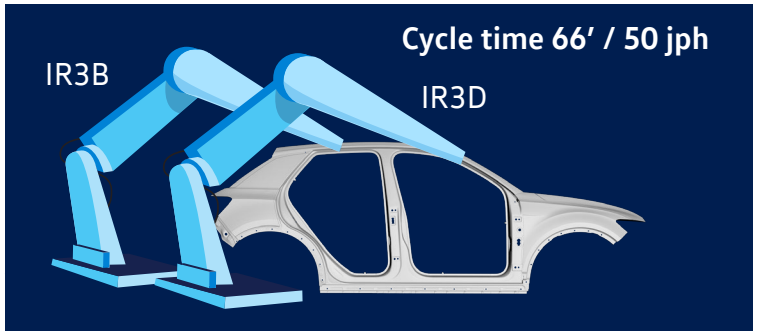
# Value Stream Management
## Framing capacity improvement

VSM

### Before




### After




### Description

- Framing 3 is the Bodyshop bottleneck
- Stations near the 68′

- Increase Framing 3 capacity by reducing the cycle time:
- Improve robot to avoid anticollision protections.
- Optimization of “Bursten” polishing laser seam.
- Change and optimization of blades for tip-dressing.
- Optimization of welding parameters.

| | Facts |
|---|---|
| **Area** | Bodyshop 6 |
| **Saving** | N/A |
| **Investment** | N/A |
| **Implementation date** | 2023 |

### Results and improvements

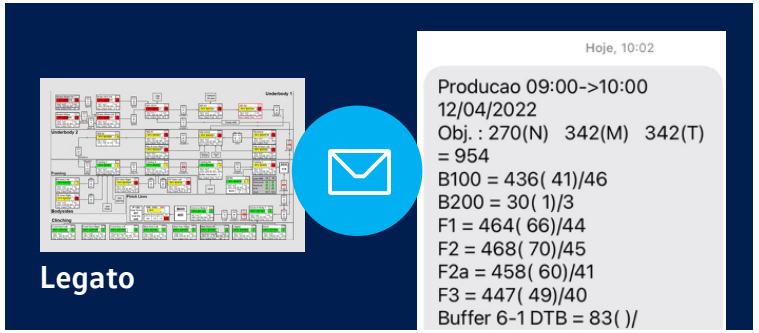
Capacity Increase.

Check **this** Best Practice **LIVE**

# BOT SMS Report
## Automatic SMS using SCADA Legato

### Before


### After




### Description

- Production information (volume, stocks and buffers) were collected hourly by the area clerk and communicated to the Team Leaders and Supervisors
- Using Legato were all the information needed is available, it was created an hourly SMS report which is automatically sent to who needs

| | Facts |
|---|---|
| **Area** | Bodyshop 7 |
| **Saving** | -2 PJ |
| **Investment** | 1,3T € |
| **Implementation date** | 2021 |

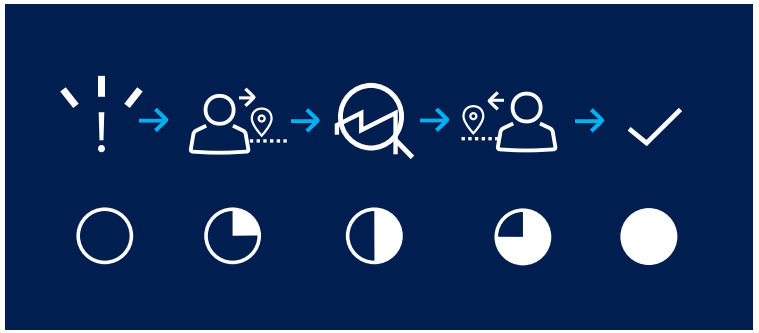
### Results and improvements

Increase transparency and management efficiency of the production lines.
Productivity reduction of 2 operators

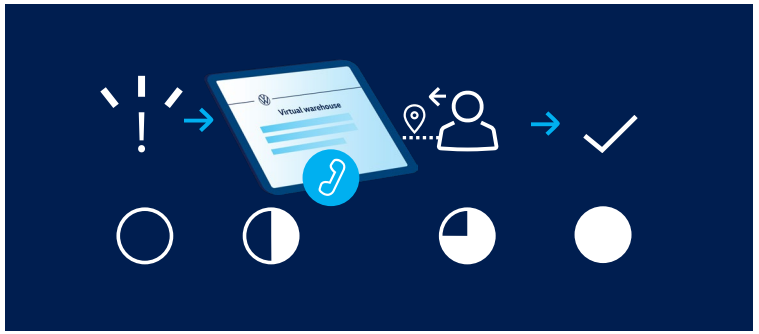
Check **this** Best Practice **LIVE**

# Maintenance APP4ALL 1.0
## Webpage browser @ BT/Operator Panels

### Before



### After




### Description

— The search for a replacement part would take time to locate a PC, login, enter various platforms, search the part and pick it up in the warehouse were it is located. Took up to 30 minutes to search equipment/standby.

– Search directly in a web environment from an industrial PC. The app reads directly in the XML files with the data regularly updated from the various platforms like SAP, Maximo and others**.** Less 83% search time needed (Takes up to 5 minutes to search equipment/standby).

| | Facts |
|---|---|
| **Area** | Bodyshop 7 |
| **Saving** | N/A |
| **Investment** | 600 € |
| **Implementation date** | 2020 |

### Results and improvements

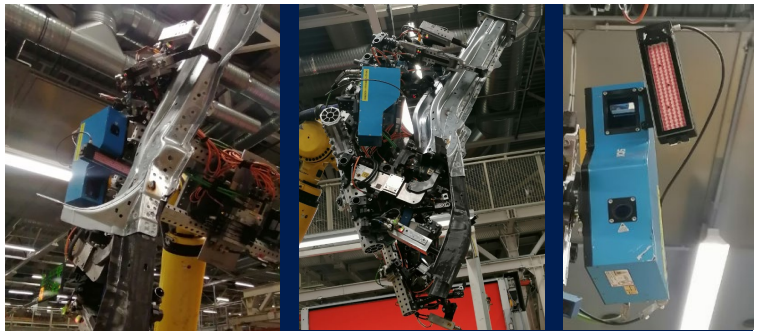
Improve MTTR (Mean Time To Repair) KPI by reducing the equipment search time.

Check **this** **Best Practice** **LIVE**

# D-Vision
## Longmember automatic pick from rack

### Before

### After



### Description

- An operator loaded manually the parts, one-by-one.
- Ergonomically challenging station due to size and weight to be maneuvered
- Capacity installed was 37 JPH
- Installation of 2 cameras (one per robot).
- Installation of 2 logistic racks' bays for automatic line-feeding.

| | Facts |
|---|---|
| **Area** | Bodyshop 9 |
| **Saving** | -4PJ |
| **Investment** | 27T € |
| **Implementation date** | 2022 |

### Results and improvements

After this upgrade, the line was able to reach 45JPH and manpower optimization. Additionally, the ergonomic concern was solved.

# Adhesive Waste Reduction
## Environmental Impact

Below 30 hours

### Before

3,5 – 7L waste (remaining glue)

### After

85,7% less waste (1L remaining glue)

### Description

— The pump plate cannot go all the way down because it sucks the plastic bag into the pump and causes malfunctions. It had to be adjusted higher up, which meant more adhesive was wasted at the end of the barrel.

– The implementation of a perforated accessory in the pump plate prevents the plastic from entering and allows the sensor to be adjusted completely downwards, reducing adhesive waste. For the 25 Kg drums, an inhouse developed drilled pump plate was implemented.

| | Facts |
|---|---|
| **Area** | Bodyshop 10 |
| **Saving** | 49T € (SGK cost reduction) |
| **Investment** | 24T € |
| **Implementation date** | 2022 |

### Results and improvements

23 tons in waste reduction, big environmental impact.

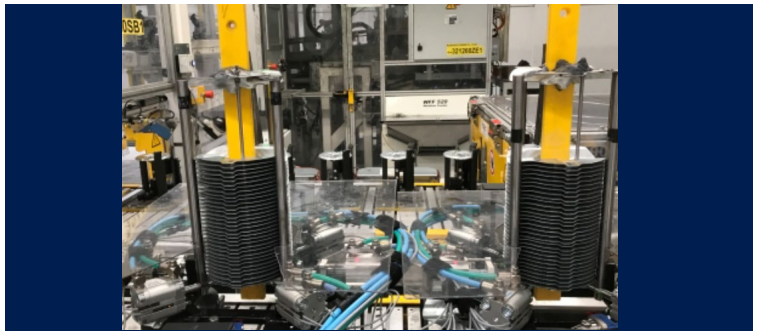
# Magazine Haltebock

## Part feeding concept independent of line

**Below**
30 hours

### Before

### After



### Description

- In station 321320 of the Boden Hinten Lines, we have a manual refill process done by one operator/Shift.
- Reload every 5 car.
- Implement a new magazine system with two feeder's, with 45 parts capacity each, to allow the operator to do some other tasks between refilling the station.
- Reload every 90 cars

| | Facts |
|---|---|
| **Area** | Bodyshop 11 |
| **Saving** | F-Zeit |
| **Investment** | €2.000 |
| **Implementation date** | 2022 |

### Results and improvements

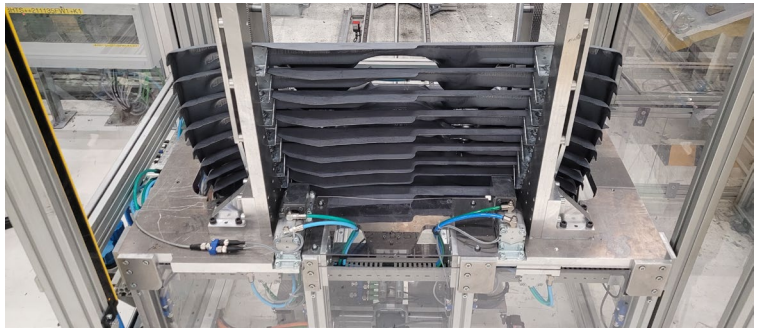
Reducing the frequency of parts feed to the line. Organization optimization potential.

# Magazine with Feeder (TS)
## Part feeding concept independent of line

**Below**
30 hours

### Before


### After



### Description

— In station AFO 1340 of the TrägerSystem Lines, we have a manual refill process done by one operator/shift.

– Implement a new magazine system with feeder, with 12 parts capacity, to allow the operator to do some other tasks between refilling the station.

| | Facts |
|---|---|
| **Area** | Bodyshop 12 |
| **Saving** | -4 PJ (combined with Slicer/Magazine) |
| **Investment** | €54.000 (Combined with Magazine) |
| **Implementation date** | 2022 |

### Results and improvements

Reducing the frequency of parts feed to the line. Saving of manpower combined with slicer and Magazine improvements. Organization optimization potential.

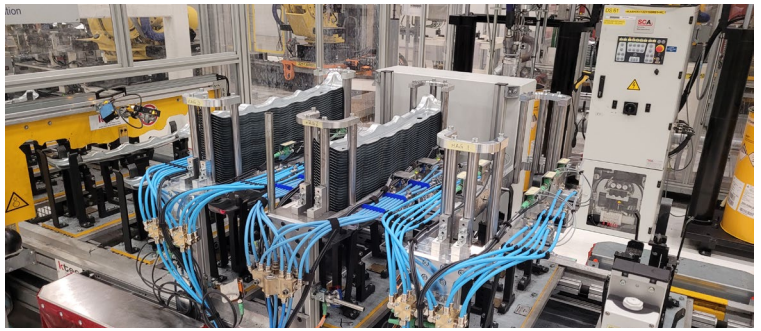
Check this Best Practice LIVE

# Magazine
## Part feeding concept independent of line

Below 30 hours

### Before

### After



### Description

— Parts were fed manually to the automatic production lines in a K-Tec conveyor. The refill operation is required every 6 cycles.

– Installation of a vertical “parts magazine” to increase buffer stock and reduce the frequency to 100 cycles (3 per shift).

| | Facts |
|---|---|
| **Area** | Bodyshop 13 |
| **Saving** | -4 PJ (combined with Slicer/Magazine TS) |
| **Investment** | €54.000 (Combined with Magazine TS) |
| **Implementation date** | 2022 |

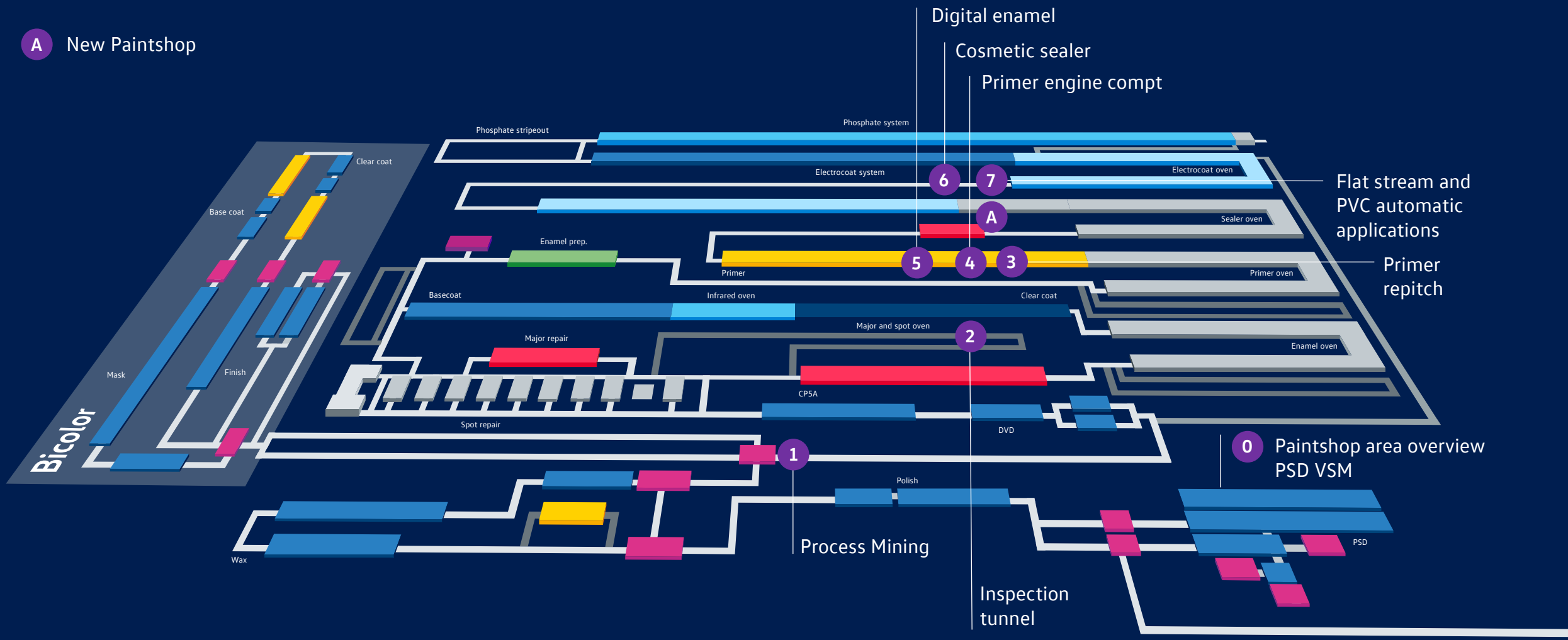
### Results and improvements

Reducing the frequency of parts feed to the line. Saving of manpower combined with slicer and Magazine TrägerSystem improvements.
Organization optimization potential.

FACTORY

Paintshop
**Walkaround**

FACTORY Lean & sustainable | Paintshop



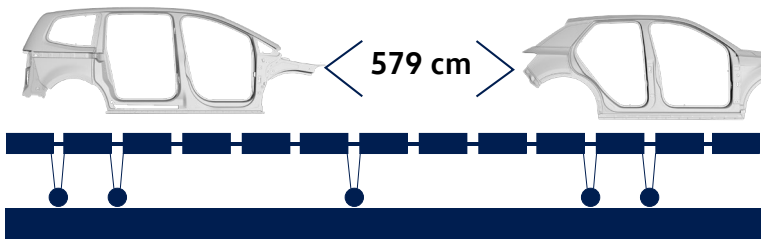
# Primer oven repitch
## Capacity increase

Below 30 hours

VSM

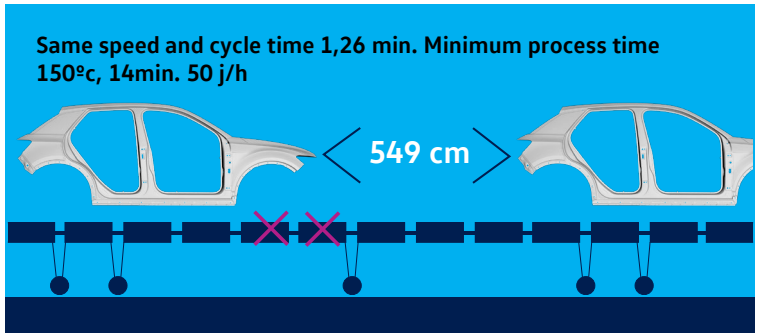
### Before

Minimum process time 150ºC, 14min | Cycle time 1,26 min/ 47 j/h




### After

Same speed and cycle time 1,26 min. Minimum process time 150ºc, 14min. 50 j/h




### Description

- With MPV minimum distance between bodies 579 cm
- 887 units/day (93% up time)
- EOP of MPV allow to shortage distance between bodies by removing 2 links. Maintain same speed, cycle time
- 934 units/day (93% up time) normal run, up to 960 with tag relief in primer prep.

| | Facts |
|---|---|
| Area | Paintshop 3 |
| Saving | -- |
| Investment | 0€ |
| Implementation date | 2023 |

### Results and improvements

Productivity and Increase capacity

# Primer engine compt
## Manual application deletion

Below
30 hours

### Before

### After

### Description

— Manual primer applications leading to potential quality faults and reworks. Working stations with relevant ergonomic score (orange station) due to worker's position during the primer application.

— Need for TAG relief operation in primer line.

— In-house developed automatic primer application with increased quality output, reducing the needs of additional reworks. Improved ergonomic score (deletion of orange station). Workloads and line balance adjusted with increased productivity. Optimized application areas: Engine compartment; Hood

| | Facts |
|---|---|
| **Area** | Paintshop 4 |
| **Saving** | 12 MA/day |
| **Investment** | 85 Tsd. € |
| **Implementation date** | 2022-2023 |

### Results and improvements

Productivity

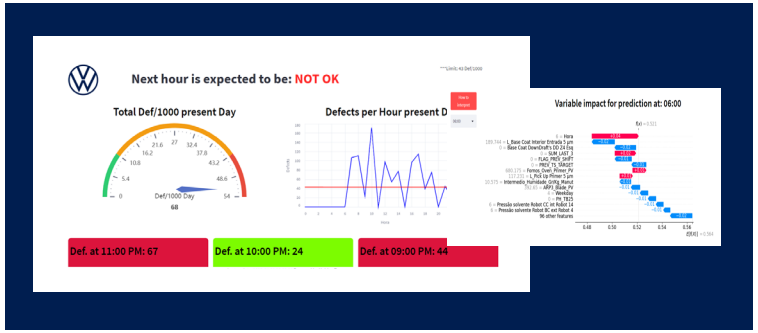
# Digital Enamel
## Quality improvement

VSM

### Before

No graphics available

### After




### Description

- Correlation was done manually between defects in CP5A and process inputs in clean room
- IA algorithm identifies the impact of each process input in the defects output

| | Facts |
|---|---|
| **Area** | Paintshop 5 |
| **Saving** | N/A |
| **Investment** | 31K € |
| **Implementation date** | POC 2023<br>Full 2024 |

### Results and improvements

Productivity and Increase capacity

# Cosmetic sealer
## Application automation

Below
30 hours

### Before

### After

### Description

— Manual sealer applications were conducted for several processes leading to potential quality faults, reworks with added ergonomic impact due to lack of accessibility.

— In-house developed automatic application with increased quality output, reducing the needs of additional reworks. Improved ergonomic score. Optimized application areas: A/B/C Pillars; Doors; Hood; Liftgate; Sides; SBBR; Water box.

| | Facts |
|---|---|
| **Area** | Paintshop 6 |
| **Saving** | 40 MA/day |
| **Investment** | 208,5K € |
| **Implementation date** | 2023 |

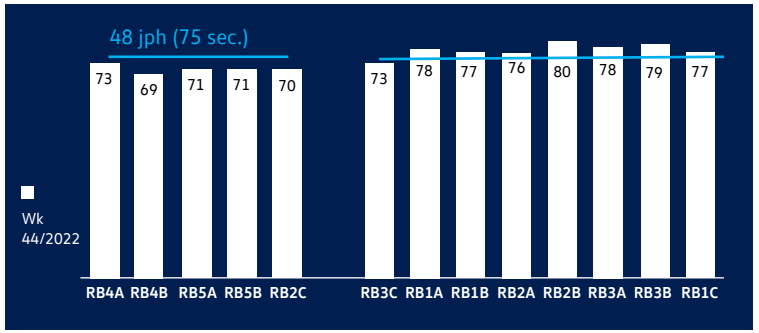
### Results and improvements

Productivity Increase

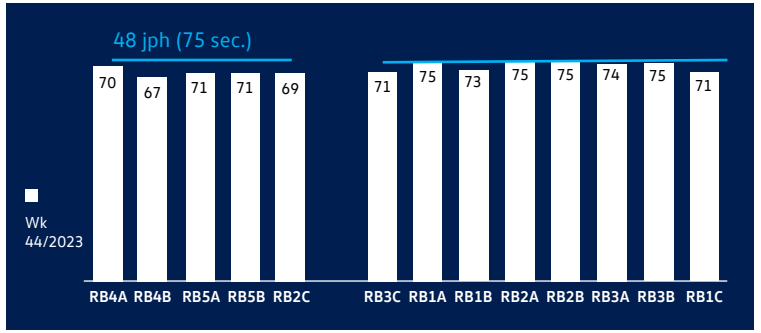
# Improve Capacity in Sealer line
## Flat Stream automatic applications

Below 30 hours | VSM

### Before




### After




### Description

— Capacity 45 jph

— Optimizations "Balancing" applications

— Capacity improve 6% (48 jph)

| | Facts |
|---|---|
| **Area** | Paintshop 7 |
| **Saving** | Capacity |
| **Investment** | 0€ |
| **Implementation date** | 2022 |

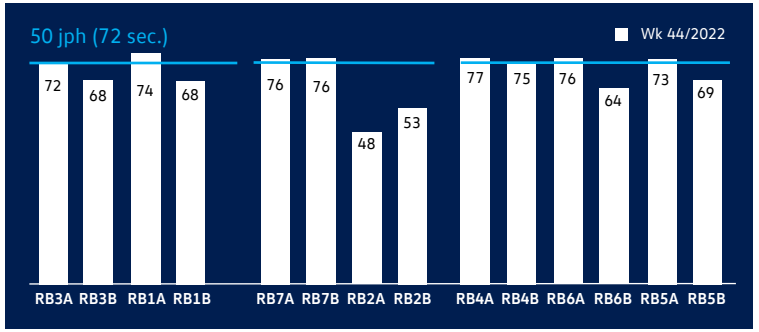
### Results and improvements

Productivity increase

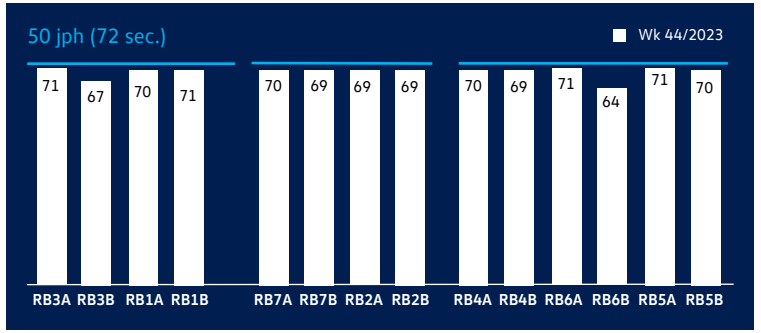
# Improve Capacity in Sealer line
## PVC automatic applications

Below 30 hours | VSM

### Before




### After




### Description

— Capacity 48 jph

- Optimizations “Balancing” applications
- Capacity improve 6% (50 jph)

| | Facts |
|---|---|
| **Area** | Paintshop 7 |
| **Saving** | Capacity |
| **Investment** | No investment |
| **Implementation date** | 2022 |

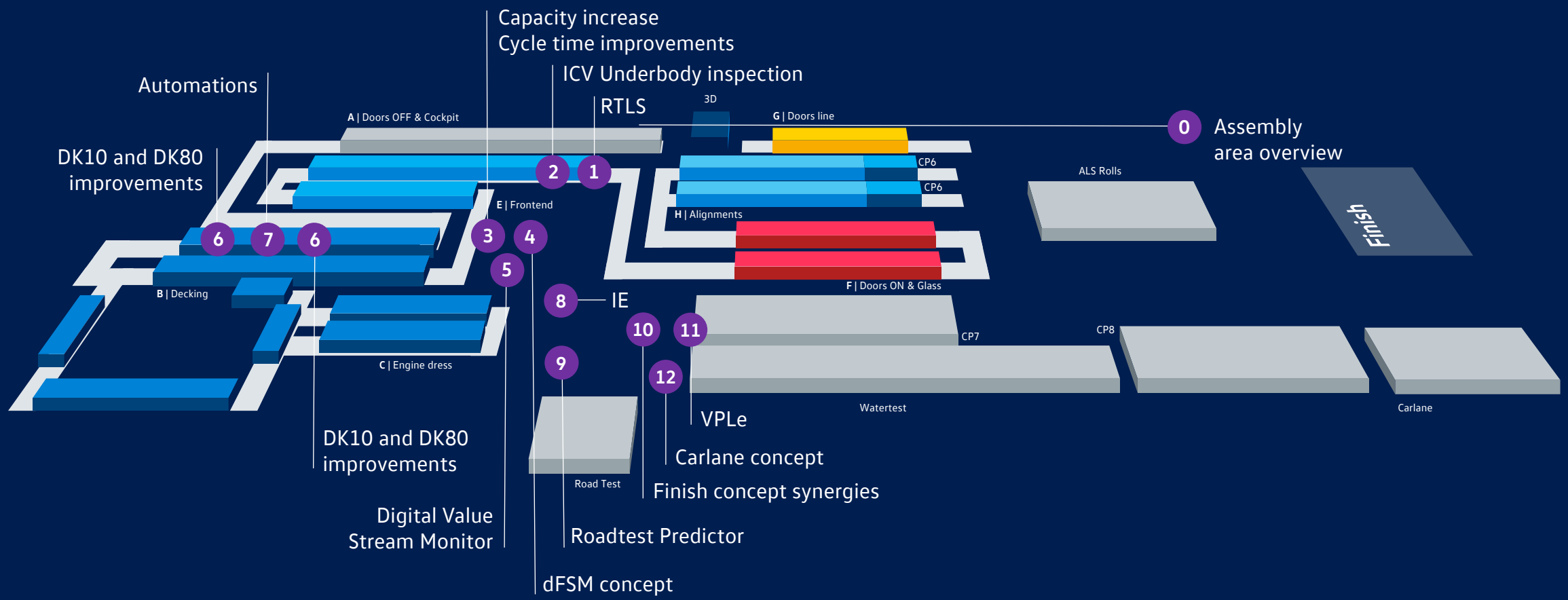
### Results and improvements

Productivity increase

# FACTORY

Assembly
**Walkaround**

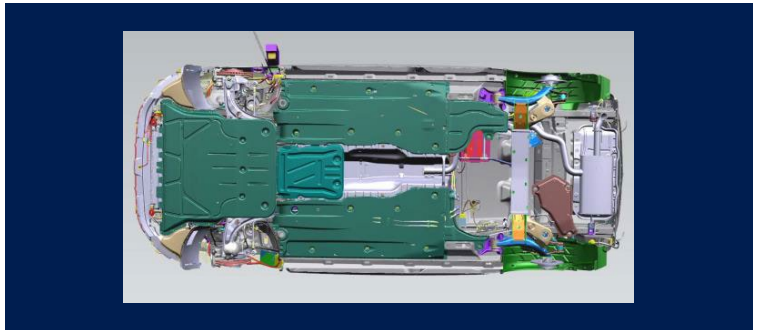
# FACTORY Lean & sustainable | Assembly



# ICV Underbody inspection
## Industrial Computer Vision

### Before

### After



### Description

— Visual check of the Underbody

– Use of cameras and software with AI to identify abnormal deviations in the Underbody
– Automatic input in FIS eQS
– Roll-out in 2023/2024 for Body, Paint and Assembly
– 58 opportunities identified in Production

| | Facts |
|---|---|
| **Area** | Assembly 2 |
| **Saving** | 128 T€/y |
| **Investment** | 2 T€ |
| **Implementation date** | June 2023 |

### Results and improvements

Improve of DLQ ZP6 & Road Test, Field Complaints reduction

# Assembly Capacity Increase
from 890 UPD to 903 UPD to 912 UPD

## Before

890 UPD

## After

912 UPD

### Description

— Complete year of 2022 with 890 UPD production between T-Roc and MPV models.

– With the EOP of the MPV, the potential for daily capacity increase was identified: **step1 to 903 UPD** on the beginning of 2023 and **step2 to 912 UPD** on week 19 of 2023.

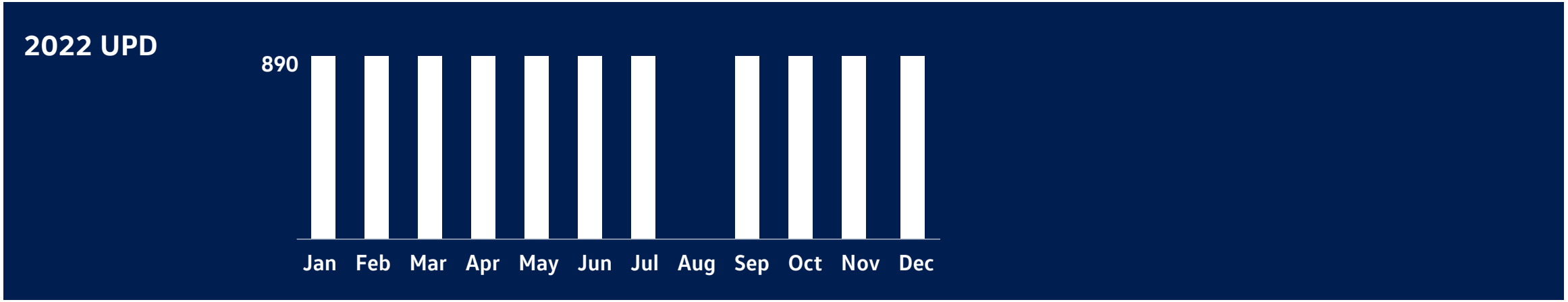
– All actions were performed by Assembly and Industrial Engineering teams and required no additional resources.

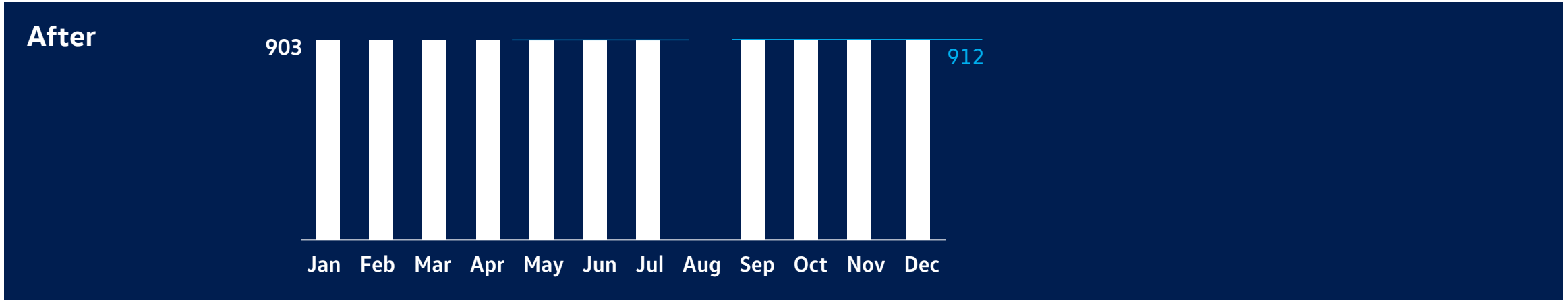
| | Facts |
|---|---|
| **Area** | Assembly 3 |
| **Saving** | TBD |
| **Investment** | 0€ |
| **Implementation date** | 08.05.2023 |

## Results and improvements

Daily output increase with no additional resources

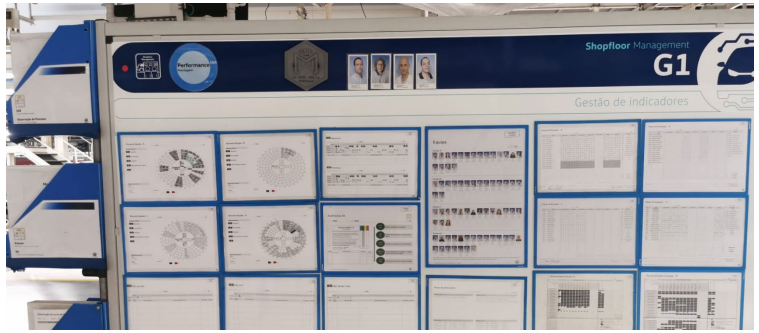
# Assembly Capacity Increase
from 890 UPD to 903 UPD to 912 UPD



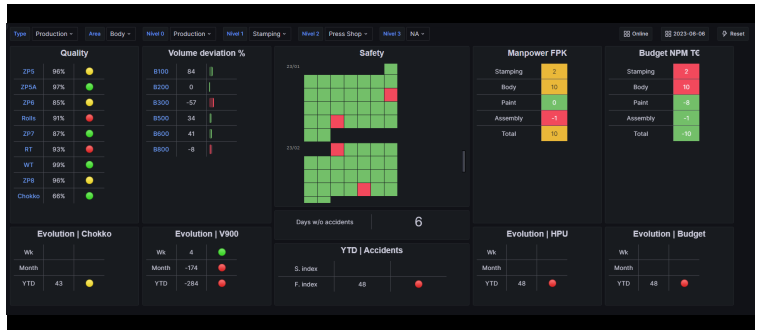



# dSFM
## Digital Shopfloor Management

### Before




### After




### Description

- KPI data collection and input is done manually in the Shop Floor Management boards for each team

- Automatic KPI data collection with no manual interaction
- Online information till the team level
- Business Intelligence tool for data analysis

| | Facts |
|---|---|
| **Area** | Production Assembly Pilot 4 |
| **Saving** | - |
| **Investment** | 10 T€ |
| **Implementation date** | 2023 |

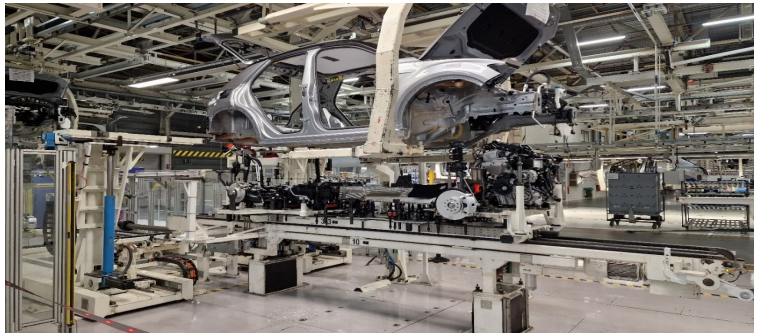
### Results and improvements

Visual management with digital tool to identify abnormal deviations and improve time of response in the shopfloor

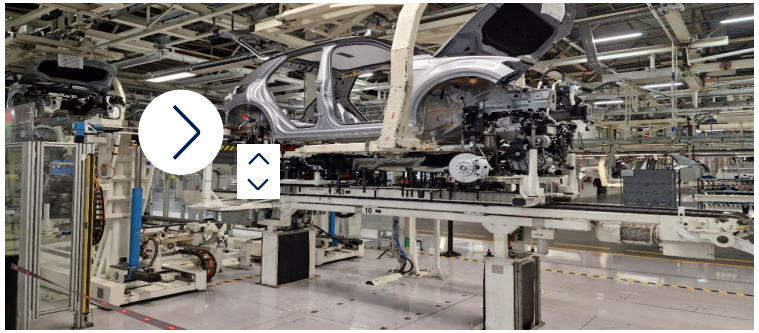
# DK10 | Cycle time improvements
## Decking

VSM

### Before



### After



| | Facts |
|---|---|
| **Area** | Assembly 6 |
| **Saving** | 4 sec |
| **Investment** | 0€ |
| **Implementation date** | 2022 |

### Description

- After frames in position Lift table moves upwards only a few centimeters to allow the trolley to go into the station.
- Table will go further upwards only after the trolley reaches position and Down holders are in the car
- As soon as the trolley reaches the Decking position, the lift table can go all the way upwards while the down holders are moving towards the car.
- This way avoiding loosing time in waiting periods.

### Results and improvements

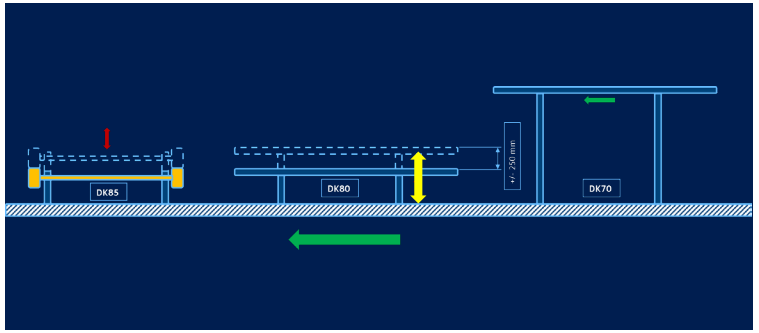
Total saving of 4 seconds per produced car

# DK80 | Cycle time improvements
## Decking

VSM

### Before

### After




### Description

- DK80 lift table travels up and down to deliver the frame to next station.
- Course distance of 800 mm
- Lower DK80 table only the necessary to allow the exit movement of the frame from Dk 80 to DK 85 (less 250 mm of stroke)

| | Facts |
|---|---|
| **Area** | Assembly 6 |
| **Saving** | 4 sec |
| **Investment** | 13 T€ |
| **Implementation date** | 2022 |

### Results and improvements

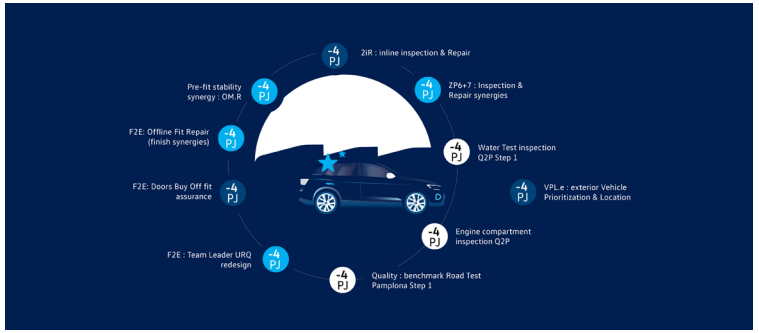
Cycle time reduction in DK80 of 4 seconds resulting from less travel movement from the table

# Finish concept synergies

## Before

No graphics available

## After




## Description

- Assembly overall strategy
- Dedicated strategy in Finish division in Assembly Area

| | Facts |
|---|---|
| **Area** | Assembly 10 |
| **Saving** | -136 FPK<br>-5 IPK |
| **Investment** | NA |
| **Implementation date** | 2018 YTD |

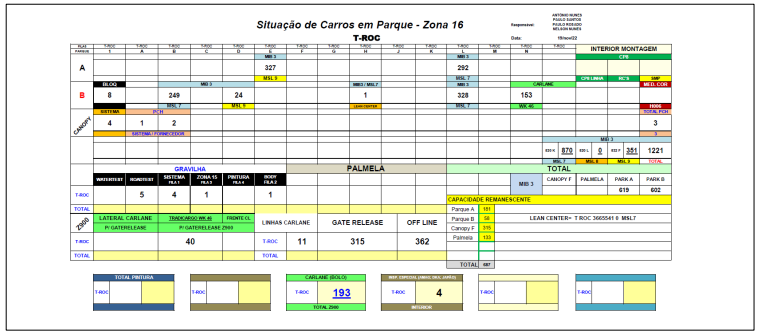
## Results and improvements

Assembly strategy for streamlining processes, inspection & rework, optimizing manpower & ensuring sustainable quality results

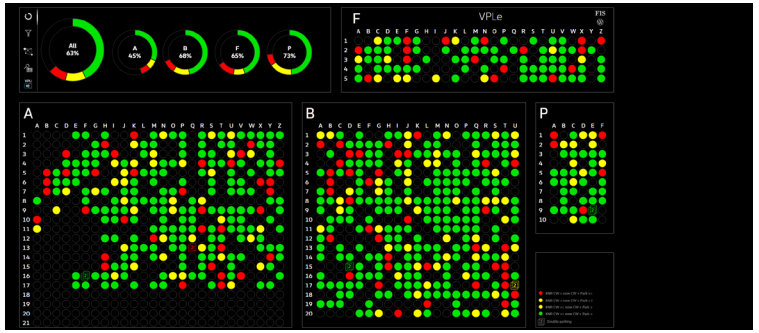
Check **this**
**Best Practice**
**LIVE**

# VPL.e
## Vehicle Prioritization & Location exterior

## Before




## After




### Description

- No external parking traceability
- Manual counting on the exterior
- Counting and analysis loops done by 1 technician

- External park stations mapping & coding with thresholds & color codes with an online visualization via webpage
- Clear visualization & identification of the location of each car and real-time prioritization and traceability in external parks

| | Facts |
|---|---|
| **Area** | Assembly 11 |
| **Saving** | 128 T€/y |
| **Investment** | 40 T€ |
| **Implementation date** | June 2023 |

## Results and improvements

Positive impact on main KPI's: MDLZ, Schleppe, Program Achievement. Park reconfiguration with ≈ 200 extra slots

# Carlane Concept
## Car cover process optimization

### Before

Check next one-pager for graphics detail

### After

Check next one-pager for graphics detail

### Description

- Offline Car cover with wrap guard done in Carlane after ZP8 with car driving between stations
- The car process is done by 17MA (car cover) and 6 MA dedicated to drive the cars, this service is provided by an external supplier.

- Inline Car cover with wrap guard done in ZP8 line
- Work stations rebalance
- No driving
- Complete inline process

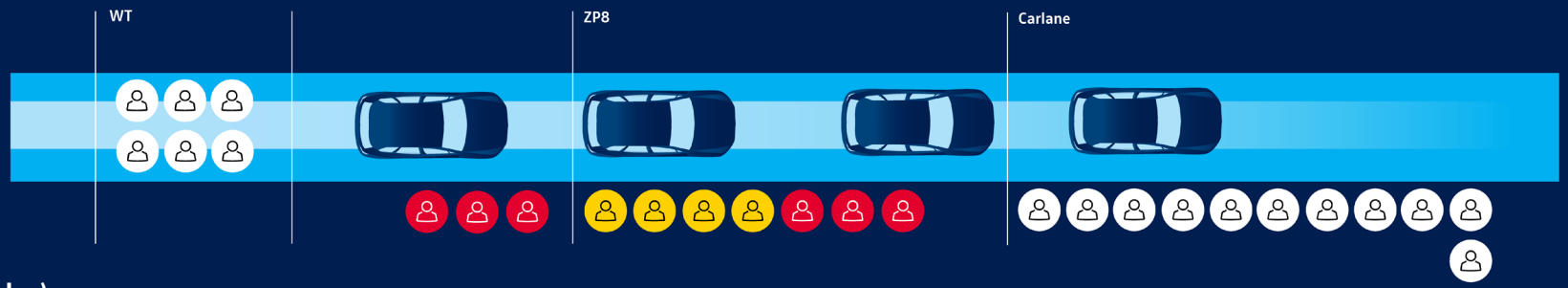
| | Facts |
|---|---|
| **Area** | Assembly 12 |
| **Saving** | 533 T€/y |
| **Investment** | 130 T€ |
| **Implementation date** | 2023 |

### Results and improvements

Optimization of 8 MA per Shift

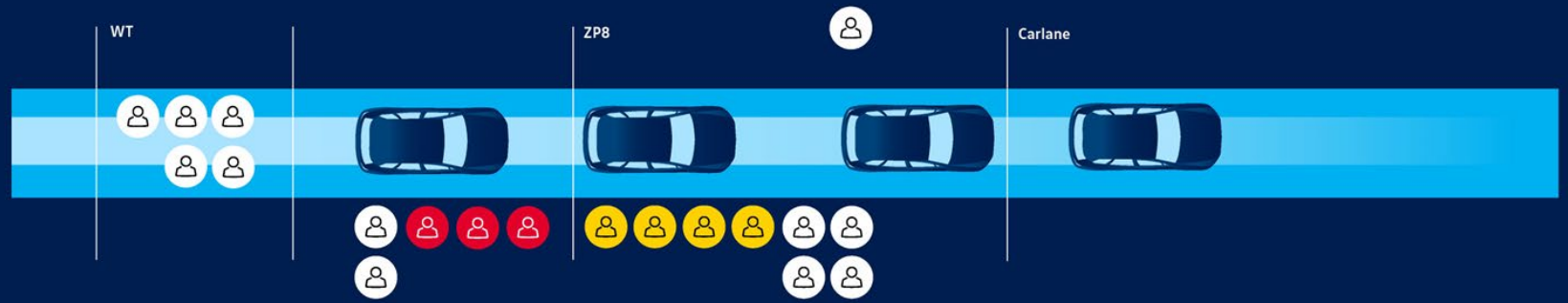
# Carlane Concept
## Car cover process optimization

### Before




23 MA/Shift (Service provider)

### After

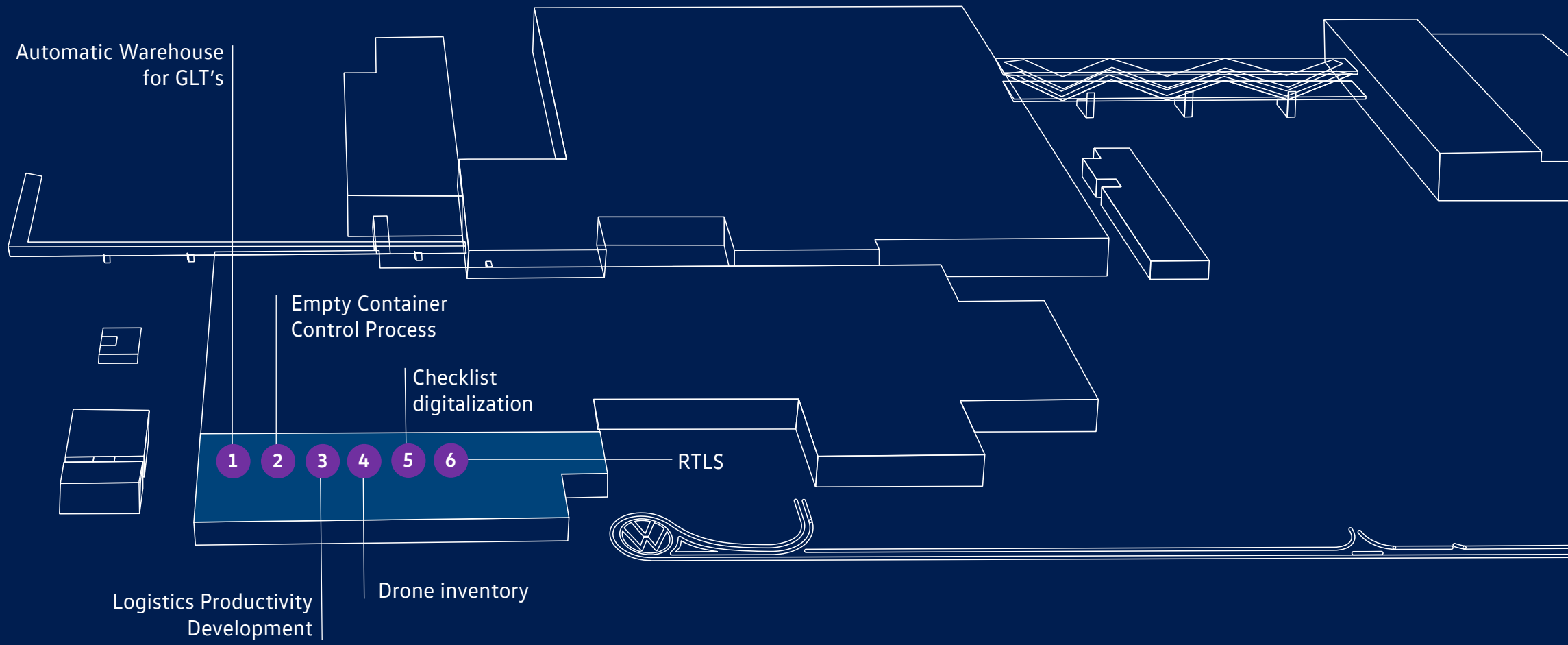



15 MA/Shift (Service provider)

# FACTORY

Logistics
**Walkaround**

FACTORY Lean & sustainable | Logistics

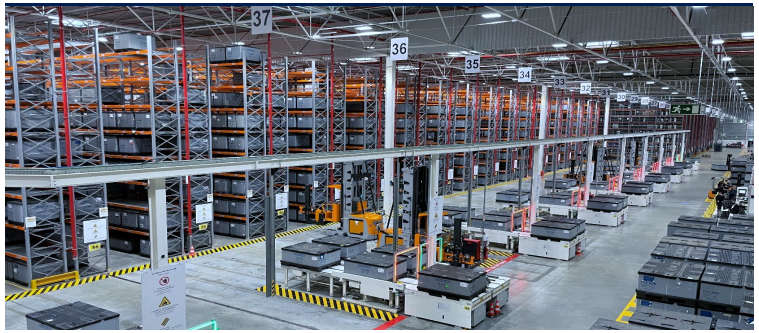


Check this Best Practice LIVE

# AGL
# Automatic Warehouse for GLT's

## Before

## After




### Description

- Manual Warehouse
  - All GLT's stored in block storage.
  - Inefficient space usage
  - External Warehouse needed to store material
- Automatic Warehouse
  - Full automation with narrow aisles and shelvestorage
  - Smart Warehouse Management System connected to equipment and LOGIS
  - Higher storage capacity
  - Increased productivity

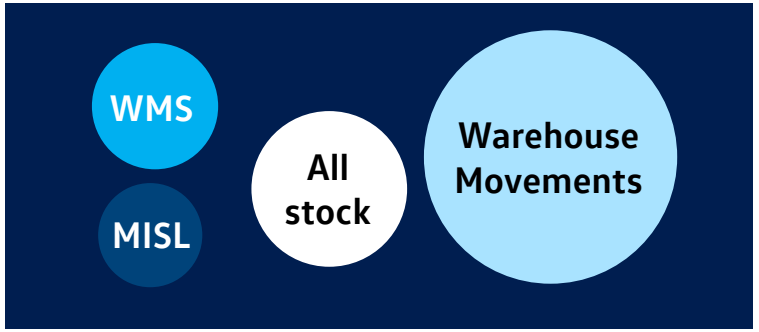
| | Facts |
|---|---|
| **Area** | Logistics 1 |
| **Saving** | 0,9 Mio € |
| **Investment** | 4,2 Mio € |
| **Implementation date** | 31.03.2023 |

## Results and improvements

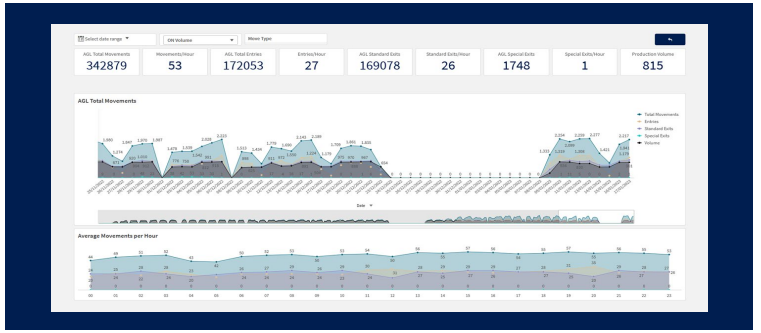
Increase of warehouse positions: external warehouse capacity no longer required; less shelve damages; reduced handling and increased integrity

# AGL | Big Data
## Automatic Warehouse for GLT's

### Before




### After




### Description

- Raw and unstructured data from multiple sources
  - Various sources of raw data not consolidated and transformed into information

- Qlik Sense Dashboard
  - Various data sources consolidated in one dashboard
  - Operation overview with multiple KPI's
  - Analysis for potential optimizations and performance enhancements

| | Facts |
|---|---|
| **Area** | Logistics 1 |
| **Saving** | TBD |
| **Investment** | N/A |
| **Implementation date** | 31.03.2023 |

### Results and improvements

Easy to use and user-friendly information in one source; warehouse performance enhancement and insights for optimizations

# Empty Container Control Process
## Empties Management System

### Before

Check next one-pager for graphics detail

### After

Check next one-pager for graphics detail

### Description

- The processes are manually managed, and counting is made once a day, with the support of excel files and others “domestic” applications.
- The lack of process monitoring and traceability of empty packages potentializes errors and extra costs.
- System with online inventory and online overview of all actions required in the process (cleaning, storage, loads, documentation) and all stock of empty packaging.

| | Facts |
|---|---|
| **Area** | Logistics 2 |
| **Saving** | 158.075 € |
| **Investment** | 90.000€ |
| **Implementation date** | Oct. 2022 |

### Results and improvements

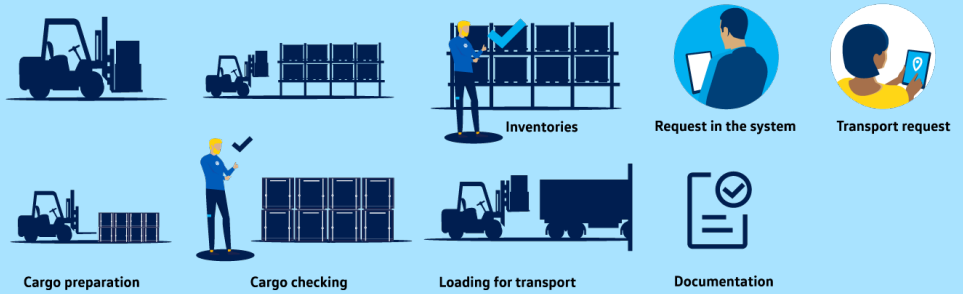
BNK Reduction; inventories online; packaging tracking avoiding errors; reporting and statistics available online and processes standardized

# Empty Container Control Process
## Empties Management System

### Before

**LOZ**

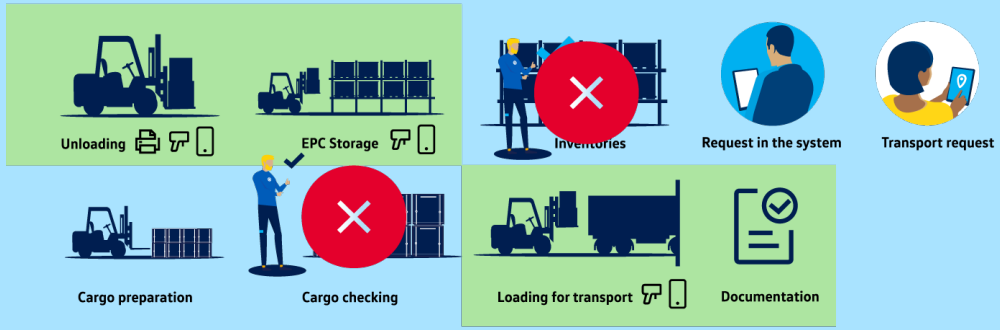

**EPC**




### After

**LOZ**


**EPC**



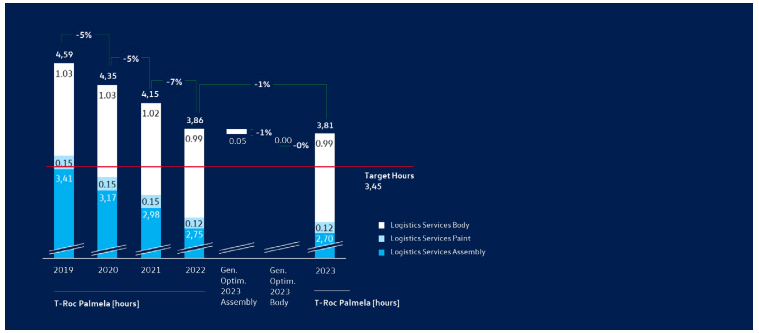
# Logistics Productivity Development

Below 30 hours

## Before

No graphics available

## After




## Description

- All Logistics Improvements/Implementations was followed individually by the departments
- Following Logistics Improvements/Implementations in a systematic way using the universal tool “Harbour Report”

| | Facts |
|---|---|
| **Area** | Logistics 3 |
| **Saving** | NA |
| **Investment** | NA |
| **Implementation date** | 2019 |

## Results and improvements

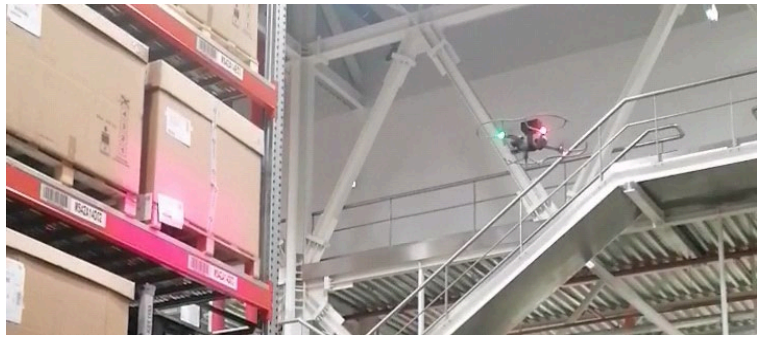
Since 2019 improvement of 17% with 0.78 hours per car (4.59 hours/car to 3.81 hours/car)

Check this Best Practice LIVE

# Inventory by drone
## LOZ Assembly

### Before

### After



### Description

- Visual checking inventory operated at height level
  - Visual comparison of packaging references versus printed stock list
  - Possibility of manual errors
  - Operation with Order Picker Truck performed at high levels
- Scanned Data inventory operated at ground level
  - Data comparison of scanned packaging references versus stock list
  - Increase of data transparency and accuracy
  - Operation with drone piloted at the ground level
  - Data collected in loco and analyzed afterwards
  - 1 drone, 1 scan system and 1 tablet

| | Facts |
|---|---|
| **Area** | LOZ Assembly 4 |
| **Saving** | 211,9 T€ (5 years) |
| **Investment** | 141,7 T€ |
| **Implementation date** | 27.04.2022 |

### Results and improvements

Increase of data transparency and accuracy; reduction of operations at high levels and reduction of BNK

# Checklist Digitalization
## TCC and unloading Areas | LOZ, Body, Paint

### Before

### After


### Description

- Folder Storage. The company must keep all documents, due to legal requirements, for 15 years.
- Use of multiple rooms with limited storage.
- Difficult and time-consuming documentation search

- Documents Digitalization
- Documents are captured and kept on an online system.
- Document consultation becomes easier, faster and reliable.
- Less time consumable process.

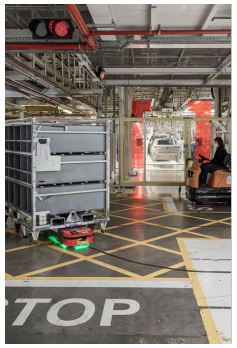
| | Facts |
|---|---|
| **Area** | Logistics 5 |
| **Saving** | 6.800 € |
| **Investment** | 18.697€ |
| **Implementation date** | Sep. 2022 |

### Results and improvements

Reduction in $CO_2$ (879Kg) and water (5.300.000L); release of physical space used to keep documents, reduction of SGK and elimination of costs to maintain actual situation

Check **this** Best Practice **LIVE**

# RTLS
## Real Time Location System for Line Feeding Assets






### Description

— With Real Time Location System (RTLS), AGV's and Tugger Trains operating on the corridors of the shop floor, are fully visible and traceable in real time. The positioning data of the line feeding equipment is used for the monitoring software to manage traffic between AGV's and Tugger Trains, i.e.: manage traffic in constrained areas like crossroads.

This last point is particularly important because without RTLS, it wouldn't be possible to have AGV's and Tugger Trains operating in the crossroad shown in the pictures above.

| | Facts |
|---|---|
| **Area** | Logistics 6 |
| **Saving** | 90 Tsd. € |
| **Investment** | 87 Tsd. € |
| **Implementation date** | 2021 |

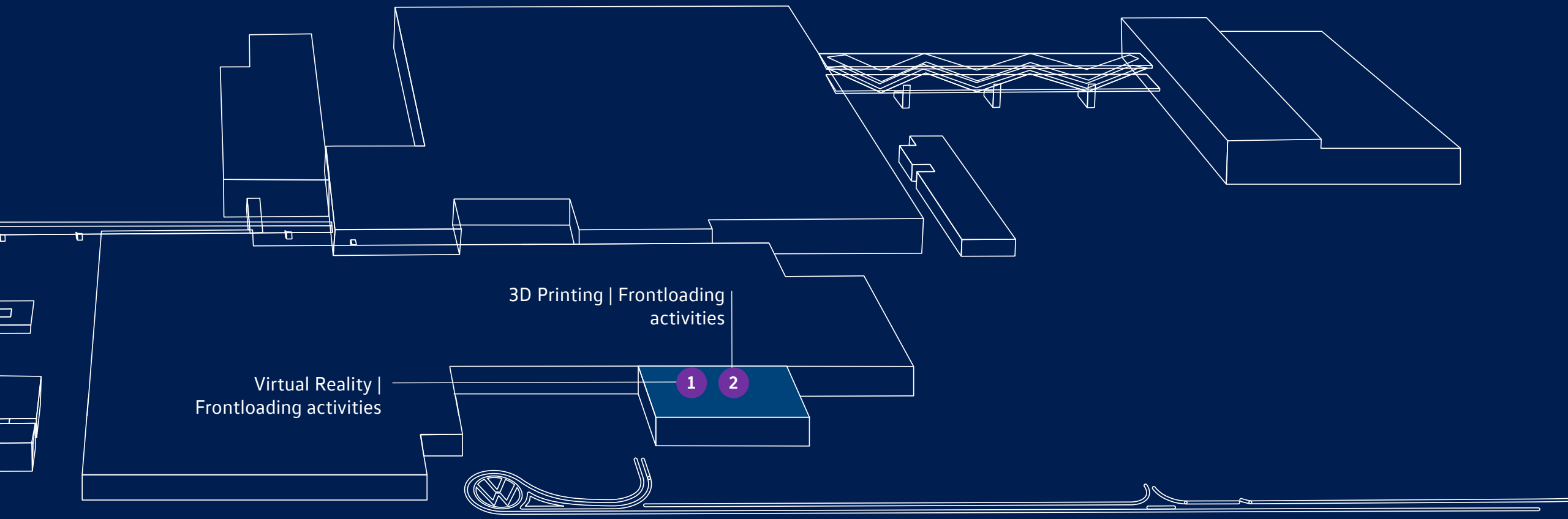
## Results and improvements

Line feeding asset management in common environments between AGV's and Tugger Trains. RTLS enabled fluid operation between these assets which allows for further dissemination of AGV's (automation) in the shopfloor at Volkswagen Autoeuropa.

FACTORY

Pilot Plant
**Walkaround**

FACTORY Lean & sustainable | Pilot Plant

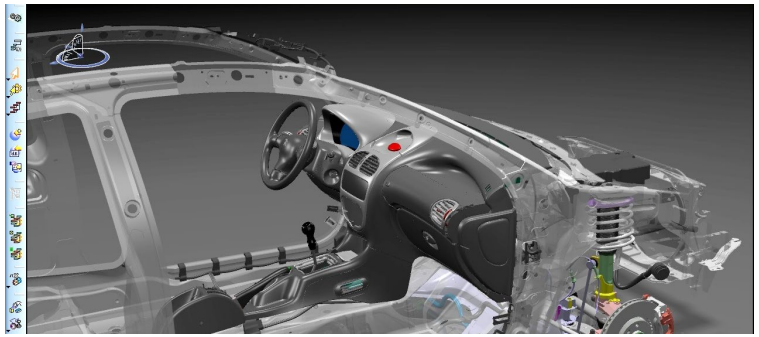


Check this Best Practice LIVE

# Virtual Reality

## Frontloading activities for product feasibility studies

### Before



### After

### Description

— The validation of product related changes in an early stage of the development phase can only be possible via the regular CAD systems or by means of prototype parts that are very costly and very difficult to manufacture. Under these conditions a quick and accurate validation from the production site is barely achievable.

– With the usage of Virtual Reality the validation of product related changes can be made in an immersive way, thus enhancing the speed and accuracy of the validation. This means that proper feedback from the production site can be quickly integrated in the product optimization cycles throughout the complete development phase.

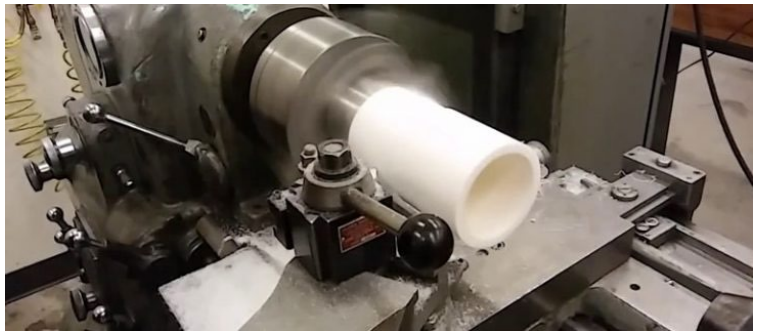
| | Facts |
|---|---|
| **Area** | Pilot Plant 1 |
| **Saving** | - |
| **Investment** | 49,6 T€ |
| **Implementation date** | 2020 |

### Results and improvements

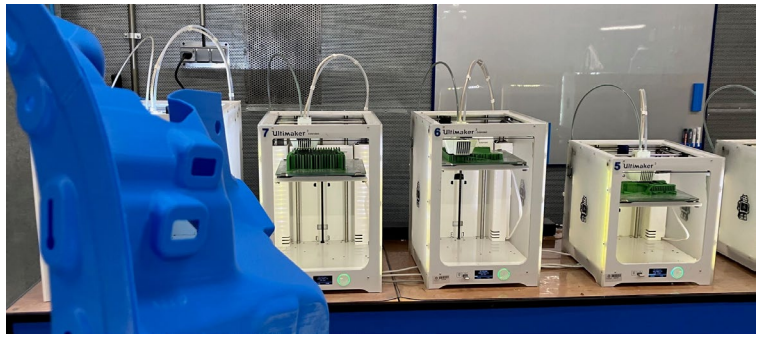
Shorter reaction time between development and manufacturing (frontloading). Less need of costly prototyping tools and/or parts in order to validate product related changes.

# 3D-Printing
## Frontloading activities for product feasibility studies

### Before



### After



### Description

— The validation of product related changes in an early stage of the development phase can only be possible via the regular CAD systems or by means of prototype parts that are very costly and very difficult to manufacture. Under these conditions a quick and accurate validation from the production site is barely achievable.

– With the usage of 3D-Printing the validation of product related changes can be easily made through 3D-printed hardware parts, thus enhancing the speed and accuracy of the validation. This means that proper feedback from the production site can be quickly integrated in the product optimization cycles throughout the complete development phase.

| | Facts |
|---|---|
| **Area** | Pilot Plant 2 |
| **Saving** | - |
| **Investment** | 21,4 T€ |
| **Implementation date** | 2019 (newest) |

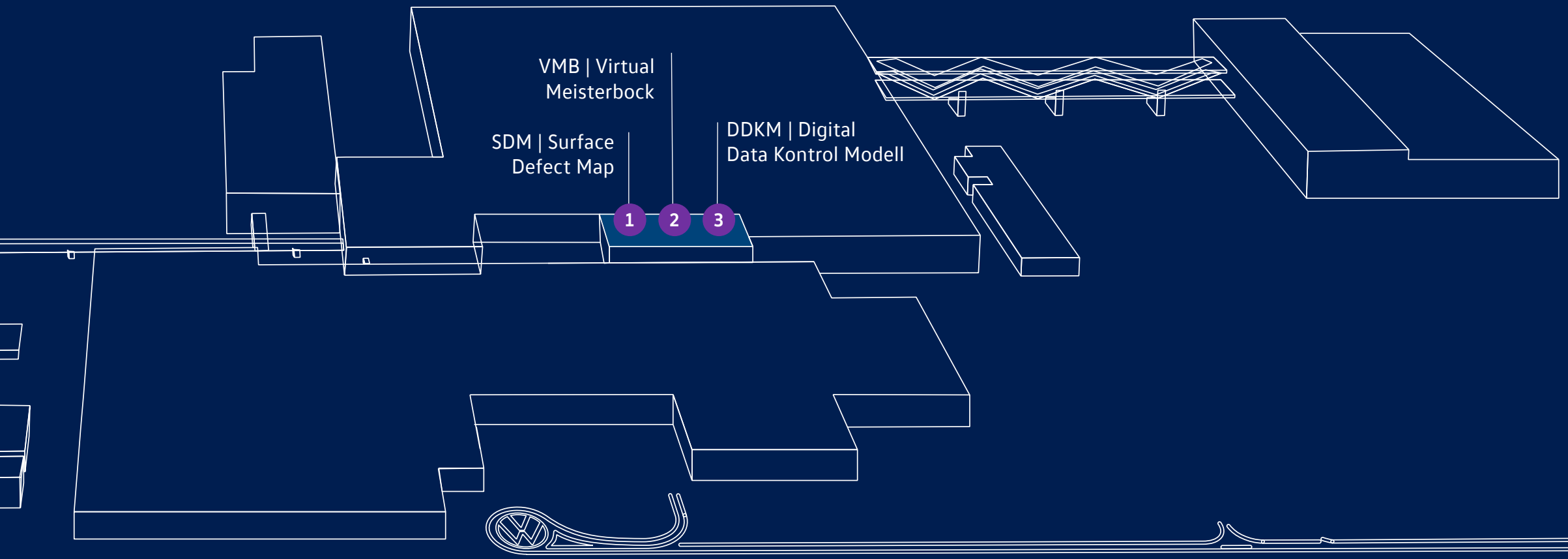
### Results and improvements

Shorter reaction time between development and manufacturing (frontloading). Less need of costly prototyping tools and/or parts in order to validate product related changes.

FACTORY

Measuring
**Walkaround**

FACTORY Lean & sustainable | Measuring

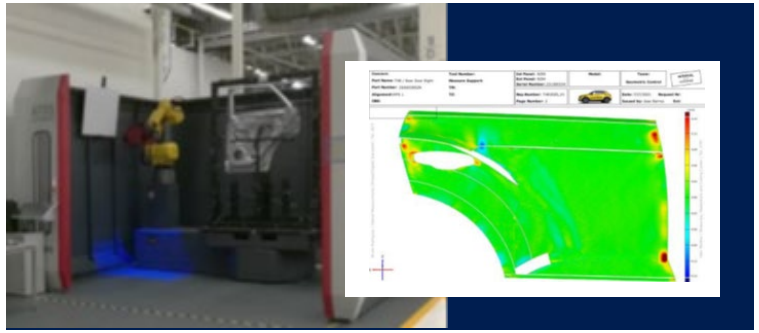


# SDM | Surface Defect Map

## Replace surface evaluation manual process

### Before

### After



### Description

- Manual process that uses an abrasive stone to check defects on outer sheet metal parts
- The manual process is digitally simulated, allowing geometric deviations and surface quality to be obtained with a single scan.

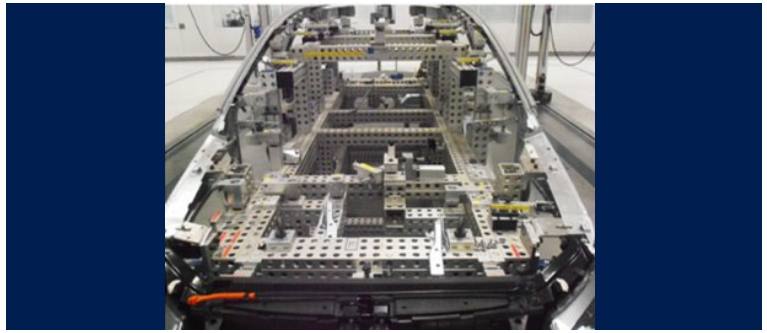
| | Facts |
|---|---|
| **Area** | Quality Measuring Room (1) |
| **Saving** | - 4 PJ in Body<br>- 140T€/year |
| **Investment** | 120 Tsd € |
| **Implementation date** | 2021 |

### Results and improvements

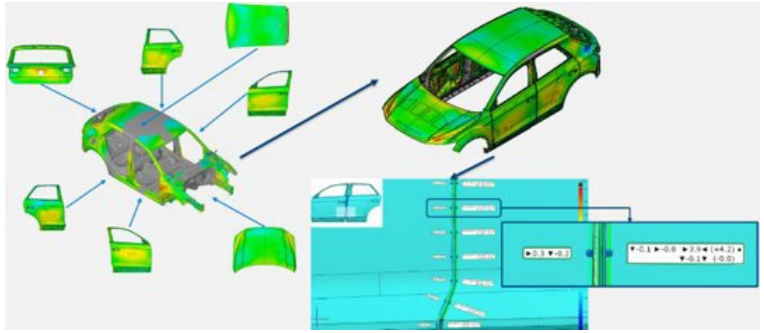
Faster process. From manual to automatic.

# VMB | Virtual Meisterbock
## Step 1 Static Model

### Before



### After



### Description

— Manual assembly of sheet metal subgroups in Meisterbock structure (1 month)

– Create Virtual Meisterbock model using digitalizations from optical measuring machines to check gaps and flushes between sheet metal parts (1 day)

| | Facts |
|---|---|
| **Area** | Quality Measuring Room 2 |
| **Saving** | - |
| **Investment** | - |
| **Implementation date** | 2021 |

### Results and improvements

Faster process, results and part evaluations.

# DDKM | Digital Data Kontrol Modell
## Replacement of physical model

### Before

### After


### Description

— Physical model of a car produced in Volkswagen Autoeuropa. Physical model had only one version and each design change had to be machined with a cost.

– New virtual/digital version that can be easily presented and updated.

| | Facts |
|---|---|
| **Area** | Quality Measuring Room 3 |
| **Saving** | - 300Tsd € each new model |
| **Investment** | 115 Tsd€ |
| **Implementation date** | 2017 / 2022 2023 New Model |

### Results and improvements

Cost avoidance for new projects. Faster process. Digital product improvement.

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## Lean & sustainable

# Thank you