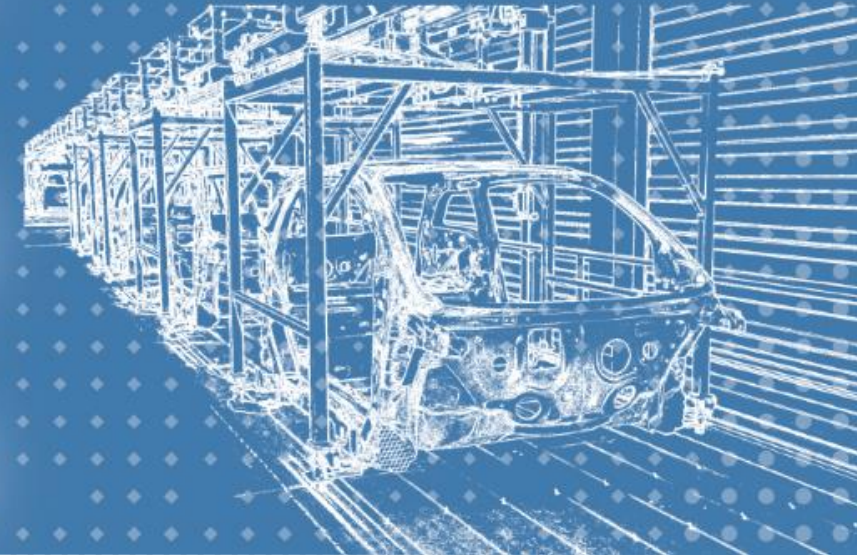
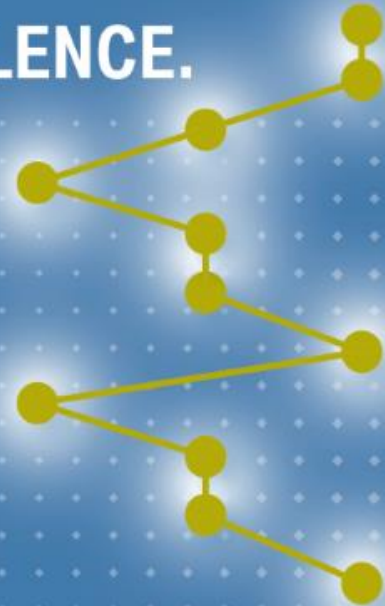


**KUNDENBEGEISTERUNG IN SERIE:
WE DRIVE MANUFACTURING TO EXCELLENCE.**



March 26, 2015

MANUFACTURING EXCELLENCE.

**MANFRED ERLACHER
HEAD OF PLANT SPARTANBURG.**

**BMW
GROUP**



Rolls-Royce
Motor Cars Limited

BMW MANUFACTURING CO. WHERE WE ARE NOW.

1,200 Vehicles Each Day

5.6 Million Square Feet

8,000 Jobs On-Site

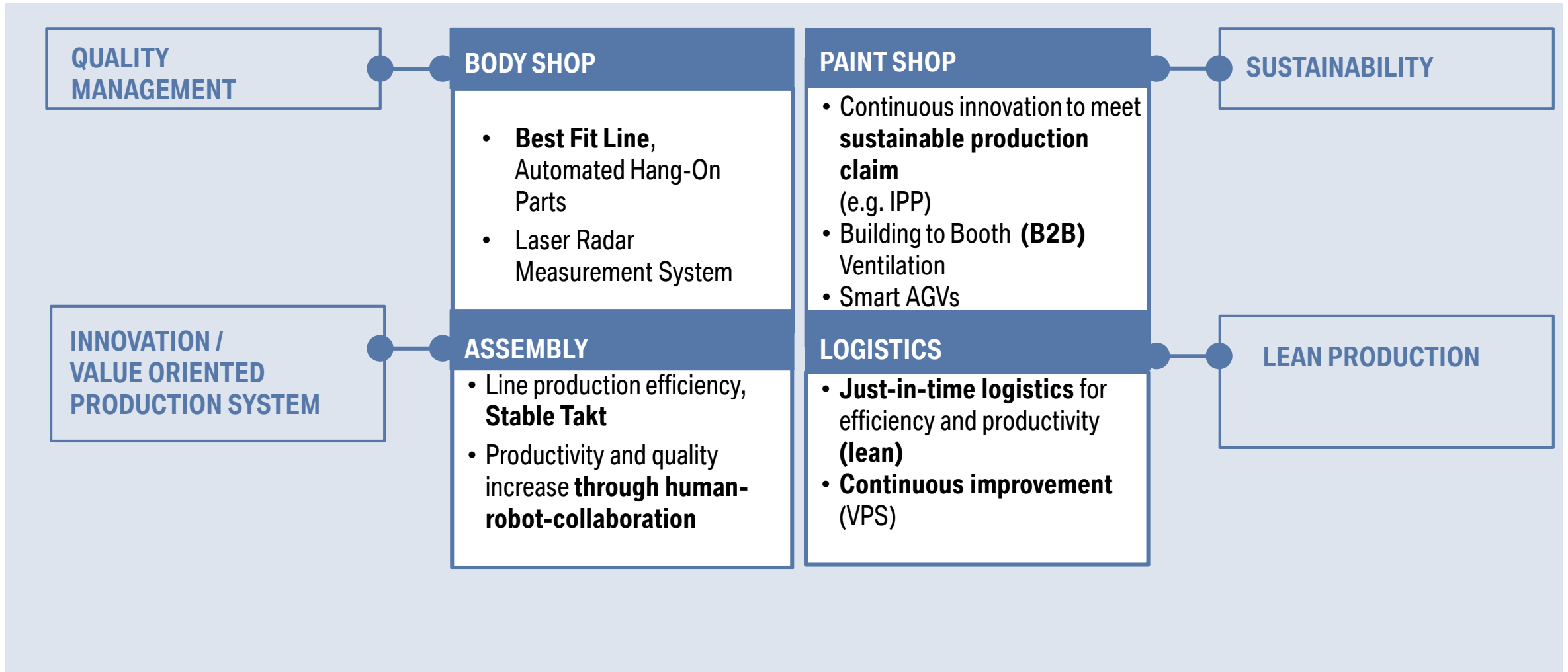
\$7 Billion Investment



BMW MANUFACTURING CO. MODEL STRATEGY.



OUR CORE ELEMENTS ARE EVEN VISIBLE AT EVERY STEP OF OUR VALUE CHAIN.



SUSTAINABILITY WITHIN THE BODY SHOP: BEST FIT. AUTOMATED HANG ON PARTS.

QUALITY MANAGEMENT

BODY SHOP

- **Best Fit Line**, Automated Hang-On Parts
- **Laser Radar Technology**



- **Three dedicated lines:** one for X5/X6 models, another for X3 and third for the X4.
- Lines operate a **fully automated process** for hang-on parts (doors, hood, tail-gate), the first in the BMW Group Production Network.
- Body shop operates **1,400 robots**.
- **Laser Radar Technology** lifts installed at the end of lines to measure entire BIW, sends data to ensure dimensional quality.

SUSTAINABILITY WITHIN THE PAINT SHOP: INTEGRATED PAINT PROCESS.

SUSTAINABILITY

PAINT SHOP

- Continuous innovation to meet **sustainable production** claim (e.g. IPP)
- Use of high-tech, sustainable finish



- In the **Paint Shop**, a **Integrated Paint Process (IPP)** technology integrates the primer coat process into the top coat process eliminating three process steps: primer, primer over and primer finish.
- This more efficient method combined with the latest in robot application equipment, as well as a **new ventilation technology** yields an ultra high-performance paint shop that has reduced the plant's **energy consumption by 30%**, **reduced carbon emissions by 43%**, **reduced VOCs by 7%** and **wastes 2%** less than conventional technology.

SUSTAINABILITY WITHIN ASSEMBLY: COLLABORATIVE ROBOTS.

INNOVATION

ASSEMBLY

- Line production efficiency, **Stable Takt**
- Productivity and quality increase **through human-robot-collaboration**



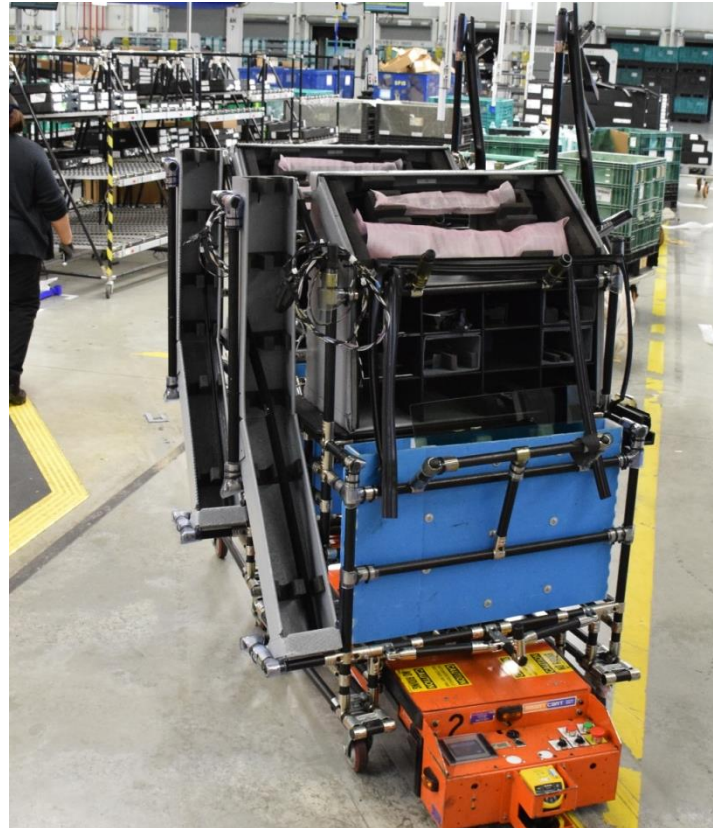
- Collaborative robots or “friendly” robots work around humans without protective fencing.
- Each of the four robots, one per door line, contains a special interface device with a roller on the end.
- The robot is programmed to apply consistent pressure with the roller around the perimeter of the door foil, securing it and the adhesive to the door.
- This is an important part of the door assembly process since the door foil protects the electronics inside the door from water leaks.

SUSTAINABILITY WITHIN LOGISTICS: SUPERMARKETS AND AUTOMATED GUIDED VEHICLES (AGV).

LEAN PRODUCTION

ASSEMBLY

- **Just-in-time logistics** for efficiency and productivity (**lean**)
- **Continuous improvement (VPS)**

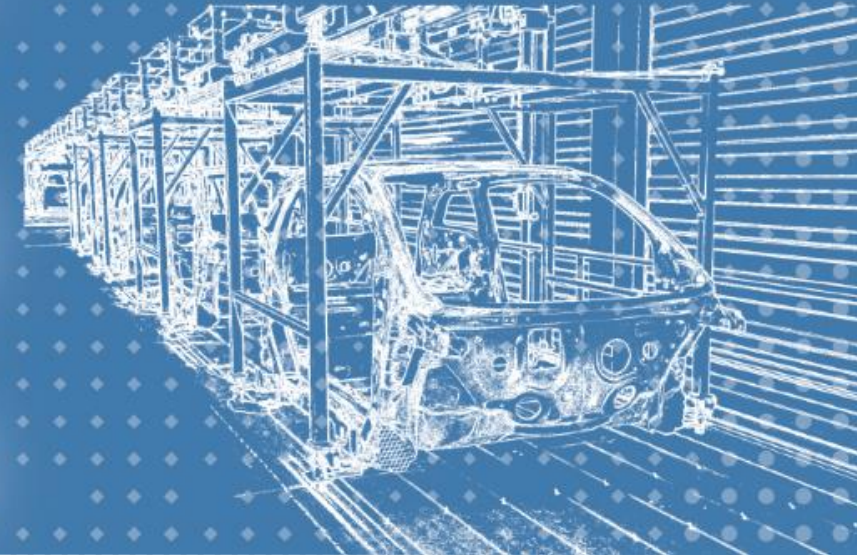


Value-added production principles or “VPS”.

This is BMW’s proprietary approach to lean manufacturing. BMW’s VPS philosophy is developed to create:

- repeatable, robust processes
- improve logistics flow
- implement value stream optimized principles, and
- pinpoint and eliminate waste in the process

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BMW GROUP CAPITAL MARKETS DAY, SPARTANBURG, MARCH 2015

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