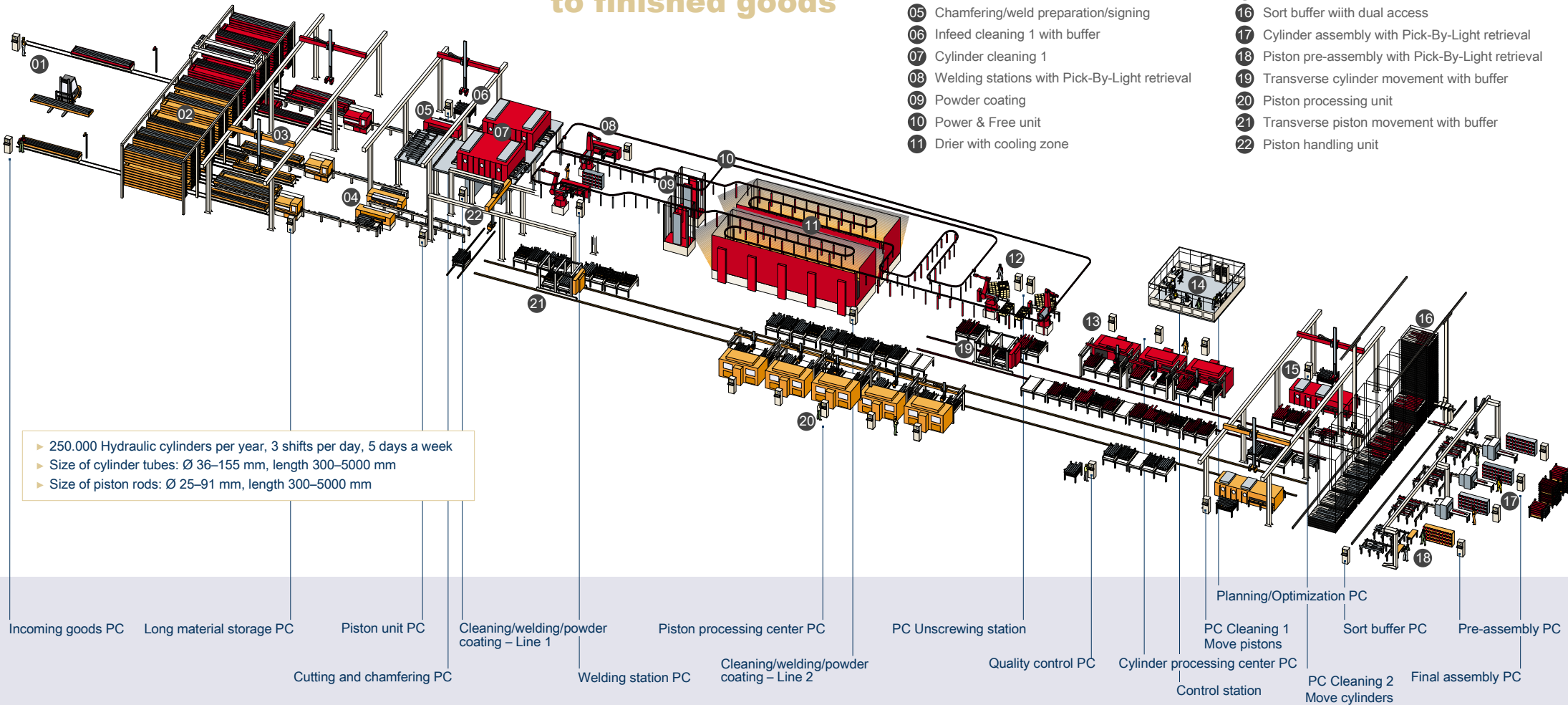


MES technology with 3Tec

Hydraulic cylinder production from raw material to finished goods



- 01 Storage area infeed with cameras
- 02 Long material store
- 03 Pre-cut
- 04 Chamfering
- 05 Chamfering/weld preparation/signing
- 06 Infeed cleaning 1 with buffer
- 07 Cylinder cleaning 1
- 08 Welding stations with Pick-By-Light retrieval
- 09 Powder coating
- 10 Power & Free unit
- 11 Drier with cooling zone
- 12 Cylinder handling with unscrewing station
- 13 Cylinder processing unit
- 14 Production control/planning/optimization
- 15 Cleaning 2 with piston and cylinder handling
- 16 Sort buffer with dual access
- 17 Cylinder assembly with Pick-By-Light retrieval
- 18 Piston pre-assembly with Pick-By-Light retrieval
- 19 Transverse cylinder movement with buffer
- 20 Piston processing unit
- 21 Transverse piston movement with buffer
- 22 Piston handling unit

▶ 250.000 Hydraulic cylinders per year, 3 shifts per day, 5 days a week
 ▶ Size of cylinder tubes: Ø 36–155 mm, length 300–5000 mm
 ▶ Size of piston rods: Ø 25–91 mm, length 300–5000 mm

Automation | Information | Transparency

3Tec automation GmbH & Co. KG
 Wilhelmstraße 8
 D-32602 Vlotho
 fon+49.(0)57 33.87 12-0
 fax+49.(0)57 33.96 00 07
 info@3tec.de
 www.3tec.de



MES technology with 3Tec

From raw material to finished goods in batch size 1

STILL GmbH in Hamburg manufacture the hydraulic cylinders for the forklift trucks made by the Linde Group. In what is a necessarily complex production process, 33 PCs control 39 machines and handling systems. The experience of advanced automation gained over many years in furniture production was the basis of a complete solution for hydraulic cylinder manufacture from a single source.

Staggered work flow generation

The production process for the cylinder tubes takes a different amount of time for that of the pistons. The first step involves separate optimization processes for tubes and pistons to minimize production waste. The individual parts reach a buffer in front of final assembly at different points in time. On the way out of this buffer, the „marriage“ of the piston and its cylinder finally takes place. So, when the optimization takes place, the capacity of this buffer and the desired production sequence must be taken into account. The second step involves the calculation of a strategy for moving stock out of long material storage based on the production fill level. The third step involves the use of intelligent buffer handling along with the knowledge of current tool configurations to minimize the time involved in reconfiguring the machine tool usage.

Intelligent control of production sequence

As seen in the schematic, all production-relevant data is exported from the ERP system and imported into the production database (Oracle). This includes the complete stock management and control of the long material storage, the various buffers as well as all pick-by-light systems. Additionally, there is a comprehensive visualization of the complete production process that integrates material flow control and shop floor data collection. All machines werden share a common user interface tailored to their specific information requirements. The control system generates jobs for the PLC control of the conveyors and handling systems. An exact calculation is required for all dimension-dependant access coordinates taking interfering edges into account. The exact and complete state of production is kept permanently up-to-date in the Oracle database.

Quality Control

Quality control based on predefined rules takes place at the welding stations and the processing centers. If an error is detected, all parts produced since the last correct measurement are automatically fed out for checking. Every newly deployed tool is locked and is only enabled after being checked by an operator. Additionally, each use of a tool is counted, and on reaching a (parameterized) check value, the tool must be checked. Every modification of a welding program or NC program is logged, so that the exact version program version of each program is known for every part produced.