JOBREPORT 32

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KÖHL SERVICES

- Robotic palletizing cells consist of self-frequency, turning station and loading bays
- Total system capacity: 1,500 discs / hr.
- Mixed operation of 3 different product types
- Robust roller conveyors for transport from the cleaning area to the palletizing area
- Vertical conveyors to compensate differences in height
- Planning, realization and commissioning

Automated brake disc handling

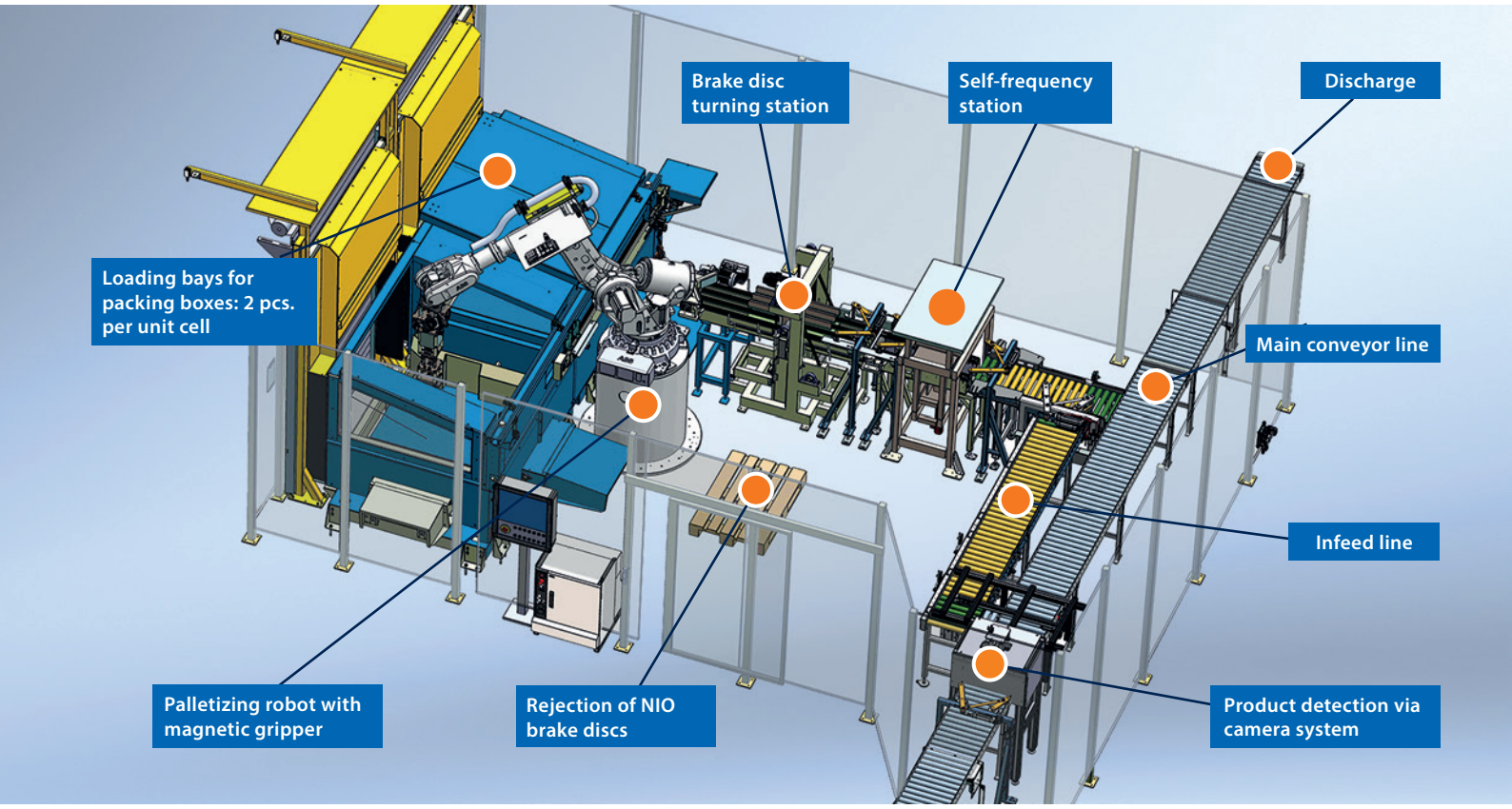
Robotic units carry out the inspection and palletizing of raw cast brake discs.

KÖHL Maschinenbau AG was challenged by its customer to connect the cleaning area and the shipping area with an automated transport system for raw cast brake discs. Each 2.4 seconds, the brake discs are transported along 100 meters via robust roller conveyors to three automation units, where the brake discs are controlled and palletized by robots according to a predefined layout.

Solid – Conveyor Technology

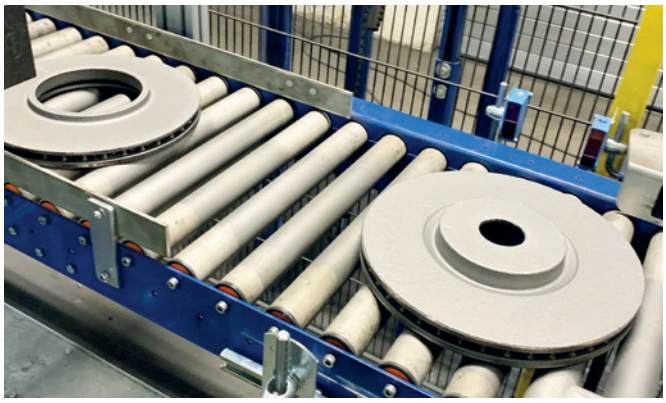
At the beginning of the process, the raw cast brake discs are grouped from 3 grinding lines within the cleaning area onto one conveyor line. Solid accumulation roller conveyors allow buffering among the individual areas and separate the processes, which results in a high level of availability.
Since both halls are separated by a road, the brake discs have to be raised to a higher level for cross-road transport. Due to the tight space conditions and the high capacity of 1,500 discs/hour, a continuously running vertical conveyor based on the paternoster principle is used.
Manual inspection stations are integrated within the cleaning area. Automated turning stations present the bottom and top sides to the worker to enable the brake discs inspection for obvious surface defects.

KÖHL
SOLUTIONS WITH POWER

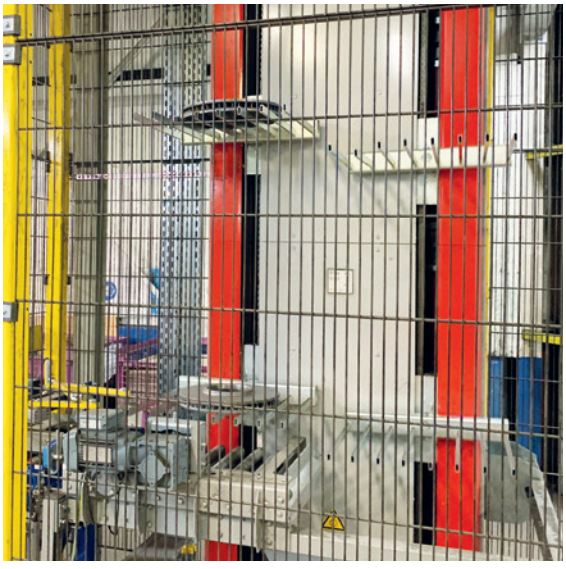


Dynamic – High Product Diversity

A total of 120 different product types (brake discs with cap or friction rings without cap) and an individual weight of up to 25 kg can be run through the system - almost without any setup steps. Furthermore, it is possible to operate the system in a mixed configuration with up to 3 different product types at the same time. For this purpose, a camera system is integrated in front of each unit infeed, which reliably detects the type of disc required for the respective unit, allowing it to be subsequently fed in.



■ Brake disc transport via solid roller conveyors



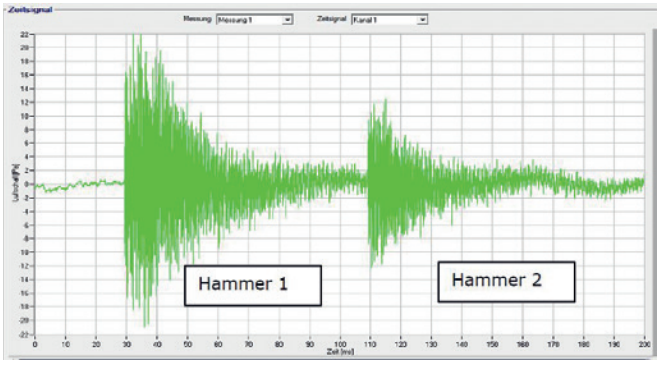
■ Continously rotating vertical conveyor

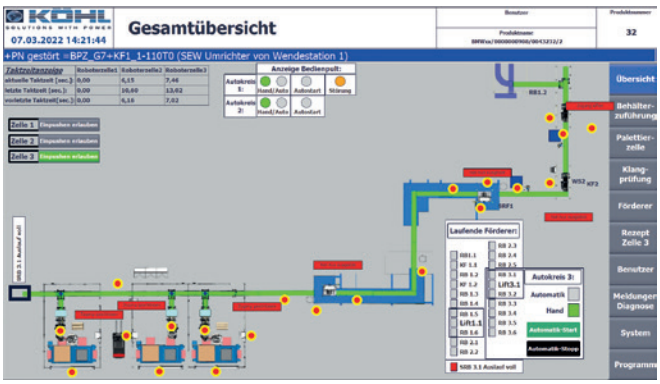
■ 4-fold turning station in the cleaning area in front of a visual inspection station

■ Infeed line within the unit with integrated self-frequency testing & turning station

Innovative – Self-Frequency Inspection

Due to increased quality requirements in the automotive industry, an automatic 100% inspection of the brake discs is carried out within each unit by using a resonance test. This procedure allows a fast and non-destructive testing of the brake discs.
Cracks, shrinkage cavities or changes in the material structure can be detected by the acoustic resonance analysis. In the systems, the brake discs are stimulated with two plungers and the resulting frequency is measured and analyzed. Influencing factors such as temperature and age of the brake discs are taken into consideration in the analysis and guarantee high accuracy.
The inspection station is equipped with an automatic setting, so that different brake disc parameters, such as disc diameter, cap height, etc., can be handled dynamically and flexibly.





Efficient – Automation & Visualization

KÖHL Maschinenbau AG was once again able to demonstrate its enthusiasm for tailor made and flexible solutions. As a specialist for efficient process automation, the automation of the conveyor technology and robot units as well as the visualization of the plant and various adjustments were realized in-house: According to our philosophy **“All from one single source”**.

■ Interlaced packing pattern

■ Removal of the packaging boxes from loading bay

Flexible – Packaging Patterns & Boxes

The robot can use different packing patterns to arrange the brake discs in the packing boxes. Different packaging configurations are possible via the palletizing software: stacked as a column or in an interlaced structure, as well as an arrangement of the brake disc cap upwards and/or downwards.
To ensure that the brake disc is in the correct orientation before being picked up by the robot gripper, a turning station is installed on the infeed which turns the discs by 180°.
Depending on the customer's requirements, different packaging boxes are used, which are centered in the loading bay using robust cylinders.

Optimized – Magnetic Gripper

Arriving in the robotic unit, the robot picks up the brake discs with a magnetic gripper and loads the boxes provided in the loading bays.
The gripper is equipped with compensation units - both in the horizontal level and in the height - to ensure reliable palletizing, even in dented or damaged boxes, without the use of camera technology.

■ Robot with magnetc gripper

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