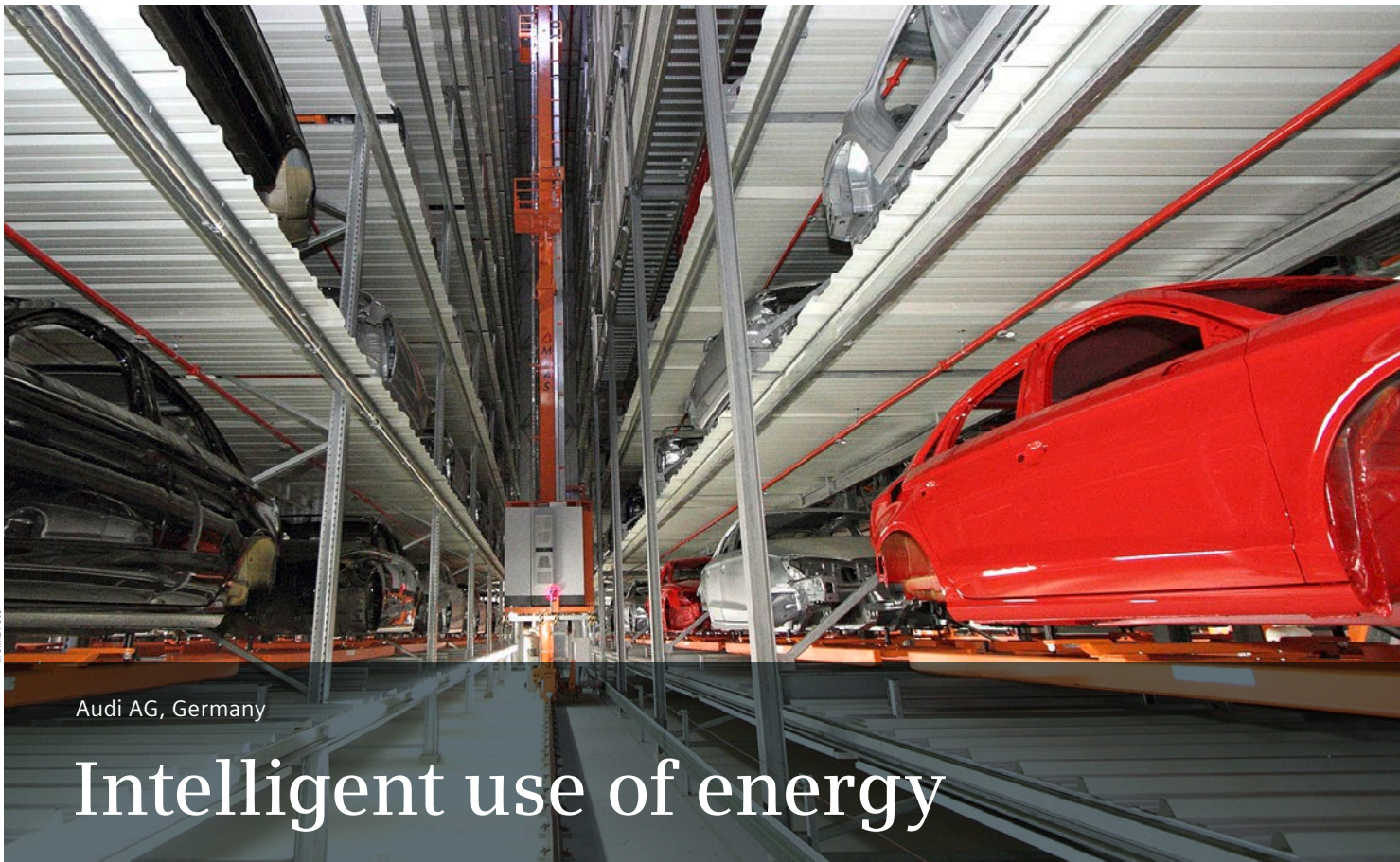


Today, automobile manufacturers operate in an environment characterized by growing competitive pressure in globalized markets and increasing diversity of models. With its new high-tech plant, Audi can face this challenge with full confidence. The innovative high-bay warehouse for 411 painted and unpainted automobile bodies towers above all the other production facilities. As the central body warehouse, it has been designed to provide optimum sequences for the paint shop and assembly stations, intelligently controlling the flow of materials in the new plant. After all, the various Audi models are to be produced with the highest possible efficiency, not only in terms of productivity and plant availability, but also in terms of energy consumption.

Manufacturer benefits from integrated drive system

“We always take a holistic approach, and that is why we have chosen to work with our long-term and experienced partner Siemens for this project,” explains Wolfgang Meyerle, technical project manager for automation technology at Audi. “With optimally coordinated solutions, we are able to implement effective manufacturing logistics, increase the availability of the plants, and design production sequences that are sustainable in terms of energy consumption.” Energy efficiency plays an increasingly important role not only for the automobiles themselves but also for manufacturing and production logistics. ▶▶

Material flow is controlled intelligently in the fully automated high-bay warehouse at the Audi plant in Győr



Audi AG, Germany

Intelligent use of energy

The German automobile manufacturer Audi has established a production facility equipped with cutting-edge technology in the Hungarian city of Győr. One of the highlights is the fully automated high-bay warehouse that serves as a central body buffer. Advanced automation and drive technology enables high-capacity and energy-efficient production processes.



Merkiz Foto

“With optimally coordinated solutions, we are able to design production processes that are sustainable in terms of the energy consumption of our plants.”

Wolfgang Meyerle, Technical Project Manager for Automation Technology, Audi

All in all, 357 geared motors, 306 frequency inverters, and 51 motor starters are used in the high-bay warehouse and the associated conveyor technology – an integrated drive system whose efficiency the automobile manufacturer benefits from across all areas of the central body buffer.

Using energy intelligently

Considering the great variety of types and variants of automobile models, the individual parts that constitute an automobile must be repeatedly compiled into groups in order to eventually create series for individual production steps. A central step in this process is the intermediate storage and sequencing of the bodies. In the Hungarian automobile plant, this task is performed by the fully automated high-

bay warehouse. There, energy is used intelligently. The Sinamics S120 drive system controls the individual traction, lift, and telescopic drives of the storage and retrieval machine. Due to the modular design, infeed with a controlled intermediate circuit is possible. This eliminates unwanted harmonic effects, and energy consumption can also be managed intelligently with this solution. With the Active Line Module, braking energy can be used intelligently and can be supplied to another drive that is accelerating at that point in time. This leads to compensation between the braking and driving axes. Ideally, the braking energy “commutes” between the individual drive axes and does not need to be fed back into the grid at a loss.

The modular design of the Sinamics S120 system also makes it possible to scale the drive connections

Left: The Simatic ET 200pro FC frequency inverters, protection class IP65, can be mounted in a compact manner on the conveyors

Right: The drive of the lifters to move objects over the production line uses the latest generation of Sinamics G120D-2



Merkiz Foto

of the individual axes. This type of targeted axis control minimizes inrush current peaks and relieves the load from the grid. It also makes it possible to optimize the energy consumption of the entire plant.

Smooth flow of materials due to reliable conveyor technology

A nearly 2-km-long conveyor system links the high-bay warehouse with the body shop, paint shop, and assembly. Here, all movements are exclusively horizontal, but nonetheless equally efficient. "They are equally efficient because the drives of the conveyor belts that first convey unpainted and then painted bodies also use Siemens technology," explains Meyerle. 321 geared motors and Simatic ET 200pro FC frequency inverters are in interaction here. The latter have protection class IP65, which allows them to be mounted in a compact manner on the conveyor sections without a control cabinet. Reliability and energy efficiency are key. The system offers high plant availability because the modules can be exchanged under current and during operation. In addition, due to the inverter's regenerative feedback capability, braking energy can be fed back into the grid – energy that is not lost in the braking resistor and thus can be used effectively elsewhere.

One glance at the assembly area of the Audi plant in Győr shows that work is performed efficiently there as well, which is mainly due to intelligent motion and drive control. The lifters used to move objects over the production lines were equipped with state-of-the-art drive technology. The previous solutions with protection class IP20 were replaced by

Efficient infeed technology with Sinamics

When powering lifting applications, centrifuges, and conveyor belts, drives must often apply the brakes on considerable masses. This releases a significant amount of braking energy that is lost without the implementation of an appropriate technical solution. Sinamics frequency inverters with regenerative feedback capability offer various infeed concepts to reuse this energy.

- **Efficient infeed for Sinamics G120D/Simatic ET 200pro FC:** Infeed technology reduces energy consumption by up to 40%; future-oriented and sustainable manufacturing; no external supplementary components (such as braking resistors) necessary which reduces configuration and installation time and additionally saves space
- **Smart infeed technology for Sinamics S120:** unregulated infeed/regenerative feedback for motion control applications
- **Active infeed technology for Sinamics S120:** Regulated infeed/regenerative feedback for motion control applications; optimized fail-safe system ensured by constant controlled link voltage – making the drive system insensitive to load variations; automatic compensation of capacitive or inductive idle power throughout the entire machine



the latest generation of Sinamics G120D-2 inverters. In addition to protection class IP65 and positioning capability, these compact drives also feature regenerative feedback and thus also contribute to energy-efficient production sequences.

Efficient manufacturing processes implemented

In the new plant in Győr, Audi implemented sophisticated production logistics that satisfy the demand for effectiveness and energy efficiency. In collaboration with Siemens, this resulted in an innovative high-bay warehouse with an optimized flow of material due to well-engineered and intelligently combined drive solutions, thus enabling efficient manufacturing processes. ■

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