Innovative Technology for Today's Demanding Production

PSI Technics is developing a new positioning standard in cooperation with Volkswagen AG in Wolfsburg, Germany.

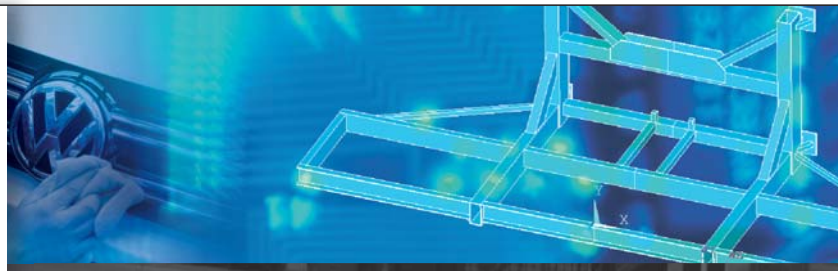
As part of a pilot project, Volkswagen AG's Production Planning department in Wolfsburg commissioned PSI Technics with analyzing the efficiency of the mechanical components and the drive technology of an existing vertical material lift.

Virtual Modeling – an analysis of machine behavior via computer modeling was used to simulate all relevant system components to digitally recreate a variety of different loading conditions.

Virtual modeling provides reliable data and extensive insights into machine behavior

By using virtual modeling different drive and closed-loop configurations could be compared and evaluated with regard to their cost-benefit ratio prior to retrofitting the XSB51 vertical material lift. Based on Volkswagen AG's positive experiences with PSI Technics' **ARATEC** Positioning Solution System at the client's Wolfsburg factory, the ARATEC system was also used for the virtual modeling pilot project.

The Conveyor Technology Planning department (PWG-P/F) at Volkswagen AG, headquartered in Wolfsburg, Germany, had commissioned PSI Technics to analyze and evaluate the operation of a vertical material lift in a vehicle body warehouse. The successful cooperation was aimed at developing a new positioning standard for similar vertical lifting systems.



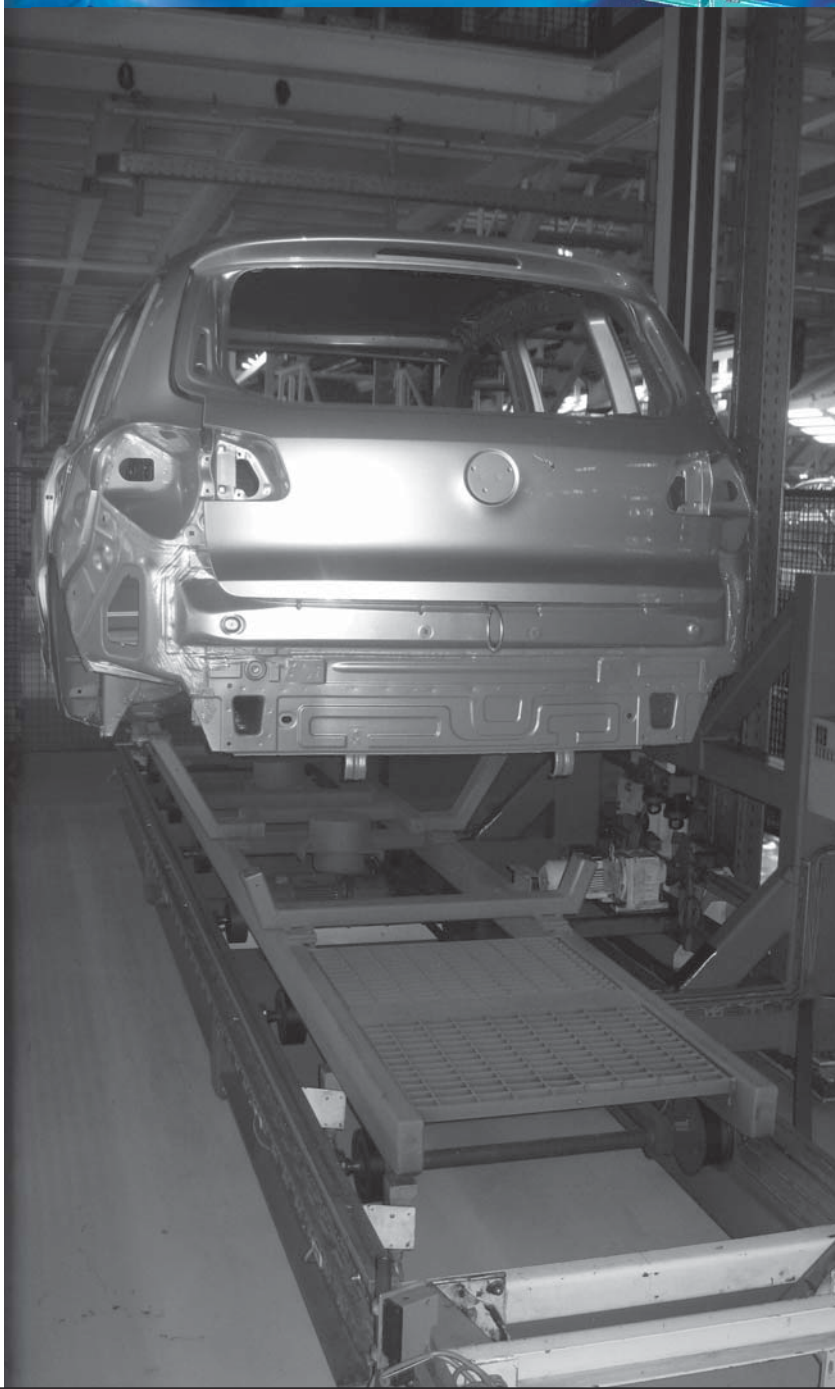


Image Source: PSI Technics, Volkswagen AG

Project Brief

The Challenge

Seamless Integration

The smooth retrofitting of the vertical lift that was used as a reference system was a vital part of the pilot project. Three decisive factors needed to be taken into account:

The first prerequisite was that the system could be switched between the old and the new configuration mode at any time, so the difference between both configurations could be experienced first-hand during a plant walk-through while the system was in operation instead of just relying on modeling and diagrams.

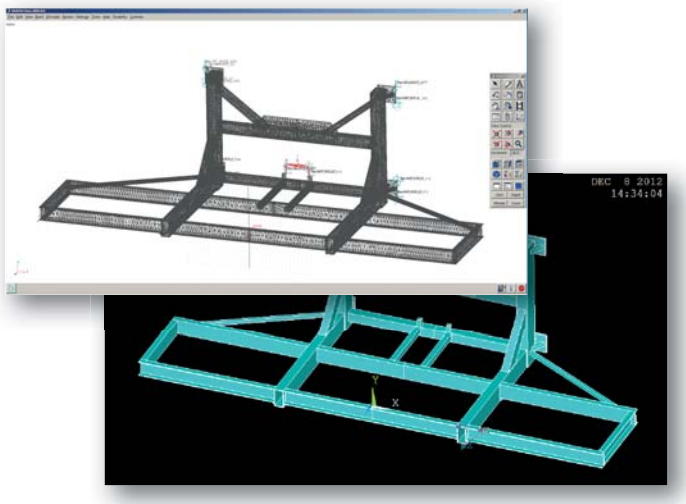
Second, the retrofitting had to take place within five days during the factory's late shift. PSI Technics' engineers were faced with the challenge to plan the retrofitting so that it could take place in less than eight hours per day and the retrofitted and fully functional system could be returned to automatic operation on schedule.

Third, no changes or adjustments were to be made to the existing PLC or host controller hardware during retrofitting.

Revealing and demonstrating optimization potentials

Innovative techniques helped determine various optimization approaches for a vertical material lift used in the automotive industry. An ideal optimization scenario was assumed to minimize energy consumption and include time-optimized trajectories that would not affect throughput, while keeping mechanical stresses to a minimum. Since the vertical material lift combines mechanical, electrical and PLC control engineering with closely interacting core components, the entire system had to be taken into account.

Motion analysis was used to determine the system's current motion profile, which provided a basis for determining optimization potentials. All existing loading conditions and motion sequences were simulated in a **virtual model** using finite element methods (FEM), multi-body models and controller modeling. The results were verified against the actual operation of the system and illustrated the benefits of using an intelligent positioning controller.



Significant Improvements with Major Cost Savings Potential

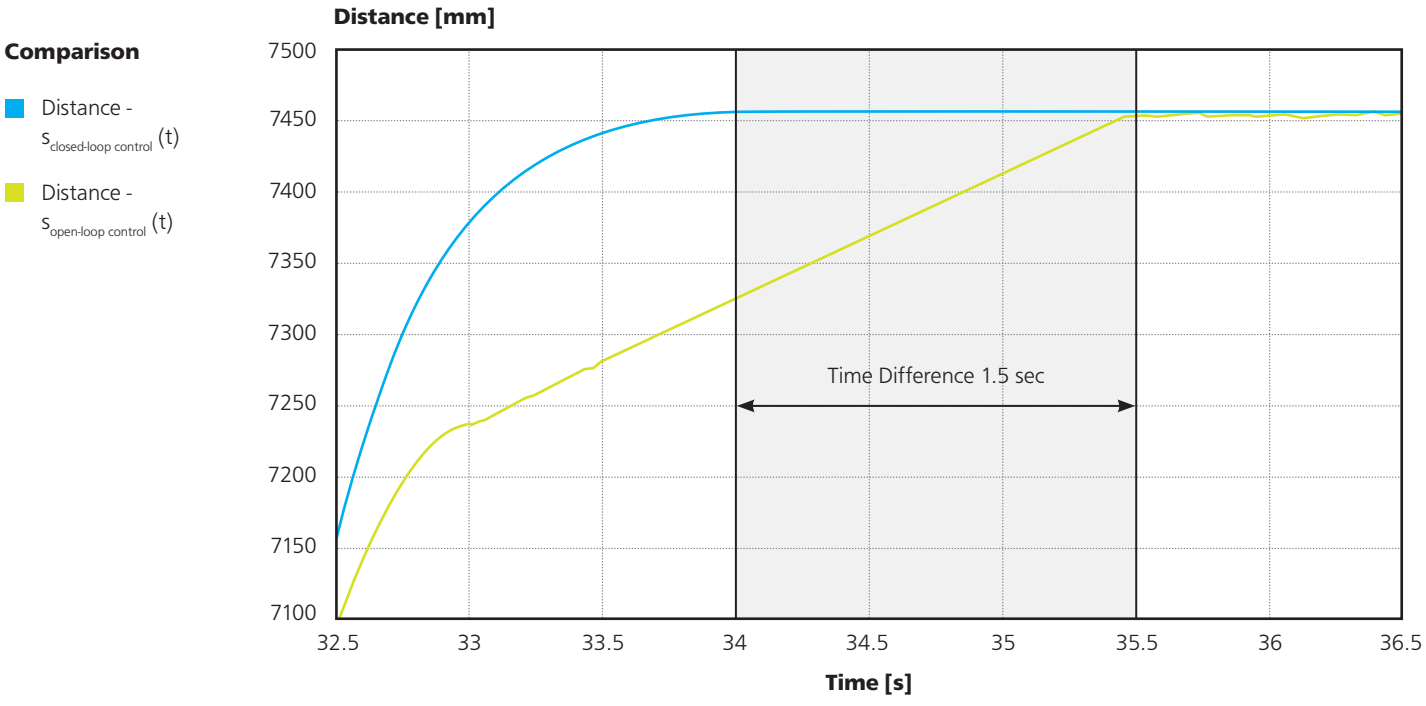
The Solution

The retrofitted vertical lift fulfills and exceeds all of the client's expectations regarding cycle times, stability, reduced mechanical wear and power consumption. As calculated during virtual modeling the system's mechanical stress was reduced by more than 15%. At the same time, power consumption decreased and the cycle times were reduced by 3 seconds. These results were achieved by using the ARATEC Positioning Solution System with time-optimized motion paths and accurate positioning.

Stress comparison between the PLC-controlled system (green) and the system with closed-loop positioning control (blue):

Advantages of the ARATEC Positioning Solution System:

>> No creeping speed
>> Shortens cycle times by 3 seconds
>> Cycle times can be dynamically adapted to match production processes
>> Reduced energy consumption
>> Reduced CO_2 emissions (859.2 kg/year for each vertical material lift)
>> More efficient drive technology
>> The system is optimally positioned, irrespective of the load
>> Optimized loading and unloading process
>> Reduced mechanical stress by more than 15%
>> Reduced wear and oscillations
>> Increased system lifespan
>> Low maintenance



A Resounding Success

PSI Technics fulfilled all prerequisites to Volkswagen AG's utmost satisfaction. The pilot project, aimed at developing a valid positioning standard for both retrofitted and new systems, was achieved in the shortest possible time.

Project Duration

Volkswagen AG has been using the system since June 2013. The system was installed during late shifts without operational disruption.

A New Positioning Standard

Following the excellent experience during the pilot project, Volkswagen AG in Wolfsburg now relies on PSI Technics' ARATEC Positioning Solution System for retrofitting and new installations. In the meantime, PSI Technics successfully retrofitted two additional lifting systems. From now on, the ARATEC Positioning Solution System constitutes an integral part of tenders issued by the client's Production Planning department.

Jens Schischke,
Conveyor Technology Planning department (PWG-P/F),
Volkswagen AG

„With the ARATEC system PSI Technics not only provided us with an efficient long-term solution that helps us to cut costs, but with state-of-the-art positioning technology for our Wolfsburg factory."

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PSI Technics is your reliable partner for intelligent and efficient solutions that improve productivity and quality in a wide variety of fields, including: factory automation, modernization/retrofitting, industrial positioning systems, industrial image processing, thermal protection of sensors, as well as R&D for energy efficiency and energy management.

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