## GLM Lasermeßtechnik GmbH – ALIGNMENT OF STORAGE SYSTEMS / HIGH-BAY WAREHOUSE

## ALIGNMENT OF STORAGE SYSTEMS / HIGH-BAY WAREHOUSE

The range of modern storage systems starts with simple hand-operated racks, continues with forklift-operated racks and ends with fully automatic high-bay warehouses of more than 40 m height. Depending on the racking system, different guidelines and standards must be checked and observed during assembly and operation. However, the requirement of exact dimensional accuracy applies to all racking systems. Especially in fully automated high-bay warehouses, the precise alignment of the racking is very important. Slight deviations in the distances lead to errors in the automated storage and retrieval processes.

## High bay warehouse

High-bay racks with automatically or manually movable conveyors occupy a special position in racking constructions. Most high racks exceed the construction height of 12 m and thus the scope of the RAL-RG 614 quality assurance ends. Therefore, the "Calculation principles for storage and retrieval equipment, tolerances and clearances in high rack storage" FEM 9.831 was introduced especially for high rack storage. In addition, VDI Guideline 3645 applies to the racking served by industrial vehicles. This includes, among other things:

- Sideloaders
- Three-side forklift
- Fork-Three Sideloader
- C-fork three-way sideloader
- Swivel mast three-way sideloader
- High-lift order picker

## **3D** measuring system

GLM Lasermesstechnik has developed a 3D measuring system for measuring and adjusting high racks. The evaluation is based on the FEM 9.831 guideline and can be further adapted to your requirements. It includes among others:

- Deviation of the shelf uprights from the alignment, as well as longitudinal and transverse inclination
- Height of the upright bases
- Height of the top edges of the uprights on one level
- Offset of the uprights of two opposite racking rows

The results of the measurement are automatically returned a few minutes after recording with the help of our software package. The package consists of a Microsoft Excel® based application and a plug-in for <u>Rhino3D</u><sup>®</sup> or <u>3 DIM PC-Basic</u>. The measurement is carried out by a 3D measurement system with 3-DIM Observer Motorised.

Components of the measuring system are a motorised industrial total station (laser station), a field computer or tablet and target equipment.