

Frequency inverters

8200 vector

Handling technology

Lift stations for Opel Vectra production

Lenze

Automotive



With the new Vectra, the automotive manufacturer General Motors has broken new ground in terms of production methods. Whether in respect of quality management systems, employee teams or production techniques – the new jewel in their crown underwent extensive re-evaluation of working procedures prior to going into production. For the purposes of production, parts of the two plants in Rüsselsheim in Germany and Ellesmere Port in the U.K. were completely redesigned and refitted. The aim was to reduce unit costs by increasing the degree of automation engineering at operational level.



Lifting station at Ellesmere Port

#### Networked systems

A number of production areas for body components were to be linked with the aim of automating the handling of vehicle bodies in white. To a large extent, this requirement defined the task for which handling technology was to provide a solution. For General Motors, it was essential to use a reliable and tested system which would offer all the advantages of modern drive technology, such as networking, increased functionality as standard, and service as required on-site.

#### Project team

The solution was provided by means of a joint venture between two companies with expertise in this field. Fredenhagen GmbH & Co. KG, based in Offenbach in Germany, supplied the material handling technology and Lenze AG, based in Hameln in Germany, supplied the electronic drive technology for the lifters. The result: material handling systems

which can achieve cycle times of 60 seconds. An extra back-up drive system was specified for the lifting drives. So that it is possible to adapt the systems quickly and easily in the event of new vehicle types being introduced, drives are network-compatible with Profibus DP, and easy to maintain and diagnose. The material handling package was completed by a space-saving design and a tailored service concept.

#### Handling technology

The specification of the cycle times was a decisive factor in the design and layout of the handling system. Essentially, the overall design of the system is determined by the speeds of the individual carriages and their cycle times, from which were derived the acceleration and deceleration values. In order to save even more assembly space in the production hall, a transportation system needing

no floor space was selected, in which the electrified monorail system is installed above the individual production stations (e.g. welding stations or handling units). Hoists powered by Lenze drive technology convey the individual components to the relevant production stations.

#### Back-up drive system

The lifting technology comprises both console hoists and suspended lifting stations, all of which are equipped with a back-up drive train. This means that, in the event of an error, the system can easily be switched to the redundant back-up system. Diagnostic systems check at regular intervals that the trolleys are working correctly. The geared motors which can be manually disconnected, and inverter drives which can be replaced in next to no time, mean that it should always be possible to optimise system availability.

### Lift station drive technology

The hoists are equipped with Lenze 8200 vector frequency inverters, which have two communication interfaces as standard and can be connected to the most popular types of fieldbus system via plug-in modules.

In this application, the second drive interface is not used on a daily basis. However, if required, it can be used to carry out an on-site drive diagnosis via an RS232 interface with a PC or Notebook. Both interfaces have the same priority and can be used to access all frequency inverter data and parameters.

The frequency inverters are also equipped with numerous auxiliary functions for lifting applications. These include:

- ▶ Temperature monitoring of motors via PTC and additional  $I^2 \times t$  function in the drive
- ▶ monitoring of the three motor phases
- ▶ Error message in the event of overvoltage and engaging of the mechanical brake

### Automation engineering

A higher-level PLC, which communicates with each individual frequency inverter via Profibus DP, is responsible for the overall control of the drives.



Frequency inverter 8200 vector

Fieldbus networking reduces the amount of cabling required and enables an accurate diagnosis to be carried out in the event of an error. In addition, networking not only makes data generally more transparent but also provides an easy way of acquiring information for statistical production monitoring.

The time required to replace drives must be kept to an absolute minimum. For this reason, the process has been simplified so that even those who are not experts will be able to restart the system in no time at all following an error.

### Service concept

The complete system for the UK-based General Motors plant also included the setting up of a service package tailored to meet customer requirements. For this purpose, the required response times of all those involved in service processes (internal plant maintenance and supplier service outlets) were analysed and specified. The following measures were introduced as a result of this analysis:

- ▶ Provision of stock which might be required in the event of an emergency
- ▶ Employee training
- ▶ Designation of responsible contacts
- ▶ Definition of emergency procedures

### Summary

The system described in this document reflects the current state of the art for plants of this size. It includes all the elements required to ensure high availability in vehicle assembly processes:

- ▶ Use of bus systems to acquire all relevant data for diagnostic purposes
- ▶ High reliability of components used
- ▶ Installation of redundancy and safety functions where necessary
- ▶ Employee training and qualification

This type of project can only become reality if partners who are highly motivated, skilled and expert in project management work together to provide the maximum possible benefit for the end customer.

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## Brief profile

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**Created:** 1872

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**No. of employees:** 220

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**Industry:** Materialflusstechnik

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**Address:**

Fredenhagen GmbH & Co. KG  
Sprendlinger Landstraße 181  
D-63069 Offenbach/Main  
Postfach 100554

D-63005 Offenbach

**Telefon:** +49 (0) 69 84 08-0

**Telefax:** +49 (0) 69 84 08-222

**Internet:** [www.Fredenhagen.de](http://www.Fredenhagen.de)

**E-mail:** [info@fredenhagen.de](mailto:info@fredenhagen.de)

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