

Screen for 26-Metre Overflow is Unique in Europe

by Christoph Schmehl

Europe's largest fully automatic bar-screen plant currently in use in a mixed-water spillway started operation in Darmstadt. The city of Darmstadt specified the requirements beforehand in a tendering competition. The order for the manufacture, supply and installation of the fine-screen unit was placed with HST Hydro-Systemtechnik. The fine screen is for catching coarse and solid suspended matter in an existing discharge plant. The discharge plant was fitted with the screen unit to clean the water overflowing into the main outfall and to trap suspended substances in the sewer which had previously caused considerable water pollution.

Environmental protection is one of the most important tasks facing local and central government. In mixed-water sewerage systems, rainwater and waste water from households and industry flow into one common sewer which channels it to the treatment plant. In Darmstadt, during heavy falls of rain, the pressure on the sewerage system was relieved by means of overflows into bodies of water. It was uneconomical to purify the strongly diluted mixed water in the sewage-treatment plant. For this reason, part of the mixture of rainwater and sewage was stored in special constructions and then discharged directly into a body of water when their full capacity was reached.



To avoid water pollution from the overflows during heavy rainfall, the city of Darmstadt commissioned HST with the manufacture, delivery and installation of a fine-screen unit for retaining coarse and solid matter in the mixed-water sewerage system. This led to the construction and installation of the largest fine-screen unit for mixed-water treatment in Europe. The corrosion-resistant stainless-steel screen, which weighs 8 tons and is 1.55 metres in height, was installed on the 26-metre dam of an overflow in the mixed-water system.

It was designed for a water quantity of 20,000 litres per sec. Coarse, fine and suspended matter are trapped by the horizontally clamped bar structure, the bars of which have a clearance of only 4 mm. Since the unit is designed as a back-raked screen, the trapped material remains on the upstream side and is carried to the sewage-treatment plant by the current of waste water.

When in operation, the hydraulic power must be continuously assured. When the screen is loaded with material, the cleaning and purification operation is triggered as required by the load and the wa-

ter level. Both the screen surface and the spaces between the bars are completely combed out and freed of detritus. The cleaning device is moved by hydraulic power only i.e. without any chains, gears and motors in the medium or EX zone which would be liable to malfunction.

The unit was installed in the construction through a 700-metre long waste-water channel of varying profile during routine dry-weather operation of the sewerage system. A special transport carriage was constructed for the purpose. The screen segments were transported through the sewer to the final location in the pre-assembled state.

TeleMatic Automation

The automation technology was regarded as extremely important because it contributes decisively to the function and operational reliability of the screen. All the experience gained in previous projects of a similar nature is contained in the automation software. This is a product characteristic which is just as essential as the quality of the material. The drive unit is controlled by a SMART 400 TeleMatic station. An industrial computer combines the advantages of computer technology with SPC reliability. All functions, water levels and movement sequences are continuously monitored and recorded for process history. In addition, network cameras can also be connected directly to the TeleMatic station for visual monitoring. Even the technical documentation and service instructions are stored in the TeleMatic stations.



HMI-Based Data Input and Display

The high-performance SPC (Beckhoff Twin-CAT) integrated in the TeleMatic station is programmed in accordance with IEC 61131-3 and allows the implementation of application and industry-specific solutions. Its cycle time is approximately 0.15 ms for 1000 commands. It supports the standard operating systems Windows CE and Windows XP. The high modularity of the TeleMatic station also reduces the dimensions of the electrical switch equipment.

While the SMART-400 TeleMatic station controls the screen unit, measurements and error signals are displayed locally on a Cimrex panel from Beijer. Important settings such as "Screen Level On", "Screen Level Off", "Screen Running Time" and various other operating parameters can be set on the operating panel.

Besides easy configuration and programming, the panel has an intuitive method of operation with freely programmable function buttons which can be programmed for special customer requirements.

Construction Kit and Standards Reduce Costs

Through the use of the HST system principle and HST standards, it was possible to reduce the engineering costs of the unit installed in the Darmstadt project by 25 %. This reduction was achieved by the use of design-software tools, matching assemblies and standard components.

The Advantages of HST High-Performance Screens

- Optimisation of costs by construction-kit system and standard dimensions
- High throughput due to bar-type design favouring current flow
- Combining of entire screen surface
- Fully automatic cleaning
- Variable arrangement and installation position
- High operating and functional reliability through extensive integrated monitoring, diagnosing and maintenance functions
- High protective system (IP 68)
- No sensitive drive elements
- Low spare-part requirement and quick response times through high standardisation

Technical Data

Customer:	City of Darmstadt
Type:	Fine screen
Bar gap:	4 mm
Self-cleaning:	Automatic
Designed for:	20,000 l/sec.
Drive system:	Electro-hydraulic
Control system:	HST Telematic
Material:	Stainless steel
Overall length:	26 m
Overall height:	1.55 m
Total weight:	8 tons
Location:	Mixed-water sewerage system, RÜ 012