Implementation of TroxNetCom LON using the example of the Düsseldorfer Opera

The Challenge:

The fire protection technology at the Düsseldorfer Opera needed to be completely reorganised. First and foremost, this applied to the fire dampers and the smoke detection system.
The old fire dampers, that were only equipped with a solder for the fusible link part, were replaced with motor-driven fire dampers which were additionally equipped with their own smoke initiators. In this way, the fire damper is guaranteed to close even with the presence of cold smoke (T<72°C) and thus to prevent the smoke spreading.
To remove smoke, the fire dampers can be driven into the open position in the case where no thermic release took place.
In the course of the redevelopment, a future-oriented control and monitoring system needed to be incorporated parallel to this so that the possibilities for continual expansion and later connection to all devices were ensured.
The control and monitoring system had to enable automatic maintenance of the fire damper (checking the actuator drive as well as the shutter position), indicate the current data of the fire damper and the smoke detector and also to ensure that a connection to the present fire detector headquarters and to the ventilation equipment was implemented.
Besides this, further important challenges to meet were reduced cabling and no additional control cabinet volume.
The first stage of the renovation dealt with 24 fire dampers and 24 smoke detectors.

Solution:

Trox developed an appropriate concept together with ROM in which the TroxNetCom-LON offered the optimal solution. This was due to the fact that with the TroxNetCom-LON:

– the request for continual expandability and for the possibilities of connecting all other devices to one and the same bus system was able to be fulfilled
– the cabling efforts were minimal

In addition, no additional control cabinet volume was needed due to the decentralised construction.

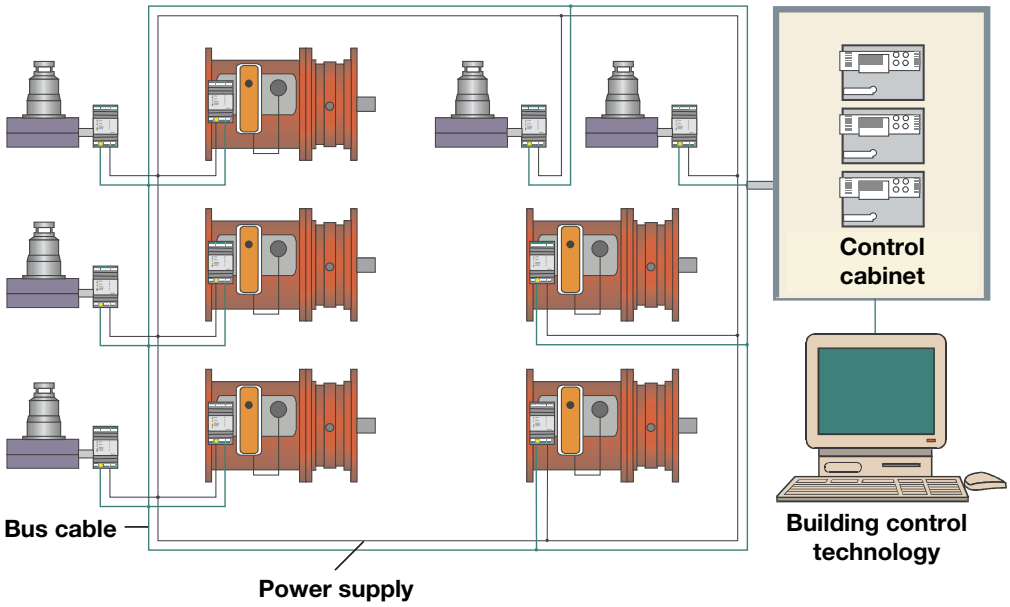
The desire on the part of the company ROM to operate with only one contractual partner was accommodated by the fact that Trox took on the role as system integrator in this project, delivering both it's own central controller, as well as the bindings (connection of the individual LON modules), and also carried out and integrated the equipment right through to the technical inspection (TÜV).

Each fire damper was delivered with a motor and the incorporated LON-WA1.
The LON-WA1 module enables the opening up and closing down of the motor-driven fire dampers, the registration of the stop position, as well the monitoring of the actuator drive running time. At the same time, variables such as the next maintenance date are saved.
The RM-O-VS smoke initiators were equipped with the LON-WA2 module which enables all signals from the smoke detector, such as air speed, degree of pollution, smoke etc. to be made available to the LON network.

The entire cabling, approximately 1000m (two-core bus cable and two-core power supply 24 V AC), was laid in fire-resistant E90 cable. With traditional cabling, 6000m of seven-core cable (E90) would have had to be laid.

The connection of the fire detection headquarters and the ventilation equipment was achieved by means of a modified LON-WA1 module which was built into the existing control cabinet and integrated the signals from the fire detection headquarters and the ventilation equipment into the LON network.

System construction LON System



The central controller, in the form of a PC, enables the retrieval of all data in the system, the operation of maintenance programmes, as well as event-logging onto a hard drive and a printer. The central software is constructed in such a way that it can be expanded at any time and it also has the possibility to monitor other technical devices.

Should the fire detector headquarters or a smoke initiator report a smoke event, all fire dampers and the ventilation equipment are switched off. A smoke removal switch that can be operated by the fire brigade switches on the extracted air equipment and opens all smoke prevention shutters that are located in the extracted air as long as they have not released thermally.

Summary:

Through the implementation of TroxNetCom-LON the equipment construction and the cabling was able to be optimised to such an extent that the requested specifications of flexibility and expandability were optimally fulfilled.
The implementation of the fire protection concept was tested and rated by the technical inspection (TÜV) and found to be very good.
By means of the TroxNetCom-LON system, no additional control cabinet was necessary. The cabling efforts compared to conventional cabling was reduced by a factor of 6.
The cost-savings amounted to approx. 50,000 DM, whereby the additional flexibility, the expansion possibilities and the depth of integration achieved through the implementation of TroxNetCom were not taken into account in the cost calculation.

Implementation of Labcontrol-LON, taking the example of the research centre Bayer Wuppertal

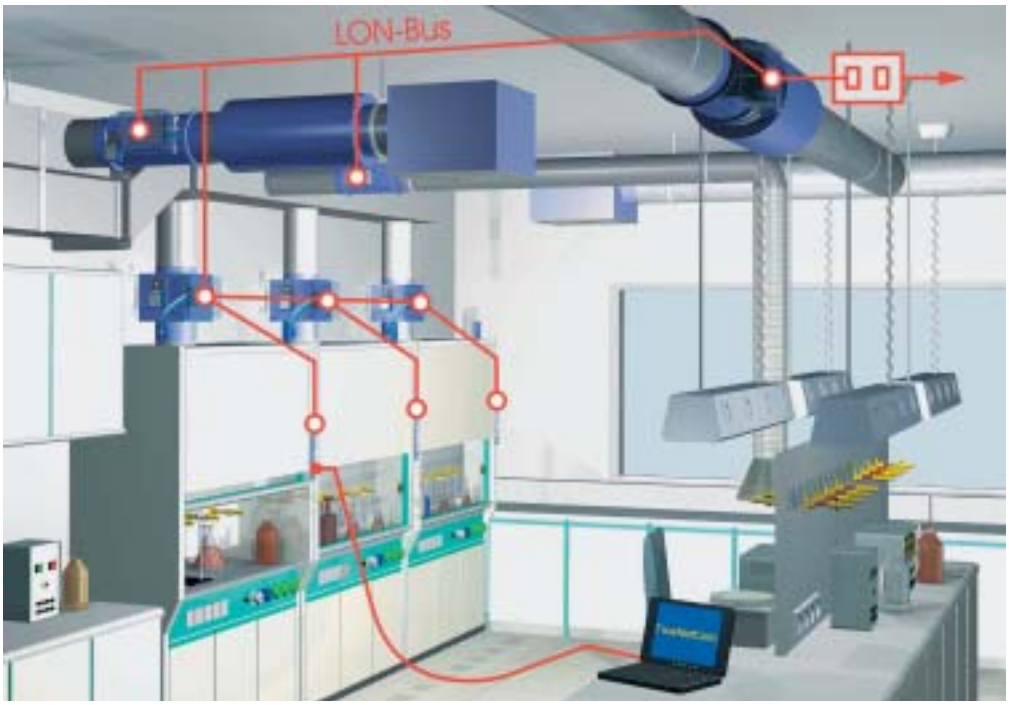
Task:

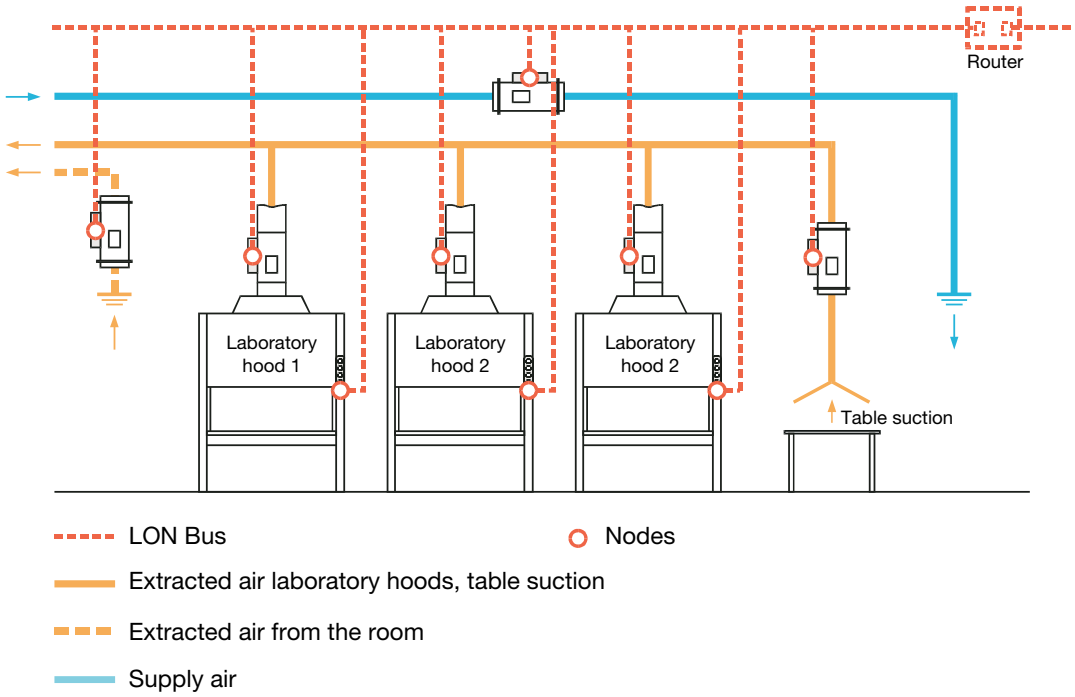
A laboratory building within the research centre Bayer Wuppertal needed to be completely renovated. This also affected 256 laboratory hoods integrated in this building. The main request of the client was to reduce costs through the implementation of the most modern technology, to guarantee a rapid investment period for the technical equipment costs, as well as to provide the system users the greatest possible safety.
For this reason, the laboratory hoods had to be regulated with respect to the air technology in order to meet requirements (Correction times < 1 sec). The maintenance of constant pressure within the individual laboratory zones played just as great a role as both the possibility for continual expansion, as well as the later connection of all other devices.
Additional challenges that needed to be fulfilled included the demand for reduced cabling efforts and for no additional control cabinets.

Solution:

Trox developed an appropriate concept in which the Labcontrol-LON offered the optimal solution, as the desire for continual expansion and for connection possibilities of devices to one and the same bus system were completely fulfilled. Additionally, the cabling efforts were minimal and by means of the decentralised construction, no additional control cabinet volume was necessary.
Moreover, the system distinguished itself by means of a very rapid regulation of flow rates, according to needs, as well as by means of the maintenance of constant pressure in the laboratory areas (Correction times < 1 sec).

Laboratory example with 3 hoods, as well as supply and extracted air within the room





The desire on the part of Bayer to operate with only one contractual partner was accommodated by the fact that Trox took on the role as system integrator in this project, carrying out and attending to bindings (connection of the individual LON building blocks), and also the integration of the equipment right through to the connection with the building management system.

The 256 laboratory hoods were divided into 22 zones. Each laboratory hood was equipped with an extracted air volume flow controller with an integrated regulation facility TCU-LON, including a LON monitoring facility. 12 laboratory hoods were each allocated to a TCU-LON supply air volume controller. Each zone represents an individual subnet with 25 nodes that were bound via a configured router and the backbone.
Within a particular zone, the laboratory hood controllers provide their current volumetric flow rate to the supply air volume flow controller which correspondingly readjusts the volume flow so that the pressure behaviour within a zone remain constant. Parallel to this, a room pressure transmitter measures the current room pressure and corrects the controlled values. The total controlling processes occur simultaneously through which correction times of <1 sec occur.
Via the router, the building management system is provided with possibilities of operating mode shifts (day-night reduction, emergency operation) and all reports from the controller, such as alarm, air amount too low, emergency operation, current volumetric flow rate etc. are transferred.

The backbone combines all laboratory zones and is switched on to the control central.
Faults in the system are recognised here immediately and the consumption value is registered so that the system continually runs under optimal conditions.
The cabling efforts were minimal, as within a zone only a 24 V AC voltage feed network and a two-core bus cable had to be pulled to the controllers. Additional control cabinets were not necessary. The connection between the individual subnets (Backbone) was likewise possible over a mere two-core bus cable.

Summary:

Through the implementation of Labcontrol-LON, the system construction, the wiring, the utilisation comfort and safety were able to be optimised to such a degree that the requests for flexibility and expandability were completely fulfilled.
The customer checked and rated the cost-benefit relation and found it to be very good.
Calculations showed that the annual energy savings will lie in the region of 30% and that the system will thereby have depreciated itself within a period of 3 years.
By means of the decentralised Labcontrol-LON system, no additional control cabinet volume was needed.
The cabling efforts compared to conventional wiring were reduced by factor of 8.
The system could be set into operation zone by zone, independent of building progress. In this way, the shutdown times were reduced to a minimum.