PRESS RELEASE

Intralogistics for the aluminium industry

Caution, People Hard At Work!

When others are running out of steam, the engineers at Vollert Anlagenbau are just getting into their stride, specialising in intralogistics systems for heavy goods – especially for the metalworking industry. For the aluminium extrusion works of apt Hiller for example, Vollert developed a fully automated intralogistics system which facilitates an end-to-end material flow from the extrusion works to the processing department and then on to the downstream anodising plant and newly constructed shipping warehouse. Major parts of the new system were installed and existing systems modernised and integrated while production was ongoing. As well as a higher handling capacity, the virtual warehouse of the transport control system allows optimum utilisation of the space offered by in-process stores, even with different sizes of transport basket.

We often come across aluminium extrusions in the shape of door and window frames or car trims in our daily lives. They are far more frequent – though perhaps less visible – inside air-conditioning systems, as housings for electric motors and in machinery and plant. What they all have in common is the way they are made: they are extruded from aluminium billets as shaped sections up to 50 meters long, cut to manageable lengths of between six and eight meters, stacked automatically in transport baskets, hardened in furnaces at 180 °C and then surface-finished by anodising and further processed. Anodising (the electrolytic oxidation of aluminium) protects the shapes from corrosion and abrasion.

One of Germany's largest aluminium extruders is found at Monheim on the river Rhine. Here at apt Hiller, four extrusion presses produce the required shapes – 43,500 tonnes of them last year alone. The plant anodises over three million square meters of aluminium surface every year. Since the old internal transport system was only partly automated, and frequent manual handling operations within the plant posed a risk to its high quality standards, the material flow was fully automated as part of the construction of a new shipping warehouse. To keep costs within reasonable limits, the engineers from Vollert incorporated existing systems into their design and modernised them.

Areas connected by a tunnel shuttle

Incorporating an existing link between the extrusion plant and the anodising shop posed a particular challenge. apt Hiller has a 200 meter long 'tunnel shuttle', a particular logistical

solution which was integrated into the central transport control system and upgraded in line with the new handling capacities. To meet the increased throughput, the shuttle was fitted with reinforced running gear and can now perform 15 journeys per hour and is available 24 hours a day, carrying up to 3 tonnes of aluminium shapes on each outward trip from the extrusion plant to the anodising shop. On its return journey the shuttle brings back empty transport baskets and delivers them to the various loading stations. In the past, the full and empty transport baskets were loaded by an automatic crane. This crane had reached the limits of its capability, so fully automated lift and chain conveyors now perform its functions at the newly created packing station for the anodising shop. Meanwhile the old crane has been modernised by Vollert and equipped with an onboard control system, so continues to be available for special duties within the shuttle station. Here, a lowering rig lowers the baskets down four meters into the tunnel where they are transferred to the shuttle. This core element of the system can handle up to 380 baskets a day in three shifts. The lift's capacity is actually rated for 480 baskets a day, leaving plenty of capacity for future production growth. The loading station at the end of the packing line is automatically fed with an empty basket from the buffer store via roller and chain conveyors. The baskets are stacked in the buffer three-high so as to make optimum use of the available space. A static basket destacker separates the baskets for the loading station.

The entire handling plant is controlled by a newly developed central transport control system which ensures that the automatic crane provides the right baskets at the right time. Vollert's designers had to address a number of specific criteria here: "The smooth sequence of operations is dependent on the transport baskets being correctly sorted," explains Henry Schulze, the project manager responsible at Vollert. "Because of the customer's specific requirements, the system has to be designed for four different types of basket with two different basket widths which perform a total of seven different transport tasks and differ in height, width and length. Since all the baskets are in circulation at the same time, the transport control system (TCS) has to forward plan the mix ratio of the baskets to ensure that sufficient numbers of each type are available at all times. The right basket must be in the right place at the right time."

Smaller baskets are stacked two-high to maximise the shuttle's carrying capacity, though this is not possible with large baskets owing to the height of the tunnel. The customer's own baskets are fed into the system in a transport basket supplied by Vollert. The baskets can also be coded as "fast-track", "part-load" and "intermediate storage", as well as being assigned to the different end points located around the plant with its many branches. This

is made possible by a central identification system which uses barcodes to link the load to a particular basket number. Barcode scanners with oscillating mirrors read the barcodes as the transport baskets move around the system, so the location of a particular basket can be identified at any time. A failover guarantees that positional data are not lost following an emergency stop or power failure.

Orders for the anodising plant that were previously requested "on demand" can now be placed centrally at terminals. The TCS assembles the desired sequence and automatically generates traversing instructions for the automatic cranes.

A lift as high as a house handles the heavy load

The same goes for the lifting station installed by Vollert at the 'terminus' in the anodising plant. After passing through the tunnel the transport baskets arrive here on roller and chain conveyors. The lift covers a height of no less than 14 meters at a rate of 0.5 m/s to connect the station in the basement with the ground floor and the first floor. Aluminium extrusions destined for further processing or dispatch are transferred at ground floor level, while those intended for surface finishing are automatically taken to the clamping area on the first floor. Transport baskets are collected from and delivered to a two-level conveyor system – full baskets are transferred to the upper conveyor, empty baskets are transferred from the lower conveyor to the lift and returned to the station. In the anodising shop on the first floor the extrusions are picked up by a new Vollert automatic crane and set down in a 60 meter long buffer store. The load – which can weigh up to three tonnes – attains speeds of 1.5 m/s. The automatic crane subsequently lifts the baskets into one of the four specially designed transfer gates on hand trucks which are then taken for clamping to the anodising shop. Empty baskets are transferred back to the automatic conveyor system using the same transfer gates.

In the processing department on the ground floor, a second automatic crane newly designed by Vollert services an in-process store which has been configured as a production buffer to handle the fluctuating cycle times and transit times of the adjacent plants. Vollert's automatic crane in this area has an 18 meter span and is equipped with a crab which allows diagonal movement. The crane's four wheels are independently driven to achieve high rates of acceleration. A laser rangefinder mounted at each end of the crane beam guarantees its accurate approach to its destinations. The automatic crane acts as a distribution level between processing and the packing department. This calls for very fast cycle times so a hoisting speed of 0.7 m/s was selected. The grabs of the automatic crane can also swing

upwards so as to make the most of the confined space available. In this way loads can be withdrawn out of the area over the top of stacked baskets, and diagonally too if necessary thanks to the crab. This avoids waiting times and maximises handling capacity.

Virtual warehouse optimises space

The engineers from Vollert were also able to increase the storage capacity even further. The system's virtual warehouse uses a flexible storage grid to make optimum use of the available space and to minimise the space wasted when storing the different sizes of basket. A grid with a length of 12 cm is created as a basic pattern, and smaller or larger baskets are set down flexibly within corresponding multiples of this. The transport control system even allows for the different stack heights of the various types of basket. Terminals at different points around the system display its occupancy and degree of utilisation. This was just one of a number of aspects which persuaded apt Hiller to opt for the Vollert solution, according to Arwed Rüter, its Head of Plant Engineering: "We were looking for a central intralogistics solution that would increase the handling capacity of the whole plant and reduce damage in transit, while at the same time offering sufficient flexibility when processing individual jobs. Vollert's solution has brought us all these benefits." Despite the central sequential control for example, the shift leader in the anodising plant can override the system and alter the job sequence. Job data can be changed and delivery brought forward at any time. The TCS automatically takes account of urgent jobs and the capacity of individual buffer stores in its scheduling.

Close coordination ensures uninterrupted production and safety

As well as the engineering brief, the project team were faced with a time challenge, as the new intralogistics solution had to be up and running quickly and without disrupting production. To guarantee this outcome, structural operations that were part of the project – such as opening up the wall of the factory and extending the first floor of the anodising plant – were precisely timed. A phased upgrade and commissioning within the space of just a few weeks was made possible through intense logistical planning in close cooperation with the project team at apt Hiller in advance of the actual installation. Vollert's engineers needed just one year from project engineering to acceptance. This included the parallel creation of a tailor-made safety concept and getting it approved by the employers liability insurance fund and the health and safety authorities. "The dispatch, packing and anodising departments in particular called for special solutions," explains Henry Schulze "owing to their interfaces between the automated plant and our employees. To avoid unnecessary

shutdowns in overall production as far as possible, we prioritised operator actions right down to the final emergency stop." The doors of the safety gates in the anodising department are also fitted with a special end-of-cycle control so that when the extrusions are removed from the plant it does not stop unnecessarily but first completes its regular cycle. Jürgen Hoffmanns, Head of Logistics and project manager at apt Hiller, expressed his satisfaction after the first few months of full operation, declaring "The new intralogistics has already proven its worth. The automation of the plant and its high availability have allowed us to increase capacity, which in turn benefits our customers who are pleased their orders are delivered on time."

About Vollert Anlagenbau GmbH

As specialists for heavy loads and large parts, Vollert Anlagenbau GmbH develops turnkey intralogistic concepts for the aluminum and metal industry. As a general contractor and full-service provider, the service range encompasses state-of-the-art material flow, storage and packaging technology as a stand-alone solution or integrated into a larger logistics environment.

Whether fully automated mega-high bay systems for aluminum coils, intelligent material flow systems for the leading aluminum extrusion press manufacturers, the world's most efficient storage and retrieval machines for the storage of sheet metal plates, automatic crane systems for 50 tons and more or the most modern surface coating systems – Vollert is everywhere.

Vollert's plant and machine solutions are used in more than 80 countries worldwide. Its subsidiaries in Asia and South America also strengthen the sales activities. Vollert employs 250 people at its company headquarters in Weinsberg. **www.vollert.de**

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Image 1a
The hardened aluminium extrusions weighing up to 3 tonnes are distributed fully automatically to the other stations in the factory on roller and chain conveyors and a transfer carriage (red) at the new packing station.

Image 1b (detail)
At the so-called station (yellow) a centrally controlled lowering rig (blue) transfers up to 380 transport baskets a day to the 200 metre long tunnel shuttle leading to the anodising shop.

Image 2
Centrally controlled lifting rigs (red) and roller and chain conveyors transfer the bundles of extrusions from the anodising shop to the packing and shipping areas. The system automatically returns empty transport baskets to their starting points within the system.

Image 3
A flexible storage grid enables the central transport control system to make the best use of the available space even with different basket sizes. The automatic crane can also allow for the different stacking heights of the baskets.

Image 4
A Vollert automatic crane with an 18 metre span acts as the distribution level between the extrusion processing and packing areas.

Image 5
The automatic crane's four wheels are independently driven to achieve high rates of acceleration. A crab facilitates diagonal movement.

Image 6
The automatic crane's grabs can be swung upwards, so loads can be withdrawn out of the storage area over the top of stacked baskets at any time.

Image 7
A laser rangefinder mounted at each end of the crane beam guarantees its accurate approach to its destinations. Fast cycle times are achieved with the lifting rate of 0.7 m/s.