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STAHL CraneSystems

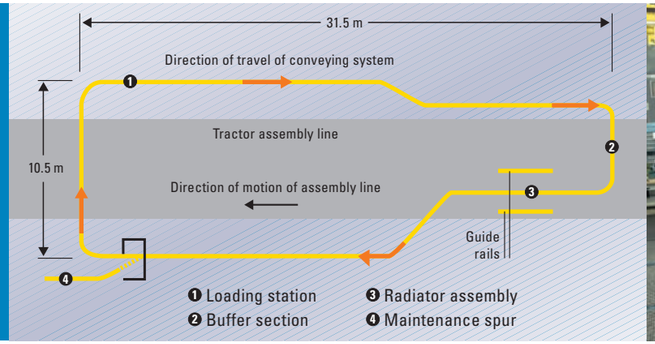
Overhead monorail for tractor radiator assembly John Deere, Mannheim

Type of installation circular runway in special KT2000 profile _ **Length of runway** 93 m with maintenance spur **Trolleys** _ 8 monorail trolleys, each 250 kg S.W.L. _ **Hoists** STD 1005-8/2 2/2-2E dual chain hoists _ **Power supply** eight-pole conductor line integrated into system _ **Equipment** radio remote control with redundant infrared signal, travel speed synchronised with assembly line, chain hoist at right-angles to runway, can be moved on special skid

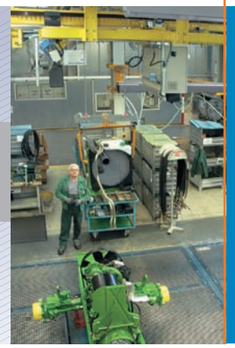
Lifting technology | Drive technology | Control technology

STAHL CraneSystems

Only low-maintenance systems ensuring maximum availability are used for supplying material to the assembly line in the series manufacture of the tractors.

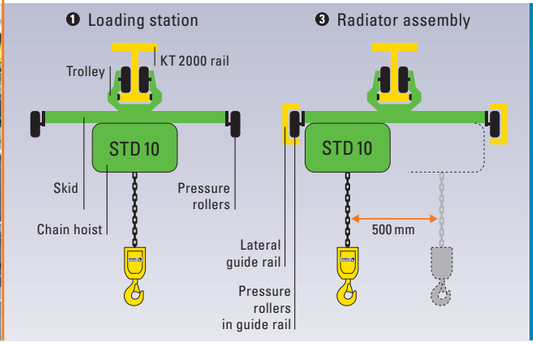


The radiator is taken up manually at the loading station by means of radio remote control.



The trolley transports the radiator on the circular runway without swinging thanks to the load pick-up on two hooks.

At the loading station, the load is centred under the monorail. For assembling the radiators, the hoist can be moved at right-angles to the runway on a freely movable skid, as the tractors have different wheelbases.



Tractors for the German and international market are built in the Mannheim factory of American agricultural machinery manufacturer, John Deere. Approx. 2600 staff work here at the second largest location in the world of the US specialist from Moline, Illinois. Over 200 tractors leave the line every day in one of the most modern tractor factories in Europe.

Starting situation On the tractor assembly line, there are a great number of hoisting and transporting tasks to be solved, after all the continuously moving line must not be subject to failures or downtimes. Thus the speed of the line on which the various tractor components are installed in sequence is the deciding factor for every transport task. Similar to the motor industry, the correct parts must be supplied "just in time" to the relevant tractor. Supply reliability must be planned so that the line can continue to run even if failures should occur in subordinate processes – such as pre-assembly. Conventional logistic concepts for the transport of components to the assembly line include for example manually operated bridge cranes. A similar crane was used at John Deere in the past.

Requirements The John Deere production specialists analysed the work processes involved in installing the radiators and came to the following interesting conclusions. **Costs:** The path covered by each radiator was 35 m in one direction. Manual delivery of the radiators by means of a bridge crane practically necessitated one operator full-time. **Quality:** As the radiators were suspended from the crane hook it was not possible to exclude damage to the radiators or tractor components. **Process safety:** There was no buffer storage space for the radiators so line downtimes with correspondingly reduced productivity were possible. **Safety at work:** As the crane speed was not synchronous with the line speed, operating the crane was difficult. Assembly had to be performed on the line in motion with the radiator still suspended from the hook, a mistake might cause the radiator to be pulled off the crane hook.

Realisation Various concepts were discussed in a dialogue with the customer to increase the cost-effectiveness and process safety of the radiator assembly. The solution was found in splitting the control of the functions "lifting/lowering" and "horizontal transport". A suspended monorail system with partially automatic control on the basis of the KT 2000 small crane system from STAHL CraneSystems was implemented.

Tractor assembly Eight trolleys for taking up the radiators were installed on a circular runway of a total length of 93 m. The 250 kg loads were lifted in the trolleys synchronously at two points electric chain hoists STD10 at a speed of 8 m/min and a creep speed of 2 m/min. The two-point load pickup ensures that the radiators do not swing during transport. The travel motion is stepless up to 10 m/min using KT2000 friction wheel drives. Horizontal travel is automatic while the lifting and lowering motion is manually operated. Equipping the circular runway with eight trolleys ensures that a buffer store of five trolleys carrying radiators is always available at the assembly line. Attaching the pre-assembled radiators at the loading station is manually controlled by means of radio remote control. The load is lifted to a safe height automatically. Transportation to the buffer store is also automatic. Here the radiators wait to be called for by the assembly workers. This call is initiated by radio remote control as soon as a new tractor chassis arrives at the assembly point. The trolley moves to an unloading station and travels automatically at line speed, its longitudinal position above the line can be corrected by accelerating the drive. As the tractors have different wheelbases, correcting the exact position of the trolley at right angles to the line is also necessary: the hoist is therefore mounted in the trolley on a freely movable skid with 500 mm travel so that the load position at right angles to the monorail can be corrected. Dangerous diagonal pull on loads is thus excluded by the design. A special safety concept was realised for the remote control of the individual trolleys: In addition to the radio signal an infrared signal with a restricted range is transmitted to the trolley.

To improve process safety, a maintenance spur was planned onto which a trolley can move via a track switch. This means that while one trolley is being serviced, the others can continue operating without interruption.

The whole system was designed in autumn 2004 and installed and commissioned around New Year 2005, including the suspension structure required.

Result The KT2000 system by STAHL CraneSystems plays all its trumps in this system with bends and track switch: The trolleys are supplied with 3-phase A.C. current and control signals by the integrated maintenance-friendly conductor line making KT2000 an ideal platform for automation tasks in the vehicle manufacturing industry.