

ROLLER SUPPORTED CABLE CARRIER SYSTEM: EFFICIENT CONTAINER CRANE OPERATION


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Ship-to-shore (STS) loading systems form a bridge between container ships and port facilities to allow easy loading and unloading of cargo hold. At the Manzanillo International Terminal (MIT) in Colon, Panama, several container cranes are in operation around the clock. This requires a particularly high level of robustness and availability for the systems and all components to prevent costly failures and downtimes.

This was the case with their Shanghai Zhenhua Heavy Industry Co. (ZPMC) Crane #23 at this port facility – the old cable carrier was no longer able to meet the requirements. MIT was in the market for a new turnkey system that would take the performance of their cable track systems to the next level.

MIT is one of the largest container logistics networks in the Americas. Their location at the entrance to the Panama Canal makes this a key logistics point for container traffic as ships pass between the Atlantic and Pacific Oceans. This terminal operates over 25 STS cranes that all need to operate reliably 24/7, seven days a week. With this type of reliability requirement, when it came time for MIT to replace their cable track system on Crane #23, they decided to conduct a broad search to insure they reviewed and implemented the latest in cable track technology to get the maximum life and reliability of their system.

TRACK AND CABLE LIFE

MIT was looking to improve upon some of their current cable track problems. The current track

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Installation photo
of TKHD/RSC
at Manzanillo
International Terminal



installed on their crane had small rollers that were integrated into the sideband links of the track at every metre. This design initially lowered the tow friction, but because only a very small portion of the roller was exposed over a relatively large gap, the wheels eventually failed turning this system into a gliding system.

Once this happened the tow forces increased and track abrasion began to take place. Because the wheels rode over each other in their current design, this also caused increase vibration and noise.

The final point of improvement that MIT was demanding from any potential replacement cable track was to stop cable jacket abrasion from taking place within the cable carrier. In their current system they had seen cable jacket abrasion taking place where the cables interacted with the cable track cross-bars.

TURNKEY PROBLEM SOLVER

MIT contacted several suppliers and asked for suggested solutions. Despite the problems with the old

system, a cable carrier was the optimum choice. Because of the application requirement, neither a festoon system nor a conductor rail would be considered for this application. The type of cable carrier consequently was to remain the same, but a lot of other aspects had to change, especially with regard to wear. The improvements in this area had to be clearly demonstrated by comparative measurements.

Other requirements were easy maintenance and a high level of reliability. And of course the general specifications had to be met as well: the ZPMC crane required a travel length of 112 metres which can support a velocity of up to 2 metres per second, acceleration of up to 0.5 metres per second squared and an additional load of 35 pounds per metre, and last but not least they wanted a 'turnkey system'.

MIT was looking for a supplier to completely design and implement the project, from overseeing the demolition of the old system to the commissioning and installation of the new. After viewing cable track

options in the market, MIT decided to work with Tsubaki KabelSchlepp. MIT was particularly impressed by the proposed design to make this cable carrier a fully exposed wheeled system that would ride on rails. At no point would it be possible for the top and bottom sides of the cable track to touch each other. This would fully eliminate the track abrasion issue they had experienced.

Also, because the wheels ride on a rail, and not on the side-band, the design eliminated the vibration concerns that had been expressed. Installation on the ZPMC Crane #23 of the terminal began in March of 2018 and was completed that same week. The team led by project manager Thorsten Serapinas, Manager Project Engineering at Tsubaki KabelSchlepp, implemented a turnkey system consisting of a cable carrier and guide channel, including a floating drive arm and proper strain relief as well.

FLEXIBLE, ROBUST, EASY TO MAINTAIN

The selected carrier for this application was the new TKHD90 that had been specifically designed and tested by Tsubaki

KabelSchlepp for long travel crane application and to be used in a roller supported chain (RSC) guide channel configuration. The TKHD90 also features anodised aluminium cross bars to provide maximum strength and at the same time reduce the potential for cable jacket abrasion. These bars can be easily opened from both the inside and outside radius of the track.

With the RSC, the upper track section does not glide on the bottom track or trough, since it runs on rollers. The fully exposed rollers are mounted on ball bearings at the side of the carrier and allow very long travel lengths requiring substantially less driving power. The tension and thrust is 90 per cent less than a comparable gliding system. Since the wheels are fully exposed, there is also no concerns of them 'locking' in position. The rollers run on the guide rail and do not contact other rollers. Ball bearings and a polyurethane roller surface additionally contribute to quiet and smooth operation.

"We are fully satisfied with the new system and with the cooperation with Tsubaki KabelSchlepp," David Avice from MIT confirmed. "The well thought out design is meeting our expectations."



RIGHT

Testing of the RSC system to duplicate the actual travel and speed that a cable track system on a STS crane



ABOUT THE AUTHOR

David Smith is the Director of Sales for the KabelSchlepp Division of U.S. Tsubaki Power Transmission LLC. He has been a part of the KabelSchlepp team for the past 17 years and has been involved in the industry for 25 years.

ABOUT THE ORGANISATION

U.S. Tsubaki is a subsidiary of Tsubakimoto Chain Co., a leading manufacturer and supplier of power transmission and motion control products and is the world's market share leader in roller chain. Tsubaki provides optimal and customisable solutions for a range of applications within the Port Crane Industry. These include Cable & Hose Carriers and Cables, Roller Supported Chain Systems, Drive Chains, Leaf Chains, Backstops & Clutches and Electric Actuators. With nearly a century of successful manufacturing know-how and technical expertise, Tsubaki can provide the best engineered solution to fit your specific needs, and provide the Tsubaki Advantage.

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Second installation photo of TKHD at Manzanillo International Terminal