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# HOIST

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In 1986, a nuclear accident at Chernobyl devastated the surrounding area, and rained radioactive pollution across Europe. Now, a new shelter is being built to contain and dismantle the contaminated ruins; within the confines of the shelter four highly customised bridge cranes will play a vital role in the clean up operation

## Lifting in Chernobyl

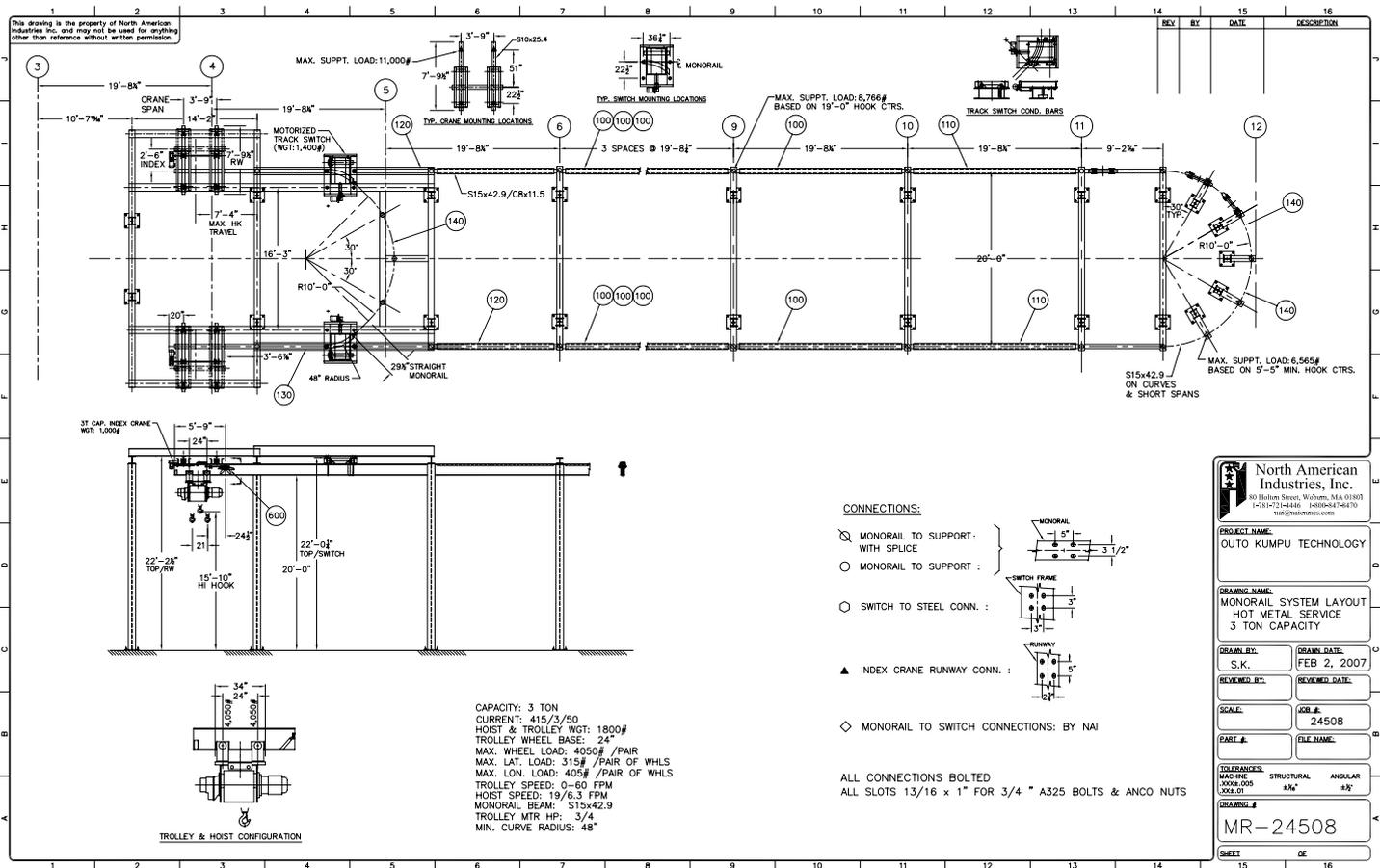
Drawing room ○ LEEA ○ Patent

CeMAT  
ASIA

CeMAT  
INDIA

# On its metal

A hot metal company in India has ordered a complex curved S-beam monorail crane system, designed and built by North American Industries



As the manufacturing processes of all industries, including metals, become highly automated, customised material handling solutions are a must to maximise efficiency and production. One such custom monorail crane design was recently engineered and manufactured by North American Industries (NAI) for a hot metal facility in India.

The monorail crane system was purchased by a global company in the metal and mineral processing industry from one of its locations in Canada. The company acting as contractor was in the process of designing and building a hot metal iron ore sintering plant for its customer in India where the monorail was shipped upon completion from North American Industries' manufacturing facility in the US.

## Design

This made-to-order custom monorail system was designed and built with three hoists and three trolleys running on a curved S-beam monorail. The hoists on the system carry ladles, while the monorail is designed to enable the ladles to receive hot metal from furnaces in order to deliver it to automatic pouring lines. There are two switches and two index bridges as part of the monorail system to maneuver the ladles into the right position. The index bridges side shift 30in and the switches allow the trolleys and their hoists to go either straight or on curve, depending on the operational requirements.

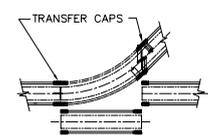
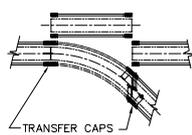
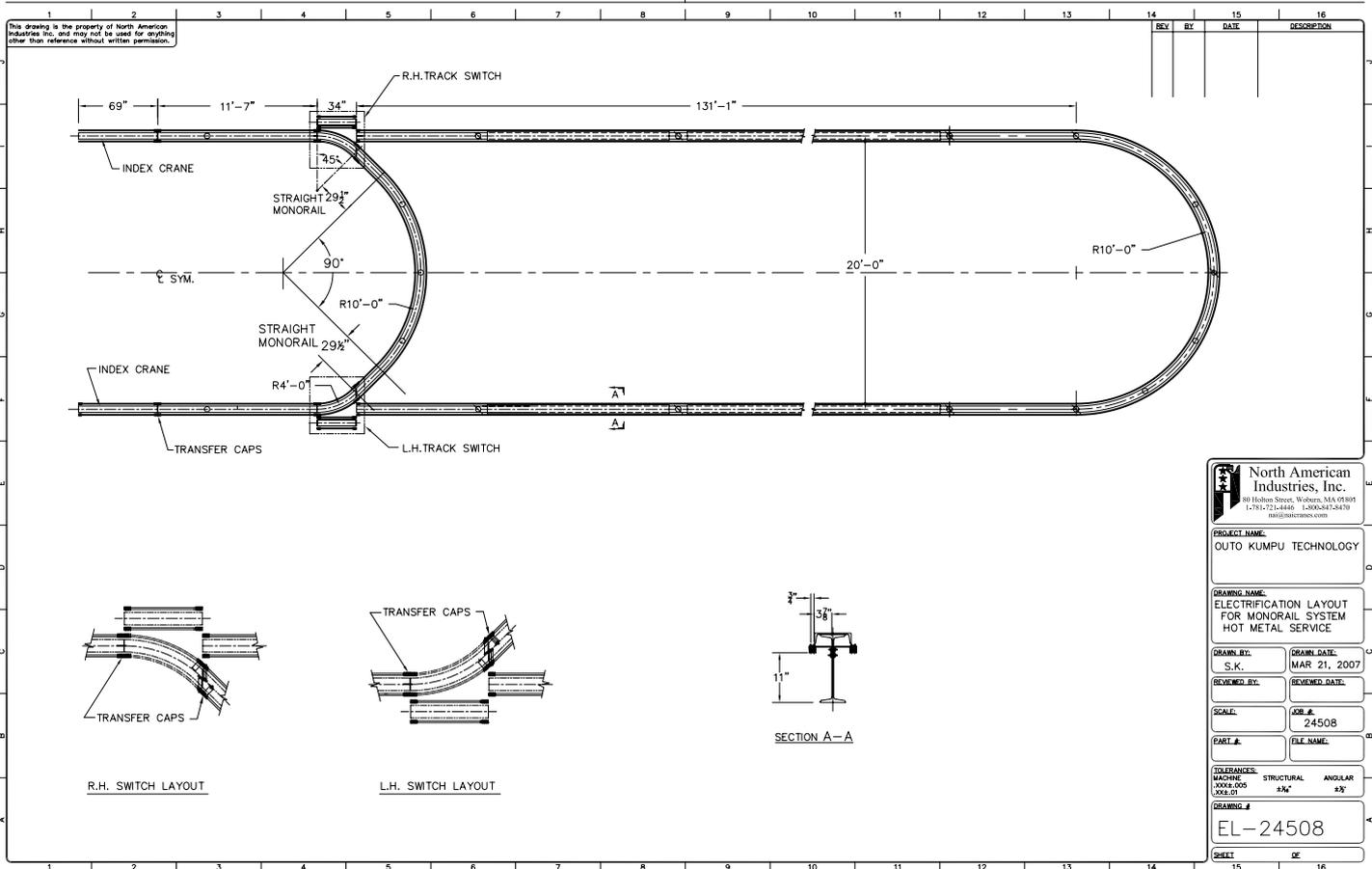
Special swivelling trolleys with drives below the rail enable the trolleys to go through the standard switch (shown on drawing TRHST24508).

The smallest radius is 4ft through the switches and 10ft elsewhere (drawing MR-24508). One of NAI's engineers describes how the track switch operates: "The track switch's function is similar to a railroad switch, however, I think that a railroad switch inner track pivots to re-direct the train, whereas our switch has two inner tracks, one straight and one curved and by sliding, it aligns either one with the incoming track and directs the trolley accordingly. The sliding is actually rolling and is motorised." The switch is shown on drawing MR-24508 and in more detail on SW-24508.

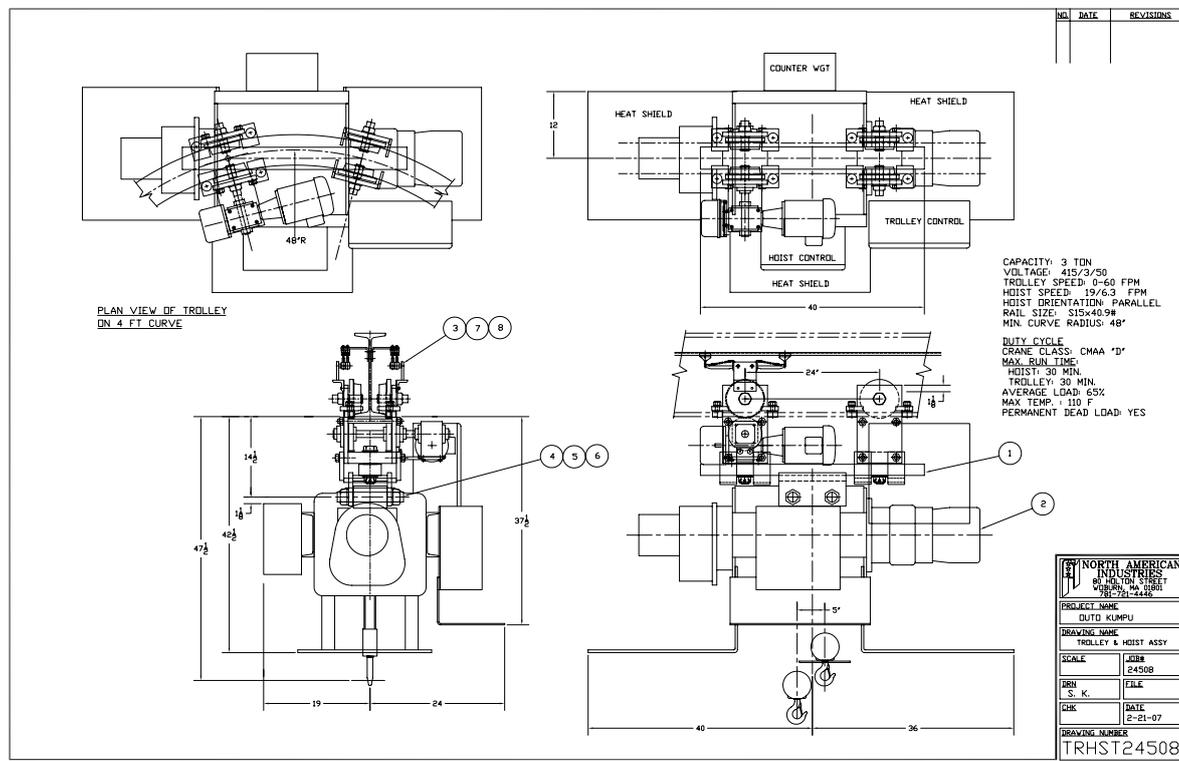
## Hot metal industry customisation

The curved track is not the only customisation on the monorail system that makes it especially suitable for the hot metal industry. The trolleys

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PROJECT NAME		
OUTO KUMPU TECHNOLOGY		
DRAWING NAME		
ELECTRIFICATION LAYOUT FOR MONORAIL SYSTEM HOT METAL SERVICE		
DRAWN BY	DRAWN DATE	
S.K.	MAR 21, 2007	
REVIEWED BY	REVIEWED DATE	
SCALE	JOB #	
	24508	
PART #	FILE NAME	
TOLERANCES:	STRUCTURAL	ANGULAR
MACHINE	±0.005	±0.01
	±0.01	±0.01
DRAWING #		
EL-24508		
SHEET	OF	
15	16	



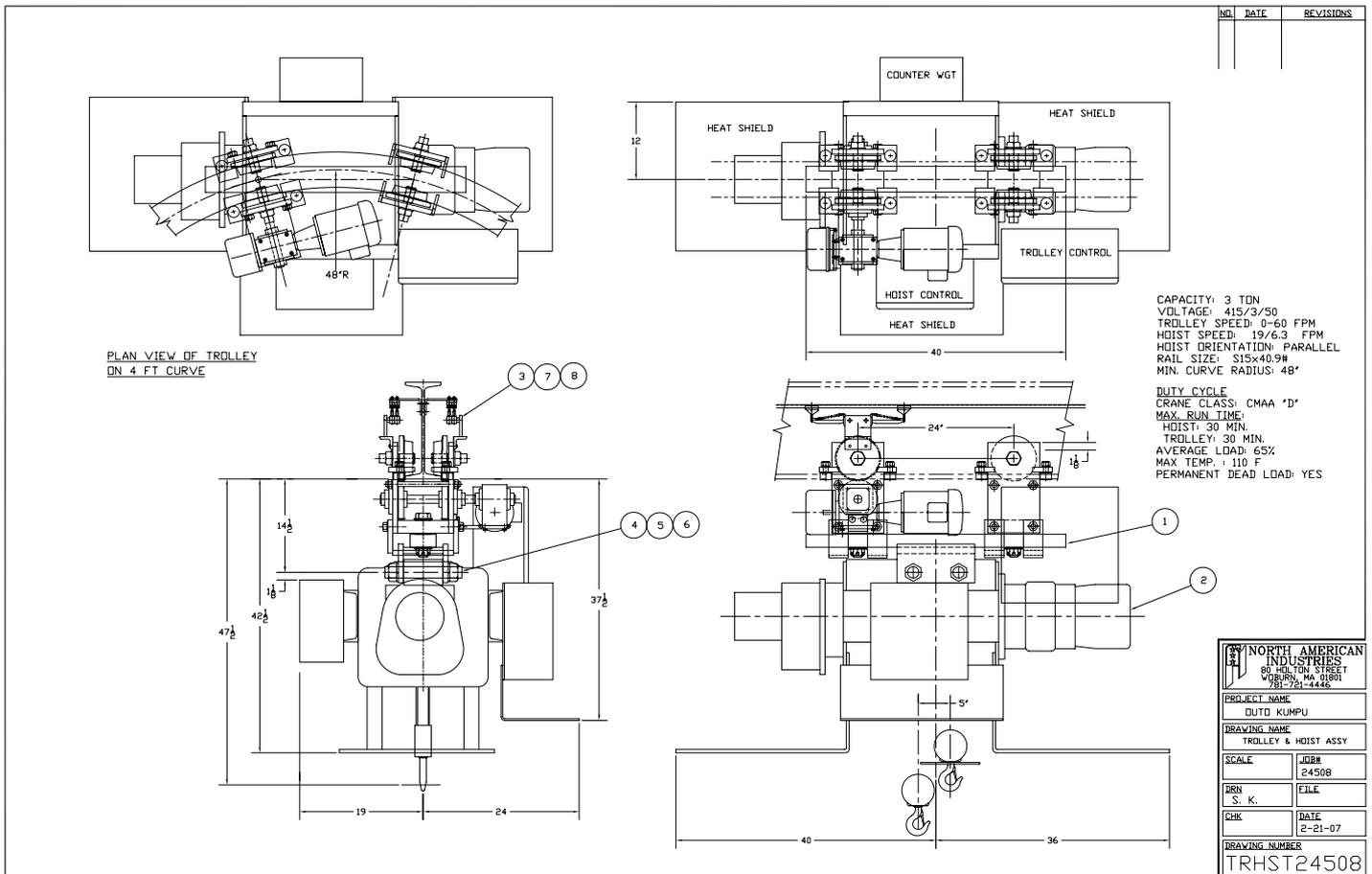
There are two switches and two index bridges as part of the monorail system to maneuver the ladles into the right position

NAI had to adjust the design to lengthen the system beyond the original specification

and track were designed for 3t capacities but 5 US ton hoists were deliberately used in engineering and construction. "Hot metal handling equipment requires higher safety

factors, so we usually utilise higher capacity hoists and de-rate them to the actual weight handled, thereby, automatically getting higher safety factors for the hoist," explains the NAI

principal engineer assigned to designing this crane system. The monorail was also designed with protection for the hot metal environment and meets NEMA 4



The two electric switches and two index sections are hardwired to the control station on columns

watertight standards. After the customer changes and the design completion, the linear length of the monorail ended up being about 365ft. NAI had to adjust the design at the request of the customer to lengthen the system beyond their original order. The purpose of a made-to-order custom crane is to increase efficiency and allow better output by the customer's facility, so customer change-orders are not a problem.

**Controls**

The two electric switches and two index sections are hardwired to the control station on columns. One control operates the northern switch and index station while the other control operates the southern switch and control station. Hoists and trolleys are operated via radio control. It is set up such that if one hoist trolley is being operated from radio control, the spare controller cannot operate that same hoist and trolley, thus eliminating the chance for multiple operators to interfere with each other trying to control the same hoist and trolley simultaneously from different locations. ■

**AN END USERS' GUIDE: CRANES IN HARSH ENVIRONMENTS**

**High temperatures**

Indoors, high air temperatures can cause electrical components and motors to fail much more quickly on a standard crane not built for such an environment. Heat is a by-product of electrical currents, and high ambient temperatures slow the dissipation of the heat from the electrical current. If the heat source is localised such as a furnace or ladle of metal below the hoist, a heat shield can deflect the heat away from sensitive parts of the crane.

Your crane manufacturer may also design your crane with control box fans and heavier, thicker wire insulation on the bridge electrification. NAI also uses class F insulation on end truck and trolley motors. Use of Class B insulation can allow the motor to burn out at temperatures that Class F motors easily withstand. Your crane manufacturer may also advise on the most appropriate hoist type and safety factor.

**Special environments**

Some cranes used in plating lines, galvanising facilities, or other open tank

chemical processes require cranes to operate in caustic and corrosive environments. A standard crane can sometimes work, but the lifespan will be very short and maintenance costs very high. By substituting materials that will not rust easily or using protective coatings, the affects can be minimised.

Cranes that carry hot metal require special safety features. NEMA 4X sealed control systems can keep the controls dry and protected from fumes. Splash guards and other small upgrades can reduce maintenance costs. Consult your crane manufacturer to make sure the equipment is designed with the proper NEMA rating if appropriate.

**Wise decisions**

Keeping certain spare parts on hand may also be a wise decision to ensure optimum uptime especially in environments where some parts may be more prone to wearing quickly. A recommended spare parts list can be created specifically for your crane's situation.