



SLAG TRANSPORT SYSTEM



WHAT WE DO

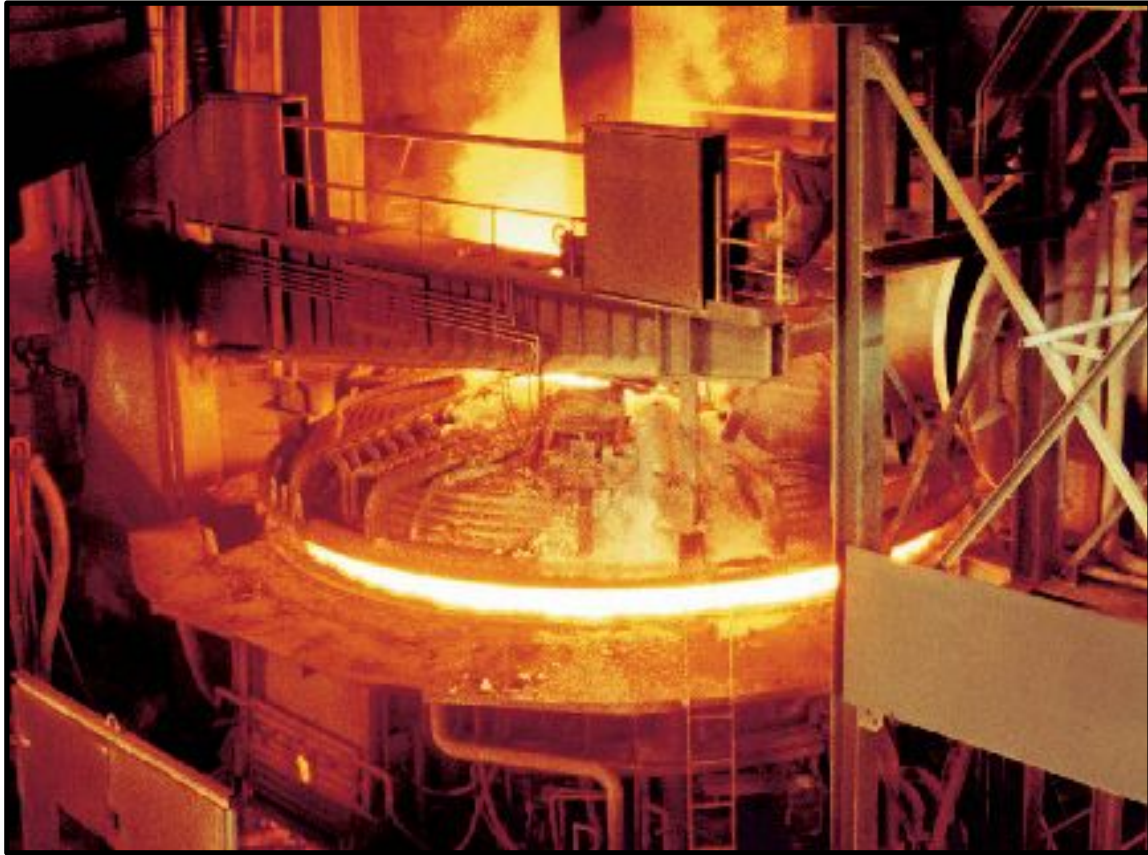


- Heavy load material handling solution providers
- Designers and manufacturers of load transporters, load carrying pallets and Slag Transport Systems
- Manufacturers of High Capacity Lift Trucks and Coil Handlers

THE EAF FOAMED SLAG CHALLENGE



MINI MILL SLAG HANDLING CHALLENGES



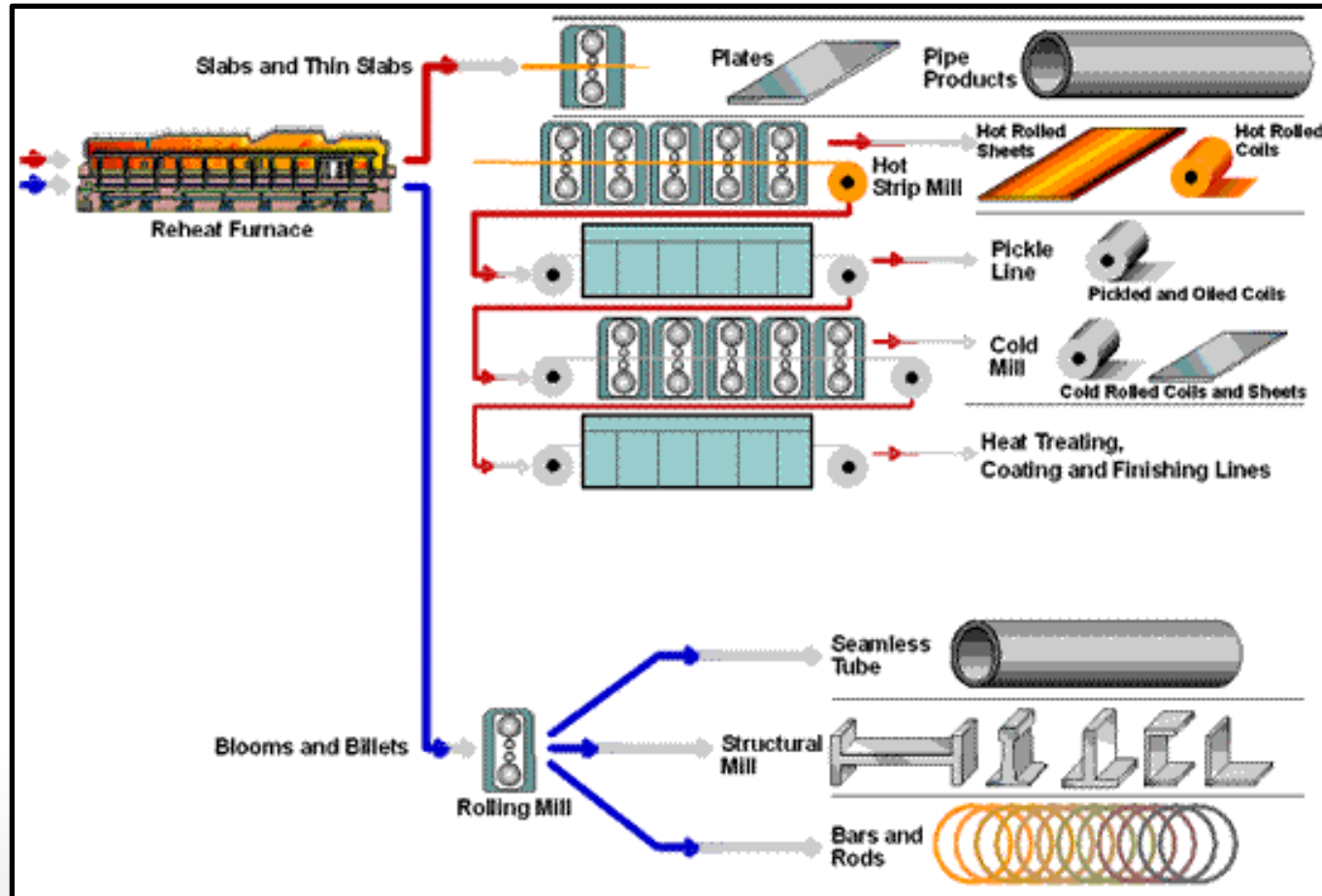
- Increased EAF foamed slag handling volumes from larger furnaces and increased oxygen and carbon injection
- Reduce energy consumption costs
- Reduced heat cycle times to increase tonnage output

MINI MILL SLAG HANDLING CHALLENGES CONT.



- Processing slag, recovering steel
- Safety
- Reducing operational costs to improve profitability

OTHER MINI MILL MATERIAL HANDLING OPERATIONAL CHALLENGES



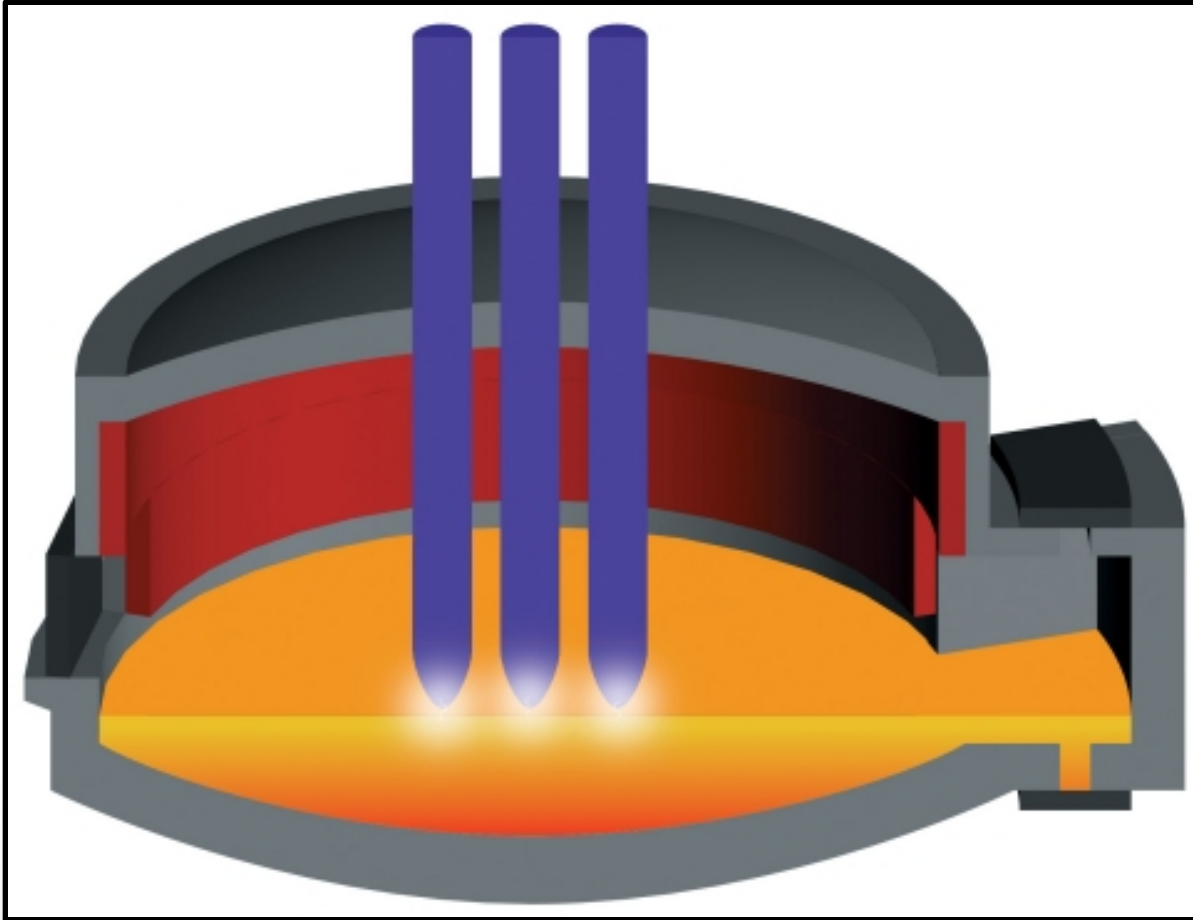
- Scrap handling
- Downstream product handling and transporting
- Process support material handling IE mill scale, sludge, rolls, mill scrap etc.
- Increased outsourcing of handling

THIRD PARTY MILL SERVICE CHALLENGES



- Safety
- Maintaining customer liquid steel
- Increased EAF foamed slag handling volumes
- Reducing operational costs maximizing returns to shareholders
- Providing expanded services to client base including scrap and downstream finished product handling & transport
- Maintain and develop new competitive advantages in service offerings to existing and new customers

EAF SLAG FOAMING CHALLENGES



- Oxygen & Carbon injection reduces electrical energy consumption, causes increased volumes of foamed slag and protects the furnace lining
- Reduces tap to tap times increasing production

EHF SLAG FOAMING CHALLENGES CONT.



- Typical operation requires 2 to 3 slag tap off cycles per heat IE 3 slag pot trips to and from disposal sites, usually causing furnace delays due to volume limitations of pots
- Fluctuations in foamed slag volumes can exceed the capacity of slag pots causing dangerous over flow and furnace cycle delays

TYPICAL SLAG POT & CONVENTIONAL CARRIER



- Cast Iron / Steel Construction
- Volume capacity approx. 25 m³
- Industry standard for decades



EAF SLAG FOAMING OPERATIONAL SOLUTION

- Requires increased capacity slag container and transporting equipment to enable un- interrupted continuous de-slagging with a single slag container removed once - at the end of the heat
- Impact – reduce tap to tap times by 33%
- Paling Transporter was challenged by a Middle East Steel maker to develop a solution – that is when **STS** was born

SLAG TRANSPORT SYSTEM - 'STS'



EVOLUTION TO SLAG HANDLING



CAPACITY & CARRIER REQUIREMENTS



- 260% increased slag container volume IE 65 m³ verses 25 m³ standard pots
- Transport carrier must be min. 150 tons to 175 tons total payload capacity slag and STS container pallet

STS CONTAINER PALLET AT FURNACE



- Stable design
- For operator, simplified entry, lift and go
- Travel path of transporter protected by container and pallet

STS CONTAINER PALLET



- High heat resistant steel versus cast iron construction
- Refractory lining not required
- High slag volume capacity 70+ m3
- Similar dry granular slag base applied prior to filling

STS CONTAINER KEY DESIGN FEATURES



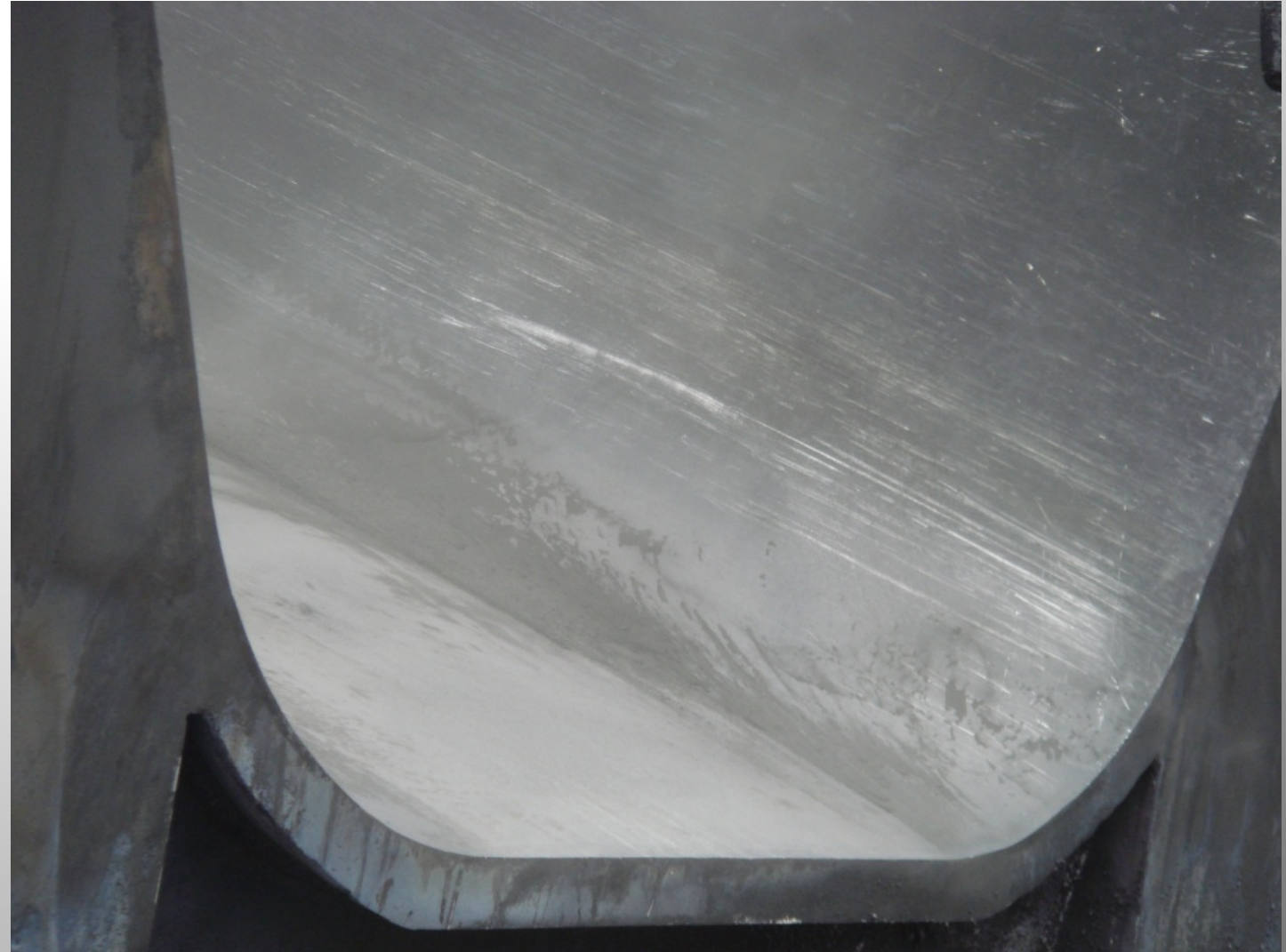
- High heat resistant steel
- Strength and durability 5x that of a cast steel pot
- Formed & fabricated
- Greater contact area increases heat dissipation

STS SLAG CONTAINER DOOR

- Self opening discharge gate with mechanical linkage controlled by container tilt elevation



INSIDE THE SEASONED STS CONTAINER



ADDITIONAL STS CONTAINER OPERATIONAL BENEFITS



- Safer container design
- More durable container

SLAG DUMP SITE VIEWS



STS - SLAG TRANSPORT SYSTEM



DEDICATED SINGLE FUNCTION SLAG POT HANDLER

ADDITIONAL STS CONTAINER OPERATIONAL BENEFITS - ELIMINATION OF SKULLS



- Elimination of skulls removal and labour- intensive processing
- Improved steel recovery in slag processing

TRANSPORTER OPERATION



ENTER PALLET



LIFT & DRIVE

STS CONTAINER TRANSPORTER

- Tight turning radius, and high maneuverability required inside most mills



OPERATOR SAFETY



- Double shielded operator cab
- High container sides
- Transporter can be quickly and safely extracted from under the pallet if required in an emergency

STS IN OPERATION



ENVIRONMENTAL IMPLICATIONS



RADICAL CHANGE IN TECHNOLOGY



SUMMARY: KEY COST SAVINGS AND ROI CONSIDERATIONS

- Increased steelmaking tonnage
- Fewer slag containers in system lower capital investment
- 1 trip versus 2/3 trips per heat to slag dump site
- Elimination of stuck skulls and skull processing
- Elimination single purpose high investment carriers
- Enables business case for introduction of downstream product handling CTS System for further operational cost savings
- Enhanced safety

OTHER USES FOR STS



CONTINUOUS TRANSPORT SYTEM - CTS



- Standardized pallets adapted to specific handling challenges
- Staging of empty and loaded pallets frees transporters to do multiple tasks
- Increased efficiency and utilization of handling equipment
- Lower total material handling capital investment and operating costs
- “Dumping Capable” pallets
- Transporter the base vehicle for STS – functionally similar to scrap dumping pallet

CTS PALLETS



- Welded steel construction
- Versatile flat deck equipped with fixtures to handle virtually any extreme weight / handling characteristic challenge
- Standard pallet weight: 20 – 25 tons
- “Dumper Capable”

STEEL COIL YARD OPERATIONS



FINISHED PRODUCT



SCRAP HANDLING



CHARGE BUCKETS



OTHER PLANT HEAVY ITEM TRANSPORT

- Mill rolls spent & finished
- Sludge, mill scrap etc.

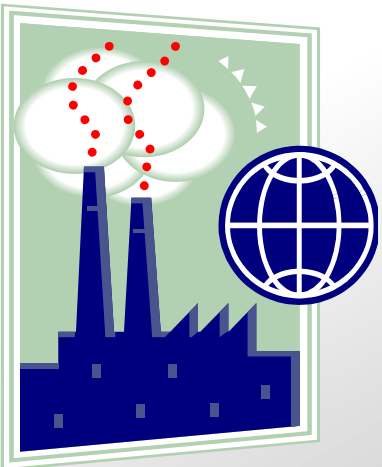




STS/ CTS TOTAL INTEGRATED TRANSPORTING AND HANDLING SYSTEM



THE CASE FOR STS & CTS



- Increased production tonnage
- Improved delivery performance to plant users & customers
- Lower material handling equipment investment
- Increased productivity
- Lower operational costs
- Reduced road damage & repair costs
- Embrace current world class technology

INNOVATION IN LIFTING PROFITS



PATENT REGISTRATIONS

CANADA

- CA2641529

USA

- US7993573B2

WORLD

- WO2007_087726