#### a group company of A MITSUBISHI HEAVY INDUSTRIES, LTD. MHI INDUSTRIAL ENGINEERING & SERVICES PRIVATE LTD.



## **ADVANCED CARGO HANDLING SOLUTIONS**



A JV Company between Mitsubishi Heavy Industries Ltd. (MHI), Japan and Anupam Industries Ltd., India

## Company Profile

#### Ahead in Technology Unmatched in Performance.

With more than 50 years of experience in material handling segment, we continue to thrive and innovate advanced concepts and technologies to ensure higher uptime. Our Cranes are designed with the help of sophisticated softwares at MHI, Japan and later manufactured at the two ultra-modern manufacturing facilities in India.

min also all 5 -

A perfect blend of Anupam's manufacturing excellence, skilled human resources and MHI's technological and management expertise leads to creation of top-notch cranes. Manufactured at state-of-the-art infrastructure, our cranes deliver high value at competitive pricing.



-

# Worldwide Distribution Of Our Cranes

#### a group company of A MITSUBISHI HEAVY INDUSTRIES, LTD. **MHI INDUSTRIAL ENGINEERING & SERVICES PRIVATE LTD.**

From establishing manufacturing processes to implementing distribution chains, ANUPAM-MHI is creating value for its customers, *globally*.

A rising demand of our container handling cranes and bulk material handling equipment in the global markets testifies the quality and expertise that goes into manufacturing each product at ANUPAM-MHI.





Ship to Shore Cranes Grab Bucket Unloaders





# Ship to Shore Cranes

### a group company of A MITSUBISHI HEAVY INDUSTRIES, LTD. **MHI INDUSTRIAL ENGINEERING & SERVICES PRIVATE LTD.**

#### Standard Features Can manufacture all kinds

of crane required by customers through our state-of-the-art technologies and vast experience of the international market. Can provide comprehensive engineering solutions through the independently developed basic/trunk control software in addition to advanced spreaders.

Advanced functions supported by our long experience and technical skill.

#### Auto Anti-skew Syster Improvement in the efficiency of loading/unloading operations through the automatic skew reduction of the suspended loads so far difficult to control. Semi-automatic Operation Improvement in

**Advanced Features** 

Operability

Anti-sway System

variety of electric,

both systems are combined based on the

accumulated

performance.

Rich selection from a

mechanical systems ar

hybrid models in which

experiences and prove

efficiency and reduction in operator's fatigue through the semi-automa sea-side/shore-side operations.



### • Container vessels from coastal

Available Vessel

feeders to super post panamaxes (22 rows).

ANUPAM-MHI brings you the most reliable

performance every time. Maximizing the

overall efficiency, we help our customers

generation high performance workhorse.

and dependable STS that delivers unmatched

achieve outstanding results by providing next

• Rich selection of multi-purpose cranes fully operable for bulk/pulp carriers.

	Maintainability	Safety
id า ค	Remote Monitoring Prompt support of technical maintenance and minimization of downtime by the real-time data communication with our engineering department.	Prevention of Collision with Vessel Crane/gantry travel comes to a stop before the mast portion of a vessel to prevent the crane from colliding with the vessel.
n	Reliable Structure • Light weight design with extensive fatigue life of structure achieved by using ADAMS dynamic analysis and FEM analysis. • Highly reliable crane	Prevention of Snag Load Crane damage due to the abnormal catch on a container vessel is prevented and thus safety is ensured.
on	structure drastically reduces maintenance.	Seismic Isolation System Can withstand an earthquake with an intensity of the Southern Hyogo Earthquake class, and the crane loading/unloading after earthquake are also easy. Influence on the foundation is minimized thanks to absorption of earthquake forces.

# Ship to Shore Cranes





#### A New Generation of Super Lightweight Container Crane

With a focus on innovation and technological advancement we are doing a lot more than just meeting customer requirements - We are also anticipating their needs for tomorrow. Our Super Lightweight Container Crane is a result of this commitment. Specially designed to move the containers higher, faster and more accurately these cranes are setting new standards in container handling industry.

#### Features

GUIDE

PRODUCT

07

- Projected as a 22-row vessel compatible container crane installed in the exiting wharf exclusive for 18-roll vessel without needing any drastic reinforcement absorption of earthquake forces.
- Lightweight has been realized by the adoption of 3-point hanging by mean of the boom tension bar, while the boom/girder are formed to a simple box with trapezoidal cross section to materialize lightweight.
- Reduction of the boom weight has been achieved through the configuration of converting the tilt system (formerly installed in the boom end) to the rear of the girder to be installed with the small-turn device and anti-snag system.
- The rated load capacity of 61 tons makes it possible to hoist two 20-feet containers (30.5 tons each) simultaneously.



#### Automatic Anti-Skew System (Patented)

Improved efficiency of cargo handling thanks to the short-time attenuation of the loading skew that is difficult to control.

- Detection of loaded positions by means of the image processing technology.
- Simplified mechanism (activation of the existing skew device). • Excellent anti-sway performance.
- The optimal regulator control realizes skew attenuation and positioning simultaneously.



#### **Remote Monitoring**

#### Effects of Introducing the Crane

- Attentive support is provided by the AMIL engineers who have a thorough knowledge of hardware and software in the event of trouble.
- Proper upkeeping of the crane through a long-term maintenance service.

### 

#### a group company of A MITSUBISHI HEAVY INDUSTRIES, LTD. **MHI INDUSTRIAL ENGINEERING & SERVICES PRIVATE LTD.**

#### Seismic Isolation System (Patented)

#### Functions

- Lowering of the crane natural frequency by means of the seismic isolation system installed on the legs of the cranes.
- Decrease of the acceleration of seismic response.
- Decrease of seismic loads onto the crane.
- Structural reinforcement is unnecessary owing to the reduction of the stress on crane legs.
- Prevention of derail by the control of rocking vibrations.
- Reduction in the crane reaction to the wharf.
- Maintenance of functions and soundness of the crane
- systems after suffering from an earthquake are possible.



## **Transfer** Cranes

RMGC (Rail Mounted Gantry Crane)

Highly Sophisticated Transfer Cranes to Enhance the **Efficiency of Container Yard** 

**ANUPAM-MHI** Gantry cranes include Transfer Cranes for on/off loading available in a broad range of lifting capacities. Specially designed for space intensive container stacking these cranes meet the most demanding requirements of modern day ports and ensure highest customer satisfaction. Featuring state of the art technology ANUPAM-MHI Transfer Cranes guarantee excellent reliability, performance and long service life.

#### RTG (Rubber Tyred Gantry Crane) 8-Wheel and 16-Wheel Lineups Conformed to Permissible Wheel

#### **Standard Functions** Auto Steering

Automatic straight travel is provided enabling a facile maneuverability.

#### Mechanical Anti-Sway System

Highly reliable and efficient anti-sway system adopting mechanical sway attenuation.

#### Smart Hoist

Cycle time is shortened by the increase of hoist speed/ acceleration to the limit of motor capacity according to the load conditions.

#### **Automation Features** Magic Eye

Automatic stacking operations are made possible using the eye (camera) installed on the spreader. This can reduce the burden on the operators (compatible with 24-hour terminal operation).

#### Right-Angled Stop of Travel

An automatic right-angled stoppage is practicable at each loading/unloading position, providing high efficiency by cutting down on the troublesome positioning operation.

#### Prevention of Collision with **Adjoining Crane**

Collision prevention is achieved by detecting the echo from the adjoining crane by using an ultrasonic sensor installed.

RTG (Rubber Tyred Ga	ntry Crane	?)		RMGC (Rail Mounted Gantry Crane)		
Туре	1 over 4 stack RTG	1 over 5 stack RTG	1 over 6 stack RTG	Туре	(12 rows + 2 chassis) × 6 stacks	
Rated capacity under spreader	40.6 ton	40.6 ton	40.6 ton	Rated capacity under spreader	41.0 ton	
Lifting height under spreader	15.24m	17.75m	21.0m	Lifting height under spreader	21.668m	
Span	23.47m	23.47m	23.47m	Span	37.03m	
Trolley travel range	19.07m	19.07m	19.07m	Trolley travel range	45.43m	
Wheel base	6.4m	6.4m	8.0m	Wheel base	15.0m	Ш
Overall width	11.5m	11.5m	14.3m	Overall width	24.0m	III S
Operating speed Main hoist (m/min) T.Travel G.Travel	23/52 70 135	23/52 70 135	23/52 70 135	Operating speed Main hoist (m/min) T.Travel G.Travel	35/96 150 120	PRODUCT 6
Steering Differential and 90° cross travel					10	

#### a group company of A MITSUBISHI HEAVY INDUSTRIES, LTD. **MHI INDUSTRIAL ENGINEERING & SERVICES PRIVATE LTD.**

#### Stack Profile Sensor

Prevention of collision between stored containers and hoisted loads is achieved with a minimal interlock by means of the detection of the number of stacks per row, thus securing high efficiency of operation while avoiding the danger of collision perfectly.

#### Small-Turn System Skew Anti-Sway Mechanism

Small-turn system to manipulate the horizontal angle of spreader turn; angle of spreader turn is controllable without difficulty by the skew anti-sway system that takes hold of the spin, resulting in the improvement of transporting efficiency.

#### 

## Transfer Cranes

#### Automation

## The outline of the method for controlling hoisting acceleration/deceleration



#### **Smart Hoist**

Minimized cycle time achieved by the increase of hoisting speed/acceleration up to the marginal capacity of the motor depending on the load conditions.



**Prevention of Collision with Adjoining Cranes** Ultrasonic sensors are used for the prevention of collision through the realtime detection of the acoustic reflection from the adjoining cranes.

#### Small Turn System; Skew Anti-sway System

1 PRODUCT GUIDE

Equipped with small-turn system to manipulate the spreader horizontal angle which enables the sway control of the spreader horizontal spin. Facile maneuverability is ensured by the prompt curbing of the spin-sway developed due to the staggered center of the gravity of the containers.

## 



#### Automatic Steering

Strong rubber magnets are embedded breadth-wise and height-wise along the gantry passage to sense the magnetism, enabling the straight travel of a gantry at an accuracy of  $\pm 50$  mm.



#### **Right-Angle Stop**

Front/rear embedded magnets detect the amount of offset when coming to a stop, thereby enabling a right-angle stoppage.

# MHI INDOST





#### Stack Profile Sensor

Collision of the stacked containers with a loading cargo is prevented by means of the optical range finder detecting the number of tiered containers per row with minimum interlocking configuration.

#### a group company of A MITSUBISHI HEAVY INDUSTRIES, LTD. MHI INDUSTRIAL ENGINEERING & SERVICES PRIVATE LTD.

Spreader

#### Magic Eye

A camera is installed on the hanging beam to detect the offset between the suspended load and its target to ensure high precision of detection. A highly accurate automatic transport system has been achieved through the sophisticated operation combined with the predicted seating control.

anti-sway efficiency.



## Transfer Cranes

### a group company of A MITSUBISHI HEAVY INDUSTRIES, LTD. MHI INDUSTRIAL ENGINEERING & SERVICES PRIVATE LTD.

E-RTG (Electric Rubber Tyred Gantry Crane)

## E-RTG (Electric Rubber Tyred Gantry Crane)

Being a sustainability driven company, ANUPAM-MHI is constantly involved in developing innovative products and solutions that help in reducing environmental impact.

ANUPAM-MHI's Electric Rubber Tyred Gantry Crane is an exemplar product that combines technology with sustainability. While it enhances the operational efficiency it also helps in reducing the consumption of diesel fuel and emission of pollutants.



#### Advantages over conventional RTG

- No engine is equipped on RTG, hence environment friendly
- Reduction of time and costs due to the shorter maintenance intervals of the diesel-electric-drive
- Reduction of intervals for refueling results in reduced costs and efforts
- Significantly less emission by the lesser use of the combustion engine and thus better environmental conditions at the site

### 

FRODUCT GUIDE

# Grab Bucket Unloader

#### a group company of A MITSUBISHI HEAVY INDUSTRIES, LTD. **MHI INDUSTRIAL ENGINEERING & SERVICES PRIVATE LTD.**



#### **Semi-Automatic Operation**

	Conventional Type	Advanced Type
Type of Operation	Teaching playback type	Feed-forward feed-back control (with sensor-less anti-sway control)
Setting Method	Requiring model operation for various patterns by expert operator	No need of model operation (hatch clear point setting only)
Anti-Sway Performance	Influenced by wind and initial sway	Less influenced by initial sway and other factors
Work Efficiency	Subject to the performance of model operation	Higher efficiency like skillful operator
Total Evaluation	Not Recommendable	Highly Recommendable

Engineered to unload greater volume of bulk, ANUPAM-MHI Grab Bucket Type Unloaders serve ports throughout the world. Each functional specifications of the product is designed and developed to deliver high-quality, performance-backed results for our customers. Ensuring efficient, economical and reliable results with a long service life, our bucket type unloaders prove to be a perfect solution that meets the most demanding unloading facility requirements.



#### Semi-Automatic Operation

Providing high-performance anti-sway and accurate positioning operation by combination of feed-forward control and feed-back



Sensor-less Sway Detection System

20

• Load Position Calculation from torque feedback of trolley motor • Semi-automatic operation is available without additional sensors



# Grab Bucket Unloader



#### Automatic Control for Bucket Grabbing

Grabbing Torque Control Real time torque control of bucket grabbing when accelerated traverse movement to avoid material drop.

**Bucket Lowering Control** Grabbed material amount control according to material gravity to avoid overload by lowering bucket when grabbing. Lowering length can be set at operator's cabin.





Bucket Tip Horizontal Control Bucket grabbing control to make its tip horizontal for enhancing efficiency when unloading material at the bottom of ship. Can be selected at operator's cabin



### Light-Weight Trapezoidal Box Structure





PRODUCT GUIDE 17

Those automatic grabbing control are effective even under manual operation

#### a group company of A MITSUBISHI HEAVY INDUSTRIES, LTD. **MHI INDUSTRIAL ENGINEERING & SERVICES PRIVATE LTD.**

### a group company of A MITSUBISHI HEAVY INDUSTRIES, LTD. MHI INDUSTRIAL ENGINEERING & SERVICES PRIVATE LTD.

150 Beach Road, #29-00 Gateway West, Singapore - 189720 Phone: +65-6305-5200 Email: crane-mies@mies.com.sg www.mies.com.sg





ANUPAM-MHI Industries Limited 138, G.I.D.C. Vithal Udyognagar - 388121, Via. Anand, Gujarat, INDIA. Phone: +91-2692-235210, 236118, 236211 | Email: anupam-mhi@anupam-mhi.com

www.anupamgroup.com