



# The Future of Port Solutions

Building on a strong tradition

# Terex milestones in port business



1824

1968 Launch of Straddle Carrier 2000



1993 1995  
REGGIANE China

1960

2009

1966 1986  
Launch of Lift Trucks Launch of Reach Stackers & Empty Container Handlers



2012

1933



1995



1906

1956  
Invention of Mobile Harbor Cranes

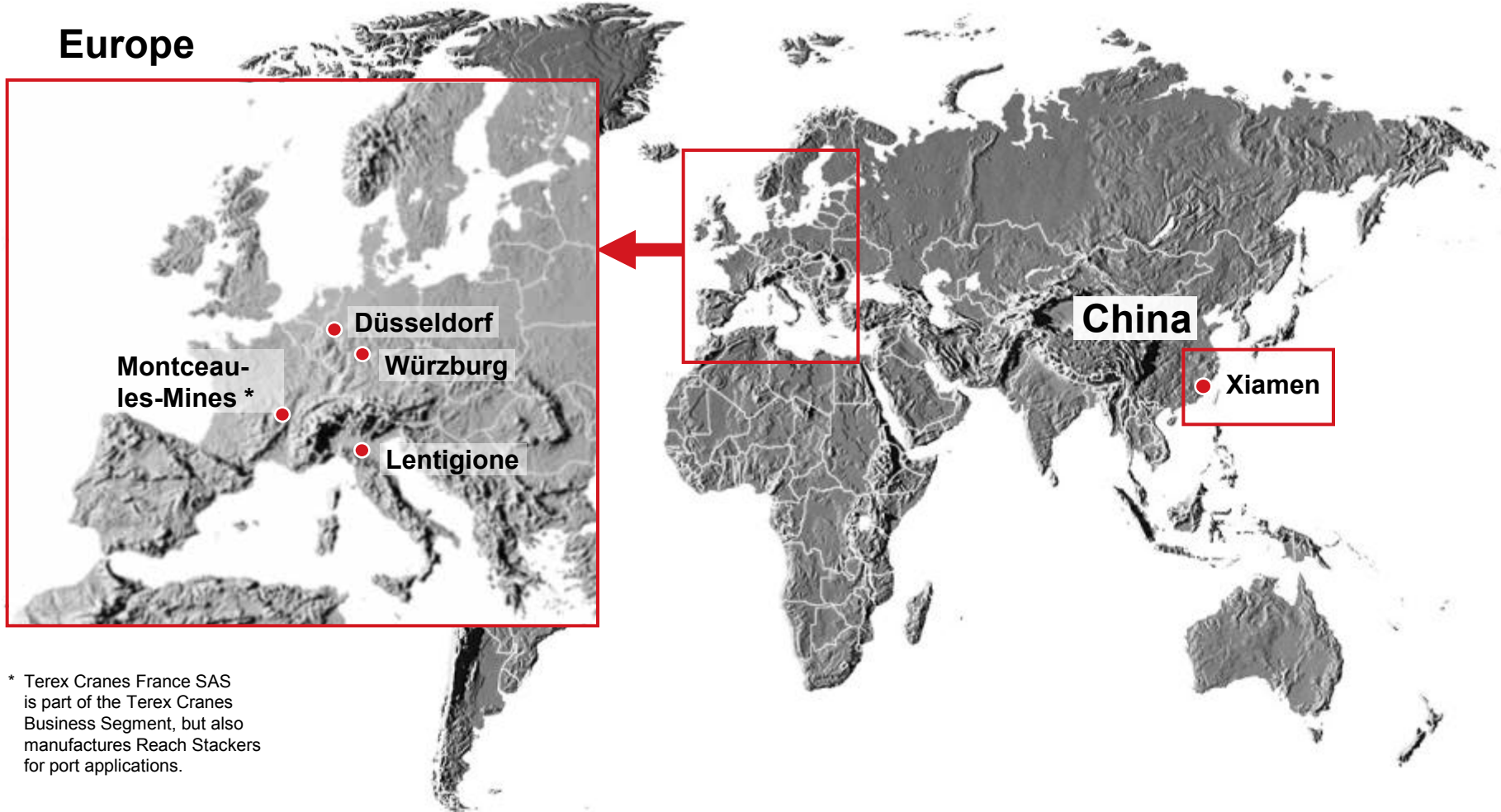
1980s  
Invention of Automated Guided Vehicles

2006 2011



# Manufacturing locations

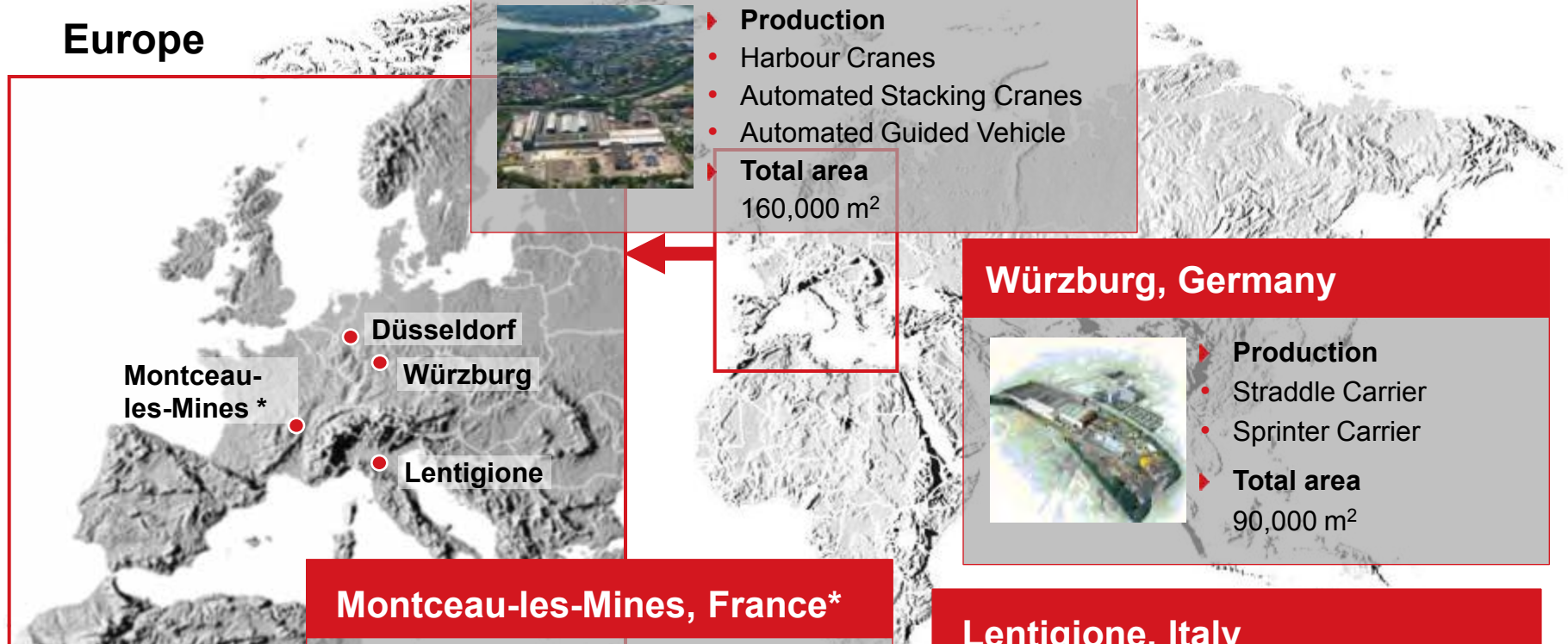
## Europe



\* Terex Cranes France SAS is part of the Terex Cranes Business Segment, but also manufactures Reach Stackers for port applications.

# Manufacturing locations

## Europe



### Düsseldorf, Germany



- ▶ **Production**
  - Harbour Cranes
  - Automated Stacking Cranes
  - Automated Guided Vehicle
- ▶ **Total area**  
160,000 m<sup>2</sup>

### Würzburg, Germany



- ▶ **Production**
  - Straddle Carrier
  - Sprinter Carrier
- ▶ **Total area**  
90,000 m<sup>2</sup>

### Montceau-les-Mines, France\*



- ▶ **Production**
  - Reach Stackers
- ▶ **Total area**  
38,800 m<sup>2</sup>

### Lentigione, Italy

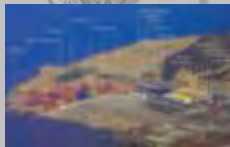


- ▶ **Production**
  - Full Container Handlers
  - Empty Container Handlers
  - Fork Lifts
- ▶ **Total area**  
150,000 m<sup>2</sup>

\* Terex Cranes France SAS is part of the Terex Cranes Business Segment, but also manufactures Reach Stackers for port applications.



## Xiamen, P.R. China



- ▶ **Production**
  - Ship-to-Shore Cranes
  - Rubber-Tyred Gantry Cranes
  - Rail-Mounted Gantry Cranes
  - Reach Stackers
  - Empty Container Handlers
- ▶ **Total area** 280,000 m<sup>2</sup>

China

• Xiamen

# Product and service portfolio

## Loading & unloading

- ▶ Ship-to-Shore Cranes (STS)
- ▶ Harbor Cranes
  - Mobile Harbor Cranes (G HMK)
  - Portal Harbor Cranes (G HSK)
  - Floating Cranes (G HPK)
  - Pedestal-Mounted Harbor Cranes (G HPK)
  - Rubber-Tired Portal Harbor Cranes (G HRK)

## Transport

- ▶ Straddle Carriers (SC)
- ▶ Sprinter Carriers
- ▶ Automated Guided Vehicles (AGV)

## System capabilities

- ▶ Planning & consulting
- ▶ Software
- ▶ Service

## Storage

- ▶ Automated Stacking Cranes (ASC)
- ▶ Rubber-Tired Gantry Cranes (RTG)
- ▶ Rail-Mounted Gantry Cranes (RMG)

## Handling

- ▶ Reach Stackers (RS)
- ▶ Empty Container Handlers (ECH)
- ▶ Full Container Handlers (FCH)
- ▶ Fork Lifts
- ▶ Hoppers

# Product and service portfolio

## Loading & unloading

### ▶ Ship-to-Shore Cranes (STS)

### ▶ Harbor Cranes

- Mobile Harbor Cranes (G HMK)
- Portal Harbor Cranes (G HSK)
- Floating Cranes (G HPK)
- Pedestal-Mounted Harbor Cranes (G HPK)
- Rubber-Tyred Portal Harbor Cranes (G HRK)

## Transport

- ▶ Straddle Carriers (SC)
- ▶ Sprinter Carriers
- ▶ Automated Guided Vehicles (AGV)

## System capabilities

- ▶ Planning & consulting
- ▶ Software
- ▶ Service

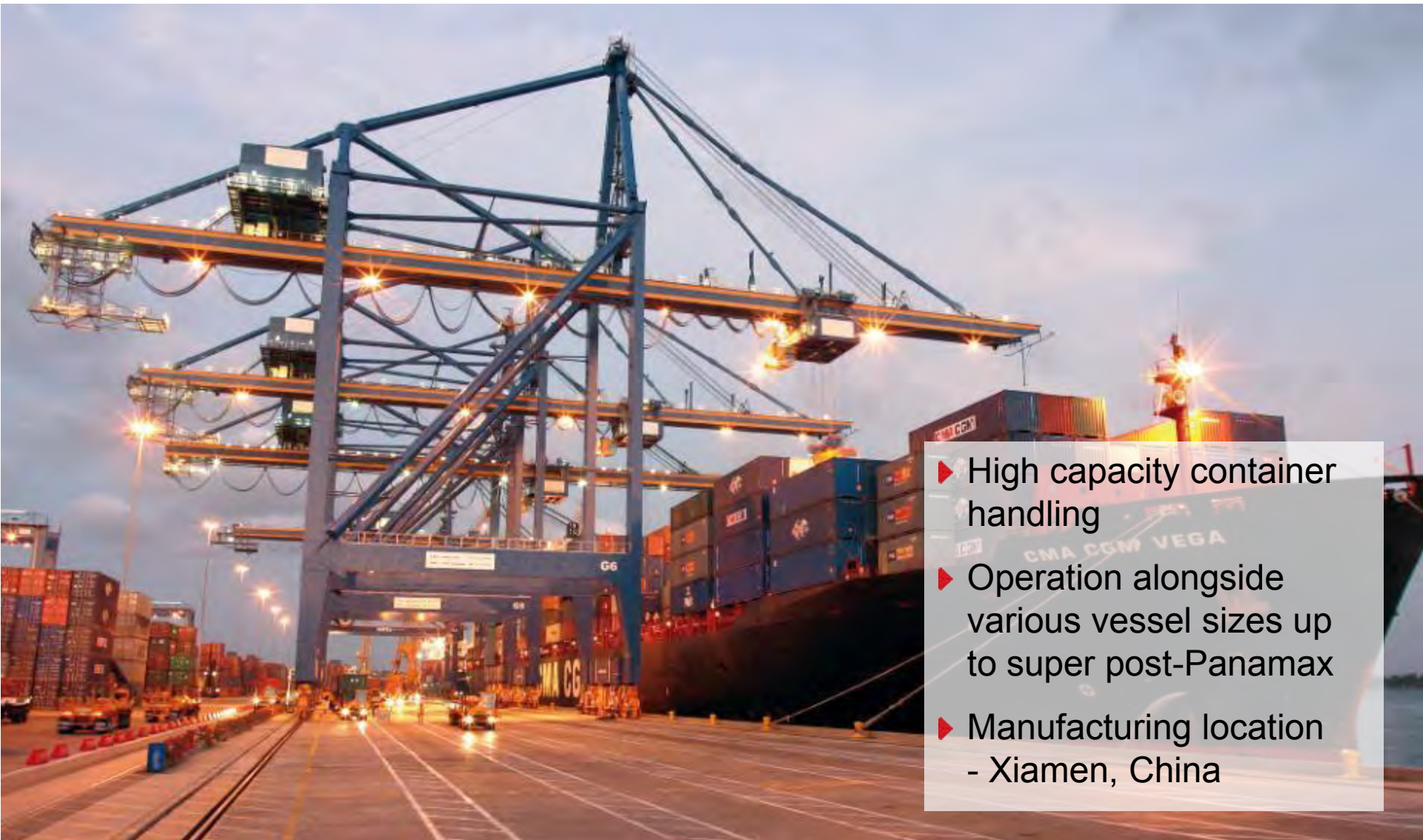
## Storage

- ▶ Automated Stacking Cranes (ASC)
- ▶ Rubber-Tired Gantry Cranes (RTG)
- ▶ Rail-Mounted Gantry Cranes (RMG)

## Handling

- ▶ Reach Stackers (RS)
- ▶ Empty Container Handlers (EGH)
- ▶ Full Container Handlers (FCH)
- ▶ Fork Lifts
- ▶ Hoppers

# Ship-to-Shore Cranes (STS)



- ▶ High capacity container handling
- ▶ Operation alongside various vessel sizes up to super post-Panamax
- ▶ Manufacturing location - Xiamen, China



# Ship-to-Shore Cranes (STS)



## ► Capacities

- Handling 20' to 45' containers
- Lifting capacities (under spreader)
  - Up to 65 t, single/twin
  - Up to 120 t, tandem

## ► Dimensions

- Rail span up to 35 m
- Outreach up to 66 m
- Lifting height up to 46 m (from dock level)

## ► Speeds

- Gantry travel 45 m/min (standard)
- Trolley travel up to 244 m/min
- Hoisting with load up to 90 m/min

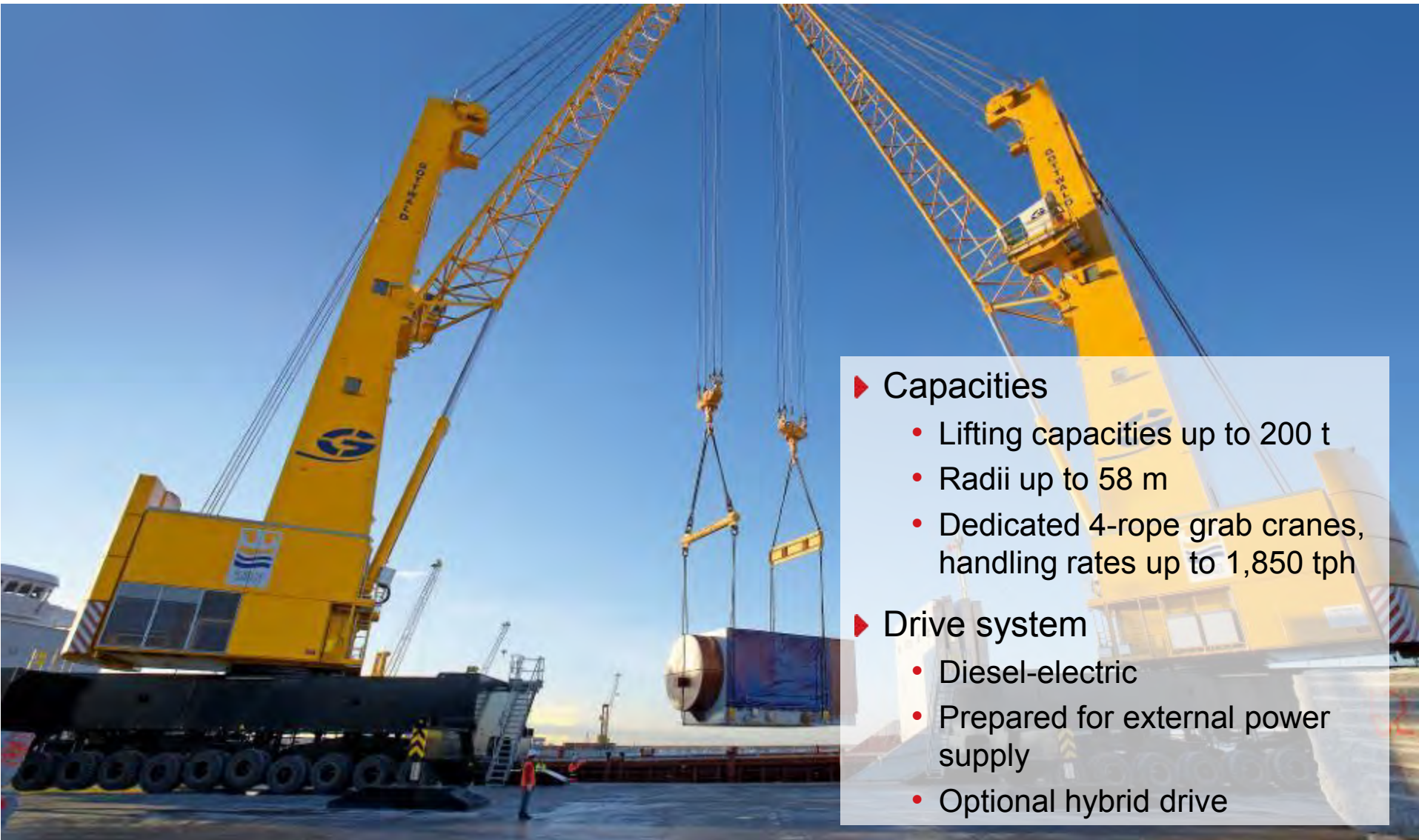
## ► Design

- Trolley: rope towed or self-propelled
- Power supply: port mains or on-board diesel generator

# Harbor Cranes



- ▶ Loading & unloading of containers, general, bulk and project cargoes
- ▶ Broad range of crane sizes, types and variants
- ▶ All crane types based on proven mobile harbor crane technology
- ▶ Mobile throughout a port – flexible place of operation
- ▶ Low specific investment in equipment and infrastructure
- ▶ Manufacturing location:  
- Düsseldorf, Germany



## ▶ Capacities

- Lifting capacities up to 200 t
- Radii up to 58 m
- Dedicated 4-rope grab cranes, handling rates up to 1,850 tph

## ▶ Drive system

- Diesel-electric
- Prepared for external power supply
- Optional hybrid drive

# Harbor crane range



Port Solutions

Barge/Coaster

Feeder

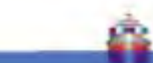
Standard

Panamax

Post-Panamax

Super Post-Panamax

Container vessel size



Rows ≤ 6

≤ 8

≤ 10

≤ 13

≤ 17

≤ 18

Small Crane Family

Model 2

Model 3

Model 4

Model 5

Model 6

Model 7

Model 8

Medium-Sized Crane Family

Large Crane Family

Bulk vessel size

Barge/Coaster

Handysize

Handymax

Panamax

Capesize Bulker



DWT ≤ 5,000

≤ 30,000

≤ 50,000

≤ 80,000

≤ 170,000

# Modular design of Harbor Cranes



**Small Crane Family  
Model 2**



**Medium-Sized Crane Family  
Models 3, 4 and 5**



**Large Crane Family  
Models 6, 7 and 8**

## Quayside cranes

**G HPK**  
Pedestal-Mounted Harbour Crane

**G HSK**  
Rail-Bound Portal Harbour Crane

**G HRK**  
Rubber-Tired Portal Harbour Crane

**G HMK**  
Mobile Harbor Crane

**New type  
for Model 2**

**Chassis length and no. of  
axles depends on crane model**

## Floating cranes

**G HSK** Portal Harbour Crane on Barge

**G HPK** Floating Crane

# Harbor crane types

## Mobile Harbor Cranes

- ▶ Extremely versatile
- ▶ High performance
- ▶ Short lead times achieved by Advance Order Programme
- ▶ Low specific investment in crane and infrastructure thanks to modular design

## Portal Harbor Cranes

- ▶ For narrow and special purpose quays
- ▶ Individually designed portal
  - Clearance height: 4 - 10 m
  - Track gauge: 10 - 20 m

## Floating Cranes

- ▶ Turnkey solution from barge to crane
- ▶ No additional investment in land or quay infrastructure
- ▶ Ship-to-ship or ship-to-shore handling
- ▶ Operation on quayside, mid-stream or on the open sea

## Rubber-Tired Portal Harbor Cranes

- ▶ Combines mobility of a mobile harbor crane with the advantage of a portal solution
- ▶ Easy to drive under
- ▶ Easily manoeuvrable

# Product and service portfolio

## Loading & unloading

- ▶ Ship-to-Shore Cranes (STS)
- ▶ Harbor Cranes
  - Mobile Harbor Cranes (G HMK)
  - Portal Harbor Cranes (G HSK)
  - Floating Cranes (G HPK)
  - Pedestal-Mounted Harbor Cranes (G HPK)
  - Rubber-Tired Portal Harbor Cranes (G HRK)

## Transport

- ▶ Straddle Carriers (SC)
- ▶ Sprinter Carriers
- ▶ Automated Guided Vehicles (AGV)

## System capabilities

- ▶ Planning & consulting
- ▶ Software
- ▶ Service

## Storage

- ▶ Automated Stacking Cranes (ASC)
- ▶ Rubber-Tired Gantry Cranes (RTG)
- ▶ Rail-Mounted Gantry Cranes (RMG)

## Handling

- ▶ Reach Stackers (RS)
- ▶ Empty Container Handlers (EGH)
- ▶ Full Container Handlers (FCH)
- ▶ Fork Lifts
- ▶ Hoppers

# Straddle Carriers (SC)



- ▶ Picking, carrying and stacking containers
- ▶ Ability to transfer, lift and stack
- ▶ Hydrostatic or diesel-electric drive
- ▶ Optional EcoCap energy saving system
- ▶ Manufacturing location  
- Würzburg, Germany



# Straddle Carriers (SC)



## ► Capacities

- Handling 20' to 45' containers
- Lift capacity (under spreader) up to 60 t

## ► Dimensions

- Width approx. 5 m
- Length approx. 10 m
- Lifting height up to 12 m (3+1)

## ► Speeds

- Travel up to 30 kph
- Hoisting up to 24 m/min

## ► Features / options

- Single or twinlift
- Automatic spreader positioning system
- Weighing system
- Tyre pressure / oil condition monitoring
- Others

# Sprinter Carriers



- ▶ Picking and carrying containers
- ▶ Ability both to transfer and lift
- ▶ Hydrostatic or diesel-electric drive
- ▶ Manufacturing location  
- Würzburg, Germany



# Sprinter Carriers



## ▶ Capacities

- Handling 20' to 45' containers
- Lift capacity (under spreader) up to 60 t

## ▶ Dimensions

- Width approx. 5 m
- Length approx. 10 m
- Lifting height up to 6.2 m (1+1)

## ▶ Speeds

- Travel up to 32 kph
- Hoisting up to 24 m/min

## ▶ Features / options

- Single or twinlift
- Automatic spreader positioning system
- Weighing system
- Tyre pressure / oil condition monitoring
- Others

# AGV Automated Guided Vehicles

- ▶ Horizontal container transport
- ▶ Fully automated; fleet management and navigation software
- ▶ Lift AGV version; decouples transport from storage and thus reduces fleet size
- ▶ Manufacturing location:
  - Düsseldorf, Germany



# AGV Automated Guided Vehicles

- ▶ Handling 20' to 45' containers
- ▶ Capacity 40/60 t  
(1 container/2 x 20' containers)
- ▶ Speed up to 22 kph (6 m/s)
- ▶ Positioning accuracy +/- 25 mm
- ▶ Drive systems
  - Diesel-electric
  - Battery drive
- ▶ Battery drive system
  - Zero emissions
  - Fully automated battery change station



## Loading & unloading

- ▶ Ship-to-Shore Cranes (STS)
- ▶ Harbor Cranes
  - Mobile Harbor Cranes (G HMK)
  - Portal Harbor Cranes (G HSK)
  - Floating Cranes (G HPK)
  - Pedestal-Mounted Harbor Cranes (G HPK)
  - Rubber-Tired Portal Harbor Cranes (G HRP)

## Transport

- ▶ Straddle Carriers (SC)
- ▶ Sprinter Carriers
- ▶ Automated Guided Vehicles (AGV)

## System capabilities

- ▶ Planning & consulting
- ▶ Software
- ▶ Service

## Storage

- ▶ Automated Stacking Cranes (ASC)
- ▶ Rubber-Tired Gantry Cranes (RTG)
- ▶ Rail-Mounted Gantry Cranes (RMG)

## Handling

- ▶ Reach Stackers (RS)
- ▶ Empty Container Handlers (EGH)
- ▶ Full Container Handlers (FCH)
- ▶ Fork Lifts
- ▶ Hoppers

# ASC Automated Stacking Cranes

- ▶ Accurate container stacking with very high storage density
- ▶ High-rigidity construction
- ▶ Fully automated; crane and stack management software
- ▶ Manufacturing location:
  - Düsseldorf, Germany



# ASC Automated Stacking Cranes



## ▶ Capacities

- Handling 20' to 45' containers
- Lifting capacity (under spreader) 40 t

## ▶ Dimensions

- Working span 8 to 12 containers
- Typical stack length 35 - 50 TEUs
- Working height up to 5+1 (high-cube)

## ▶ Speeds

- Gantry travel 240 m/min
- Trolley travel 60 m/min
- Hoisting 39/72 m/min (full/empty)

## ▶ Design

- Rigid load guidance system; provides high positioning accuracy even in severe conditions
- Cantilever version available



# Rubber-Tired Gantry Cranes (RTG)



- ▶ Space-saving container stacking
- ▶ Mobile for flexible use
- ▶ Manufacturing location  
- Xiamen, China



# Rubber-Tired Gantry Cranes (RTG)



## ► Capacities

- Handling 20' to 45' containers
- Lift capacity (under spreader) up to 60 t, single/twinlift

## ► Dimensions

- Span up to 26.5 m, 7+1 truck line
- Lifting height (under heavy lift beam) up to 21 m, 6+1 high cube box

## ► Speeds

- Gantry travel 135 m/min
- Trolley travel up to 75 m/min
- Hoisting with load up to 30 m/min

## ► Design

- Fully electric drive; energy-saving system available
- Power supply: port mains or on-board diesel generator

# Rail-Mounted Gantry Cranes (RMG)



- ▶ Space-saving container stacking
- ▶ High performance, high span
- ▶ Manufacturing location:
  - Xiamen, China



# Rail-Mounted Gantry Cranes (RMG)



## ▶ Capacities

- Handling 20' to 45' containers
- Lift capacity (under spreader) up to 60 t, single/twinlift

## ▶ Dimensions

- Rail span up to 50 m
- Lifting height (under heavy lift beam) up to 34 m

## ▶ Speeds

- Gantry travel 120 m/min
- Trolley travel up to 100 m/min
- Hoisting with load up to 40 m/min

## ▶ Design

- Automatic positioning system
- Weighing system available

## Loading & unloading

- ▶ Ship-to-Shore Cranes (STS)
- ▶ Harbor Cranes
  - Mobile Harbor Cranes (G HMK)
  - Portal Harbor Cranes (G HSK)
  - Floating Cranes (G HPK)
  - Pedestal-Mounted Harbor Cranes (G HPK)
  - Rubber-Tired Portal Harbor Cranes (G HRK)

## Transport

- ▶ Straddle Carriers (SC)
- ▶ Sprinter Carriers
- ▶ Automated Guided Vehicles (AGV)

## System capabilities

- ▶ Planning & consulting
- ▶ Software
- ▶ Service

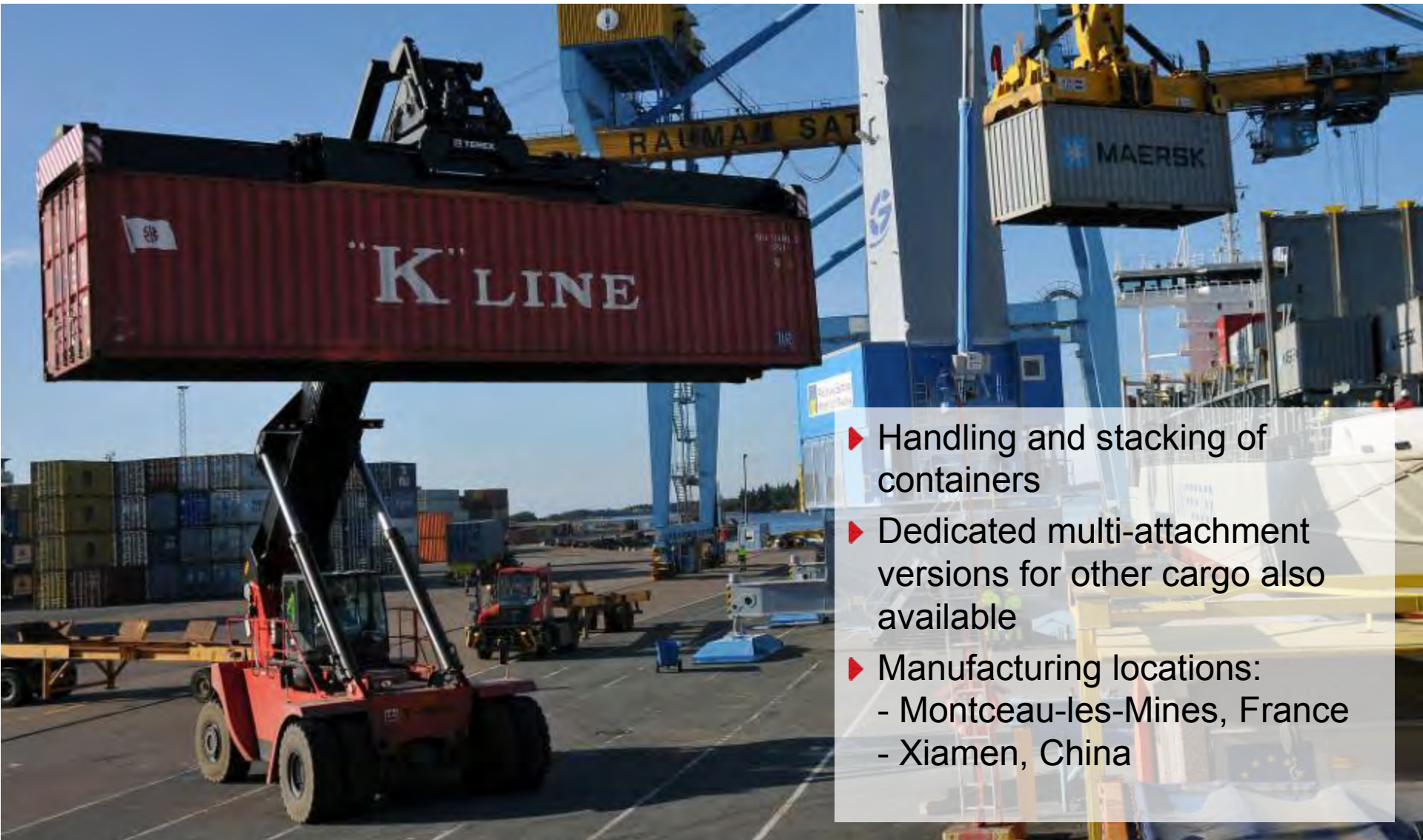
## Storage

- ▶ Automated Stacking Cranes (ASC)
- ▶ Rubber-Tired Gantry Cranes (RTG)
- ▶ Rail-Mounted Gantry Cranes (RMG)

## Handling

- ▶ Reach Stackers (RS)
- ▶ Empty Container Handlers (ECH)
- ▶ Full Container Handlers (FCH)
- ▶ Fork Lifts
- ▶ Hoppers

# Reach Stackers (RS)



- ▶ Handling and stacking of containers
- ▶ Dedicated multi-attachment versions for other cargo also available
- ▶ Manufacturing locations:
  - Montceau-les-Mines, France
  - Xiamen, China

# Reach Stackers (RS)



- ▶ Handling 20' to 45' containers
- ▶ Capacities up to 70 t
- ▶ Stacking height up to 5+1
- ▶ Intermodal/piggyback spreader available for all models

# Empty Container Handlers (ECH)



- ▶ Handling and stacking of empty containers
- ▶ Handling 20' to 45' containers
- ▶ Stacking height up to 7+1
- ▶ Single or double container handling mode
- ▶ Capacity under spreader up to 10 t
- ▶ Available with spreaders or forks
- ▶ Manufacturing location:
  - Lentigione, Italy
  - Xiamen, China



# Full Container Handlers (FCH)

- ▶ Handling and stacking of full containers
- ▶ Handling 20' to 45' containers
- ▶ Heavy-duty, extreme stacking operations
- ▶ Stacking height up to 5+1
- ▶ Capacity under spreader up to 45 t
- ▶ Available with spreaders or forks
- ▶ Manufacturing location:
  - Lentigione, Italy





- ▶ Containers or other heavy load handling (e.g. steel bars, coils, prefabricated concrete)
- ▶ Capacity up to 52 t
- ▶ Standard lifting height up to 5.1 m
- ▶ Other attachments available to handle a variety of cargo (ram, clamps, magnets)
- ▶ Manufacturing location:
  - Lentigione, Italy
  - Xiamen, China

# Hoppers



- ▶ Handling of various dry bulk materials
- ▶ Flexible unloading concepts upon
  - Trucks
  - Trains
  - Conveyors
- ▶ Different designs
  - Mobile on wheels
  - On rails
  - Permanently installed



# Hoppers

- ▶ Capacities up to 2,000 tph
- ▶ Highly efficient dust suppression systems available, e.g.
  - Wind protection
  - Flex-flap barrier
  - Wetting
  - Air curtain, automatically controlled
  - High-power extraction system
  - Retractable loading chutes
- ▶ Tailored to individual requirements



## Loading & unloading

- ▶ Ship-to-Shore Cranes (STS)
- ▶ Harbor Cranes
  - Mobile Harbor Cranes (G HMK)
  - Portal Harbor Cranes (G HSK)
  - Floating Cranes (G HPK)
  - Pedestal-Mounted Harbor Cranes (G HPK)
  - Rubber-Tired Portal Harbor Cranes (G HRK)

## Transport

- ▶ Straddle Carriers (SC)
- ▶ Sprinter Carriers
- ▶ Automated Guided Vehicles (AGV)

## System capabilities

- ▶ Planning & consulting
- ▶ Software
- ▶ Service

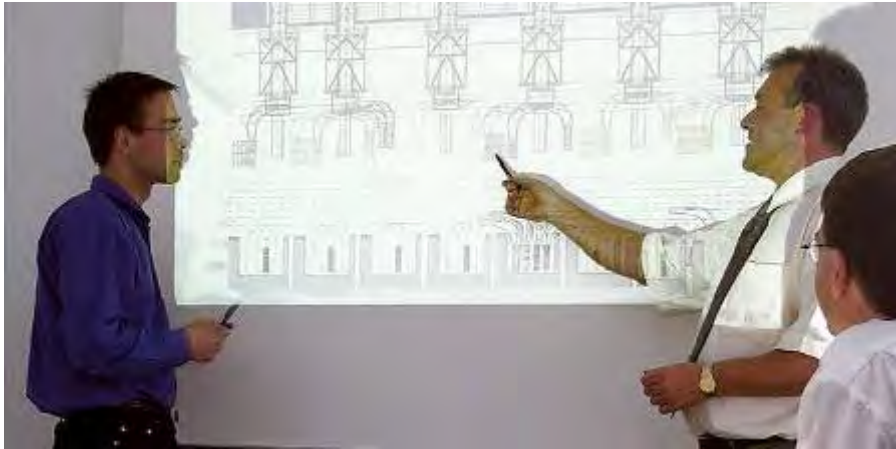
## Storage

- ▶ Automated Stacking Cranes (ASC)
- ▶ Rubber-Tired Gantry Cranes (RTG)
- ▶ Rail-Mounted Gantry Cranes (RMG)

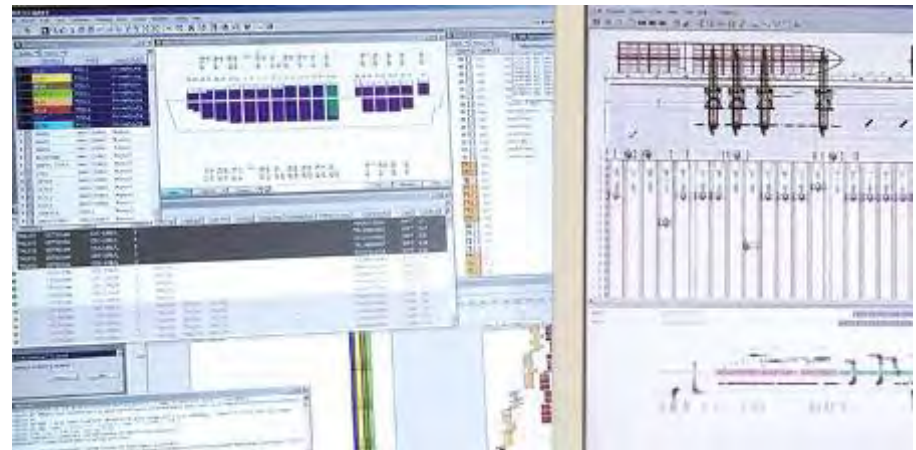
## Handling

- ▶ Reach Stackers (RS)
- ▶ Empty Container Handlers (EGH)
- ▶ Full Container Handlers (FCH)
- ▶ Fork Lifts
- ▶ Hoppers

# Planning & consulting



- ▶ Project management from concept to startup
- ▶ Simulation and emulation of terminals



# Software & simulation



- ▶ Management and navigation software
- ▶ Bulk specific IT solutions
  - CommTrac terminal management system
  - Conveyor management software
- ▶ Further software packages for container and bulk terminals
- ▶ Software brands: TBA, DBIS



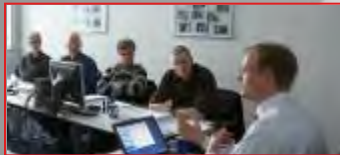
# Turnkey capability



Upgrade solutions



Analysis of required logistics performance



Analysis of changed frame conditions



Concept engineering



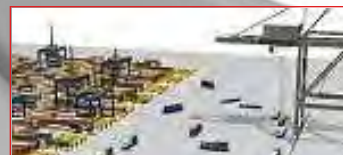
Customer service / outsourcing partner



Simulation & planning



Shipment & assembly



Turnkey project management



Software Competence & Products








Innovative base products



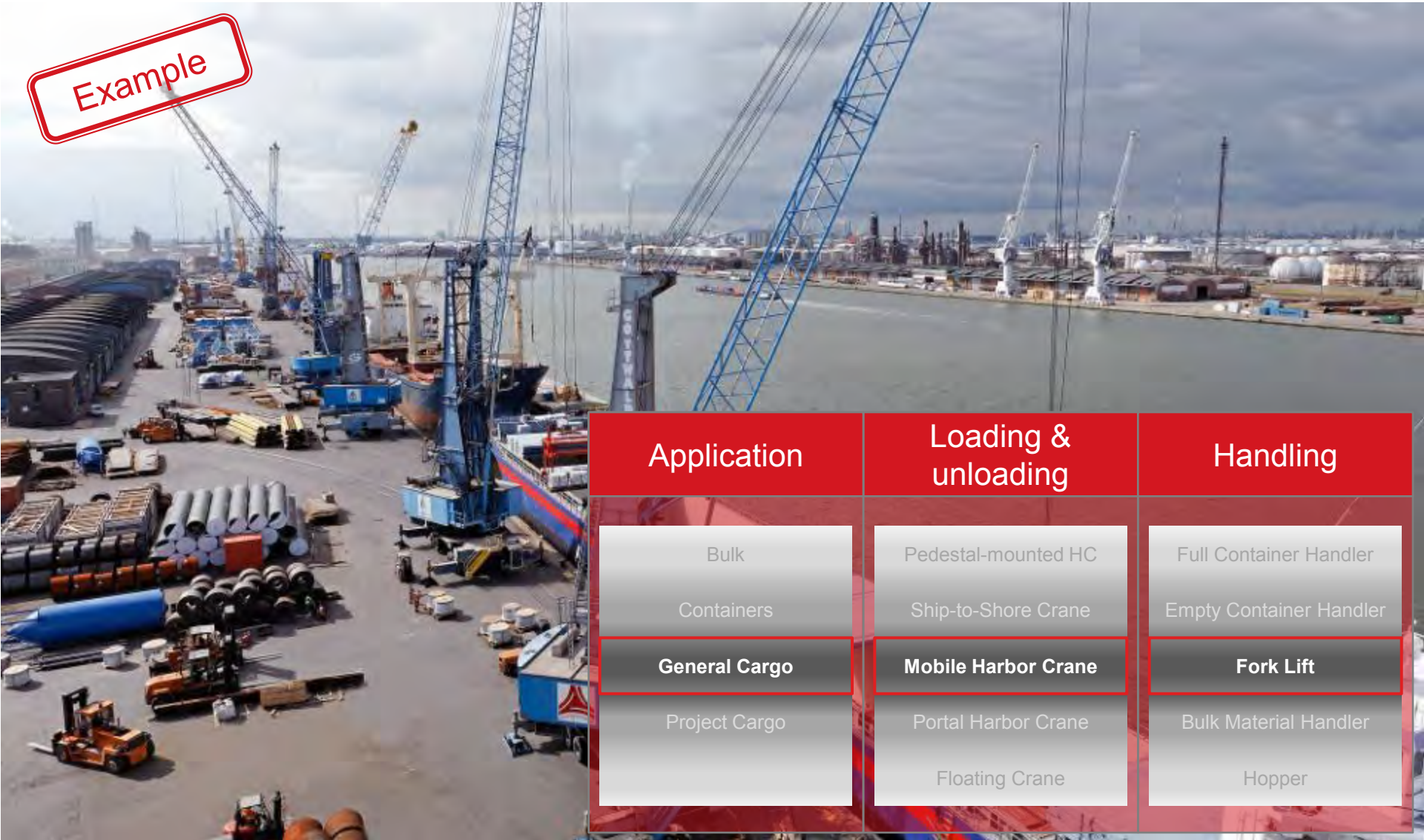


# Always the right combination

Application	Loading & unloading	Transport	Storage	Handling
Bulk	Pedestal-mounted HC Ship-to-Shore Crane	Lift AGV Battery Lift AGV	Automated Stacking Crane	Reach Stacker Full Container Handler
<b>Containers</b>	<b>Mobile Harbor Crane</b>	<b>Straddle Carrier</b>	<b>Rubber-Tired Gantry</b>	<b>Empty Container Handler</b>
General Cargo	Portal Harbor Crane	Sprinter Carrier	Rail-mounted Gantry	Fork Lift
Project Cargo	Floating Crane	Automated Guided Vehicle		Bulk Material Handler
				

# Multi-purpose terminal

Example



Application	Loading & unloading	Handling
Bulk	Pedestal-mounted HC	Full Container Handler
Containers	Ship-to-Shore Crane	Empty Container Handler
<b>General Cargo</b>	<b>Mobile Harbor Crane</b>	<b>Fork Lift</b>
Project Cargo	Portal Harbor Crane	Bulk Material Handler
	Floating Crane	Hopper

# Bulk terminal

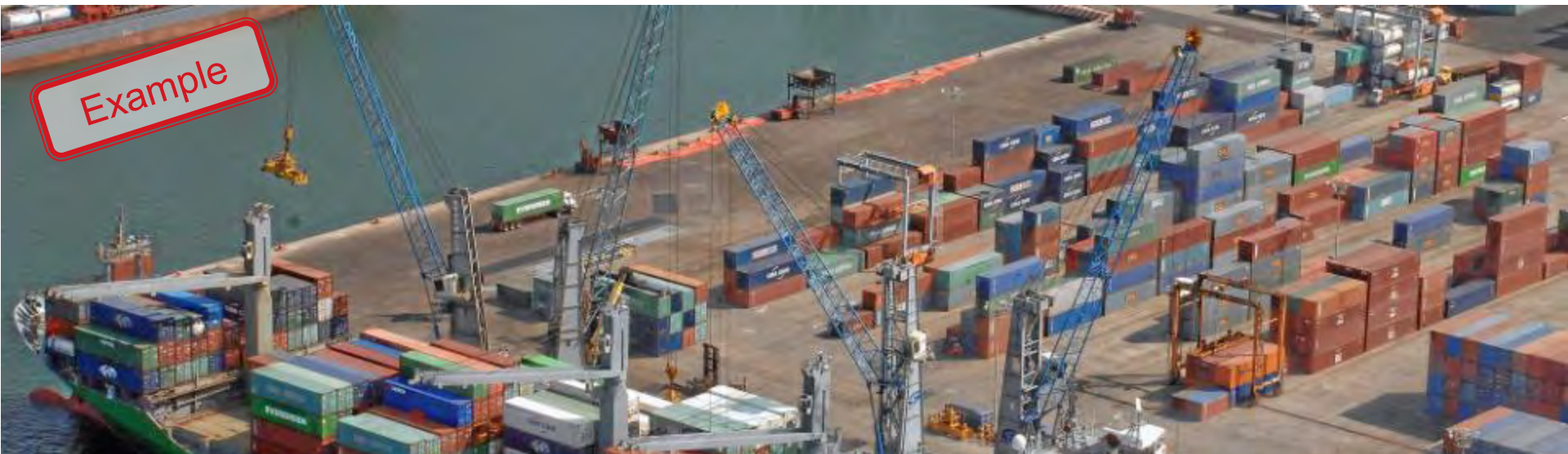
Example



Application	Loading & unloading	Handling
Project Cargo	Ship-to-Shore Cranes	Fork Lift
<b>Bulk</b>	<b>Portal Harbor Crane</b>	<b>Hopper</b>
Containers	Floating Crane	Reach Stacker
General Cargo	Rubber-tired HSK	Full Container Handler

# Manual container terminal

Example

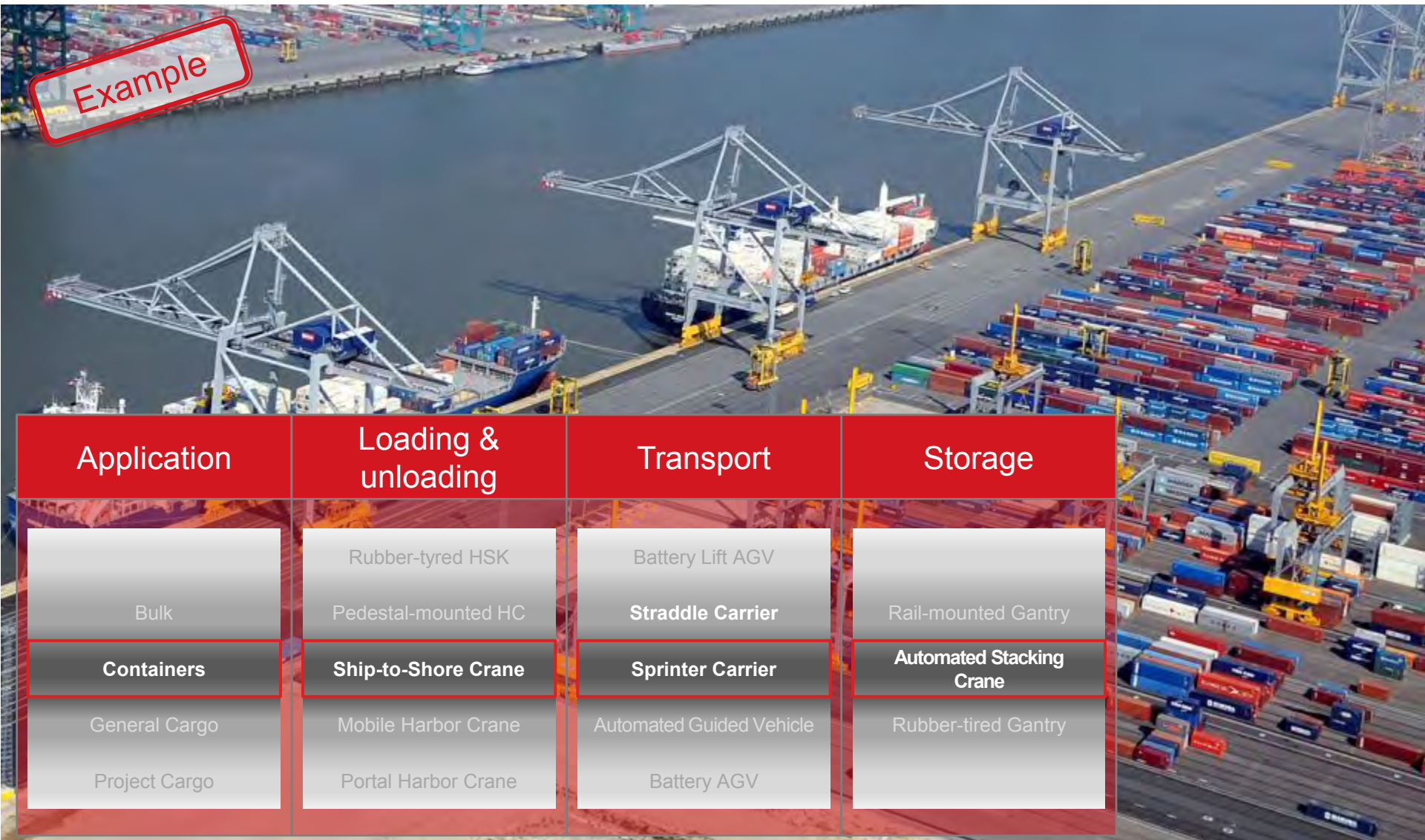


Application	Loading & unloading	Storage	Handling
Bulk	Pedestal-mounted HC Ship-to-Shore Crane	Automated Stacking Crane	Bulk Material Handler Hopper
<b>Containers</b>	<b>Mobile Harbor Crane</b>	<b>Rubber-Tired Gantry</b>	<b>Reach Stacker</b>
General Cargo	Portal Harbor Crane	Rail-mounted Gantry	Full Container Handler
Project Cargo	Floating Crane		Empty Container Handler



# Semi-automated container terminal

Example



Application	Loading & unloading	Transport	Storage
Bulk	Rubber-tyred HSK Pedestal-mounted HC	Battery Lift AGV	Rail-mounted Gantry
<b>Containers</b>	<b>Ship-to-Shore Crane</b>	<b>Straddle Carrier</b>	<b>Automated Stacking Crane</b>
General Cargo	Mobile Harbor Crane	Sprinter Carrier	Rubber-tired Gantry
Project Cargo	Portal Harbor Crane	Automated Guided Vehicle	
		Battery AGV	

# Fully automated container terminal

Example



Application	Loading & unloading	Transport	Storage
Bulk	Rubber-tired HSK Pedestal-mounted HC	Sprinter Carrier Automated Guided Vehicle	Rail-mounted Gantry
<b>Containers</b>	<b>Ship-to-Shore Crane</b>	<b>Battery AGV</b>	<b>Automated Stacking Crane</b>
General Cargo	Mobile Harbor Crane	Lift AGV	Rubber-tired Gantry
Project Cargo	Portal Harbor Crane	Battery Lift AGV	



## Terex Port Solutions provides

- ▶ Ergonomic solutions and user friendly control systems
- ▶ A comprehensive range of “green” products
- ▶ Highly efficient and environmentally compatible drive systems
- ▶ Space saving concepts



Do you have any questions?  
Feel free to ask

