

Jeff-Yinan Zhu, May 2016

# Crane Solution for Offshore Wind Power Industry

## 離岸風機安裝關鍵-港口及船舶起重設備解決方案

# Agenda

- ABB Ports Business Introduction
- ABB Crane Solution
- Floating Crane
- Shipyard Goliath Gantry Crane
- ABB Ports Service
- Value for Customers

# ABB Ports Business Introduction

# ABB Ports Business Introduction

## About us



- A global leader in the crane industry through our commitment, our solutions and our innovations.
- ABB Ports department helps you to optimize your transport of containers, bulk material and steel products.
- Our goal is to achieve fast and cost-effective goods handling.
- Our technology, your advantage

# ABB Ports Business Introduction History



# ABB Ports Business Introduction

## Business Area



### Bulk terminal

- Grab Ship Unloader
- Ship Loader
- Stacker Reclaimer

### Container terminal

- Ship to Shore Container Crane
- Rail Mounted Gantry Crane
- Rubber Tyred Gantry Crane

### Industry

- Electric Overhead Travel Crane

### Shipyard

- Shipyard Goliath Gantry Crane

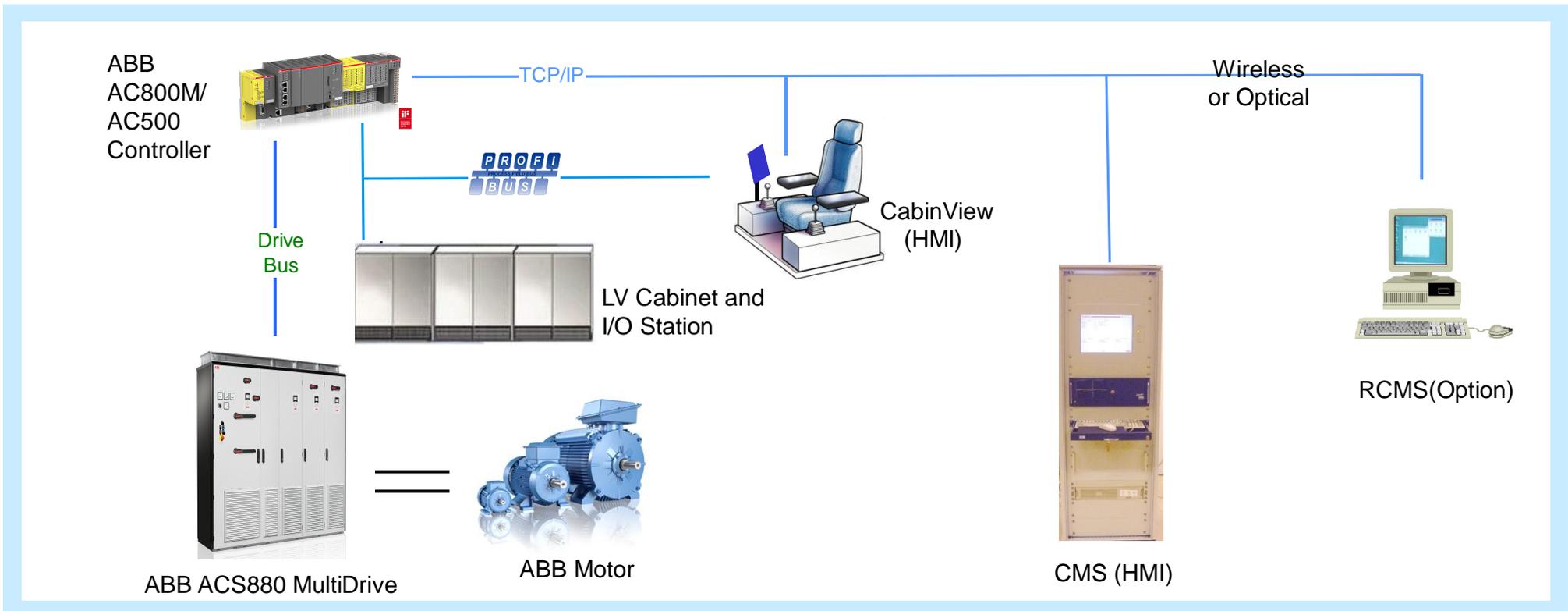
### Offshore

- Floating Crane

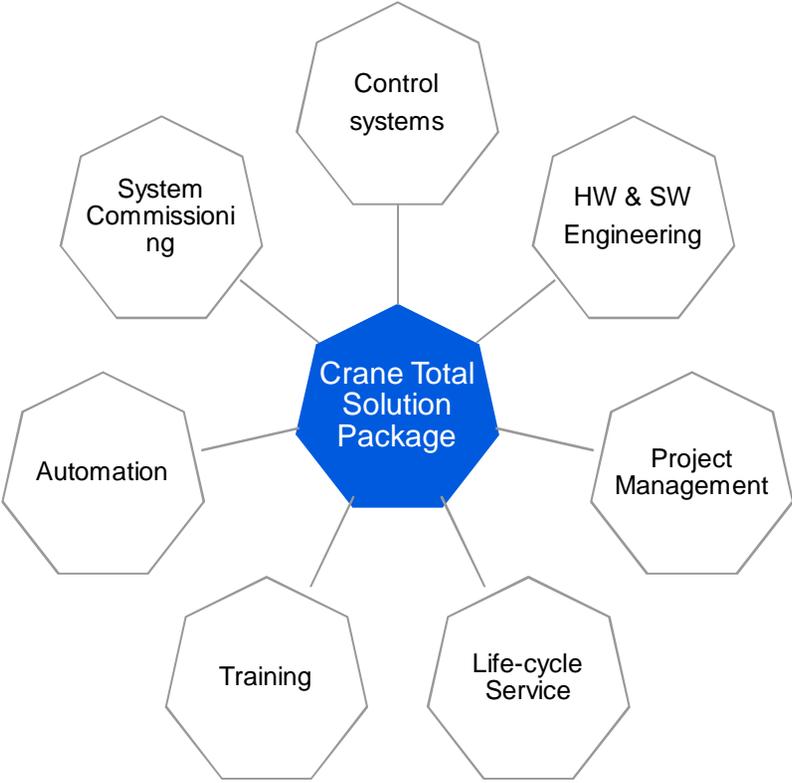
# ABB Crane Solution

# ABB Crane Solution

## ABB Crane Control System



# ABB Crane Solution Total Solution Package Instead of Products



# Floating Crane

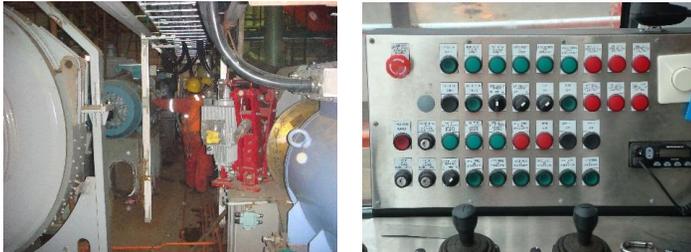
# Floating Crane Case Study



- **Ship Owner: Valentine Maritime Ltd**
- **Crane Builder: ZPMC**
- **Main Application:**
  - Handling of jackets, pilings and modules from/to the cargo barge or a platform,
  - Handling of loads on the decks, Lifting to/from the seabed.
- **Technical Parameters**
  - Main hoist: 1600t, 0 – 4.0 m/min, 72 m(height)
  - Auxiliary hoist: 300t, 0 - 10.0 m/min, 82m(height)
  - Whip hoist: 50t/10t, 0-20 m/min, 89m(height)
  - Slewing: 0 - 0.125 rpm
  - Luffing: 15 min (From horizontal to min outreach)
  - Tugger: Constant tension, 0-15 m/min

# Floating Crane

## Case Study - ABB Scope of Supply



- **Motors and Drive System with ABS certificate**
  - Main hoist, Auxiliary hoist, Whip hoist
  - Slewing, Luffing, Tugger...
- **Control System**
  - Operator's console and local control station
  - PLC, I/O, communication interface
  - Crane Monitoring System
  - LV Distribution Equipment
- **Engineering & Service**
  - Hardware design and Software design
  - Project Management
  - Training and Service

# Floating Crane

## Wind Power Installation Problems & Challenges



- **Problems**

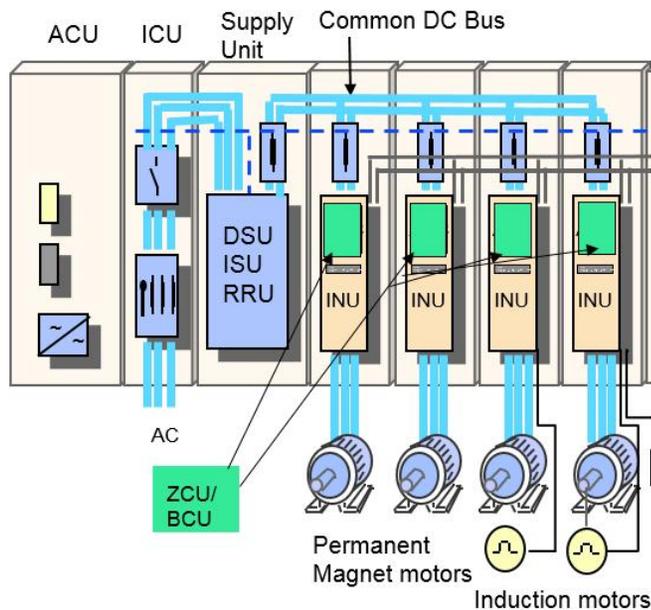
- Severe offshore environment
- Limited installation time
- High installation precision requirement
- Long installed components with high center of gravity
- Difficult offshore maintenance and service
- High installation cost

- **Challenges**

- Safety
- Reliability
- High Efficiency
- Global Service

# Floating Crane

## Key Features of ABB Solution



- **Design Standard and Certificate**

- IEC, ISO
- ABS, BV, DNV, GL.....

- **Reliable PLC Control System**

- Robust PLC & I/O hardware

- **High Efficiency Drive System**

- Common DC bus bar
- Shared energy between motors, Energy saving
- Common braking resourced to several drives

- **High Efficiency Motors**

- Decrease energy consumption
- Reduce operation & maintenance cost

# Floating Crane

## Key Features of ABB Solution



- **Safety**

- Hardware over travel, hardware stop and software stop protection for hoist, luffing & slewing
- Start and safety interlock for hoist, luffing & slewing

- **Reliability**

- Master & slave control for slewing drives with star network
- Constant torque control for hook and load
- GPS positioning for hoist, luffing & slewing

- **High Efficiency**

- Automatic hoist position compensation during luffing
- Automatic outreach position compensation during slewing
- Automatic zero position return for slewing

# Shipyard Goliath Gantry Crane

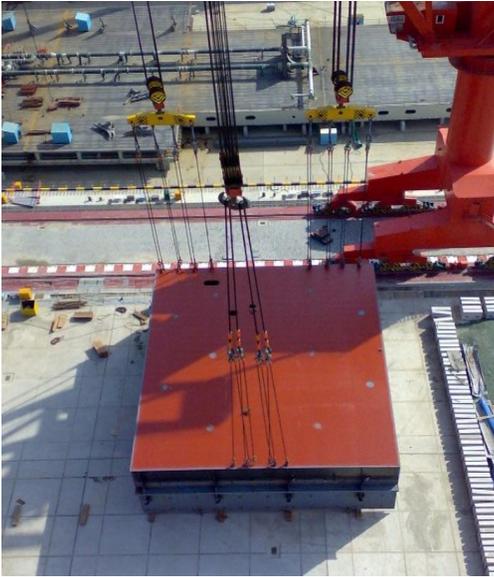
# Shipyard Goliath Gantry Crane Case Study



- **End User: Jiangnan Shipyard (Group) Co. Ltd**
- **Main Parameters :**
  - Capacity: 800 t
  - Span: 158 m (1 set) / 201 m (1 set)
  - 2 x Upper Main Hoist: 2x450 t, 0 – 9.0 m/min, 76 m (Height)
  - 1 x Lower Main Hoist: 1x500 t, 0 – 9.0 m/min, 76 m (Height)
  - 1 x Lower Aux Hoist: 1x32 t, 0 – 20.0 m/min, 76 m (Height)
  - 1 x Upper Trolley Drive: 0 – 45 m/min
  - 1 x Lower Trolley Drive: 0 – 45 m/min
  - 2 x Gantry Travelling Drives: 0 – 30 m/min

# Shipyard Goliath Gantry Crane

## Key Features of ABB Solution - Smart Balance System



Three Main Hooks Collaboration for lifting the block from the Ground

Tradition Method **(Takes 2-3 min)**

Adjust the rope of each single hook to an appropriate tight state off the ground manually and repeatedly;

Hoist up with three hooks when they are in almost the same tight state.

Complicated Operation  
Lower Working Efficiency  
Lack of Safety Protection

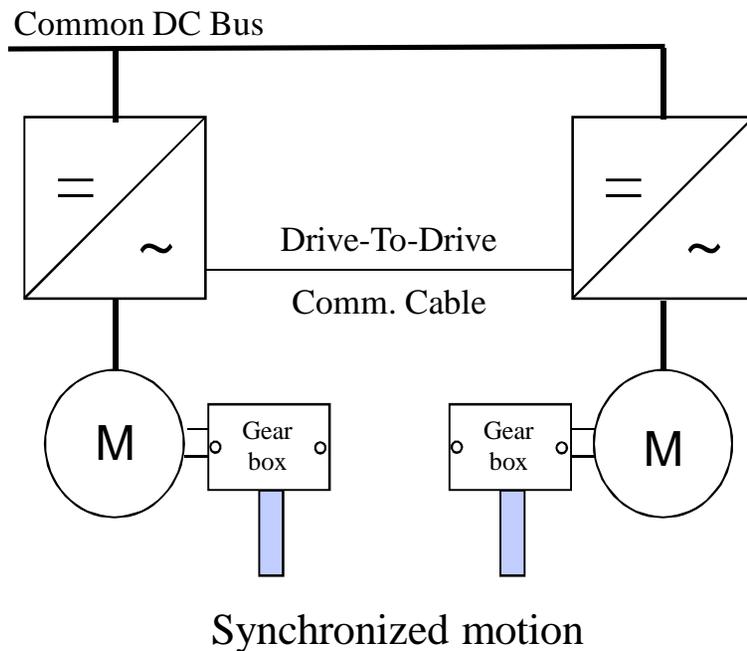
Smart Balancing Method **(40s-1min)**

Select the mode of “Three Hooks Collaboration”;

Operate “Hoisting up” joystick and adjust the ropes of three hooks to the same tight state automatically.

# Shipyard Goliath Gantry Crane

## Key Features of ABB Solution - Position Synchronized Operation



- Hoist/Trolley Position Synchronized Operation Off the Ground:
  - @ Accelerate-Decelerate / Steady Speed
    - Main Hoist 1+2:  $\pm 150\text{mm}$  /  $\pm 50\text{ mm}$
    - Main Hoist 1+2+3:  $\pm 200\text{mm}$  /  $\pm 100\text{ mm}$
    - Trolley 1+2:  $\pm 200\text{mm}$  /  $\pm 100\text{ mm}$
- Automatic correction of position error when in synchronized operation.
- Fast and adjustable response for position error (PI controller).
- Pulse Encoders must be used

# Shipyard Goliath Gantry Crane

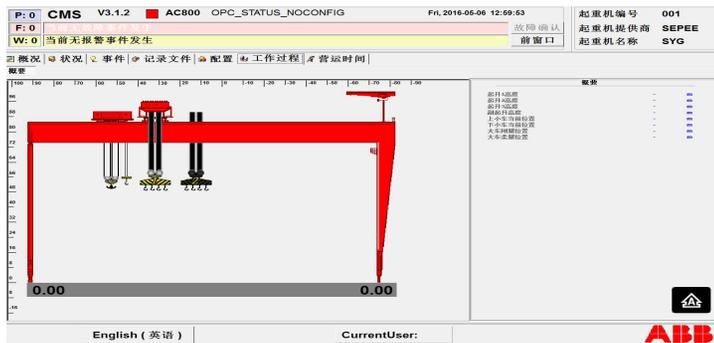
## Key Features of ABB Solution - Gantry Steering System



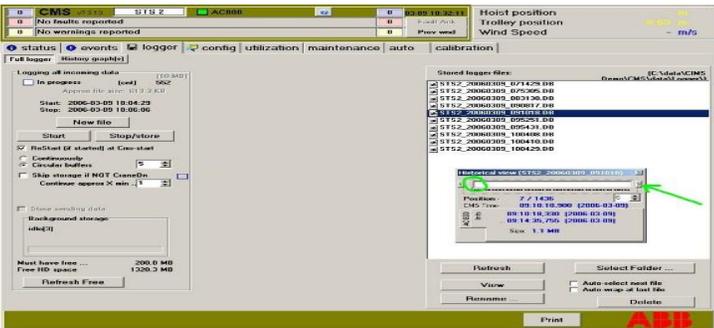
- **Position Deviation of Gantry Rigid Leg and Flexible Leg:**
  - Absolute Encoder for Gantry Position Measuring
- **Radio Frequency ID(RFID) for Position Calibration of Abs Encoder**
  - Data Carrier storing its position installed on the Rail, one data carrier every 20~30m;
  - Read/Write Head installed on the Gantry

# Shipyard Goliath Gantry Crane

## Key Features of ABB Solution - SYG Crane Monitoring System



- Actual Signals and Fault/Warning Events Monitoring
- Fault Trace Related to PLC Programs and Circuit Diagrams
- History Logger and Playback with Full Data Signals and Events
- User-Defined Productivity Report and Maintenance Report



# ABB Ports Service

# ABB Ports Service

## Our features and advantage



- ABB Ports Services is a truly worldwide service organization with three regional competence centers strategically situated to geographically support our global customers.
- We offer lifecycle services and solutions for container handling, bulk handling, and industrial cranes, as well as for other motion controlling electrical equipment in ports
- Our goal is to extend the lifetime and productivity of our customers equipment through value adding asset management services and process optimization & automation

# ABB Ports Service Our Presence



# ABB Ports Service

## Our tailored offering

### Spare Parts

- Spare parts
- Inventory management



### Asset Management

- Technical support(On-call 24/7)
- Preventive maintenance
- Remote diagnosis service
- Training



### Modernization Service

- PLC upgrade
- Drive upgrade
- System retrofit
- Informatization

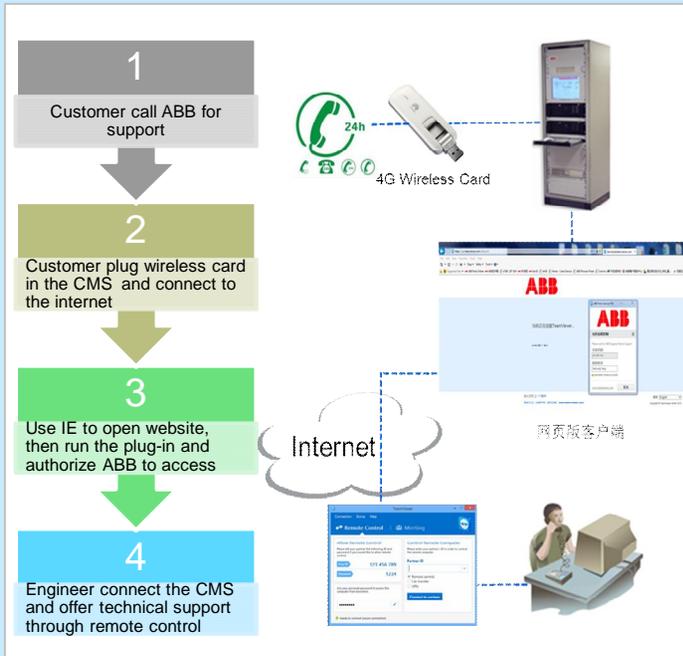
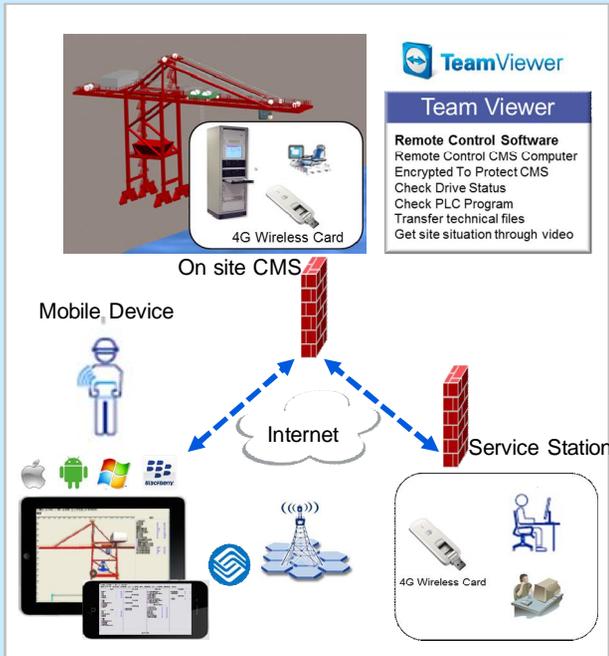


We offer tailored service products to meet different demand from different customer

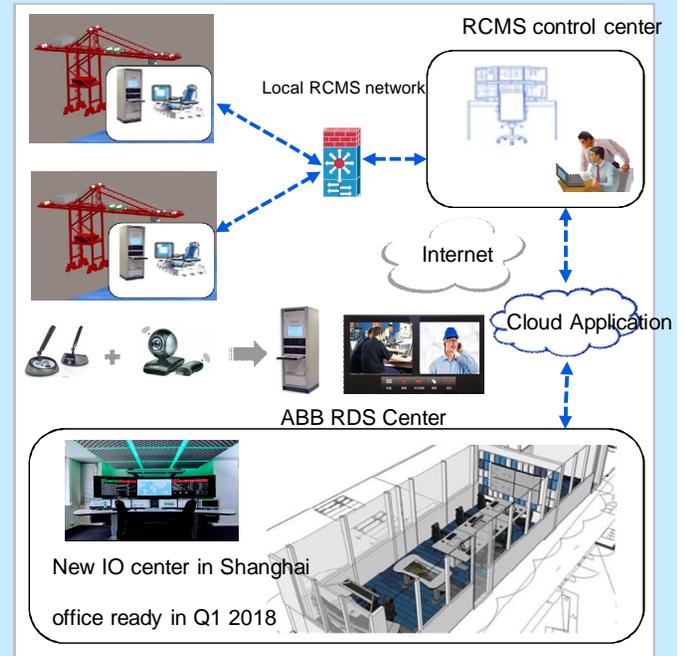
# ABB Ports Service

## RDS system composition and service process

### Simple RDS system composition and service process ( Without RCMS )



### RDS system composition ( With RCMS )



# ABB Ports Service Integrated Operations Center

## IOC Helsinki

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ABB Marine and Ports' next Integrated Operations Centre (IOC) is close to completion in Helsinki. While operations will commence April 25, the public launches will occur in May.



## IOC Singapore

Location identified, collaboration table purchased,  
EOWs workstation quoted,  
Plan to be ready by Q2 end.

## IOC Shanghai, IOC Miramar, IOC Genoa

Shanghai: RDS center set-up in 2016, Full IO center planning starts 2017 Q2, New IO center in Shanghai office ready in Q1 2018  
Ongoing plans for Miramar and Genoa

## IOC Ports (Västerås)

Ports IO development started and proceeding as planned  
Close co-operation with Marine  
IO Center Västerås plan to be operational in October / 2016

# Value for Customers

# Value for Customers



- **A reliable partner**
  - With decades of experience and competence
- **Proven, innovative solutions**
  - Setting standards in the industries we serve
- **Quality products**
  - Fit for purpose products made in ABB
- **A dedicated partner**
  - Single point contact throughout all project phases
- **Global capability**
  - Being global is really being local

Power and productivity  
for a better world™

