ACT One-Stop Solution
1993  **1st** Automated Terminal

2012  **15** Automated Terminals

2016  **35** Automated Terminals

......

2020  expected to be **over 100**
Smart Port

North America
- Fully-automated: 5
- Semi-automated: 1
- ZPMC participates: 5

Europe
- Fully-automated: 5
- Semi-automated: 9
- ZPMC participates: 12

Asia
- Fully-automated: 4
- Semi-automated: 18
- ZPMC participates: 17

Oceania
- Fully-automated: 2
- Semi-automated: 3
- ZPMC participates: 1

ZPMC participation percentages:
- North America: 83%
- Europe: 86%
- Asia: 77%
- Oceania: 20%

ZPMC participation levels:
- Fully-automated: 74%
- Semi-automated: 71%
- Fully-automated: 81%
ACT a complex systems engineering

So many different systems and equipments
Large mount of resources and capital
Traditional method VS One-stop solution
Automated Terminal Using ZPMC Solution

XIAMEN XOCT  QINGDAO QQCTN  SHANGHAI YANGSHAN IV
QingDao QQCTN ACT Project
System Architecture

TMS – Host Sys

Equipment Control System

OCR CS

Gate Automation

STS CS

QC

ASC

AGV

STS

ASC
2015.6.27
22.5 Months

25.9 box/h

5 months after opening:
Average 32 box/h
Highest 39.6 box/h
- World largest automatic container terminal.
- 7 berths + 61 automatic blocks, designed for 6.3 million TEU per year.
Contract signed for AGV

Full terminal commissioning test

Real deep sea vessel test start

10 Dec Opening

Timeline:
- 2015/07: Contract signed for QC/ARMG
- 2015/12: Contract signed for AGV
- 2016/08: Commissioning Test Start
- 2016/12: Real deep sea vessel test start
- 2017/09
- 2017/12
Smart Port

ACT One-Stop Solution

1. Planning & Simulation
2. Equipment Supply
3. System Integration
4. Operation & Maintenance

Software & Supply
Technological

- Has rich experience in designing stand-alone equipment
- Knows movement features of individual equipment well
- Can apply to multiple stage of terminal construction

Experienced

- Xiamen XOCT, Qingdao QQCTN, Yangshan IV
- Hong Kong MTL
- India Adani

Awards

- Gold Award of Singapore International Maritime Awards
- Silver Award of China Outstanding design
可利用Simulation和Emulation对码头方案进行预演评估及优化。
## Equipment Supply

<table>
<thead>
<tr>
<th>Quay Crane</th>
<th>Yard Crane</th>
</tr>
</thead>
</table>

### Horizontal Transport Equipment
- AGV
- Straddle Carrier
- Stacker/Forklift
- Reach Stacker

### Aux. Device
- Spreader
- Gate
- Entrance Guard
- Transfer Zone

**Products Design & Manufacture**
ZPMC
AGV机会充电
AGV Opportunity Charging
## System Integration

<table>
<thead>
<tr>
<th>Plan Level</th>
<th>TOS (Terminal Operation System)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Level</td>
<td>ECS (Equipment Control System)</td>
</tr>
<tr>
<td>Equipment Level</td>
<td></td>
</tr>
</tbody>
</table>

- **BMS**
- **VMS**
- **NS**
- **QCMS**
- **PLC**
- **ACCS**
- **Controller**
Software Features of ECS

- Fits all TOS
- Real-time task scheduling
- 3D monitoring
- Remote operation
- Exception Handling
- KPI analysis

System Integration
ECS

TOS Interface

Http

XML

Database

System Integration

Software

TOS Interface

TOTAL SOFT BANK LTD.

TOTAL SOFT BANK LTD.
System Integration

Software Systems

Load Collision Prevention System (LCPS)
Target Detection System (TDS)
Spread Detection System (SDS)
Optical Character Recognition (OCR)
Chassis Position System (CPS)
Ship Profile Scanning System (SPSS)
Vision Gantry Steering and Positioning System for RTG (AGSS)
System Integration

Auxiliary System

Remote Operation Control System (ROCS)

Twist lock handling system

Remote Monitoring & Diagnosis System

Yard Entrance Guard System

Automatic battery changing system

Network Communication System

Smart Gate System

Reefer monitoring system
High Quality
Low Cost
Short Construction Period

Project Management

System Integration
System Integration

Progress

- Regional commissioning and isolation management
- Strengthen institutional development

Safety

- Design system multi-layer security
- Network security standard implementation for automated container terminal

Quality

Project Management
System Integration

Quality

- Provide full commissioning programs
- Strictly follow the test and version release process
- Experienced quality assurance team
- Conduct regular test case reviews with users
Progress

Quality

Safety

Project Management

- Reusing mature software modules
- Software simulation and emulation integration test
- Single-system factory test at the base
- Coordinated project planning
- Strictly control the project nodes
Operation & Maintenance

Operation
✓ Personnel training
✓ Advice providing
✓ Operation assistance
✓ System optimization
✓ Failure fixing
Real-time monitoring
Fault prediction
Fault diagnosis
Service life prediction
Operation & Maintenance

Data acquisition

Data landing

Data modeling

Visual interface
Maintenance —

Smart O&M System

✓ On-line diagnosis
✓ Customization
✓ Automatic order dispatching
Emergency Repair

Maintenance

Automatic call for repairs

Automatic order dispatching

Emergency Repair

WO from Maintenance Schedule

Automatic order dispatching

Maintenance Schedule

WO Status tracking

Maintenance Schedule

Emergency Repair

Display of real-time running status

Smart O&M System

Statistics of real-time running data

Smart dynamic (spare parts) warehouse

Dynamic BOM of Equipment

Asset management

Display of real-time running status

Resource sharing of spare parts

Completion processing

Completion processing

Spare parts management

Status tracking
Terminexus ECO Platform
Real-time monitoring of equipment

Fault prediction and preventive maintenance based on big data

Providing real-time remote support services for global users

ZPMC Global Remote Monitoring Center
用门户的录屏视频来讲以下PPT内容。
If you want to go fast, go alone,
If you want to go far, go together.