Opportunities & Cooperation

Manufacturing Digitalization Powered by Industrial Internet

Xu Shan
VP/CTO, CASICloud

2021.7.22
1. The Rise of Digital Economy
2. Manufacturing Digitalization Powered by CASICloud
3. CASICloud Case Studies
4. International Innovation & Cooperation
01 The Rise of Digital Economy
Digital Economy Is Here

Agricultural Economy

\[ Y = F(A, L, T) \]

Industrial Economy

\[ Y = F(A, K, L, T) \]

Digital Economy

\[ Y = F(A, D, K, L, T) \]

- Data is the new driver of economic growth.
- Data is the core asset of the future competition among enterprises.

Y: Yield  F: Production Function  
A: Advanced technology  L: Labour  
T: Territory  K: Capital  D: Data
1. Global Industrial Digitalization is Growing

Global Digital Economy Volume

- **USA**: 123408
- **China**: 47290
- **Germany**: 23994
- **Japan**: 22901

Top 20 global digital companies
Forbes, 2020

Digital economy is the new opportunity of international cooperation.
China Leads the World in Digital Economy Growth

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Vol (tens of yuan)</th>
<th>% of GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011年</td>
<td>9.49</td>
<td>20.30%</td>
</tr>
<tr>
<td>2014年</td>
<td>16.16</td>
<td>26.10%</td>
</tr>
<tr>
<td>2015年</td>
<td>18.63</td>
<td>27.50%</td>
</tr>
<tr>
<td>2016年</td>
<td>22.58</td>
<td>30.30%</td>
</tr>
<tr>
<td>2017年</td>
<td>27.2</td>
<td>32.90%</td>
</tr>
<tr>
<td>2018年</td>
<td>31.3</td>
<td>34.80%</td>
</tr>
<tr>
<td>2019年</td>
<td>35.8</td>
<td>36.20%</td>
</tr>
<tr>
<td>2020年</td>
<td>39.2</td>
<td>38.60%</td>
</tr>
</tbody>
</table>

15% YoY growth in the past 10 years.
Manufacturing Digitalization
Powered by CASICloud
Government Policies

- **U.S.**: Digital Engineering Strategy to build end-to-end digital capabilities, and the **Industrial Internet** is the key factor.

- **Germany**: National Industrial Strategy 2030 ensures the leading position of manufacturing, **Industrial Internet** as focus.

- **China**: **Industrial Internet as a New Infrastructure**

Core points of the strategies: deeply integrates information technology and manufacturing technology. **Industrial internet** becomes the new engine of manufacturing transformation.
Challenges of Digitalization

1. Lack of trained professionals and technical personnel
2. Lack of digital solutions for all businesses
3. Lack of coordination between upstream and downstream enterprises in the industrial chain
4. Lack of motivation among businesses
Industrial Internet is the Digital Infrastructure

New digital infrastructure

Connection of people, machines, enterprises, government and data

Government policy tool

Data factor value

Secured connectivity

Vocational training

Public Service Platform
INDICS+CMSS

Enabler

Foundation

Connector

Big Data

Security

Training
# Industrial Internet Application Scenarios

## Scenarios

<table>
<thead>
<tr>
<th>Scenarios</th>
<th>Use case distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>设备及产品管理</strong></td>
<td></td>
</tr>
<tr>
<td>状态监测</td>
<td>80%</td>
</tr>
<tr>
<td>故障诊断</td>
<td>29%</td>
</tr>
<tr>
<td>预测性维护</td>
<td>26%</td>
</tr>
<tr>
<td>远程运维</td>
<td>19%</td>
</tr>
<tr>
<td>生产制造优化</td>
<td>37%</td>
</tr>
<tr>
<td>资源调度优化</td>
<td></td>
</tr>
<tr>
<td>能耗优化</td>
<td>16%</td>
</tr>
<tr>
<td>质量优化</td>
<td>12%</td>
</tr>
<tr>
<td>安全管理</td>
<td>8%</td>
</tr>
<tr>
<td>设计优化</td>
<td>8%</td>
</tr>
<tr>
<td>库存优化</td>
<td>5%</td>
</tr>
<tr>
<td>物流优化</td>
<td>5%</td>
</tr>
<tr>
<td>知识管理</td>
<td>4%</td>
</tr>
<tr>
<td>员工赋能/作业指导</td>
<td>4%</td>
</tr>
<tr>
<td>采购/销售决策优化</td>
<td>3%</td>
</tr>
<tr>
<td><strong>业务和运营优化</strong></td>
<td></td>
</tr>
<tr>
<td>数字化产品</td>
<td>6%</td>
</tr>
<tr>
<td>产品聚焦服务转型</td>
<td>6%</td>
</tr>
<tr>
<td>按需制造</td>
<td>3%</td>
</tr>
<tr>
<td>分享制造</td>
<td>3%</td>
</tr>
<tr>
<td>协同制造</td>
<td>2%</td>
</tr>
<tr>
<td>创新定价模式</td>
<td>2%</td>
</tr>
<tr>
<td>产融合作创新</td>
<td>1%</td>
</tr>
<tr>
<td>网络化协同研发</td>
<td>1%</td>
</tr>
<tr>
<td><strong>新模式新业态</strong></td>
<td></td>
</tr>
<tr>
<td>带动投资</td>
<td></td>
</tr>
<tr>
<td>增加客户生命周期价值</td>
<td></td>
</tr>
<tr>
<td>数据即服务</td>
<td></td>
</tr>
<tr>
<td>增加客户数量和范围</td>
<td></td>
</tr>
</tbody>
</table>

## Application results

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>成本节约</strong></td>
<td></td>
</tr>
<tr>
<td>降低用工量</td>
<td>减少故障损失</td>
</tr>
<tr>
<td>降低运维成本</td>
<td>降低能耗</td>
</tr>
<tr>
<td>减少资源浪费</td>
<td>减少安全事故</td>
</tr>
<tr>
<td><strong>效率提升</strong></td>
<td></td>
</tr>
<tr>
<td>优化业务流程</td>
<td>减少故障损失</td>
</tr>
<tr>
<td>提高资源（设备、物料）利用效率</td>
<td>缩短交付周期</td>
</tr>
<tr>
<td>提高员工工作效率</td>
<td>提高供应链运作效率</td>
</tr>
<tr>
<td><strong>产品与服务提升</strong></td>
<td></td>
</tr>
<tr>
<td>短缩研发周期</td>
<td>降低次品率</td>
</tr>
<tr>
<td>降低产品故障率</td>
<td>产品可追溯</td>
</tr>
<tr>
<td>加速产品/服务更新迭代</td>
<td>提升客户满意度</td>
</tr>
<tr>
<td><strong>业务和模式创新</strong></td>
<td></td>
</tr>
<tr>
<td>带动投资</td>
<td>数据即服务</td>
</tr>
<tr>
<td>增加客户生命周期价值</td>
<td>增加客户数量和范围</td>
</tr>
<tr>
<td>新的商业模式获得的收入增长</td>
<td></td>
</tr>
</tbody>
</table>
CASICloud: 1st Industrial Internet Company in China

- Founded in 2015 as the first industrial internet platform in China.

- National industrial internet platform
  - 22 provincial level industrial internet platforms
  - 13 vertical and park platforms covering industries including Machinery manufacturing, aerospace, automotive, electronics
  - 2000 intelligent projects and services.

- National Engineering Laboratory of Industrial Big Data application

- Extensive international cooperation: Siemens, SAP, FESTO, APEC
China • Hongkong
Main platform launched for international business
Asia Pacific, ASEAN and "One belt, one road" area

Deployment in Germany
Europe and North Africa

China Domestic ecosystem
domestic and international collaboration
INDICS+CMSS
Built the industrial internet based cloud manufacturing industrial eco-system

Compatible:
- Intelligent manufacturing
- Collaborative manufacturing
- Cloud manufacturing

Service:
- Innovation of technology, business mode and management

Cloud based elements
- Guarantee quality, improve efficiency and reduce cost
- Cloud manufacturing reshapes core competitiveness of enterprise

Intelligent upgrading
- Expand business opportunities, supporting facilities and service-oriented manufacturing
- Intelligent transformation
- Business mode innovation
INDICS-OS is a distributed industrial operating system based on cloud

- Downward: improve the ability of equipment resource connectivity service.
- Upward: support the development and operation of industrial application of new generation.
03 CASICloud Case Studies
Remote maintenance of heat treatment plant based on "5G+VR+digital twin"

**Issues**

- Poor process stability
- High scrap rate of finished products
- High operational security risk

**Key Features**

- Optimize the heat treatment process
- Improve product quality and safety
- New mode of remote maintenance

- 500 data collection points; 20 key indicators, such as, temperature, gas concentration, temperature and carbon concentration.

- **5G+VR remote inspection**: temperature field distribution, carburizing process; reduce the risk of manual operation.

- **Digital twin (device level)**: carbon potential prediction, adjust parameters in real time, improve process stability reduce product rejection rate.
Remote maintenance of heat treatment plant based on "5G+VR+digital twin"

Application Effect: efficiency ↑ 20%; Qualified products ↑ 5%; accident ↓ 95%
Electric Connector Smart Factory

Key Features

- Combination of virtual and real world through digital twins
- Cross-enterprise and mixed-line production manufacturing mode
- CRP intelligent scheduling plan
- Data-driven, flexible production to meet customized orders.

- AGV automatic distribution, logistics automation.
- Integrate robots, visual inspection systems, etc.; Flexible processing and inspection of products.
- Data collection and uploading, Intelligent production line construction.
Electric Connector Smart Factory

Application Results

- **Productivity**: +50%
- **Operation cost**: -21%
- **Time to market**: -30%
- **Defect rate**: -56%

**Workshop workers**: 75%
**Production cycle**: 66.67%
**Annual production capacity**: 500,000, +400%
Case Study: Smart Workshop/Production Line

Smart Shoe Production Line

Issues
- Information transmission relies on paper documents
- Manual loading low efficiency and potential safety problem
- Production capacity of shoes, cutting and sewing machines is insufficient

Features
- MTO flexible mixed code production and sorting & packaging
- Support entire line and segmented line
- Suitable for all kinds of cold glued shoes.

• Automatic grinding, spraying, packing and palletizing by robot, Highly automated
• Use MES system, Automatic counting
• Use AGV realize intelligent transportation
• Build smart warehouse of raw materials, semi-manufactures and finished products. Real-time information monitoring.
Case Study: Smart Workshop/Production Line

Smart Shoe Production Line

Application Results

Transparent production process, Data traceability;
Productivity ↑ 200%, Cutting ↑ 30%, Sewing ↑ 66.7%.
International Innovation & Cooperation
New Opportunities Under New Development Pattern

New development pattern

- Accelerate the formation of a new development pattern with the domestic cycle as the main body and the domestic and international Dual Circulation mutually promoting each other.
- Open door policy to a higher degree

- 21 pilot Free Trade Zones
- Industrial Internet Park
  - Transformation and upgrading of SMEs,
  - Provides online service of cross-border supply chains
  - Builds an international supply chain online ecosystem innovatively.

Coordinate and guide a new development pattern and implement a high-level opening to the world
Sino-German Government Science and Technology cooperation

Smart Cloud Manufacturing Service Research and Demonstration Factory Project ("2+2" project)
Based on the needs of Sino-German manufacturing industry transformation, fully integrate Chinese smart cloud manufacturing technology and German smart factory technology to create smart manufacturing and smart service based on the concept of cloud manufacturing. Project results of both parties have achieved incubation in Guangdong, Chongqing, Changzhou and other places, and landed in the Industrial Internet Empowerment Center to help industry talent training and technological innovation.
Cooperation with German Companies

**Siemens:**
- Eco-system partners, products, research
- Sino-German smart manufacturing pilot projects,
- Regional industrial Internet empowerment center

**FORCAM:**
- High-end edge intelligent all-in-one products and solutions
- Integration of Forcam IIoT products, SAP ERP products and CASICloud CPDM products.

**FESTO:**
- Industrial Internet vocational education overall solutions and standard.

**L&M:** Supplies used to pandemic fighting
**Kohl24.de:** Introduction of high-end equipment
**Yaband Media:** Cross-border payments and online stores
**Darmstadt Technical University:** Sino-German technical exchanges and resource sharing.
APEC SME Center for IT Promoting cloud service platform
Lan-Mekong cross-border integrated service integration platform for the ASEAN countries
Industrial Internet innovation cooperation platform in the Guangdong-Hong Kong-Macao Greater Bay Area
Suggestions

- Continue cooperation in industrial Internet with global partners to promote global industrial integration

- Build APEC SMEs Digital Transformation and Innovation Platform for manufactures in the Asia-Pacific region
信息互通  资源共享  能力协同
开放合作  互利共赢