Supporting Platform Promotes 4IR Achievement

CONTENT

01

Introduction of our company

Introduction of our company

> ➢ Established in 1988, as one of first batch of key high-tech enterprises of China's national Torch Program

> ➢ Simulation control & information system engineering

> ➢ National simulation & system control engineering tech R&D center

> ➢ Simulation control system manufacturer with the most R&D capability and influence in Asia
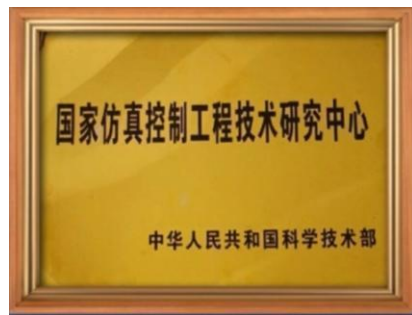
Introduction of our company

We are building two national technological innovation platforms

- **National Simulation Control Engineering Technology Research Center, approved by ministry of science and technology.**

- **Comprehensive simulation modeling technology and supporting technology service platform, approved by NDRC.**

- **We have passed ISO2000 and TUV certification.**

Introduction of our company

Our company has always received the attention and guidance of chinese national leaders.

More than 100 leaders, including Deng Xiaoping, Jiang Zemin, Hu Jintao and Wu Bangguo came to our company to inspect and guide our work.

Deng Xiaoping inspected and guided our company on 25th, Jan, 1992

Introduction of our company

- **Business and projects areas**

Simulation systems
Electric power simulator
  Thermal power
  Nuclear power
  Hydropower
  Substation and power grid
Aircraft simulator
Navigation simulator
Traffic simulator
Chemical system simulator
Motion simulator
Decision system simulator
Economic simulator
Others

300 more

Control systems
Real time data accessing system
Naibor system
Environmental control
Power plant monitoring
Online decision
Others

40 more

Three in one systems
Digital power plant
Digital cement plant
Digital steel iron plant
Industrial big data application
Internet of things
Intelligent cities

30 more

Information systems
Power plant informationize
Condition based maintenance
Large scale info management
Others

100 more

Science and education
Science & Tech museum design
VR simulation
Visual management
Others

100 mroe

02
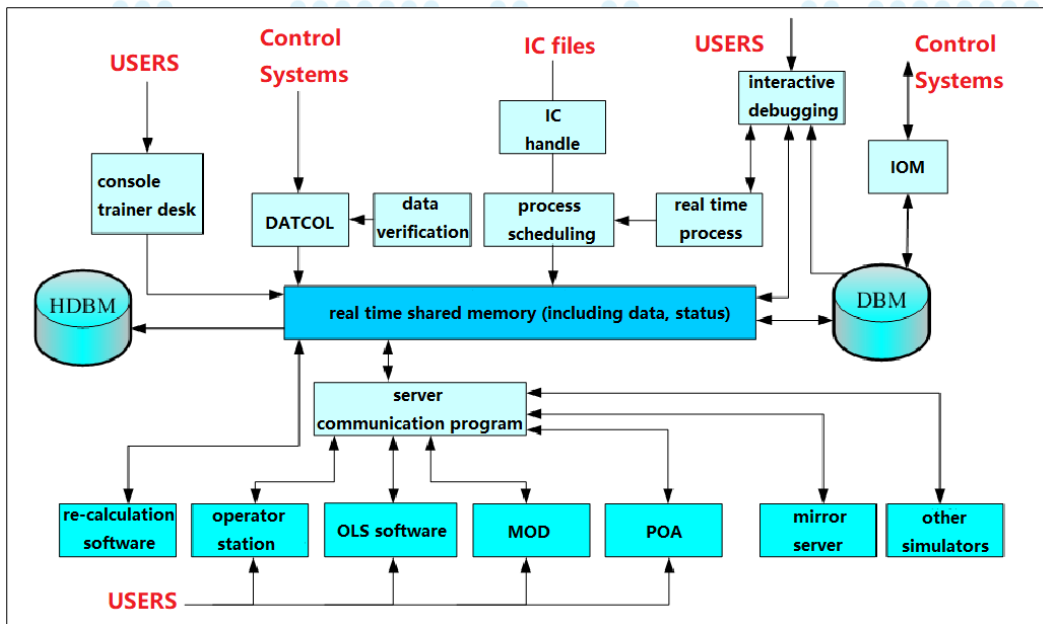
The supporting platform SimCoIn

Supporting Platform SimCoIn

- **The integrated platform SimCoIn (科英) we developed has three in one of simulation, control and information. It is the basis for the realization of various functions as online monitoring, online simulation and online decision.**

- **three in one**

- **real time, history database**

- **development, commissioning, operation**

- **simulation modeling**

- **data collecting**

- **real time calculation**

- **communication server**

- **visual tools**

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Supporting Platform SimCoIn

We developed industrial real time database with completely independent intellectual property rights. It has the advantages of simple data interface and high operation efficiency.

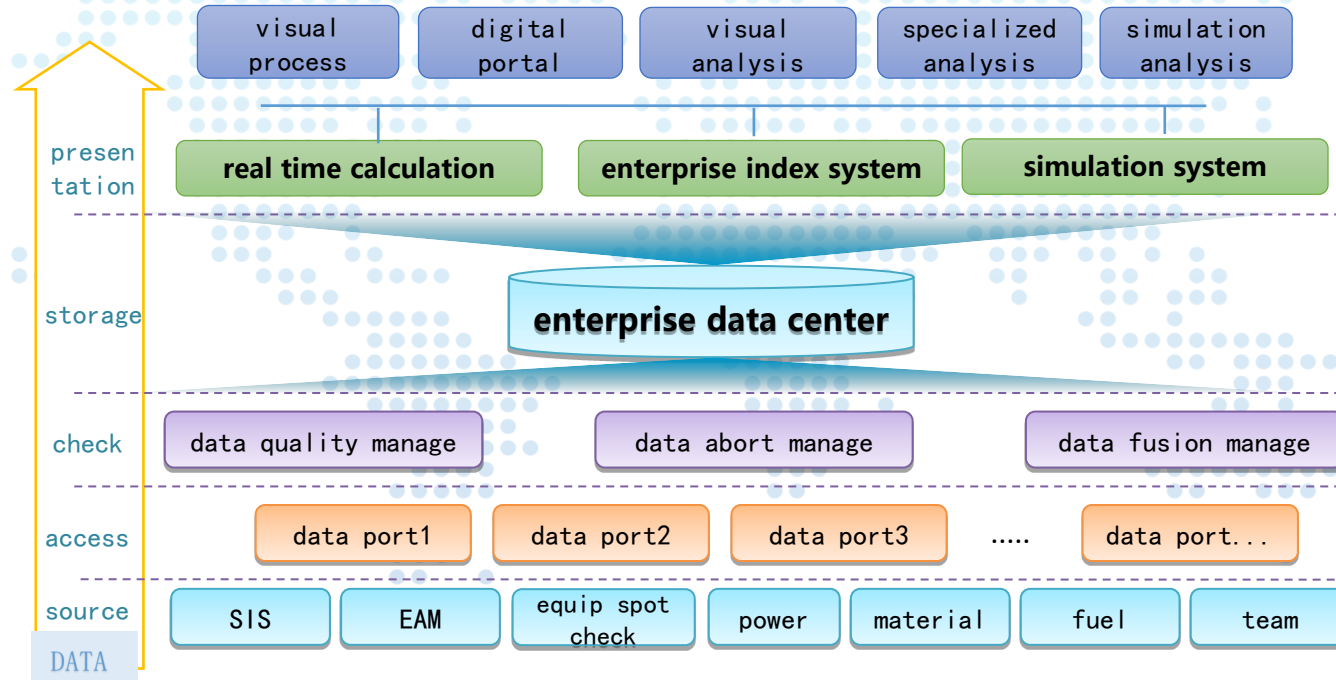Excellent performances of SimCoIn real time database:
- ➢Unlimited total memory points
- ➢Max memory points of a single global area:200k
- ➢Speed of real time value query:280k points/sec
- ➢Speed of history database query:30k records/sec
- ➢Historical data storage compression ratio:40:1

Supporting Platform SimCoIn

Interactive operation on the platform (power plant)

visual process	digital portal
visual analysis	specialized analysis
simulation analysis	

presentation

real time calculation | enterprise index system | simulation system

storage

enterprise data center

check

data quality manage | data abort manage | data fusion manage

access

data port1 | data port2 | data port3 | ..... | data port...

source

SIS | EAM | equip spot check | power | material | fuel | team

DATA

03

Working in traditional industry

Working in traditional industry

Revolution does not mean abandoning traditional and old industries. Yet, 4IR will bring them new life by injecting them with new ideas and technologies.

Difficulties and problems faced by iron and steel plants:

➢Data and information isolation

➢Manufacture procedure delays

➢Little remote monitoring and management capability

➢None of online decision tools and AI analysis

➢Excessive energy consumption and carbon emissions

➢Excessive unnecessary operating costs

Transformation & upgrading project with integration of industrialization and digitization

Working in traditional industry

SimCoIn supporting platform acting as foundation, industrial big database can be built, then more practical functions and applications are supplied such as real time monitoring, data analysis, online decision system.

Key Technologies

Major Functions

Supporting Platform

Realtime / History Database
Big data analysis
Internet of Things
Visual Client
E-map
Simulation Models

Transfer
Analysis
Calculate
Decision

SimCoIn

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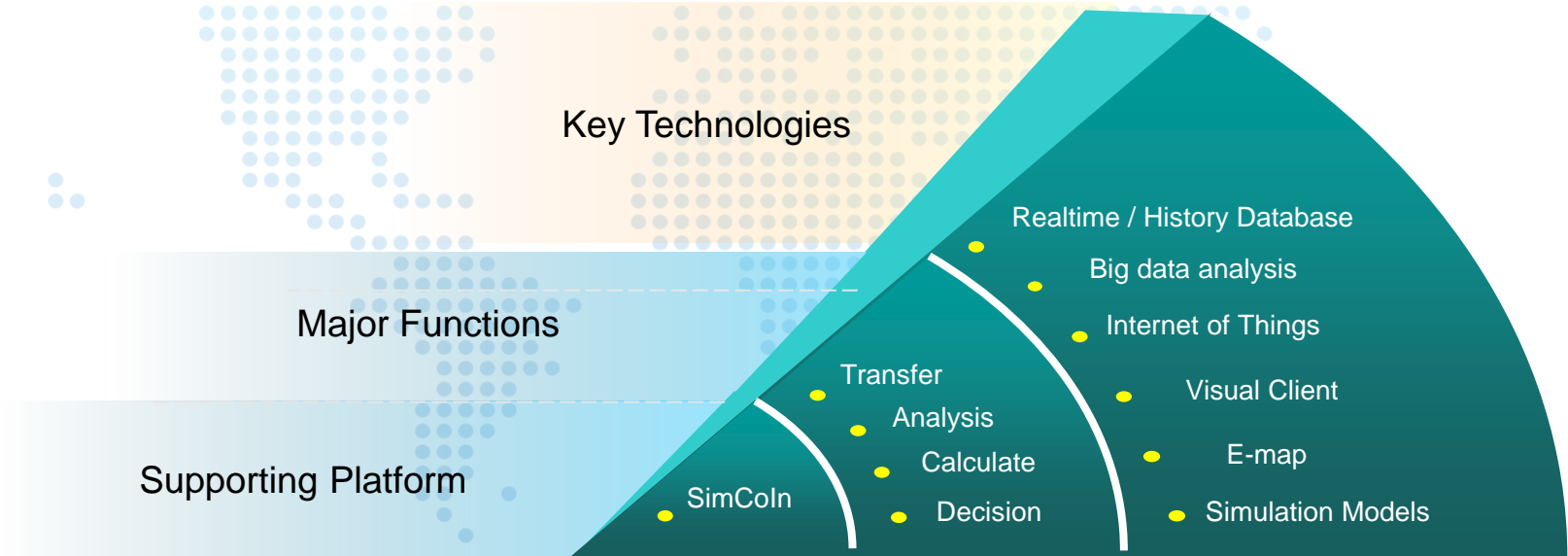
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To build a big industrial database, manage servers by levels so as to realize data collection, storage and processing centrally.

- ➢ **real time data collection (more than 220k information points)**
- ➢ **DCS systems simulators (269 sub systems)**
- ➢ **removal of potential risk   (more than 1k Gas detectors)**
- ➢ **secure storage (test data of molten iron and steel)**
- ➢ **energy management (E-M center and power control center)**
- ➢ **environmental monitoring (more than 80 emission detectors)**

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Real time simulators provide visual, alertable, traceable and analyzable manufacture procedure.
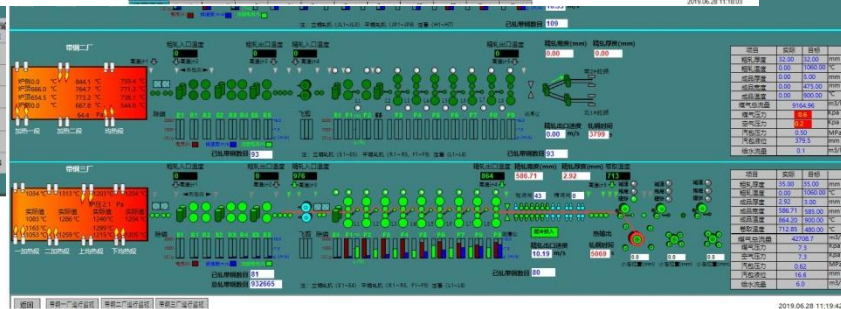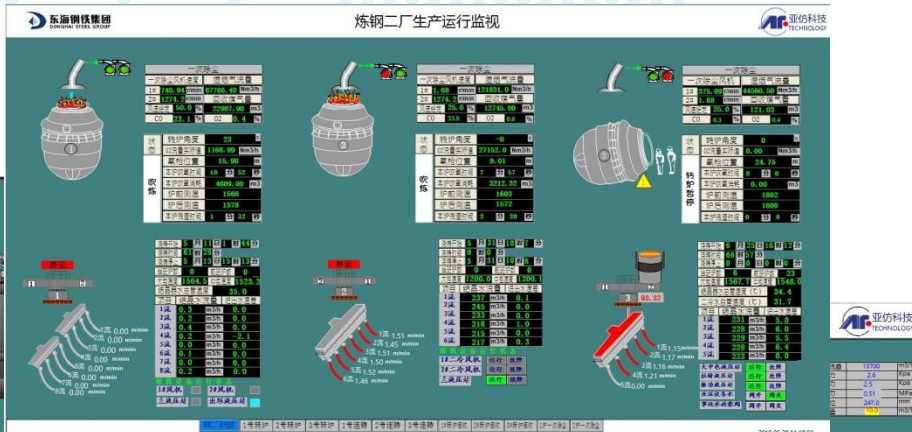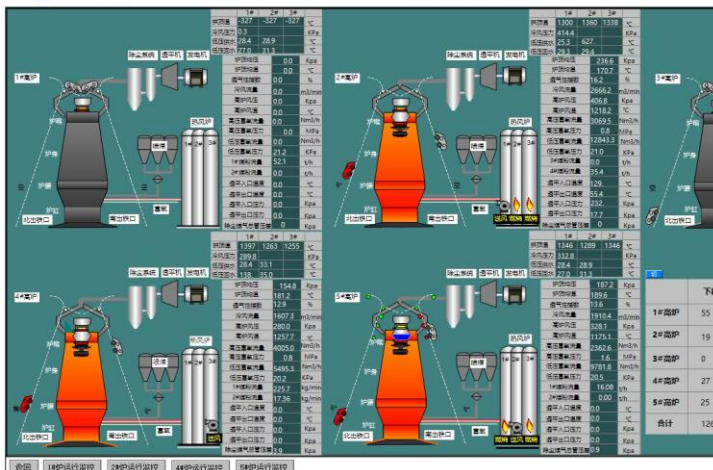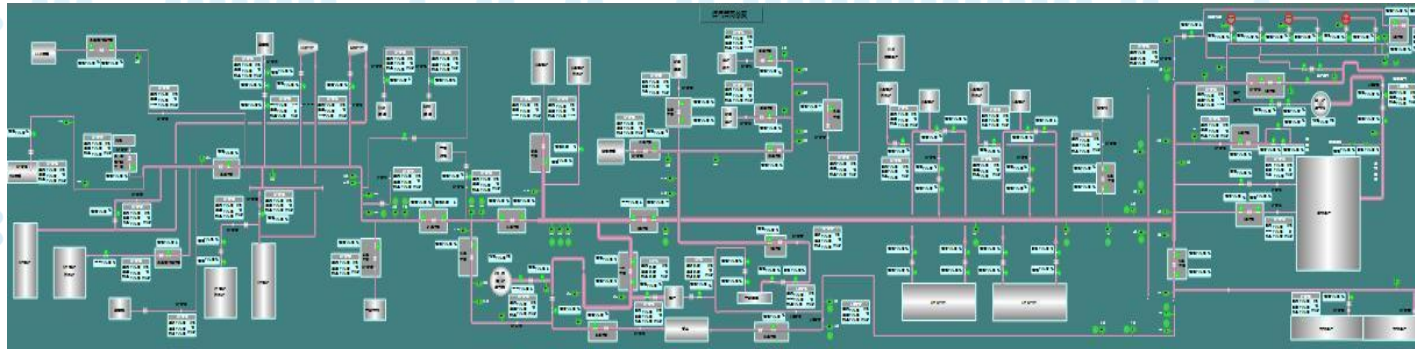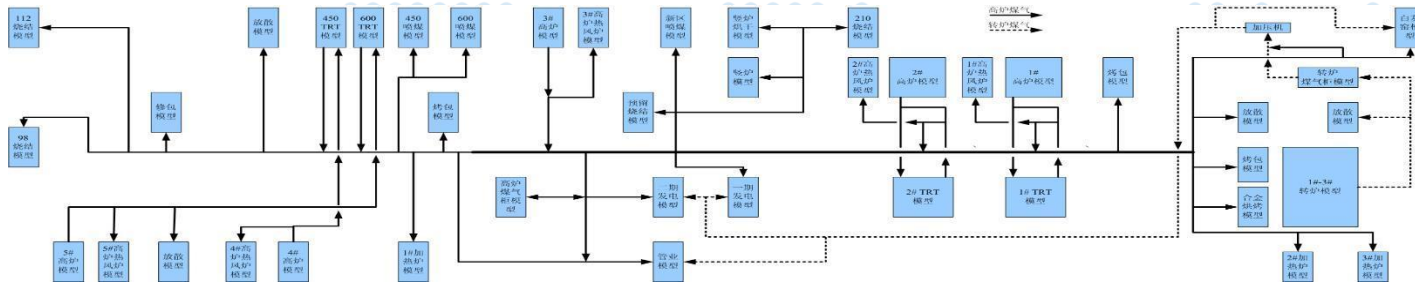
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We have developed an integrated on-line optimal scheduling system for energy production, and it improves the energy balance prediction and production scheduling capability.
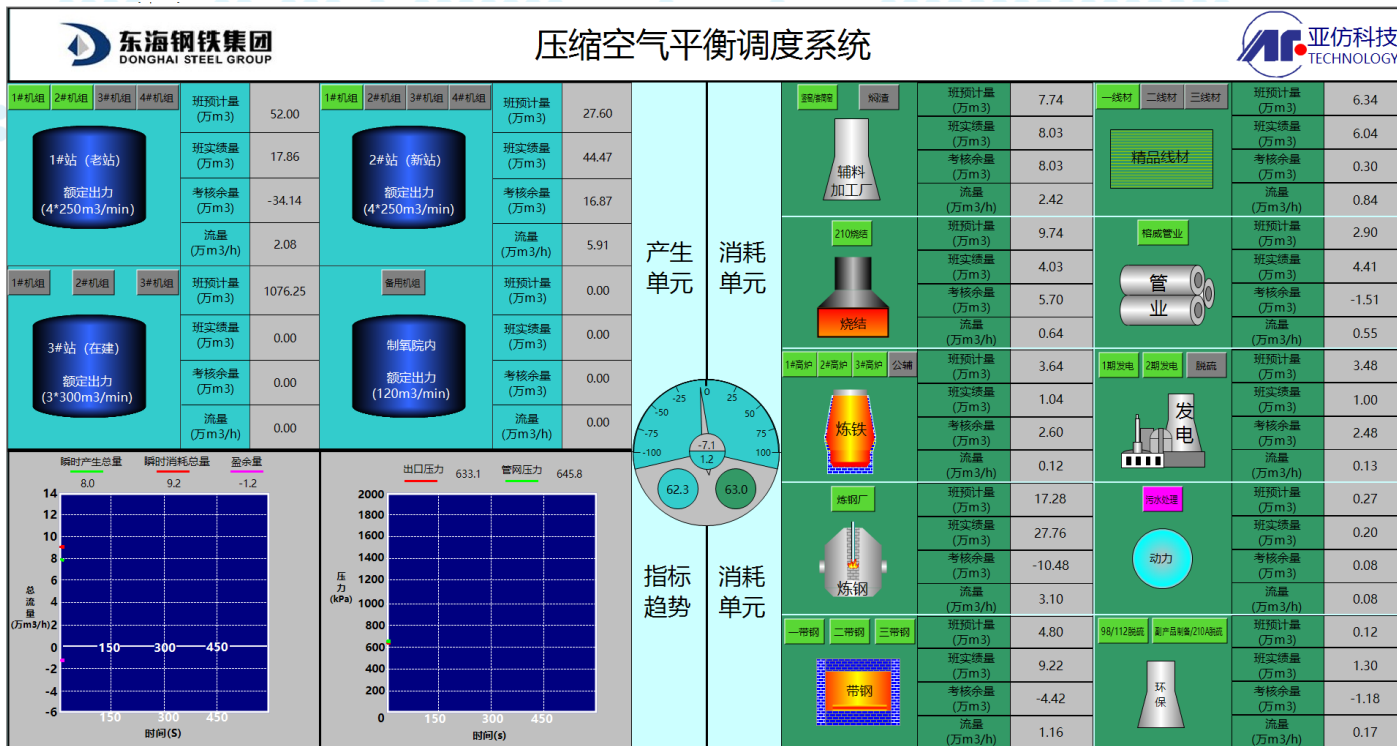

GAS pipe network digital management

Working in traditional industry

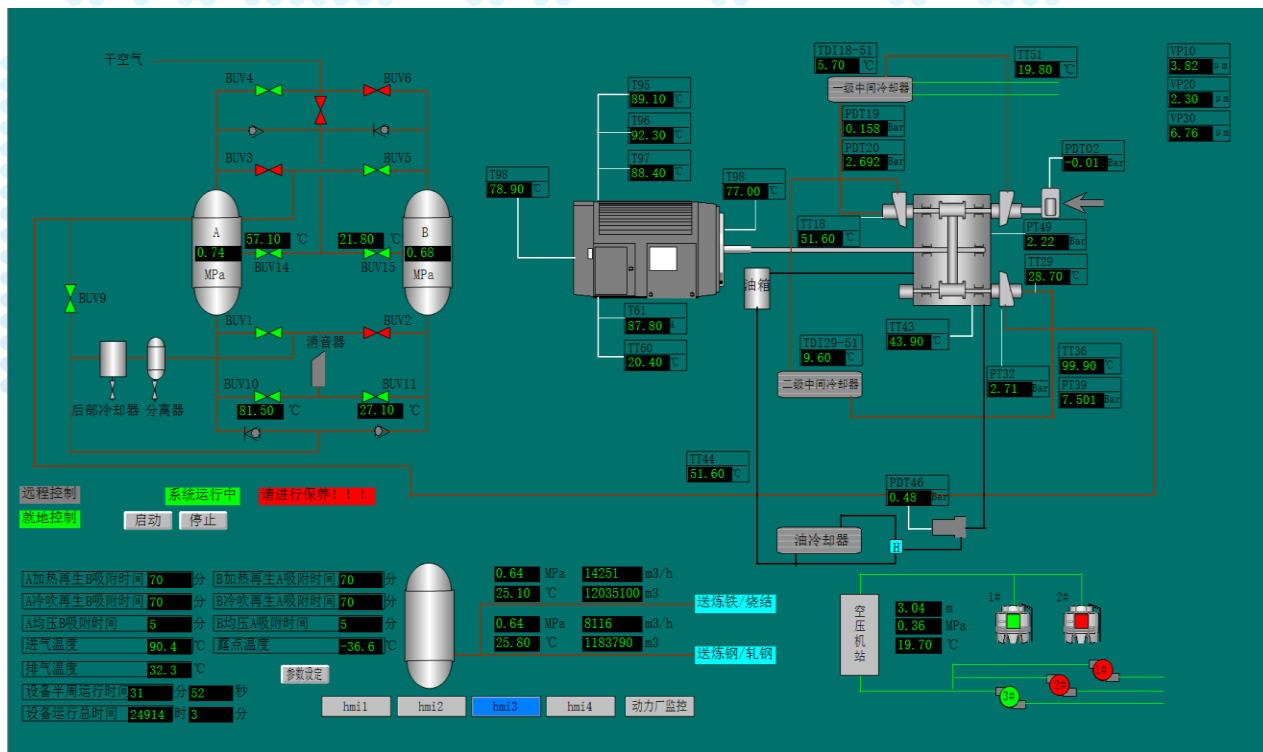**Optimized dispatching of compressed air by energy pipe network model and P-C unit model.**

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Compressed Air

Power equipment monitoring:

➢ data from PLC

➢ running status

➢ start/stop records

➢ key parameter
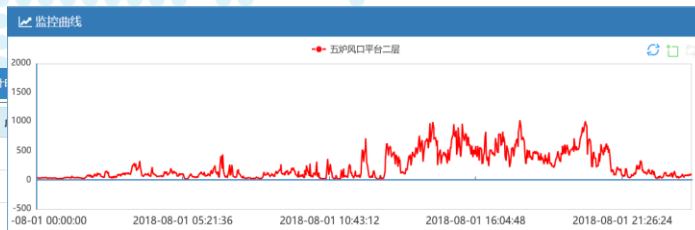
➢ set alarms

➢ trend analysis

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TECHNOLOGY

Online monitoring of gas leakage

➢Using electronic map and wireless transmission technology.

➢Centralized monitoring and early warning including more than 1000 spots.

➢Linkage between intercom system and video monitoring system.

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Electronic map for monitoring gas leakage point

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We have established a centralized dispatching center

➢ It realizes centralized monitoring and unified scheduling of production, energy, safety, environmental protection and process, greatly improves the timeliness and rationality of plant level dispatching.
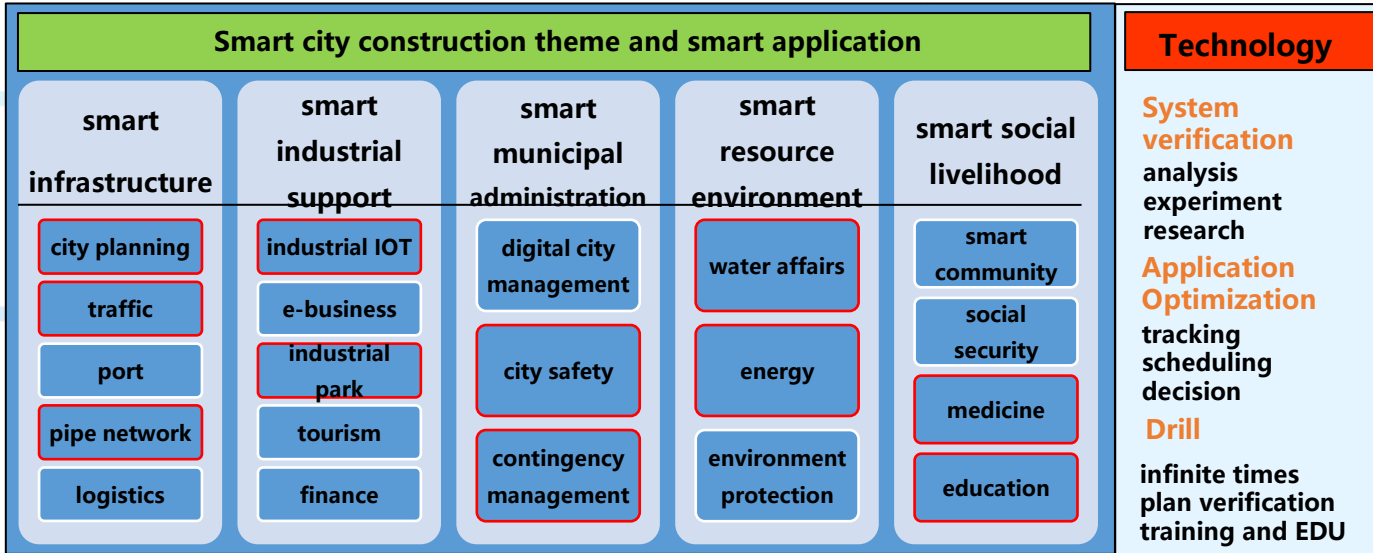
04

Working in intelligent city construction

Working in intelligent city construction

AF's Values of Intelligent City:
More scientific development, more efficient management and better life

Smart city construction theme and smart application

smart infrastructure	smart industrial support	smart municipal administration	smart resource environment	smart social livelihood
city planning	industrial IOT	digital city management	water affairs	smart community
traffic	e-business		energy	social security
port	industrial park	city safety		medicine
pipe network	tourism		environment protection	education
logistics	finance	contingency management		

Technology

System verification
analysis experiment research

Application Optimization
tracking scheduling decision

Drill

infinite times plan verification training and EDU

perception   integration   cloud-calculation   automatic disposal

Simulation, control, information 3in1 supporting platform: SimCoIn
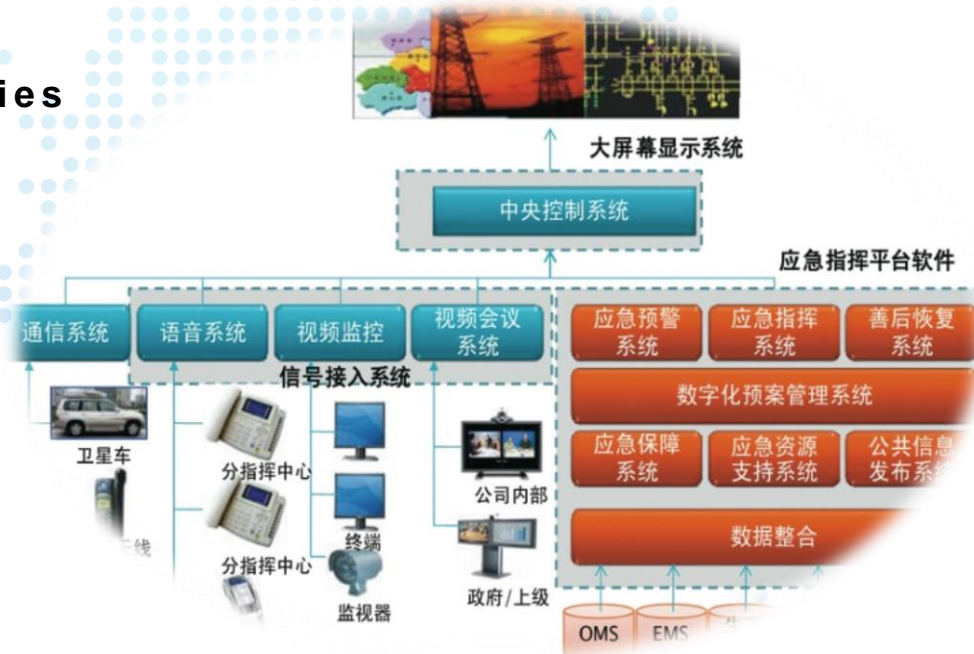
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The scope of urban emergency events includes:

- Public health emergencies

- Extreme weather like typhoon, rainstorm

- Conflagration

- Social unrest
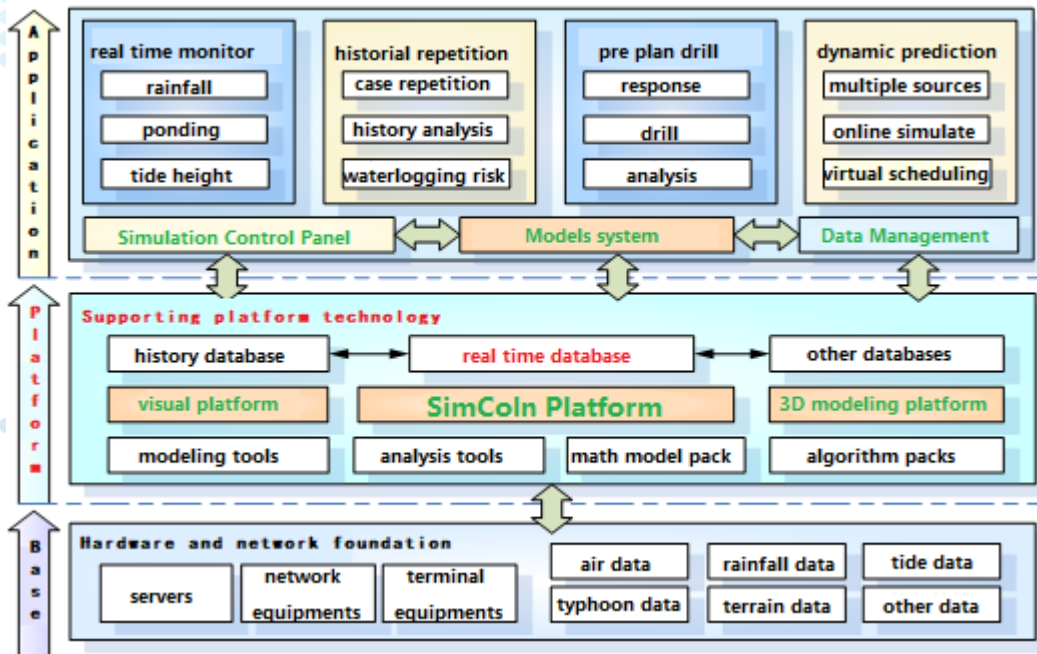
- Nuclear accident

- ... ...

Working in intelligent city construction

Urban waterlogging simulation and decision support system

- ➢ **Real time monitoring and early warning**
- ➢ **History replay and analysis**
- ➢ **Pre plan drill and analysis**
- ➢ **Dynamic prediction and scheduling**

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**Real time monitoring and early warning:**

➤ **Integrating monitoring data of meteorology, water affairs, airports, ports, etc.** **To realize centralized monitoring and management of all useful data.**

➤ **Combine the radar temporary forecast, monitoring data and numerical simulation technology to obtain more accurate real time early warning conclusion of waterlogging.**
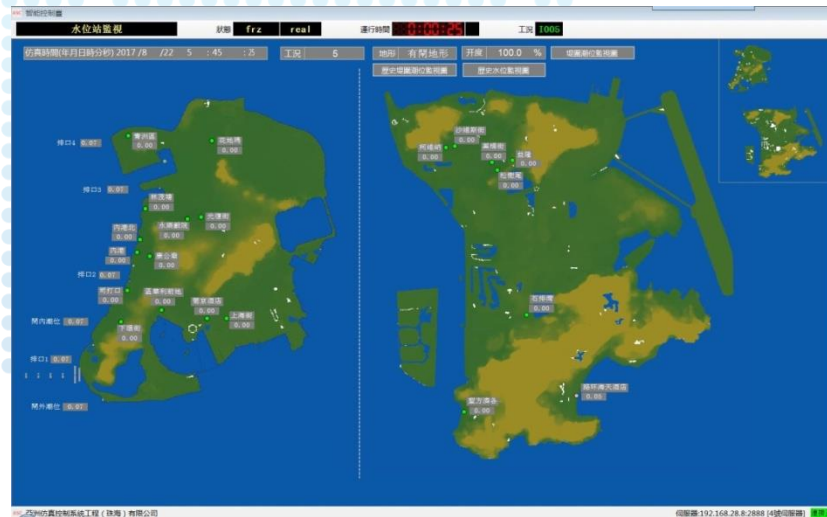
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Numerical simulation model of urban waterlogging:

➢ **Complex urban terrain can be characterized more precisely by irregular (several types of size)grid.**

➢ **Surface hydrodynamic simulation**

➢ **Urban drainage network simulation**

➢ **Coupling models**
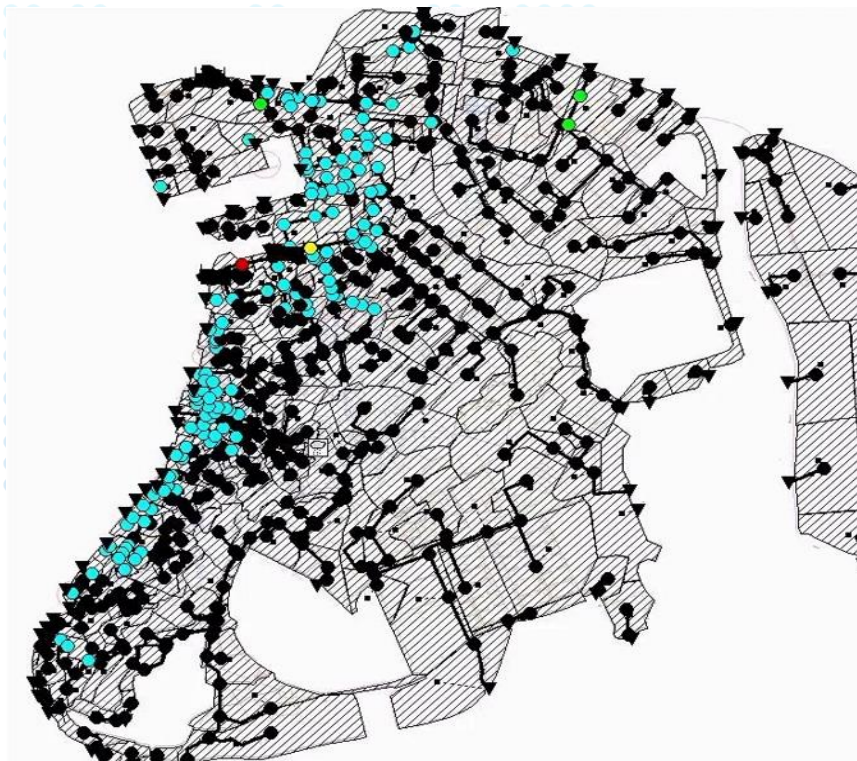
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History replay and analysis:

- ➤ **Simulation replay of historical typical rainstorm cases.**

- ➤ **AI and big data analysis technology are used to analyze the spatiotemporal distribution characteristics of urban rainfall and ponding.**

- ➤ **Based on historical analysis, the urban waterlogging risk assessment map was established.**
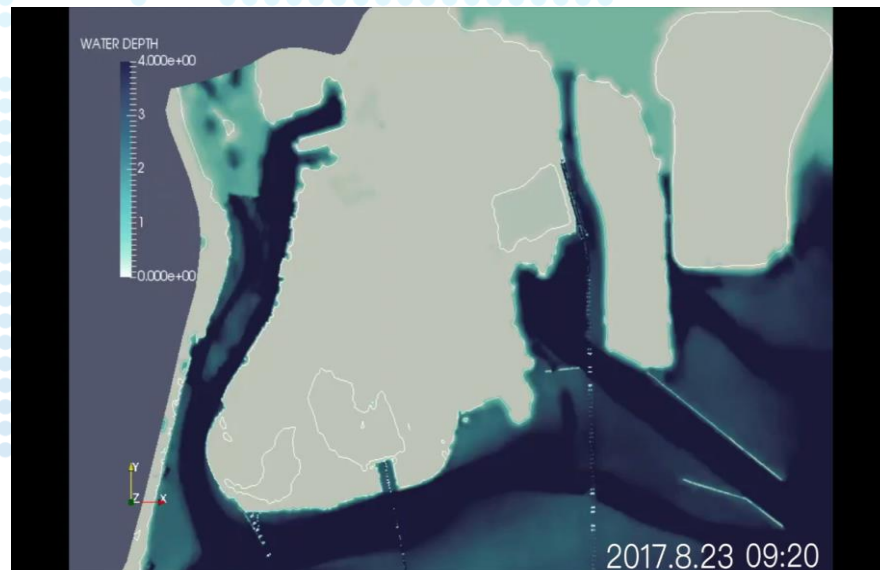
Repeat of the flooding process
Typhoon Hato(2017) in Macao

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By Repeating of the flooding process during Typhoon Hato(2017), our simulation results are consistent with the statistics results of offical departments. The flooding area of Macao Peninsula is mainly concentrated in the coastal area of the inner port of the peninsula.

NO.	Max Value time	Measured data	Simulation data	Error rate
1	2017/08/23 12:20	3.4 Km²	3.37 Km²	0.88%
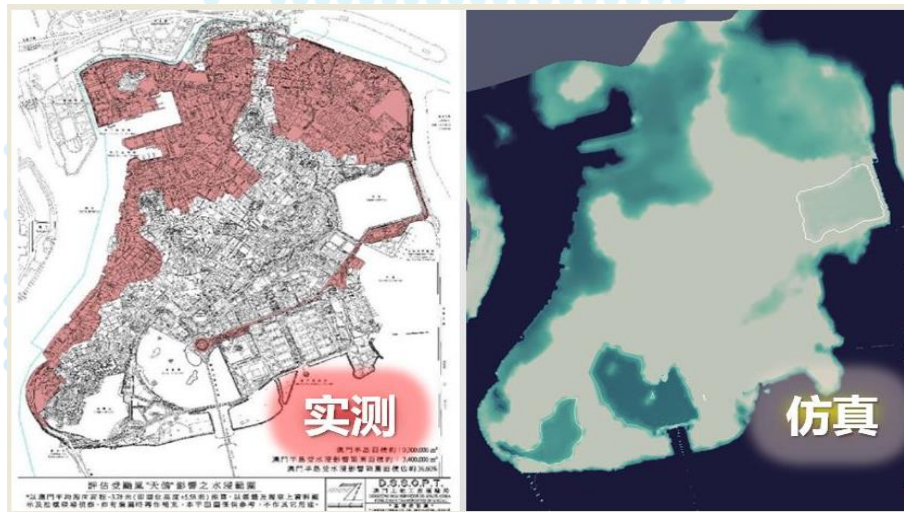
**Left: Offical statistics result
Right: Simulation result**

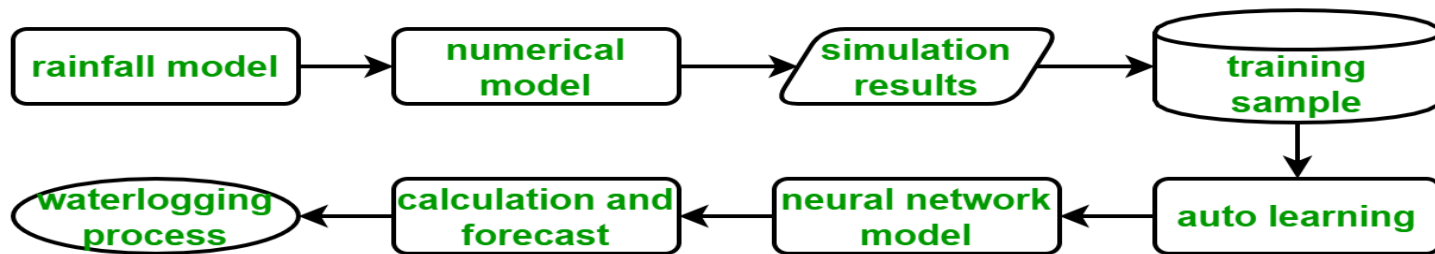广东亚仿科技股份有限公司

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Drilling and analysis of waterlogging emergency plan:

➢ Establish emergency plan analysis model to realize intelligent management of emergency plans.

➢ The multi-agent technology is adopted to establish the coordinated operation model of multi-departments for urban waterlogging emergency, so as to realize the deduction and joint drill of urban emergency plan.

➢ Based on the simulation results of the emergency plan, to improve the allocation of various resources.

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Prediction of waterlogging based on AI:

➢ **Combine neural network model with hydrologic and hydrodynamic model to realize the prediction of urban waterlogging process.**

➢ **The predicted results are more accurate than the measured monitoring data.**

➢ **The calculation speed is faster, which effectively solves the problem of timeliness of urban waterlogging early warning.**

```
rainfall model → numerical model → simulation results → training sample
                                                              ↓
waterlogging process ← calculation and forecast ← neural network model ← auto learning
```

05

Current problems and future chance

Current problems and future chance

Problems:

- ➢ Due to some reasons, such as technical closed loop, the data interface cannot be unified so far. It seriously delays the data interaction time between different support platforms, which also indirectly affects the overall achievement of 4ir.
- ➢ Lack of digital and information infrastructure.
- ➢ The contradiction between universality and customization of auto-learninges.

Chances:

- ➢ It is an important strategy for many countries and regions to use excellent support platforms to help enterprises realize digital reform, which is conducive to the leapfrog development of the Asia Pacific region economy.
- ➢ It drives talent reserve and technical exchange. Almost all industries can achieve upgrading and transformation via 4ir core technology.

Thanks for listening