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TICA®
www.ticachina.com

NANJING TICA CLIMATE SOLUTIONS CO., LTD.

No:2020V01

About TICA

An accredited national high-tech enterprise, specialized in the development, manufacturing, sales and services of environment cleaning HVAC and thermal energy utilization sectors

A comprehensive lineup of products, ranging from air handling units and fan coil units, centrifugal chillers, screw chillers, VRF units, and ORC low-temperature waste heat power generation systems with highest thermoelectric efficiency in China

Focus on indoor air quality in clean environments, with more than 60% sales revenue from clean-field related products and solutions

Individual Product Champion Enterprise accredited by National Ministry of Industry and Information, with the champion product of air handling unit

One of the top four Chinese brands in commercial HVAC industry

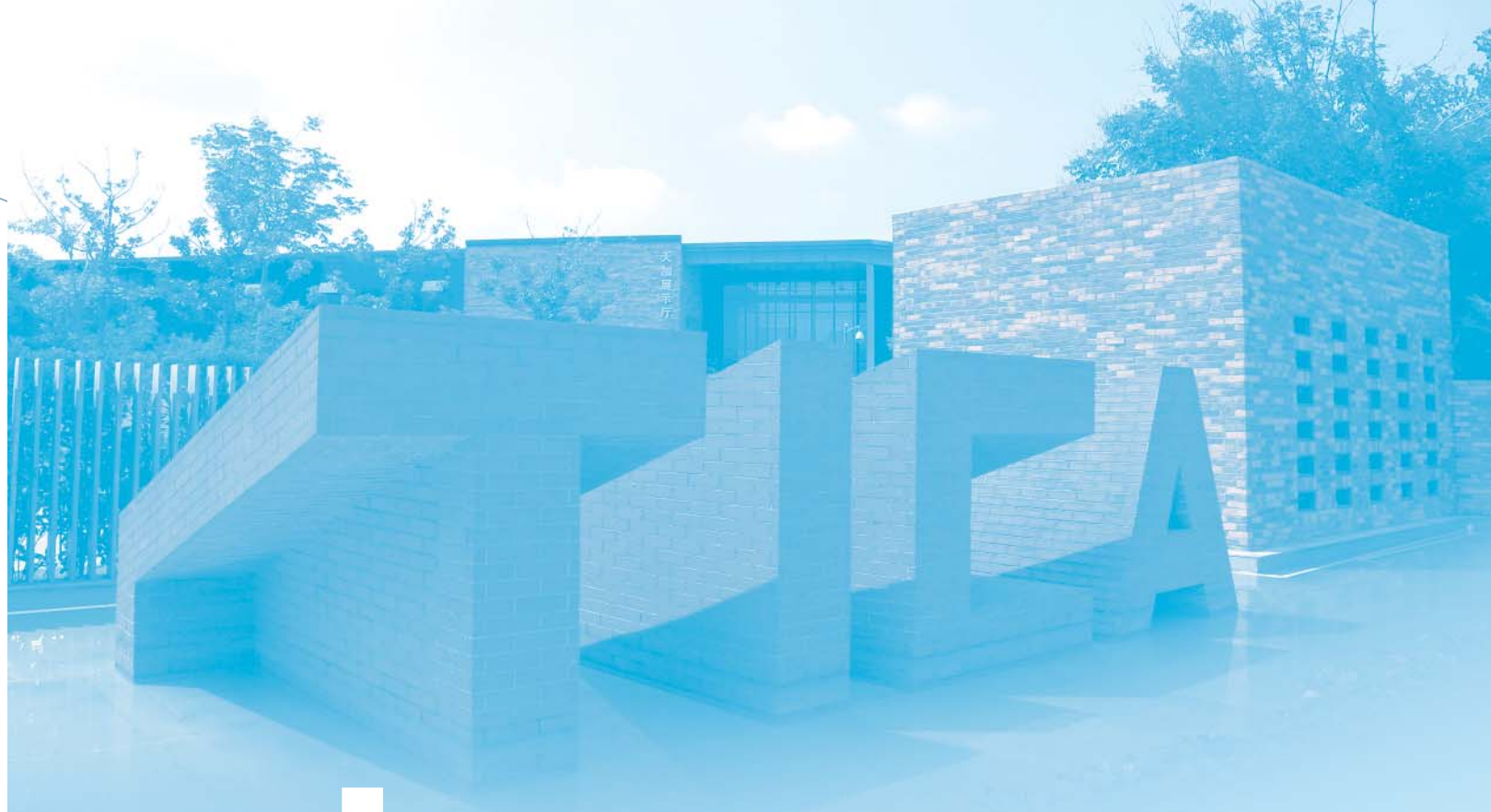
TICA Vision

Strive to be the international leading integrated system and service provider in clean environment and utilization of thermal energy

TICA Mission

Persist to maximize the value for customers through innovative technology and provide clean environment in order to improve the quality of life

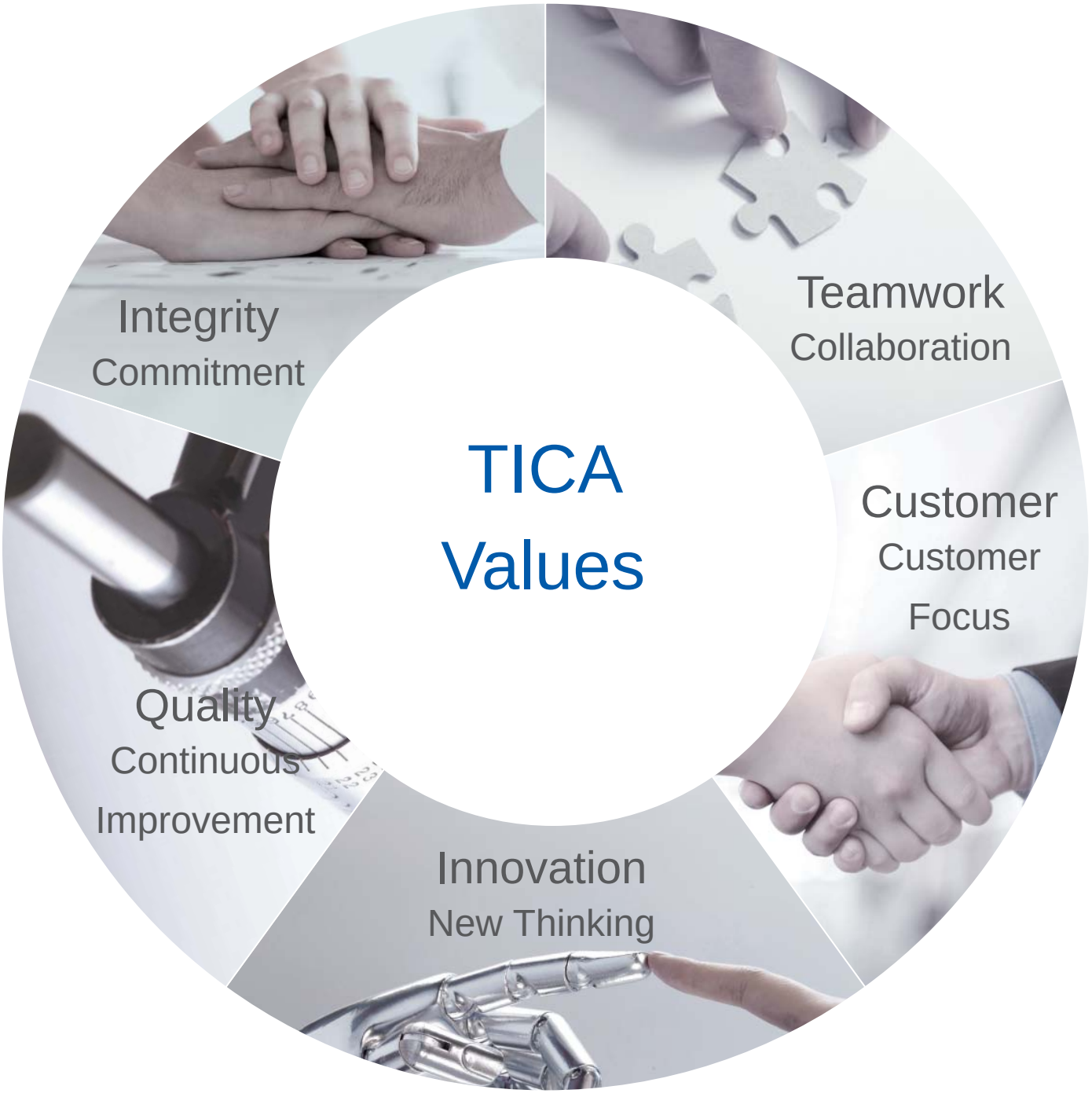
Contents



SECTION

1

Company Profile


TICA
Values
Integrity
Commitment
Teamwork
Collaboration
Customer
Customer
Focus
Innovation
New Thinking
Quality
Continuous
Improvement

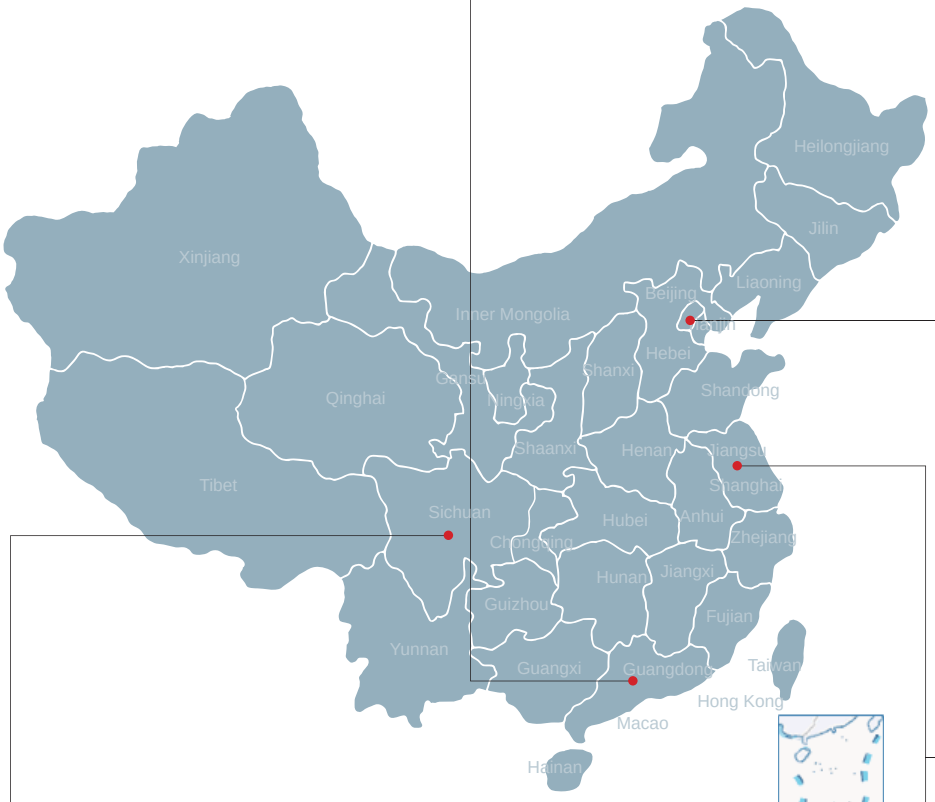
Company Profile

More than 70 branches

5 manufacturing bases
8 factories

Guangzhou Base

Construction area: 60,000 m²



Tianjin Base

Floor area: 40,000 m²

Construction area: 30,000 m²

Nanjing Headquarters

Floor area: 170,000 m²

Construction area: 90,000 m²

Chengdu Base

Construction area: 20,000 m²

Kuala Lumpur Factory

Floor Area:10,000 ㎡

Nanjing FUCA Automation Technology Co., Ltd.

Construction area: 10,000 m²

TICA Milestones

2010
Guangzhou factory established

2011
Nanjing factory relocated Japanese executives employed Quality Enhancement Plan started

1999
First factory established in Nanjing

2002
Tianjin factory established

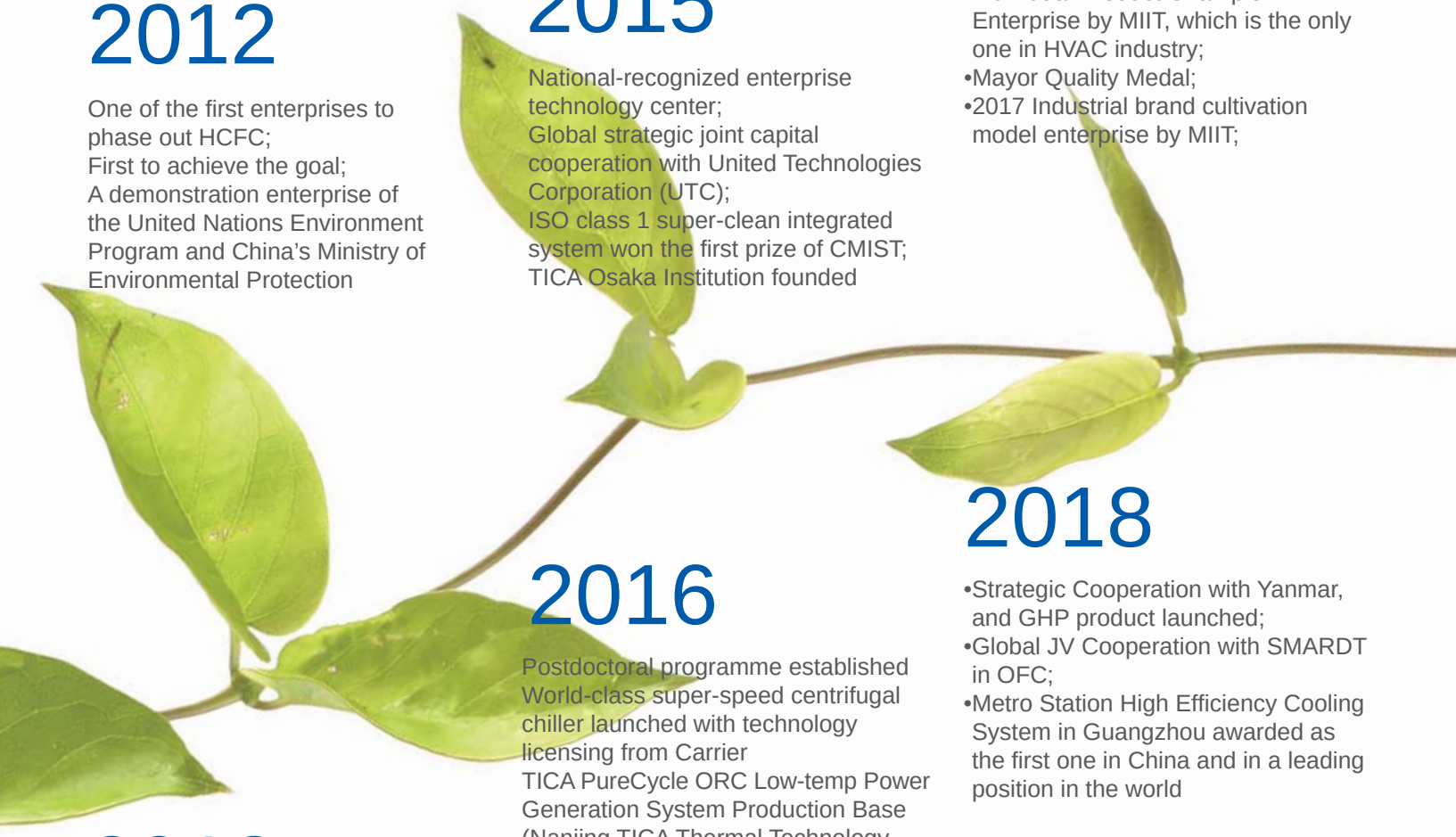
1995
TICA brand registered

2008
Sales revenue reached RMB1 billion; Accredited as a High & New Tech Enterprise

2004
TICA's system automatic control company - Nanjing FUCA Automation Technology Co., Ltd. established

1998
First patented invention of AHU with labyrinth structure

1991
Company established



2012

One of the first enterprises to phase out HCFC;
First to achieve the goal;
A demonstration enterprise of the United Nations Environment Program and China's Ministry of Environmental Protection

2013

National Green Industry Building. No.001 certified (three-star) in China; Testing Center accredited by CNAS;
First in China to get Eurovent Certification

2014

First VRF production line based on Japanese technology completed
Enterprise academician workstation founded

2015

National-recognized enterprise technology center;
Global strategic joint capital cooperation with United Technologies Corporation (UTC);
ISO class 1 super-clean integrated system won the first prize of CMIST;
TICA Osaka Institution founded

2016

Postdoctoral programme established
World-class super-speed centrifugal chiller launched with technology licensing from Carrier
TICA PureCycle ORC Low-temp Power Generation System Production Base (Nanjing TICA Thermal Technology Co., LTD.) founded

2017

- Individual Product Champion Enterprise by MIIT, which is the only one in HVAC industry;
- Mayor Quality Medal;
- 2017 Industrial brand cultivation model enterprise by MIIT;

2018

- Strategic Cooperation with Yanmar, and GHP product launched;
- Global JV Cooperation with SMARDT in OFC;
- Metro Station High Efficiency Cooling System in Guangzhou awarded as the first one in China and in a leading position in the world

2019

Completed the plant in Kuala Lumpur
Established the first gas heat pump (GHP) air-conditioning lab in China
Acquired the world's second largest geothermal power generation company – EXERGY from Italy

Honor and Awards

- ★ Individual Product Champion Enterprise Accredited by NMII (Only one in manufacturing sector), with the champion product of air handling unit
- ★ National Green Industry Building. No.001 in China (first one in China)
- ★ First enterprise to achieve the HCFC Phase-out Project in China
- ★ Vice Chairman Member of China Refrigeration and Air-conditioning Industry Association
- ★ Chairman Member of Clean Room Technology Committee, CRAA

- ★ National-Recognized Enterprise Technology Center

  (Jointly certified by the National Development and Reform Commission, Ministry of Science and Technology, Ministry of Finance, General Administration of Customs, and State Administration of Taxation)
- ★ Enterprise Academician Workstation
- ★ Postdoctoral Programme
- ★ Awarded Nanjing Mayor Quality Prize in 2016
- ★ Jiangsu Manufacturing Outstanding Contribution Award in March 2017 published on a government notice (Smart Manufacturing Enterprise)

TICA

2

Management System

Introduction of Amoeba Management Model

"The Process to Cultivate People"

Kazuo Inamori

Purpose

Total participation as all staff behaving like owners (key personnel)

Process

Small units
(10~20 persons/financial unit)

Visualization of all business costs

Make clear of figures on the account book

Consistency between physical existence, document and money flow

Cross checking

Results

Transparency
(Striving for market competitiveness)

About the ACE from UTC

ACE is the operating system in UTC, which has gradually evolved from the concept of lean manufacturing.

ACE enables all UTC employees to do their work using very simple tools and to ensure to consistently deliver benefits to our customers and to improve value flow. The core elements of ACE are culture, ability and tools.

ACE
Achieving Competitive Excellence
The United Technologies Operating System

Ten-Years Quality Enhancement Program

TICA has introduced a Japanese management team to implement the very fundamental management in terms of 5S, standardization, workflows and execution capability, and improves the overall human quality from top managers to workers, with the aim of enhancing the TICA quality to reach and exceed the Japanese manufacturing standard.

TICA Quality = Made in Japan

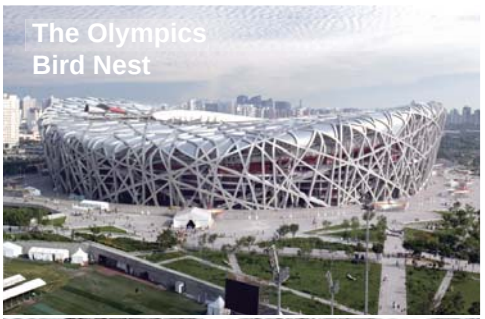
3

Industry Niche

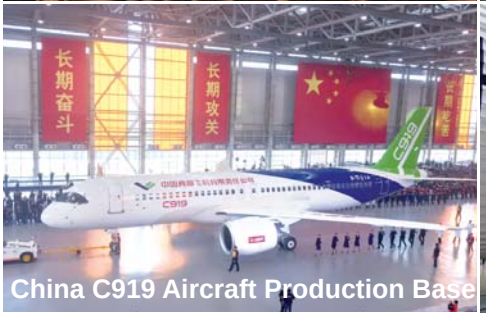
Reference Projects


Zhongnanhai


Great Hall of the People


The Olympics Bird Nest


The Olympics Cube



China C919 Aircraft Production Base


China Rocket Base

Prestigious Projects in Overseas Market

Sold to more than 50 countries and regions,including Turkey,Azerbaijan, Russia,Georgia,Chile,Argentina,Singapore,Malaysia,Indonesia, Philippines and UAE,etc.


Maldives Water Airport


Mendoza Government building, Argentina

Cibinong Shopping Center, Indonesia


Bali resort hotel


AKFA Medical Center, Uzbekistan

Singapore's IMM Mall

BIOCAD from Russia


Puertos Business Center, Argentina

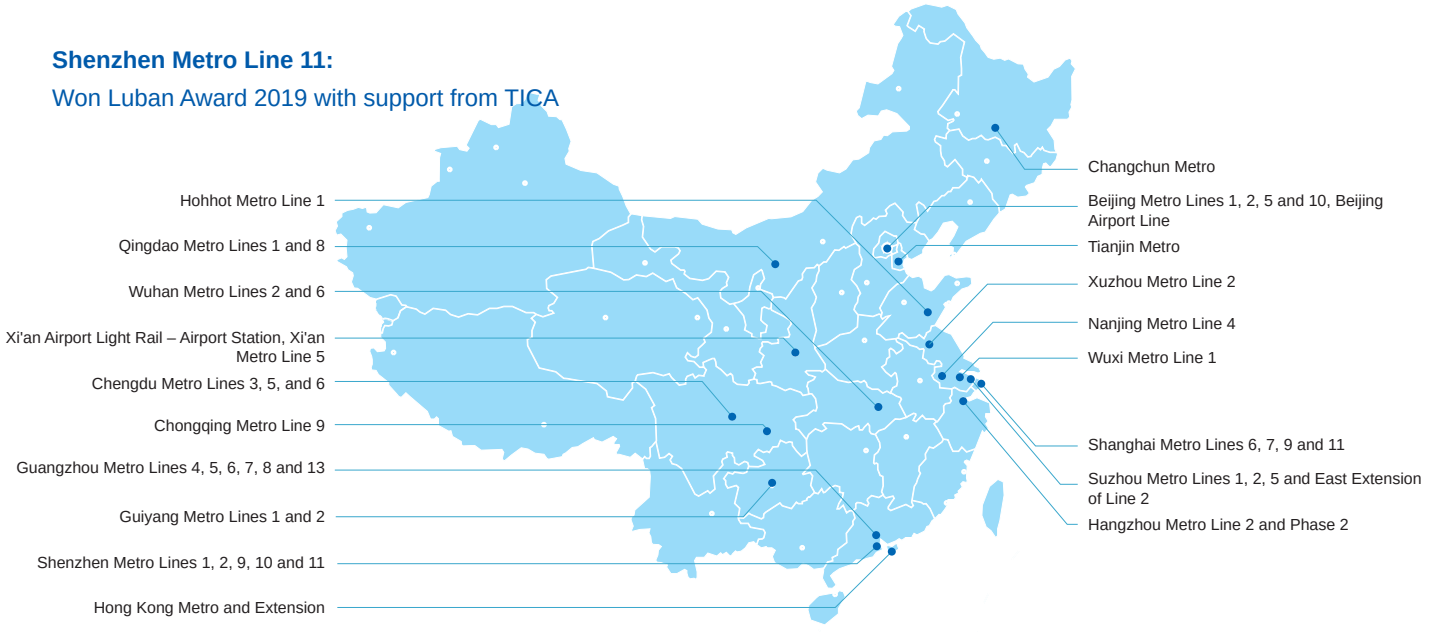

BK Business Center, Belarus

Metro Line Sector

The largest central air conditioning supplier of China Metro
Serving 60 lines in 15cities

Guangzhou Metro Line 13:
TICA and Guangzhou Metro Group jointly built Baijiang Station and Xintang Station into demonstration stations of high-efficiency energy-saving computer room

Shenzhen Metro Line 11:
Won Luban Award 2019 with support from TICA



Clean Room Application in Operation Departments of Hospitals

The largest supplier of integrated clean room equipment for operating room in China
Serving over 6000 Grade-A Class 2 and Class 3 hospitals

Beijing Military General Hospital
Peking Union Medical College Hospital
Beijing Tongren Hospital
Navy General Hospital
Shanghai Huashan Hospital
International Peace Maternity and Child Health Hospital
Lanzhou Military General Hospital
Shanghai Children's Hospital
Shanghai Ruijin Hospital
Air Force General Hospital
Shanghai Changhai Hospital
Jiangsu Province Hospital

Clean Room Application in Electronic Industry

The largest supplier of clean room equipment in China
Serving over 2000 electronics enterprises

SONY NEC IBM PHILIPS SMIC
CEC TOSHIBA FOXCONN FOXCONN Technology Group IVO SHARP Hanergy

Clean Room Application in Bio-pharmaceutical Industry

The largest supplier of clean room equipment in China
Serving over 3000 GMP-certified pharmaceutical facilities

Roche 999 三九企业集团 SANJIU ENTERPRISE GROUP Bayer HealthCare Pharmaceuticals 民生药业 MINSHENG PHARMA 东北制药
Johnson's baby 强生 哈药集团 HARBIN PHARMACEUTICAL GROUP 齐鲁制药 QILU PHARMACEUTICAL 葵花药业 SUNFLOWER 中国医药集团
novo nordisk 诺和诺德 NEPTUNUS海王 康恩贝 CONBA 扬子江药业集团 YANGTZE RIVER PHARMACEUTICAL GROUP

Clean Room Application in Paint Shops Sector

The best supplier of clean room equipment for paint shops in China
Serving famous automobile brands

一汽-大众 上海大众 众泰汽车 ZOTYE AUTO TOYOTA 广州 HONDA 一汽轿车
长城汽车 AVIC CSR 中国南车 CHANA 长安汽车 DFM

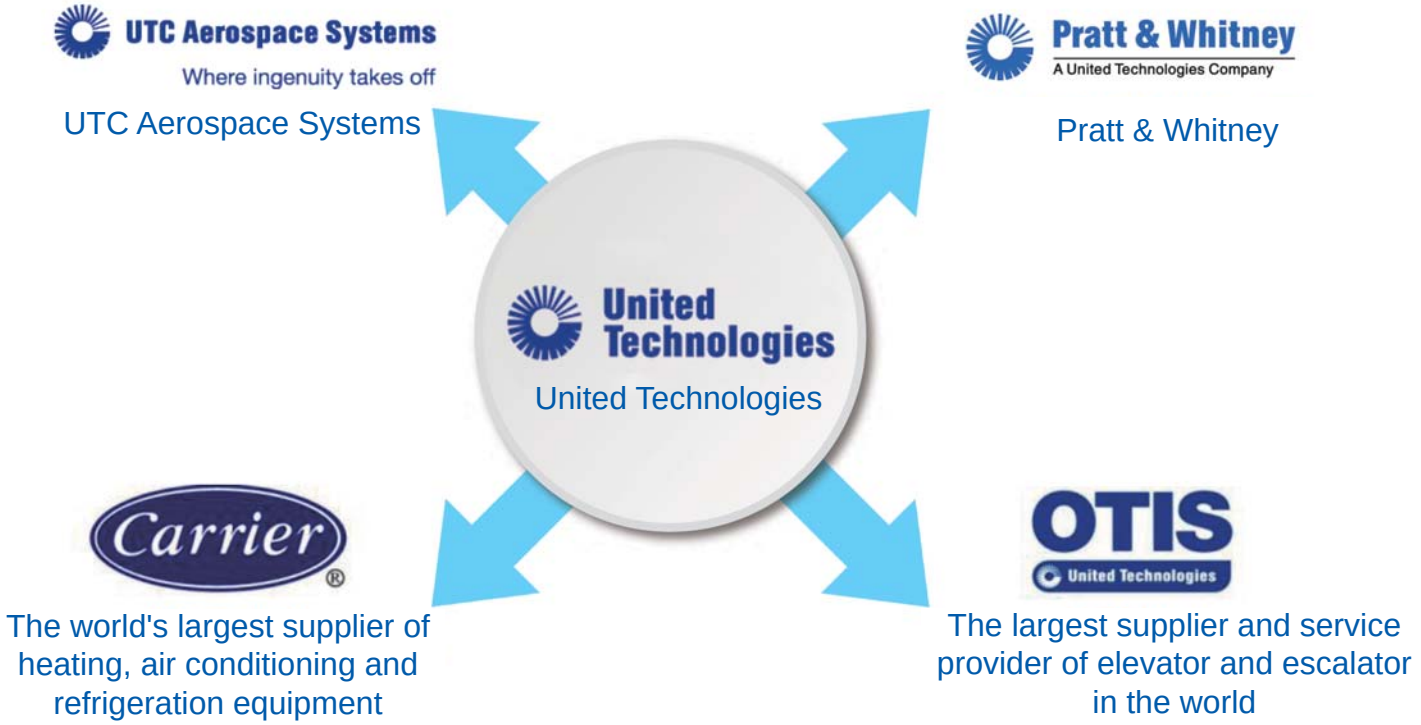
4

Basic Management and Globalization

TICA & UTC Global Strategic JV

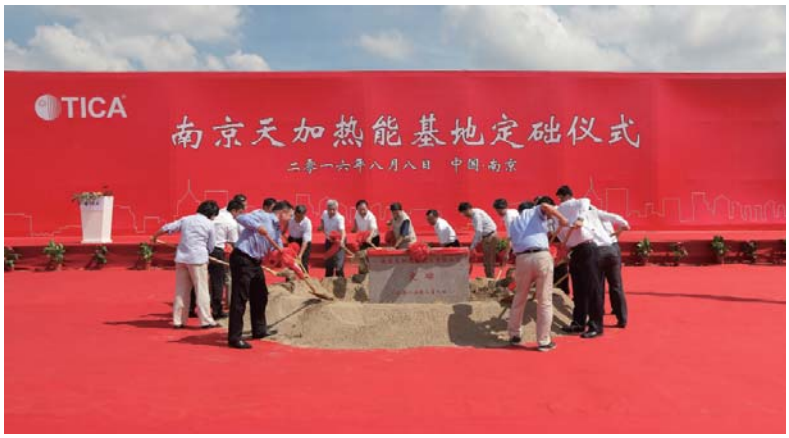
On October 9, 2015, official signing of the legal JV Agreements with United Technologies Corporation (UTC)

UTC will provide TICA with advanced global leading core technologies, such as cryogenic power system (ORC), centrifugal and screw chiller, to enable TICA's centrifugal technology ahead of its peers for two decades and its ORC technology for three decades. Both parties will integrate the global networks to come up with a new market strength.



August 8, 2016

China's biggest ORC Low-temp Power Generation System Production Base (Nanjing TICA Thermal Technology Co., LTD.) founded TICA Pure Cycle-ORC low-temperature power generation technology achieved industrialization.



In 2019, TICA Thermal Solutions group and Golden Eagle International Group jointly acquired Italian ORC supplier EXERGY — the world's second largest geothermal power equipment manufacturer. Founded in 2011, EXERGY boasts the most cutting-edge seven-stage radial outflow turbine (ROT) for ORC cycles. Its thermoelectric conversion efficiency ranks first around the world, and the annual operating time of geothermal power ORC units is as high as 99%.

TICA Acquired SMARDT – An OFC Air Conditioner Supplier

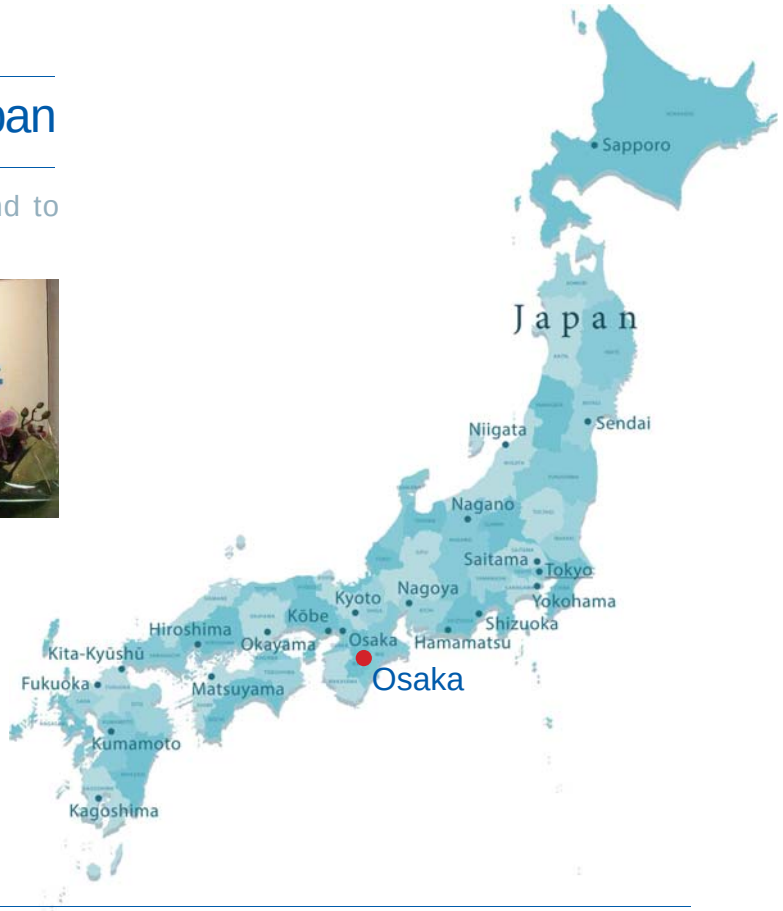
Nearly 8,000 SMARDT-made OFC central air conditioners have been installed across the world, taking up a 30% share of the global market. In Hong Kong, SMARDT's market share is 65%; Southeast Asia, 25%; Australia, 70%; and North America, 50%. SMARDT is no doubt the global OFC central air conditioner leader in terms of technology, product quality and market share.

TICA - SMARDT
2018.10.10

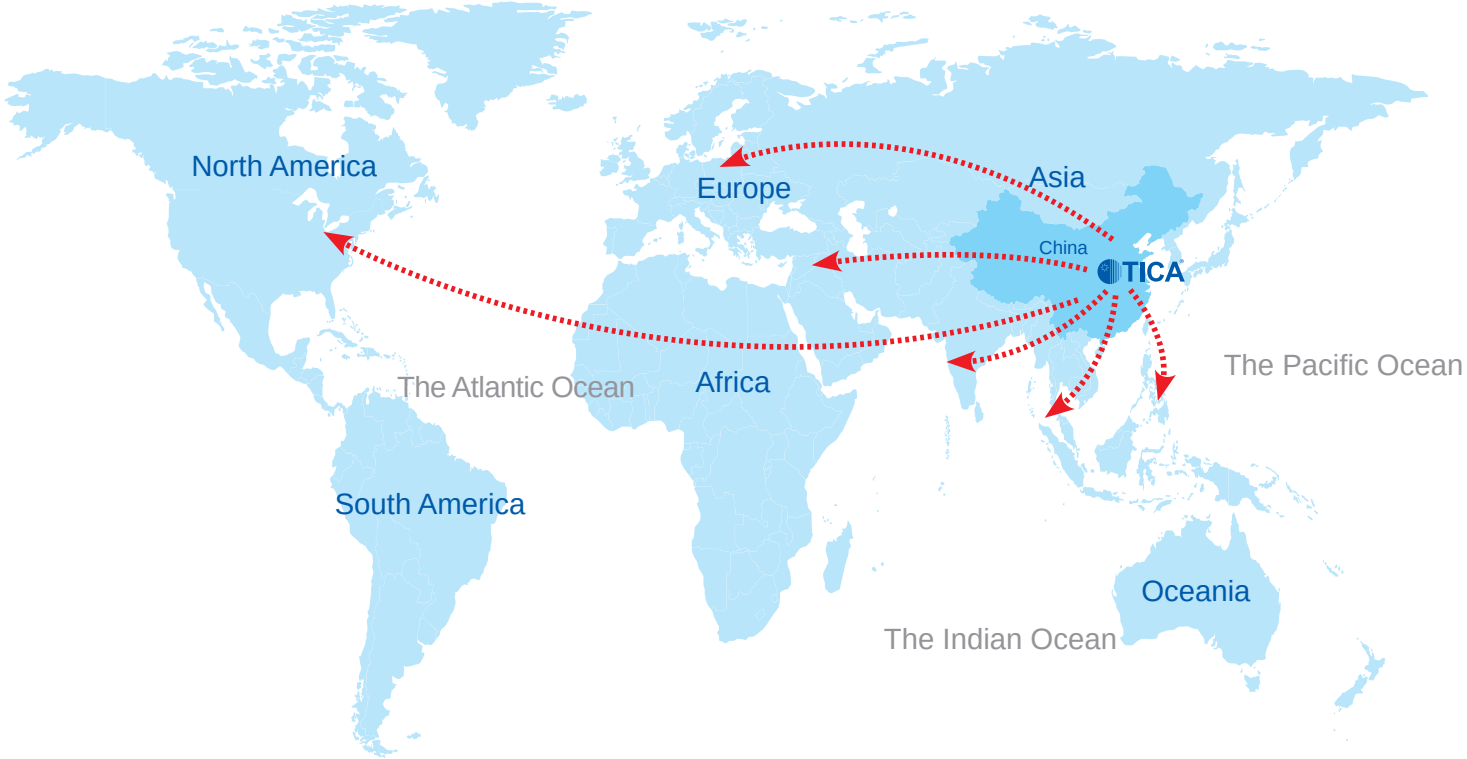
TICA R&D Institute in Osaka, Japan

The first Chinese central air conditioner brand to establish R&D institute in Japan

Engaged in advanced research on technologies of VRF, heat pump water heater, cryo-refrigeration, heat pump, professional ACU, air purifier, etc; utilizing talents in Japan to promote the development of Chinese central air-conditioning technology.



TICA will establish research centers and production bases in the USA and Europe.



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R&D and Manufacturing Capability

CNAS-certified Enthalpy Difference Labs

The largest in HVAC industry

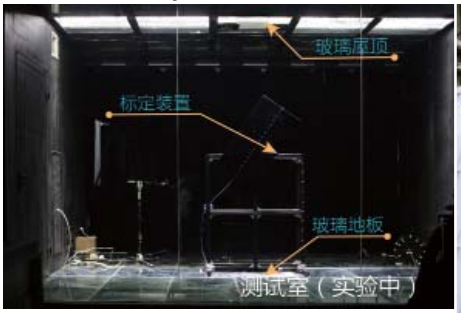
In accordance with GB, IEC, TUV and CSA standards, adhering to the principles of impartiality, independence and scientific standards as well as people-oriented.

Environmental Control Lab

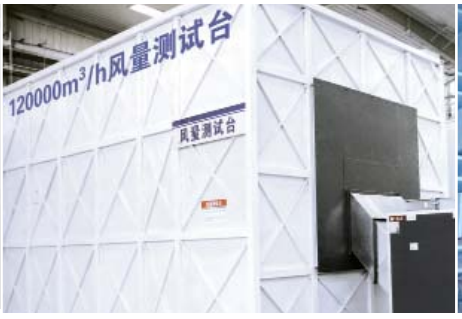
ISO class 1 ultra clean integrated environmental system

Integrated purification for operating room

Air purification analytical lab



Indoor air flow filed visualization and measurement system



The largest air volume test platform in the industry (120,000 m^3/h)

Noise Laboratory

Testing Benches for Central AC

2000RT Water-cooled Chiller Test Lab

350RT Air-cooled Chiller Test Lab

100Hp Long-running reliability lab (water)
150Hp Long-running reliability lab (fluorine)

Highway transportation simulation test platform

Environment simulation lab from -40˚C - 55˚C & snowfall simulation

Raining simulation lab

ISO class 1 ultra clean integrated environmental system

Leading the technological development of the industry; China's first system up to the highest national standard
Winner of the 1st Grade Tech-Progress Award CMIF in 2015

Experts of ISO/TC 209 WG13 Visit and Remark on

Nanjing TICA ISO Class 1 Super Clean Environment System

Accredited by international clean room experts from China, USA, UK, France, Italy, Netherlands, Korea and Ireland, the system has been acclaimed to achieve the highest international standard, which will help to drive the corresponding technological improvement.

First-class manufacturing facilities

China’s most advanced VRF line based on Japanese technology
Japan Murata sheet metal fabrication center
Germany Wagner fully automatic spraying line
CombiCut plasma cutting machine;
Self-built central gas/liquid transport zone

R&D Capability

Enterprise Academician Workstation

Work with academician Tao Wenquan (Xi'an Jiaotong University School of Energy and Power Engineering) on workstation

TICA Postdoctoral Programme

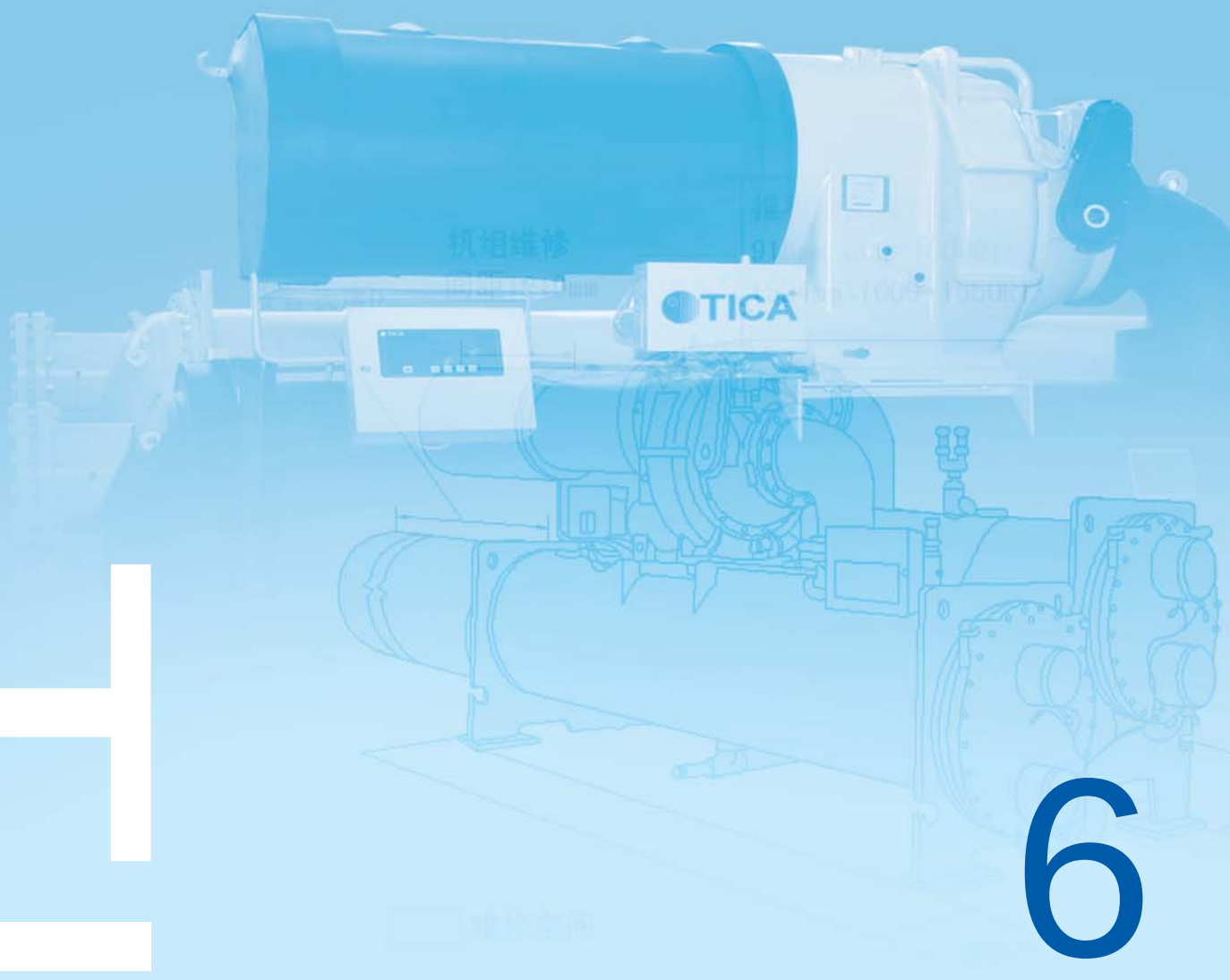
TICA established a Postdoctoral Programme under approval by the Ministry of Human Resources and Social Security and the National Postdoctoral Management Committee to carry out the postdoctoral research work and cultivate postdoctoral talents, putting up a bridge for high-tech talents and enterprises of China.

Tao Wenquan

Academician of Chinese Academy of Sciences
President of Xi'an Jiaotong Liverpool University
Vice Chairman of Chinese Society of Engineering Thermophysics
Director Member of Higher Education Thermal Engineering Course Teaching Committee under Ministry of Education
Vice Director Member of Energy Dynamics Course Teaching Guidance Committee under Ministry of Education
Vice Director Member of Heat and Mass Transfer Committee

Bases for Learning

More than 400 R&D engineers, accounting for 20% of total employees
With 12 Japanese experts, and will take in more from USA and Europe
Ministry of Human Resources and Social Security certified postdoctoral research workstation
Cooperation with Xi'an Jiaotong University/Tsinghua University/Southeast University/University of Shanghai for Science and Technology/Tongji University/Hefei General Machinery Research Institute for joint effort projects



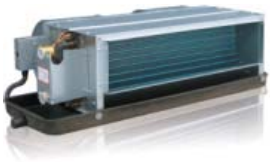
TICA

6

Core Technologies and Products

Core Technologies and Products

Air Side Products



1st and the 2nd grade tech-progress awards by CMIF No.1 in market share for 6 consecutive years

Commercial Products


Pioneer in China to use eco-friendly refrigerant
Top 4 in sales of modular air-cooled scroll chillers

Chiller Products



Water & air cooled full range line up

TICA Inverter Multi System

TIMS-ODU

TIMS-S
Independent modules

8-12HP

14-16HP

18-22HP

TIMS-AXA
Combination modules

8-12HP

14-16HP

18-22HP

26-32HP

Mini-VRF

8-16kW

22.4kW

TIMS-IDU

Round Flow cassette

Two-way cassette

One-way cassette

Slim duct

Standard duct

High ESP duct

Big capacity duct

Fresh air processor

Ceiling & Floor

Wall mounted

Air-Side Products

Ceiling Concealed FCU

High Pressure Ceiling Concealed FCU

Floor Standing FCU

Cassette FCU

DX Modular Air Handling Unit

Modular Air Handling Unit

Standard Air Handling Unit —— Ceiling Type

Standard Air Handling Unit —— Horizontal Type

Standard Air Handling Unit —— Vertical Type

Digital Variable-capacity DX AHU

Chiller Products

Air Cooled Screw Chiller (cooling only)

Water Cooled Modular Chiller (Cooling Only)

Water Cooled Flooded Screw Chiller (Cooling Only)

Water Cooled Centrifugal Chiller (Cooling Only)

Air Cooled Scroll Chiller

Water Cooled Package Floor Standing R410a

Commercial Products

Air Cooled Modular Chiller
(cooling only/Heat Pump)

Air Source Heat Pump
Water Heater

Rooftop

Water Source Heat Pump

Outdoor Units

Cassette Type

Ducted Type

Commercial Unit

Air Cooled Duct AC
(Heat Pump)

Standard Air Cooled Ducted Type AC

Fresh Air Cooled Ducted Type AC

Purifying Air Cooled Ducted Type AC

Air Cooled Cabinet Type AC

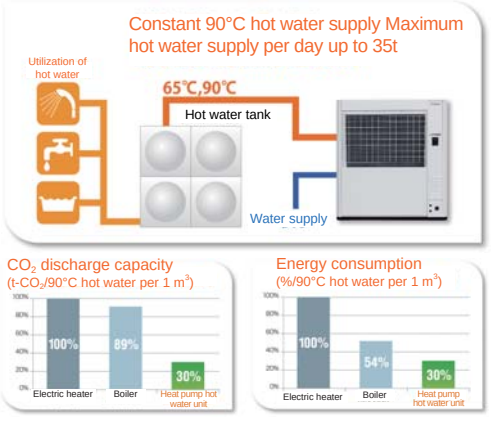
Centrifugal Chiller of International Standard

Technology Licensed by UTC Carrier

Water Cooled Centrifugal Chiller/Water Cooled Screw Chiller

Natural Refrigerant CO_2 Heat Pump Hot Water Unit

Technology license of MAYEKAWA (Japan)



TICA Pure Cycle-ORC Low-temperature Power Generation Technology

ORC technology ahead of its Chinese peers for 30 years

TICA ORC heat to electricity conversion efficiency up to 10-23%, while, 5~6% by Japanese screw expander and 4~5% by Chinese counterparts

Ferrous metallurgy

Chemical petroleum

Thermoelectric nuclear power

- Through transforming low-grade waste heat energy into high-quality electric energy, the Pure Cycle series ORC power generation systems of TICA can be widely used for waste heat recovery and power generation in the high energy consumption industries such as ferrous metallurgy, chemical petroleum, thermoelectric nuclear power, cement building materials, fertilizers, pharmacy, printing & dyeing, and papermaking.
- Geothermal power generation integrated system
- Solar-thermal power generation integrated system

Cement building materials

Fertilizers

Printing & dyeing, and papermaking

TIMS Purifying Series VRF

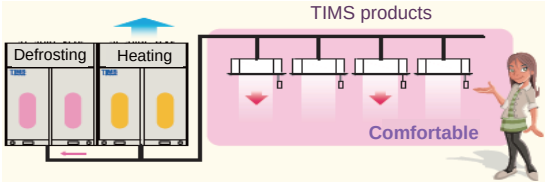
Japanese R&D + Japanese configuration + Japanese management

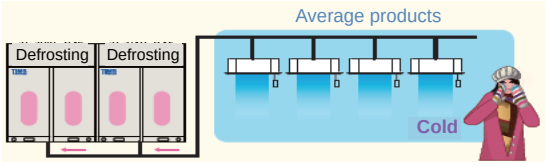
No capacity attenuation for heating at -15℃

- Enhanced heating performance especially suitable for northern area, leading changes in heating technology and reducing haze
- No capacity attenuation at - 15℃
- First Chinese VRF brand not to require an electric heater for heating at low temperature

Non-stop heating & defrosting technology

- Based on the technology from Japanese experts, the gaps between Chinese VRF and Japan have narrowed
- Industry-leading, and first Chinese brand that utilizes the technology



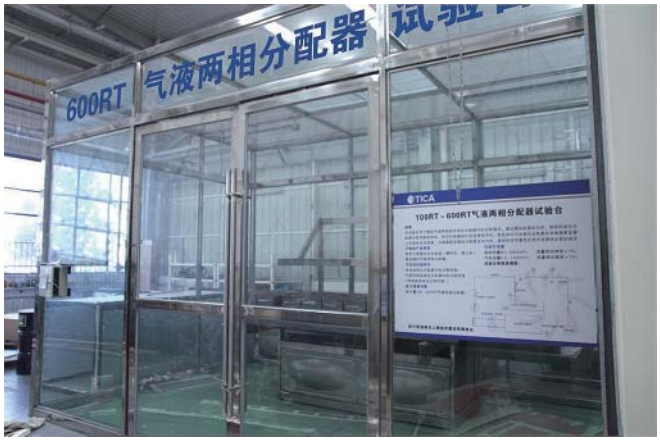


Reduce PM2.5 and indoor chemical pollution

- Return air purification unit, with filtration efficiency of PM2.5 up to 96% (2h)
- Formaldehyde filtration efficiency up to 90% (1h)
- Fresh air and haze purification unit, with double filtration and two functions in one unit

Falling Film Evaporation Technology of Screw Chiller

- CFD simulation design enables to spray refrigerant evenly on heat exchange tube to form a fluid film, hence to improve the heat transfer performance while reducing the consumption of refrigerant
- 10% increase in product performance, 30% reduction in refrigerant consumption
- Winner of China's energy-saving product certification



TICA innovative 600RT vapor-liquid distributor simulation test bench

"High-efficiency Refrigeration System for Rail Transit and Underground Stations"

Integrated COP Exceeds 6.0, Reaching the International Advanced Level

On July 13, 2018, China Refrigeration and Air Conditioning Industry Association (CRAA) organized a scientific research appraisal meeting in Guangzhou. The "High-efficiency Refrigeration System for Rail Transit and Underground Stations" jointly developed by Guangzhou Metro Group Co., Ltd., Nanjing TICA Climate Solutions Co., Ltd. and Nanjing FUCA HVAC Automation Co., Ltd. has been identified as firstly invented in China, with the integrated COP of refrigerating equipment room (chilled water pump included) greater than 6.0, a global leading technology.

7

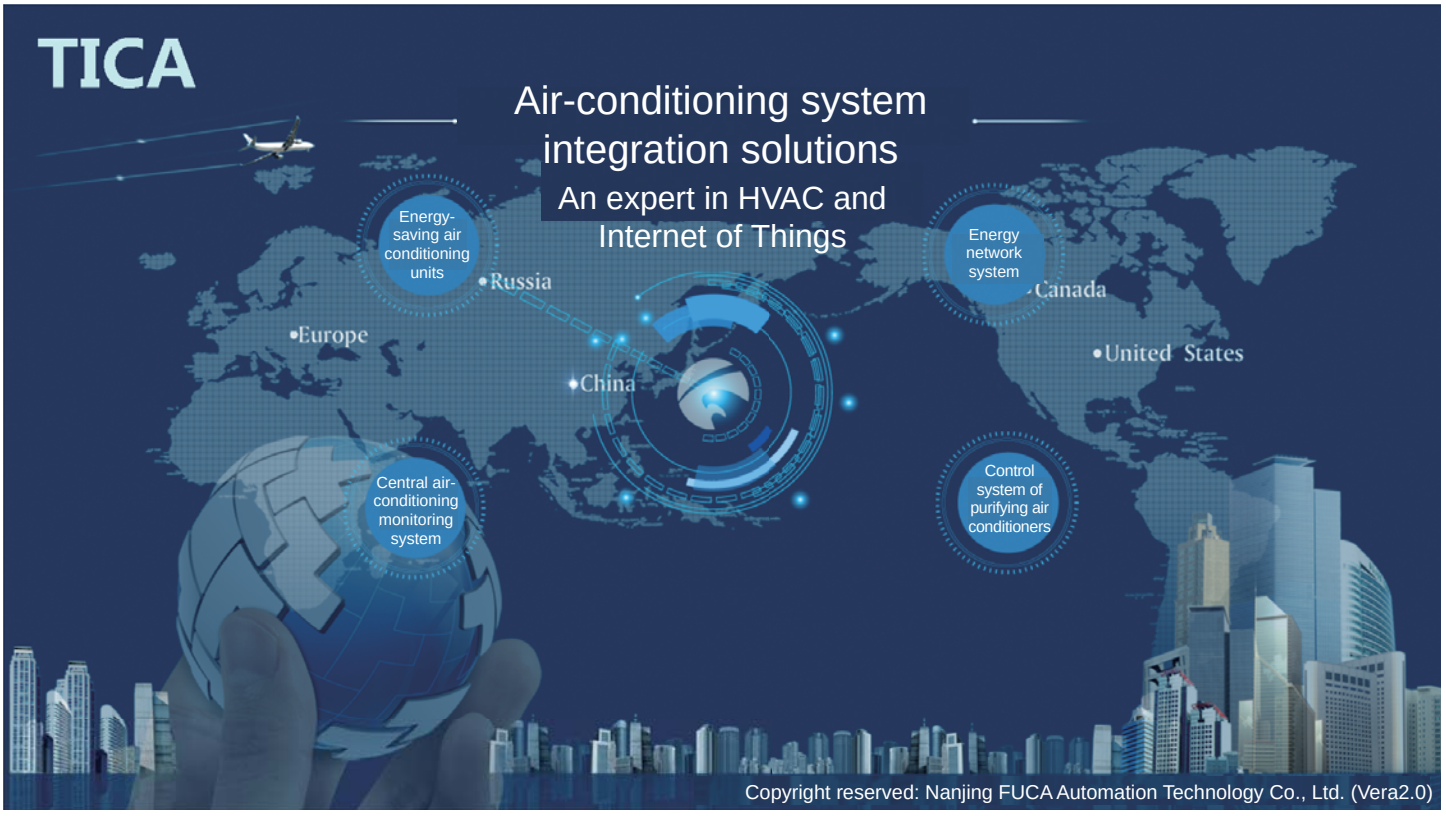
After-sales Service

TICARE

Considerate Services

Advanced Data Center for After Sales Services

The service centre takes the customers to the era of Cloud computing that provides real time data monitoring, defects analysis with suggested solutions, customized maintenance, as well as remote hosting services, to ensure normal operation of its centrifugal chillers, screw chillers, VRF units and ORC low-temperature power generation system.



Technology

TICA strives to master the core technology and persists in continuous improvement to offer best products to the customers.
TICA people always have the aspiration for perfection.

Intelligence

TICA is committed to enhancing the level of intelligen
and to powering the management system wi
comprehensive information technology.

igence
n with

C

Collaboration

TICA emphasizes teamwork and welcomes working with others. The cooperation with UTC is just a reflection of such spirit.

A

Art

Like a craftsman dedicated to mastery, we strive for perfection on our products and are committed to offering quality products.

TICA

We are endeavoring to be better

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