

Challenging of a Small-and-Medium Enterprise for Product Development

- Systematic Development Technique and Innovation -

Tatsushi Kusumoto
Executive director corporate officer
General manager, Development production department
Shinwa Controls Co., Ltd.

The 14th Japan TRIZ Symposium 2018
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Nakano Sun Plaza

Agenda

1. Company introduction
2. QFD – TRIZ - Seeds Driven QD Approach
3. Summary

1 . Company introduction

Company introduction



▶ Company overview

Company name: Shinwa Controls Co., Ltd.

Established Date: December 15, 1967 (1962 establishment)

Capital: 90 million yen

Address: 2-6-20 Kurigi Asaoku, Kawasaki, Kanagawa

Business items : Electromechanical apparatus manufacturing
- Develop, design, manufacture, and sell of Precise Temperature Control Unit, Solenoid Valve

Sales: 14 billion yen (closing of accounts in June, 2018)

Number of employees: 420 as of July, 2018

Company introduction

▶ Domestic bases



Shinwa Technos Co., Ltd. (Nagano)
※Group businesses and precise sheet metal



Nagano Plant (Nagano)
※Design development and manufacturing

Kyushu Plant (Nagasaki)

※Design development and manufacturing



Kumamoto Factory (Kumamoto)



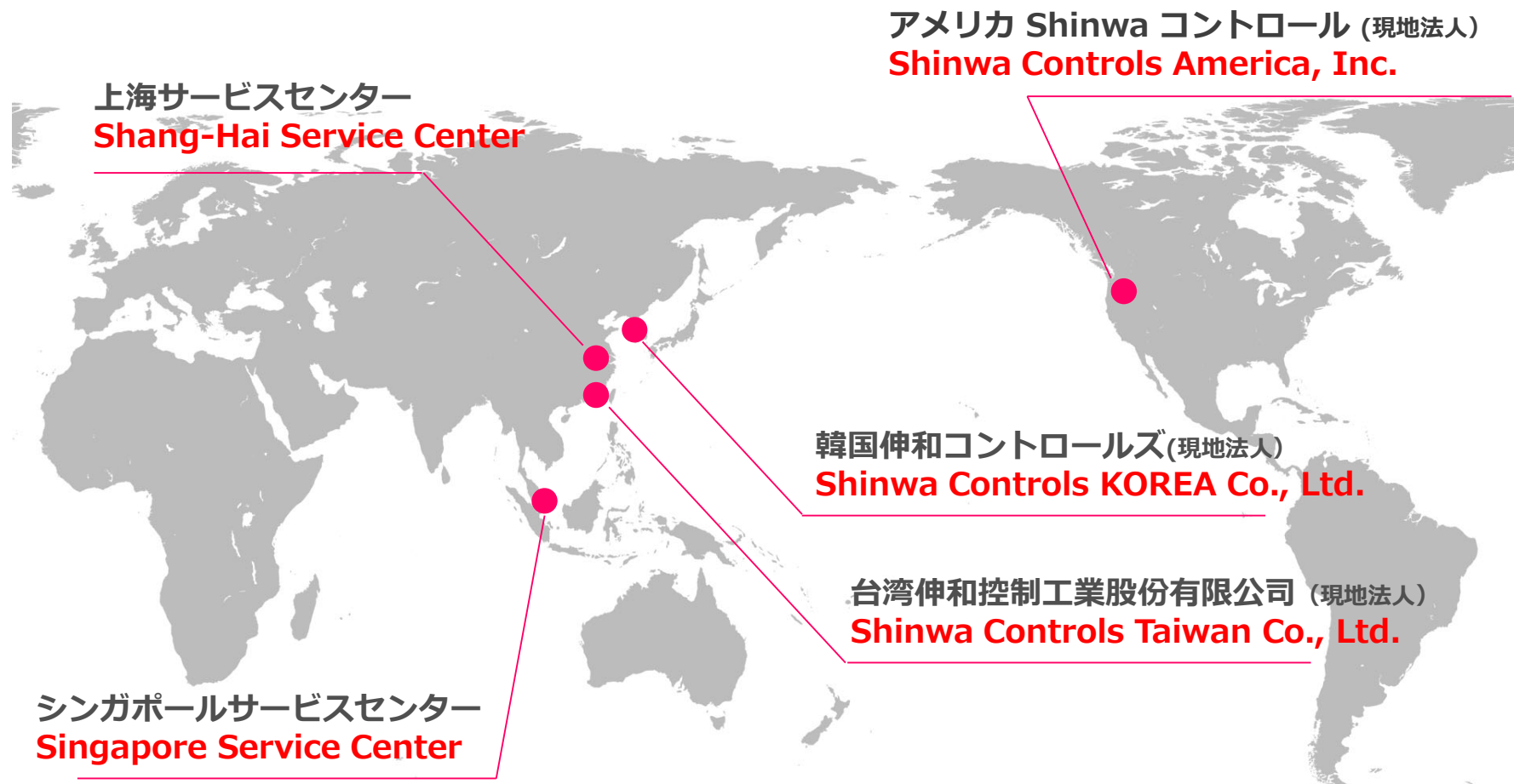
Osaka Office (Osaka)



Kawasaki Headquarters (Kawasaki)

Company introduction

▶ Overseas bases



Company introduction



▶ History

1962	June	Start as Shinwa Industry Co., Ltd.
1967	December	Establish as Shinwa Controls Co., Ltd. (sales dept. spins out from Shinwa Industry)
1972	July	Head-office moves to Higashi-Shinbashi, Minato-ku, Tokyo.
1978	March	Start sales activity on Southeast Asian market
1984	September	Opens Nagano Plant at Takatoomachi, Ina, Nagano
1988	September	Nagano Plant increase
1992	March	Opens Kyushu Plant at Oomura high-tech park in Oomura, Nagasaki
1992	November	Moves Head-office to Asao-ku, Kawasaki, Kanagawa
1996	April	Opens service center in Taipei, Taiwan
1996	August	Adds new facility to the Kyushu Plant
1996	September	Merges and acquires Shinwa Industrial Co., Ltd.
1998	December	Certification of ISO9001 (Kyushu Plant)
1999	December	Certification of ISO9001 (Nagano Plant, Headquarters, and Osaka Office, respectively)
2001	June	Shift and all company integration of ISO9001 into 2000 versions
2002	June	Certification of ISO14001
2002	July	The Research Building is established at Omura City in Nagasaki Prefecture (Office Park Omura).
2003	October	Chinese (Shanghai) Shop and Service Center established
2003	December	South Korea Shop and Service Center established
2005	January	Shinwa receives "Regional Social Contributing Award" at "The 22nd Superb proprietor" presented by The Daily Industrial News

Company introduction



▶ History

2005	May	Shinwa donates a rose garden called "Shinwa Rose Garden Hills" to Takatoomachi, Nagano Prefecture
2005	November	Adds the 3 rd facility in Nagano Plant
2006	February	Honor to receive a Medal with Dark Blue Ribbon from Japan with our social contribution
2006	May	Developed "Superb high-pure air-supply system" from NEDO New Energy and Industrial Technology Development Organization. Technological development subsidy authorization
2006	September	Invest MK Frons Co., Ltd. Located at Shimonosuwa, Nagano (Name changed to Shinwa Technos Co., Ltd. in July, 2011)
2007	March	Kumamoto Factory establishment
2008	July	Be elected by the Ministry of Economy, Trade and Industry as "2008 Vigorous production small-to-medium enterprises top 300"
2009	May	"Electric Security Management Prize" winning from Nagano Plant (Chubu Electric Power Co., Inc.)
2009	November	Hirokuni Koshima, President & CEO receives "the Order of the Rising Sun, Gold and Silver Rays."
2012	June	Kyushu Office 3 building completion
2012	June	50 th founding anniversary
2013	March	Establishes Shinwa Controls Taiwan Co., Ltd.
2014	September	Kyushu Office administration building increase
2014	December	Establishes Shinwa Controls KOREA Co., Ltd. (as a local corporation in South Korea)
2017	March	Moves to the Headquarters to Kurigi, Asao-ku, Kanagawa Prefecture
2017	June	55th founding anniversary
2017	August	Establishes Shinwa Controls America, Inc. (as a local corporation in North America)
2018	September	Valve made in our company got equipped in the small collection capsule of "Kounotori" #7, an H-II Transfer Vehicle

Company introduction

▶ Corporate principles

Sym pathy

Becoming a **proposal type corporate** that offers excellent products and technologies which wins the customer's strong support.

Creatio n

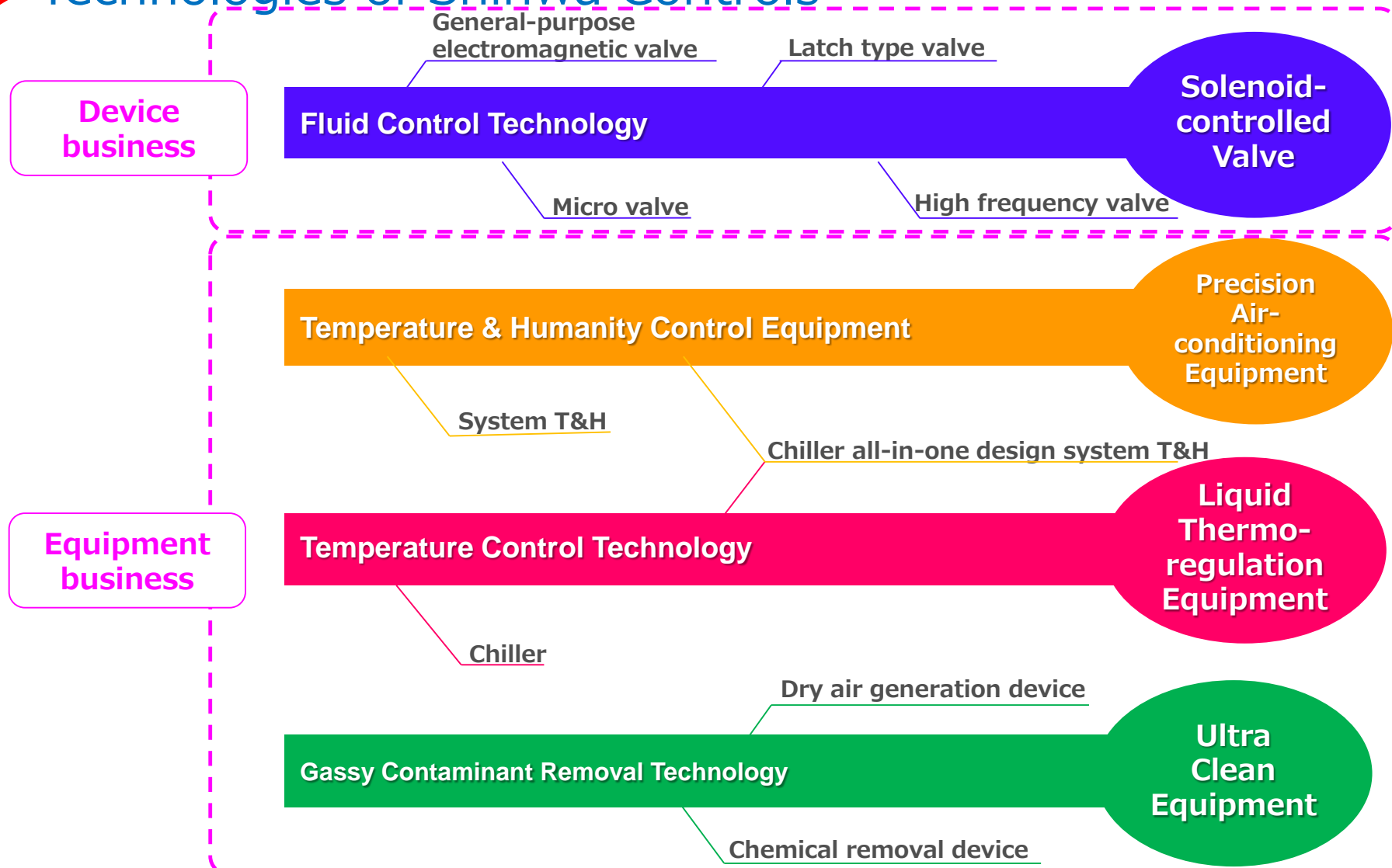
It wishes employee's happiness, and it becomes a company that works by one's best by the prosperity of the enterprise the employee's being pleased.

Symbi osis

Symbiosis with the region is aimed at, and it becomes corporate that contributes to the development of an economic culture of the regional society.

Company introduction

▶ Technologies of Shinwa Controls



Company introduction

▶ Device business (valve product)

Used for fluid control in a wide range of industrial fields such as medical equipment, analytical instruments, fuel cells, and space satellites



- Direct driven type without coupling
Control of a wide range fluid pressure
- Diaphragm type
Separating fluid and iron, and
corresponding to corrosive fluid
- Magnet latch type
Energy conserving valve
consuming electric power
only at opening and shutting

- Motorized valve
Achieving a highly accurate flow rate control
by motor drive control

For dental chair
Domestic share
50%

Artificial dialyzer
manufacturing maker
adoption ratio
60%



Company introduction

► Equipment business

Equipment that manages temperature and humidity necessary in manufacturing process of semiconductor and FPD



Precise temperature and humidity air supplying equipment

- Heat removal in silicon wafer generation process
- Temperature and humidity control in spreading and development process
- Heat removal at etching
- Temperature control at wafer inspection, dicing and final inspection
- Temperature control of liquid crystal panel etching equipment, etc.

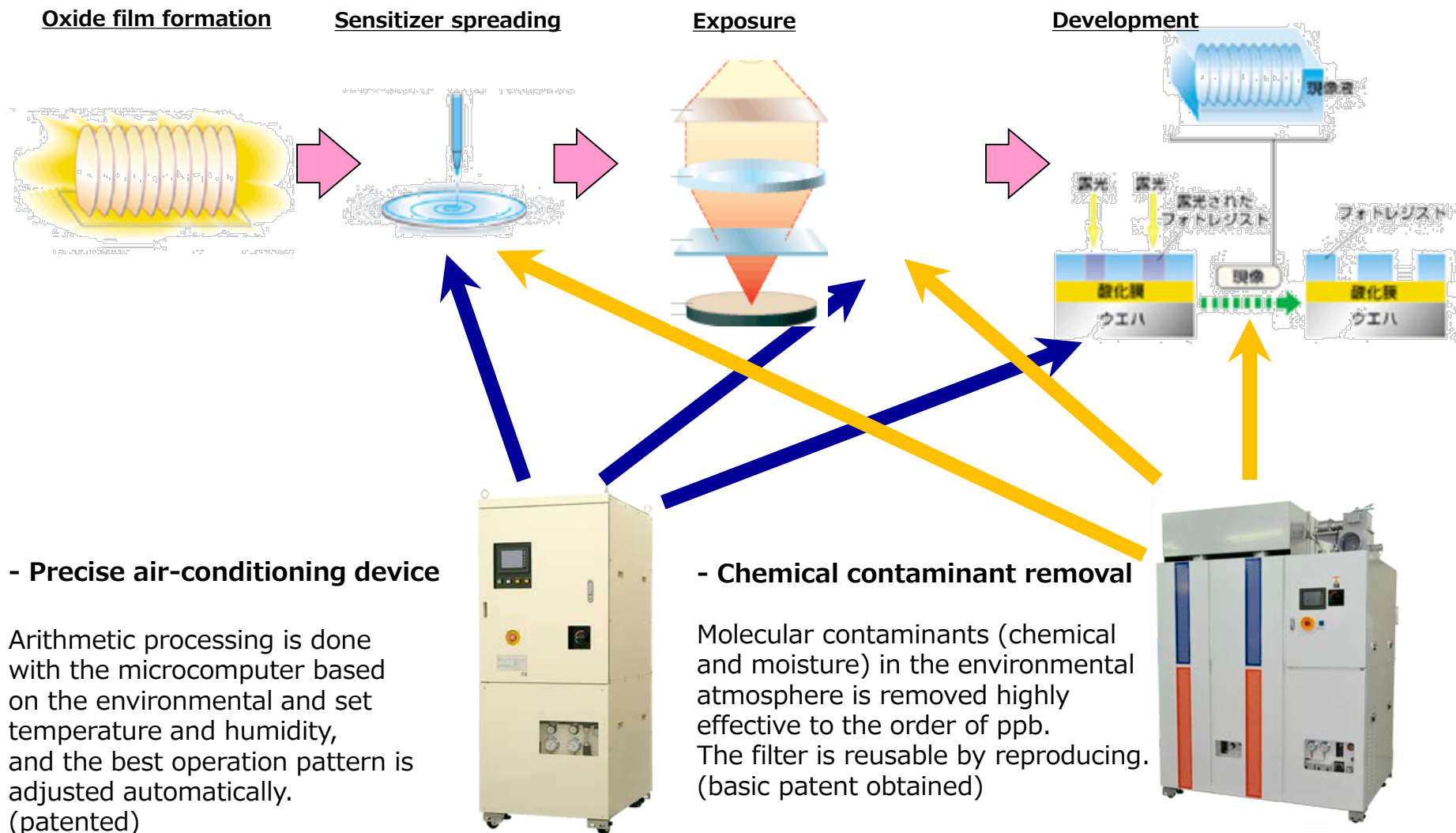
In the semiconductor device market

Limited part air-conditioning: 1st place of the world share

Fluid-conditioning: 3rd place of the world share

Company introduction

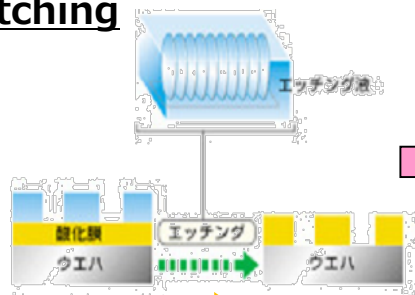
► Our products supporting the semiconductor manufacturing process



Company introduction

► Our products that support the semiconductor manufacturing process

Etching



- Low and high
temperature chiller
Heat removal at etching

Doping

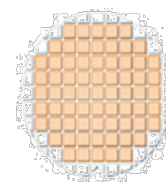


- Chiller for tester
Heat removal at wafer
inspection

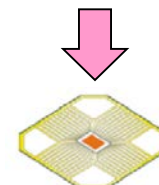
Wiring



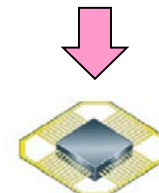
Dicing



Bonding



Molding



Completion of IC!



Company introduction

▶ The next generation energy



Pre-air conditioner for
hydrogen station



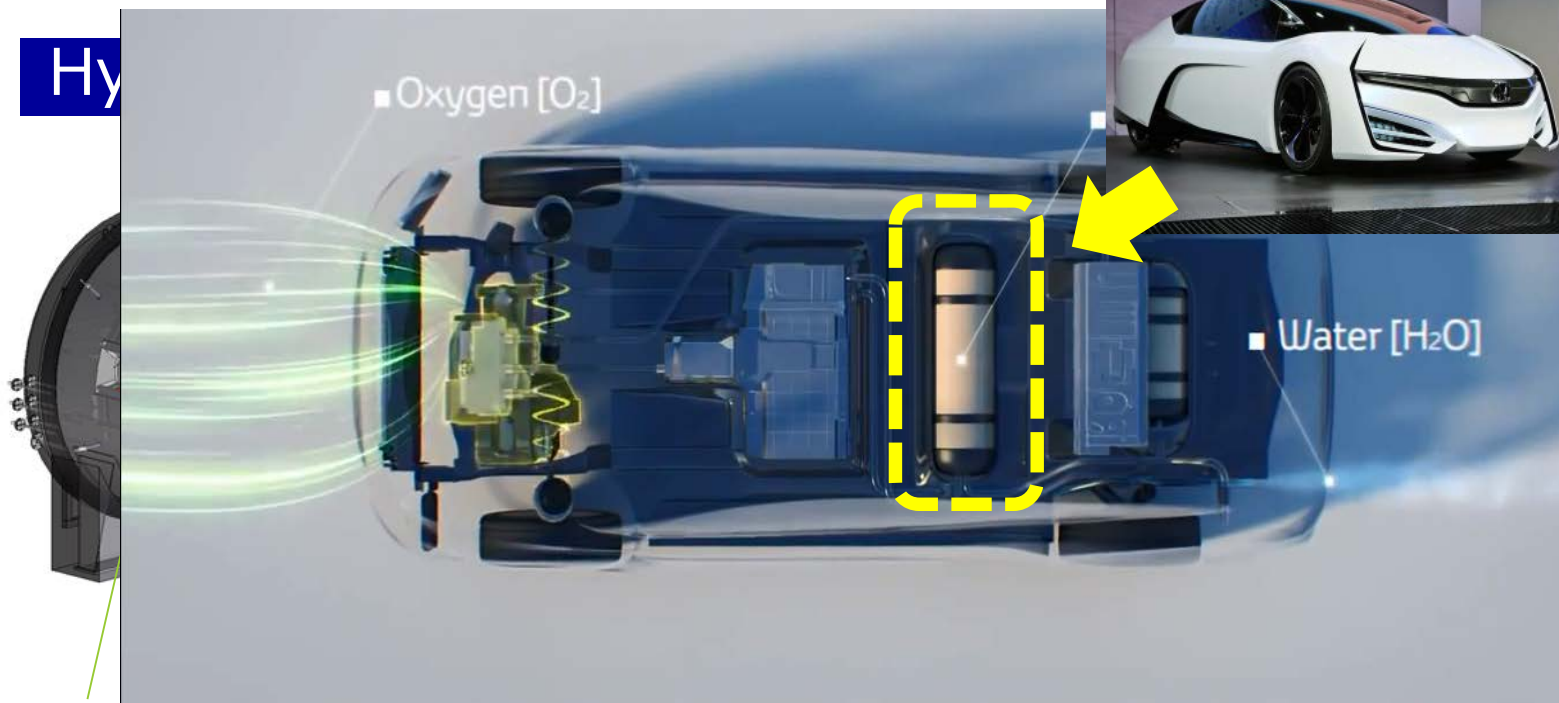
Hydrogen station
Hydrogen filling station for fuel-cell car
(delivery record: 10)

Company introduction

▶ The next generation energy

<Chamber>

Hy



Evaluation
chamber

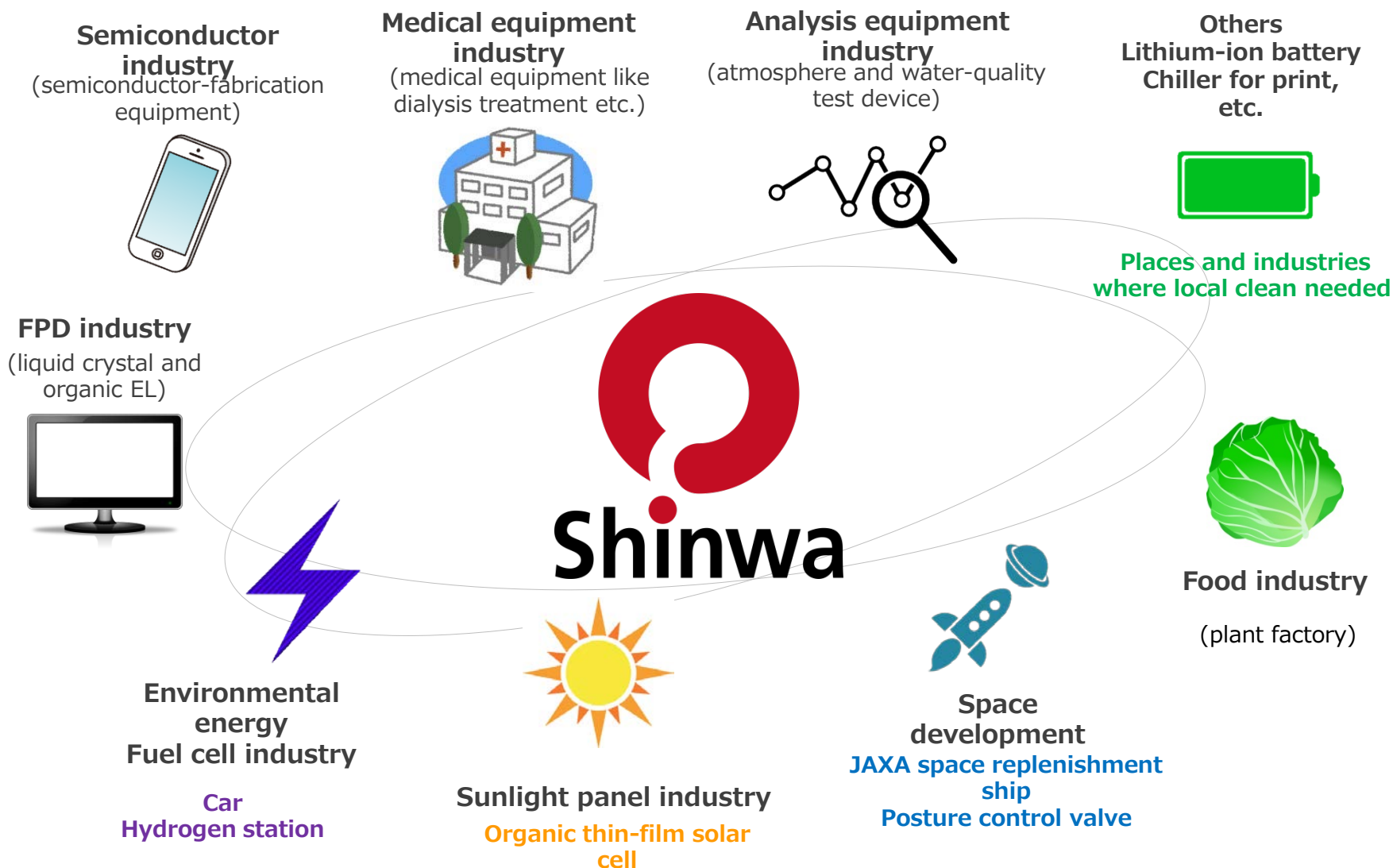
Control
System)

Fuel (hydrogen) tank

Can be deployed further to other fields

Company introduction

Area of business



Company introduction



▶ To the Space! on Tuesday, September 11, 2018

"Small collection capsule equipped with HTV" that JAXA develops
A straight type electromagnetic valve of Shinwa Controls is adopted. **宇宙開発 JAXA宇宙補給船 姿勢制御バルブ**

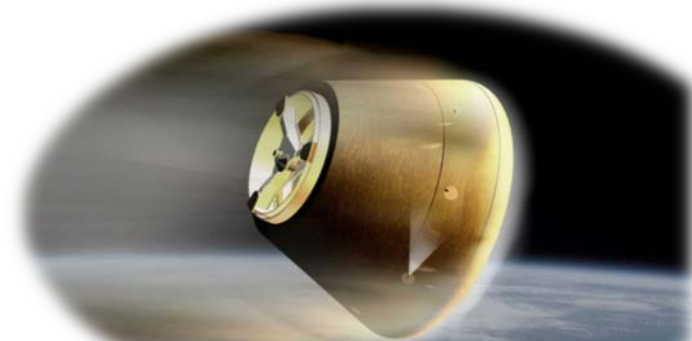
.The number of electromagnetic valves to be installed in the small collection capsule is 9

- ・8 for the capsule posture control in the atmosphere
- ・1 for parachute extraction after exceeding the atmosphere

To achieve the fall target point accuracy at the highest level in the world, "Instant response speed", "Accurate flowing quantity", and "Performance stability" are requested. Technical problems such as high airtight and decreasing the pressure loss were solved by our original technology.



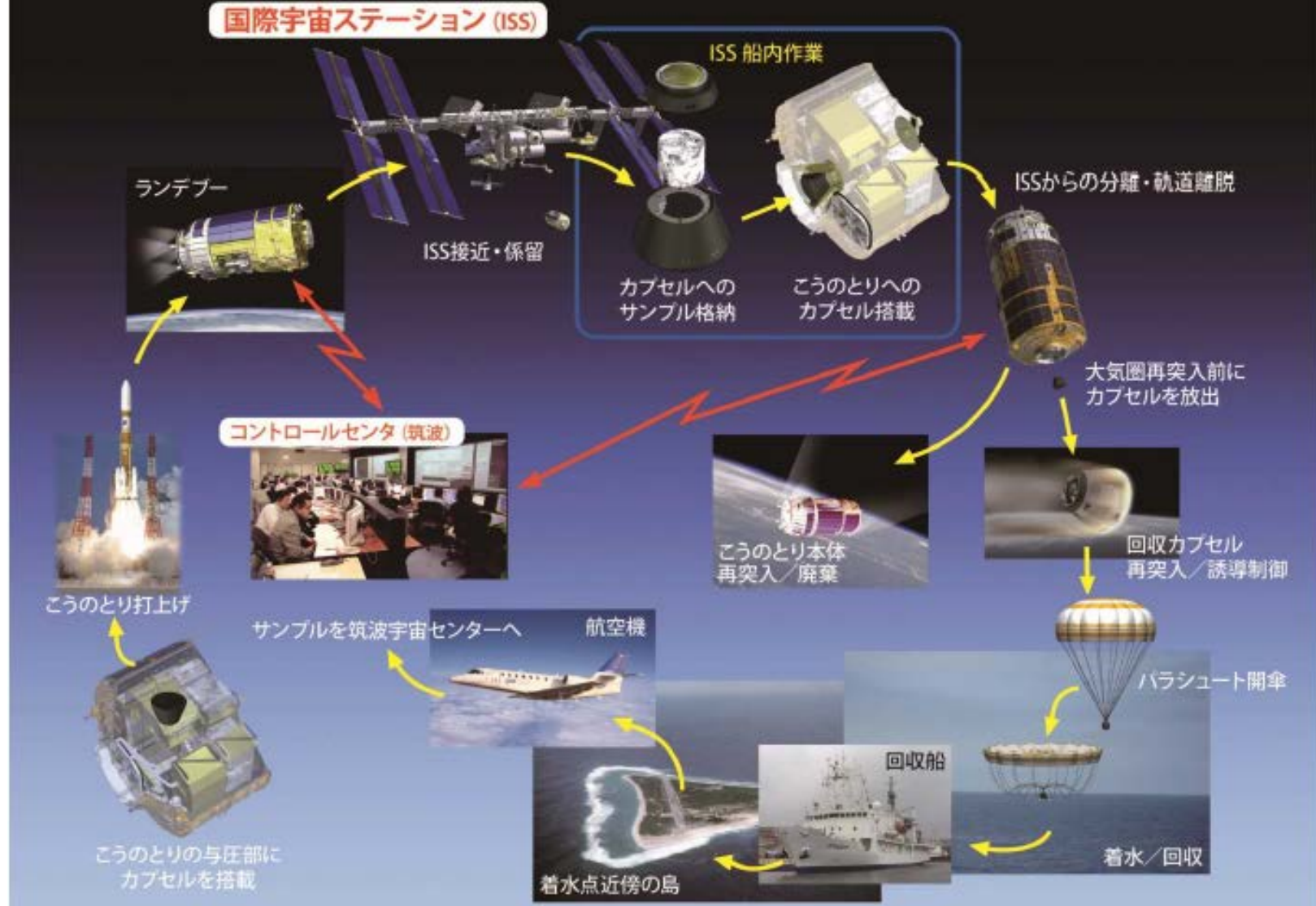
Patent No. 5990356
Externals: $\Phi 27\text{mm} \times 80\text{mm}$ in height
Weight: 170g



Diameter of the capsule: about 84cm, Weight: about 170kg

Company introduction

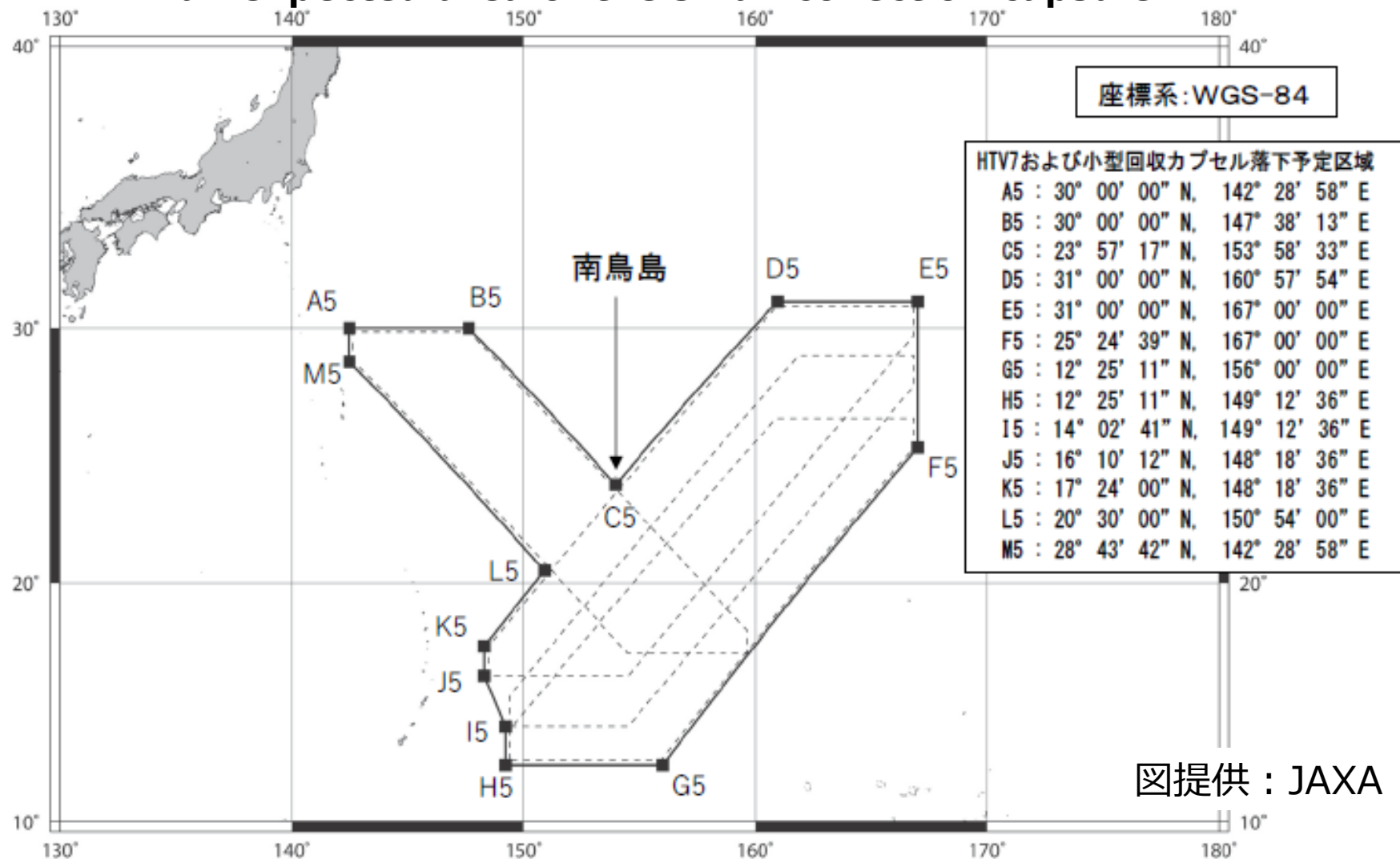
Operation Concept chart of Small collection capsule equipped with HTV



Company introduction

H-ⅡB・F7

Fall expected area of the small collection capsule



Company introduction

▶ Management Mantra

Be a proposal-oriented company to provide product and tech which gain great supports from customers.

Be a work-hard company that employees are willing to work with prosperity of the company which also wishes their happiness.

Be a company to get involved with regional economy and culture in making the local society alive together with us.

Company introduction

▶ Social activity



"Takatoo 'Shinwa Hill Rose Garden'", Ina City, Nagano Prefecture was donated in 2005



Boundary of Ina and Chino Cities in Nagano Prefecture
Tourist facility "Pass Teahouse" at Tsuetsuki, Shinshu
Delicious handmade soba noodles are offered



Company introduction

► Social activity



Rose Festival concert

Holding free music concerts in June (Nagano) and December (Nagasaki) inviting local people. There is also another purpose to support young artists.

Christmas concert



Company introduction

► Social activity



Summer Evening Festival



Local people, customers, and employees' families are invited to each office holding the Summer Evening Festival every August.

Company introduction

▶ Employee's health

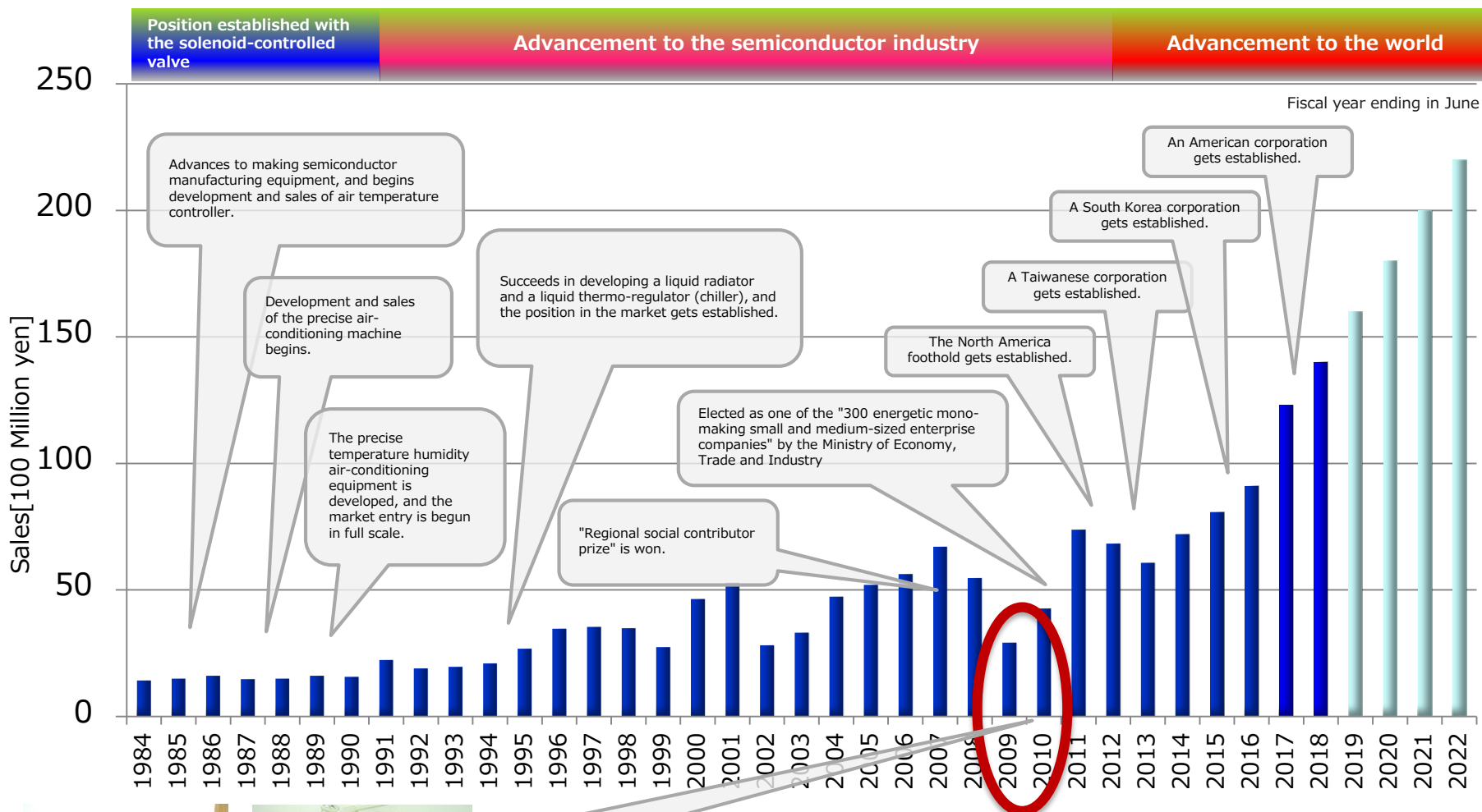


Headquarters, Nagano Office and Kyushu Office

- Promoted mainly by the feminine staff, consideration to health is improved through "Food", and delicious meals with the nourishment full marks are offered at a bargain price.

Company introduction

▶ Tracks of growth



Bankruptcy of Lehman Brothers became the chance!



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2 . QFD - TRIZ - Seeds driven QD Approach

Bankruptcy of Lehman Brothers!

- Semiconductor industry was hit directly
 - Customer's reorganization and withdrawal of major, rival enterprises
 - Main customers are domestic semiconductor/medical device manufacturers
 - Decline of domestic semiconductor industry / Control of medical expense
 - Growth of overseas market
- ⇒ The way things are going, growth is difficult ...
- ⇒ A new business/development approach is needed
- ⇒ However, there is no marketing force
- No abundant Development budget
- ⇒ New product development with QFD and TRIZ!
(Currently, executed mainly on project base)



Our company's involvement in TRIZ



1. Development of new air-conditioning device

October, 2011 - June, 2012

⇒ The device space required for installation was reduced by 50%

Presented in the 8th Japan TRIZ Symposium

2. Development of a new valve

2013

⇒ Completion of a high endurance/highly accurate control valve

Presented in the 10th Japan TRIZ Symposium

3. Seeds driven QD

From May to August, 2015

⇒ Business expansion of one's technology

How to expand one's technology in the market trend?

Presented at the IDEA User Meeting 2016

4. Development of the motor valve

December, 2016 - May, 2017

⇒ Completion of a three-way motor valve

Presented at the IDEA user meeting 2017

Our company's involvement in TRIZ ①

1. Development of a new air-conditioning device (October, 2011 - June, 2012)
⇒ The device space required for installation was reduced by 50%



CONFIDENTIAL QFDの品質表

CONFIDENTIAL そんなある日・・・

Shinwa

某A社の担当者さんから緊急の引合いあり

現行機の半分のサイズにできないか？

Shinwa

お客様が要求される期限内に、要望以上の成果を出してお納めすることができた！

フットプリント1/2！

H960

従来機

W2700

W1350

D450

小型化

Our company's involvement in TRIZ ②

2. Development of a new valve (2013)

⇒ Completion of a high endurance/highly accurate control valve

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プロジェクトの目的

電磁弁、電動弁の分野において、TRIZを活用した2件の開発を進行



バルブ製品のアップグレード

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プロジェクトの取組み

Shinwa

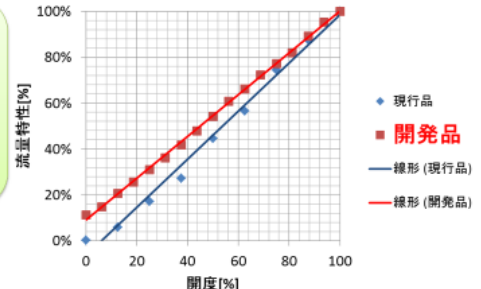
- 優れたアイデアを出すためには、的確な問題定義が不可欠
- 問題の本質を掴むには？
- システム全体像を俯瞰してみることで新たな気づきを得る

プロジェクトの取組み

Shinwa

電動弁要求品質

- 動作耐久性があること
- 流量特性がリニア特性（直線性）であること
- 純水が使用できること



開度[%]	現行品 流量特性[%]	開発品 流量特性[%]
0	0	0
20	15	18
40	30	36
60	45	54
80	60	72
100	75	90

線形近似との最大誤差：現行品の1/3

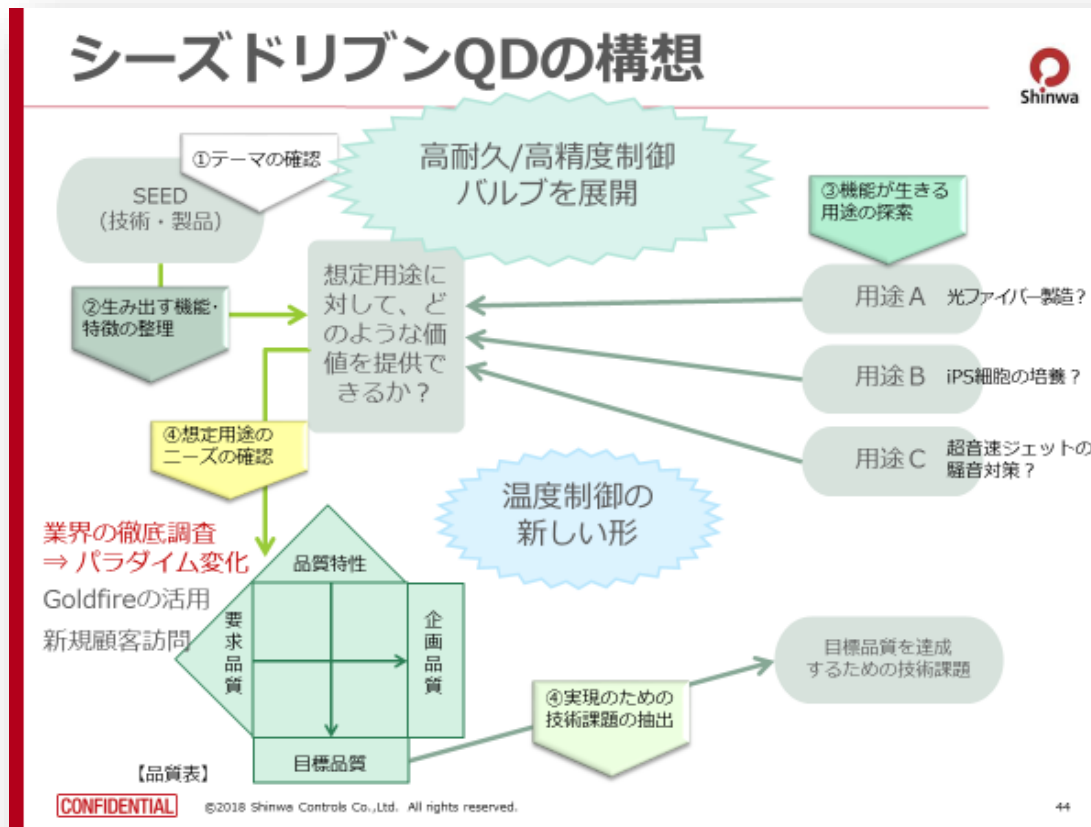
- 動作耐久性は現在評価中
- 純水への対応は材質評価を経て、耐性がある材質を使用

Our company's involvement in TRIZ ③

3. Seeds driven QD (from May to August, 2015)

⇒ Business expansion of one's technology

How to expand one's technology in the market trend?



Our company's involvement in TRIZ ④

4. Development of a motor valve

December, 2016 - May, 2017

⇒ Completion of a three-way motor valve

第10回 日本TRIZシンポジウム報告バルブを改良

2013年 - 2014年TRIZ取組み開発品バルブを応用
(開発品：高耐久/高精度制)



短所：バルブ閉時に流

顧客へサンプル納品し、シ

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バルブ漏れ量改善

漏れ許容量：サンプル品から**96%低減**

バルブ	漏れ量	流路クリアランス
サンプル品	数千mL/min	数百μm
開発品	数百mL/min	数μm

<クリアランス低減案出し>
⑧案を開発 (右図赤囲み部)

漏れ量 ⑧ < ⑨
軸トルク ⑧ < ⑨
部品代 ⑧ > ⑨

TRIZ 40の発明原理
➢ 分離原理
➢ 流体利用原理
➢ つりあい原理



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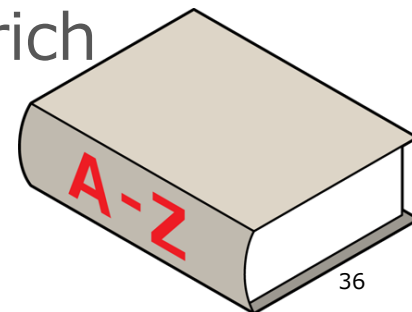


① From individual play to team play

- The problem (task) got to be arranged and visualized to get solved sharing in the team
- **Ideas got to be generated by the team**, and a variation of the solutions came to come out
- Technologies not transmitted by drawings came to be handed down
- **Salesperson came to join the team, too**

② Outside wisdom get used instead of depending on experience

- Earlier, it tended to rely on experience, but now, it came to investigate technology trends widely through **Goldfire** and the **data base** of FI·F term, etc.
⇒ **It has developed into cooperation with organizations such as universities outside the company**
- Earlier, it tended to think in a narrow aspect, but now, it came to be thought multilaterally including the use of the tools, and the conception became rich



③ Development a of strategic development activity

- "Intellectual property use conference" was held at regular meeting every month, the patent strategy was examined in all companies, and it was shared.
- Individual development acts came to get related more organically
- The number of applications to patents, utility methods, and design inside and outside the county ha increased



- ① Technological proposal type business
 - ⇒ The latest trend of the semiconductor manufacturing process is checked at the academic society, etc.
 - Furthermore, the patent trend is investigated whether there are **technologies that can be proposed proactively**.
 - ⇒ It also gazes at the **development trend of the target enterprise!**
 - ⇒ Proposal of high-value-added products to escape from price competition.

- ② From sales of things to sales of value
 - ⇒ It has changed into consideration of not the thing (= product) but the **value you are able to offer**.
 - ⇒ Consideration has risen to **its own technology**.



3 . Summary

In the middle-scale firm to which the resource is limited, the systematic development technique is considered to be effective in the following points.

- ① The activity of business and development came to develop systematically and organically.
- ② The custom of positively using outside wisdom was established to development.
- ③ Strategic use of the technology that has been established became possible.

▶ Shinwa Mission

Supporting world's manufacturing by control technology

What is being achieved by making good use of the flowing quantity control technology of the equipment, the precise temperature humidity air-conditioning of the device, and the precise liquid adjustment technology is not the device or the equipment as a thing but customer's high-quality, high performance, and efficient production, safeties, and reliance.

▶ Shinwa Values

- Entertainment
- Interesting, amusing and happy.
- Standing tall and proud
- Going all the way

▶ Shinwa Vision

- World share No. 1 of precise temperature adjuster
- Innovator of temperature adjustment technology
- Supporter of space development
- Company where each one earns industry 1

Expressing gratitude
for the guidance of
all at IDEEA, Inc.

Thank you for listening