Weets

Water environment ecology
technology systems

Cooling and circulating water purification system

Weets

TOYOTA BOSHOKU

Background of Development

1) Overview of Kariya Plant, Toyota Boshoku Global Mainstay Hub (Kariya City, Aichi Prefecture)

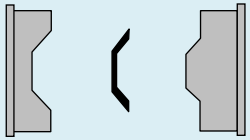
- Main plant for unit components
- Production of air cleaners and other molded plastic products
- Number of plastic molding machines: Approximately 60 (75t - 850t*)

*Variety of molding machines ranging from 75t to 850t

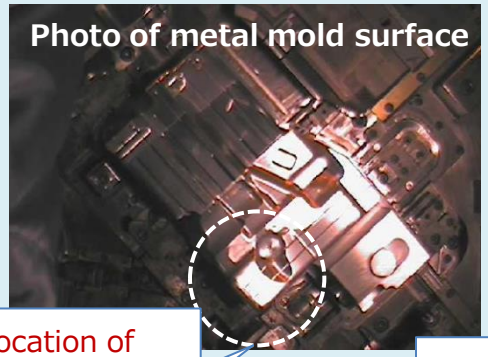
2) Problems encountered in kaizen activities

- Intermittent defects in plastic molding
- Extended time for molding is required

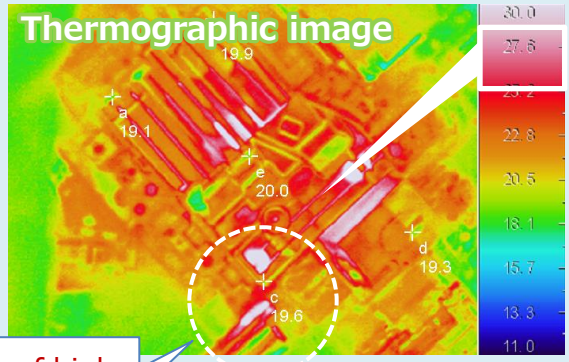
Metal mold



- Locations of mold defects match high-temperature spots in metal molds



Location of defective molding



High temperature

Area of high temperature

- Scale accumulated inside the piping for the insufficiently cooled part

→**Factors that inhibit cooling**

Cause is insufficient cooling

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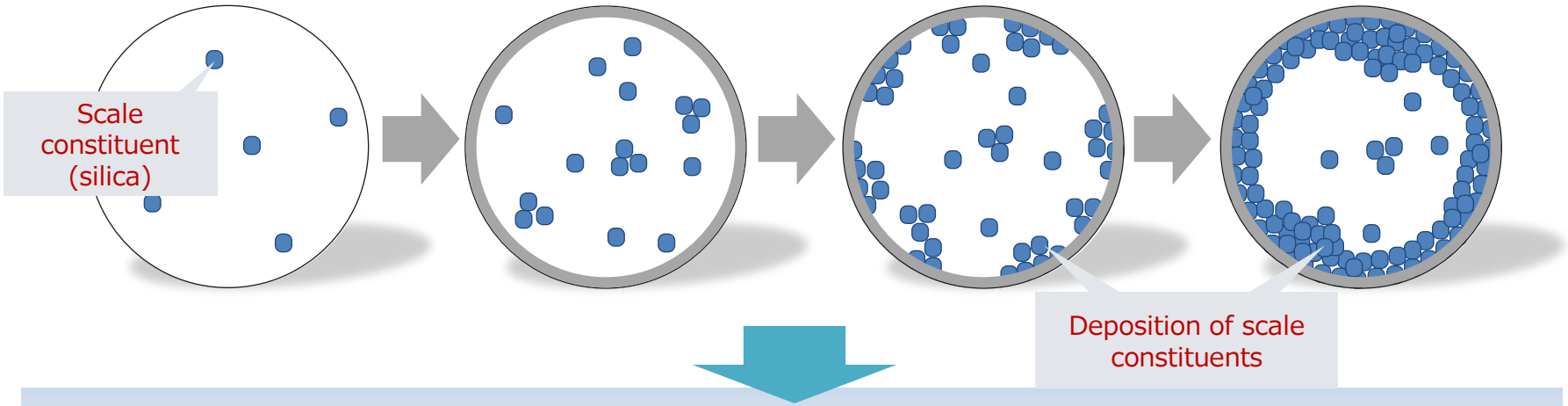
Background of Development

3) Mechanism by which scale adheres to piping

1	2	3	4
Depositing of scale constituents contained in water	Temperature changes during circulation increases concentration of scale constituents in coolant water	Scale constituents not fully dissolved in water begin to adhere to piping	Increasing build-up inhibits absorption and radiation of heat



In 2012, steps begun to improved quality of water used in circulating coolant water for metal molds

Aims in Developing Water Environment Ecology Technology Systems

Weets

Toyota Boshoku's Core Technologies

Filters

Filtration

Oil mist separator

Separation

Ion exchanger

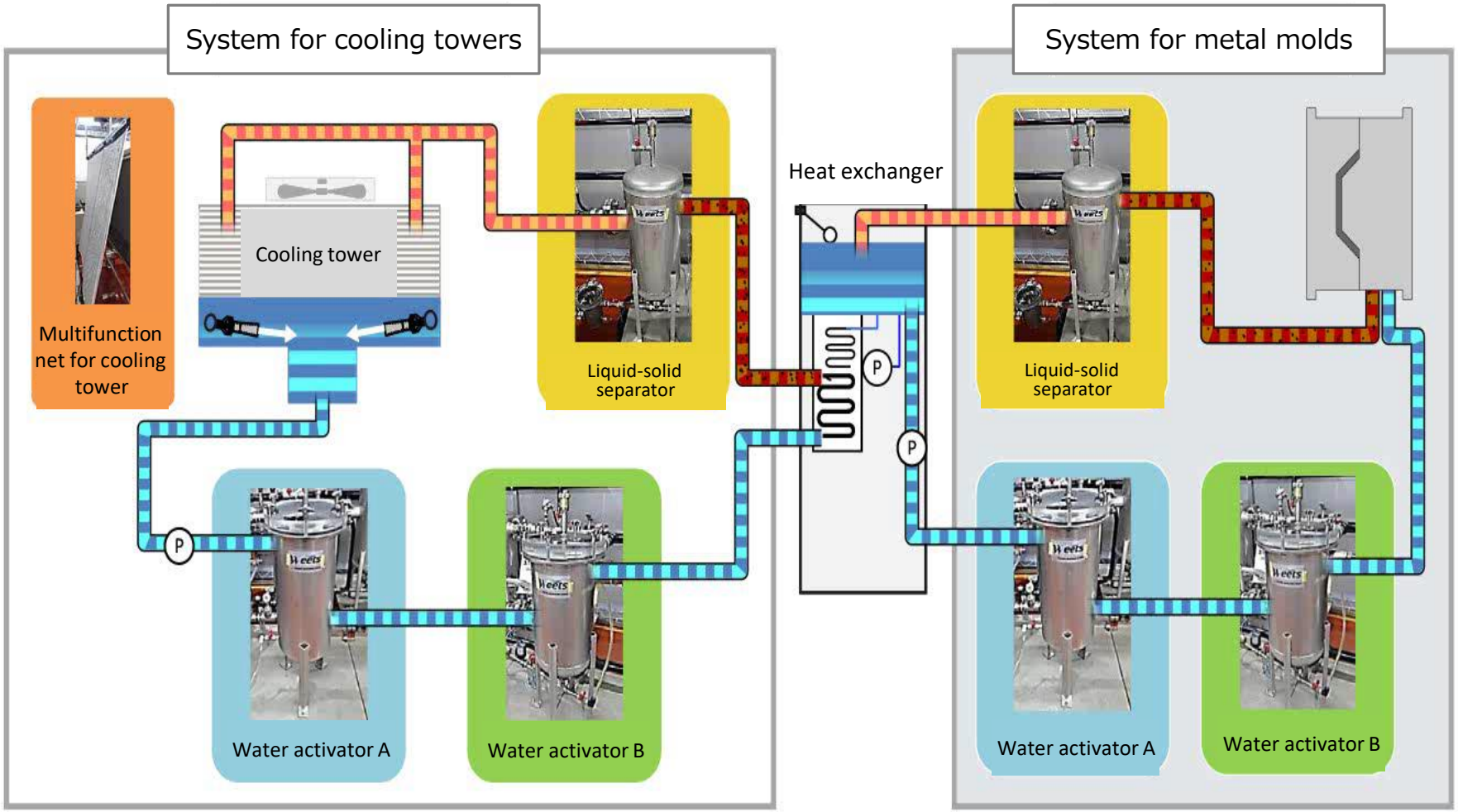
Modification/ Reformulation

Aims in improving water quality	Corrective measures (see next page)
1. Removing scale in piping	Ⅰ. Purification with TB's proprietary water conditioner
2. Preventing scale from repeated adhesion (rust prevention)	Ⅱ. Reduction of scale constituents using ceramic balls
3. Discharging removed impurities	Ⅲ. Separation of impurities through application of filtration technologies

Toyota Boshoku's original development of water environment ecology technology systems

Overview of Water Environment Ecology Technology Systems

1) System layout



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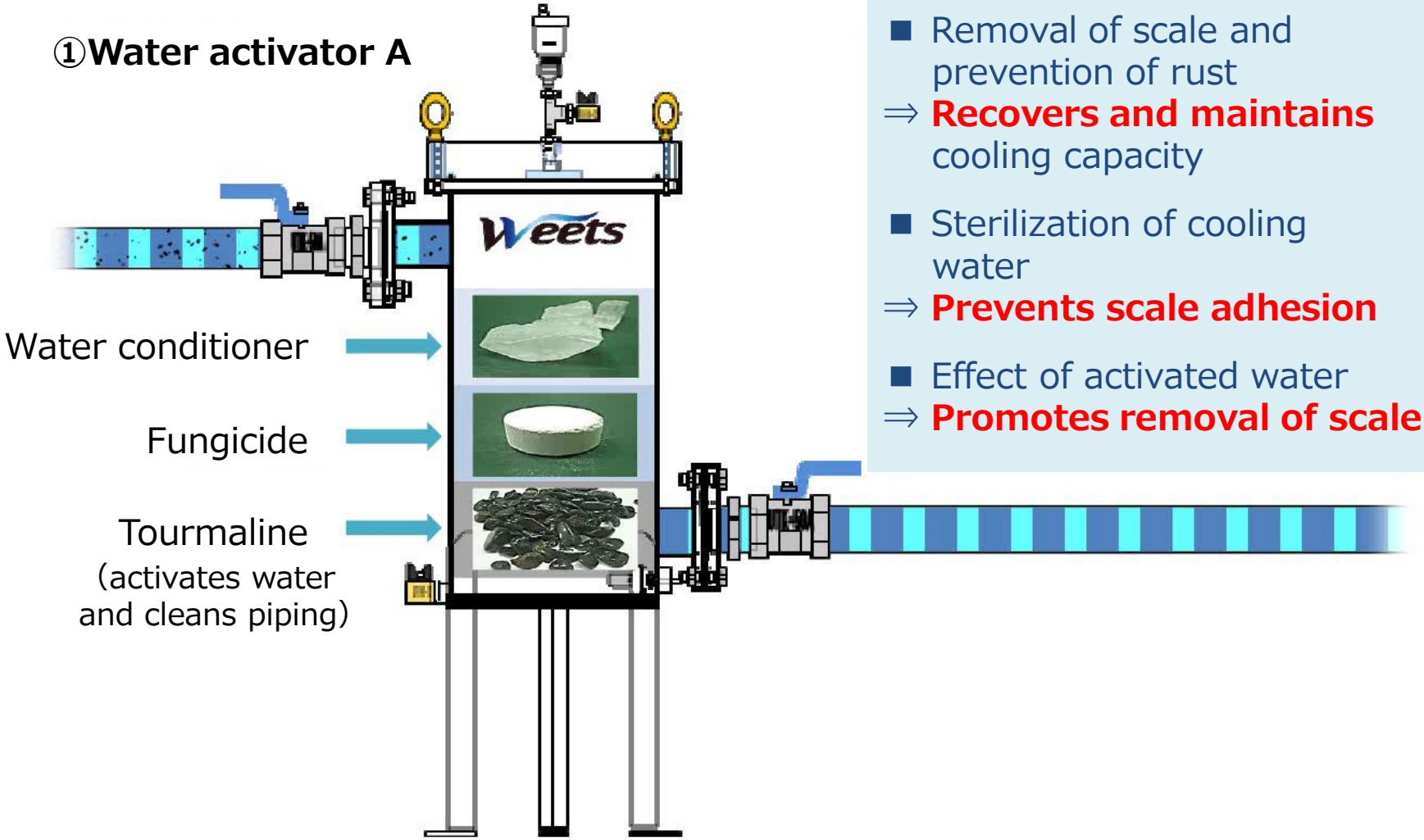
Overview of Water Environment Ecology Technology Systems

2) System details

①Water activator A

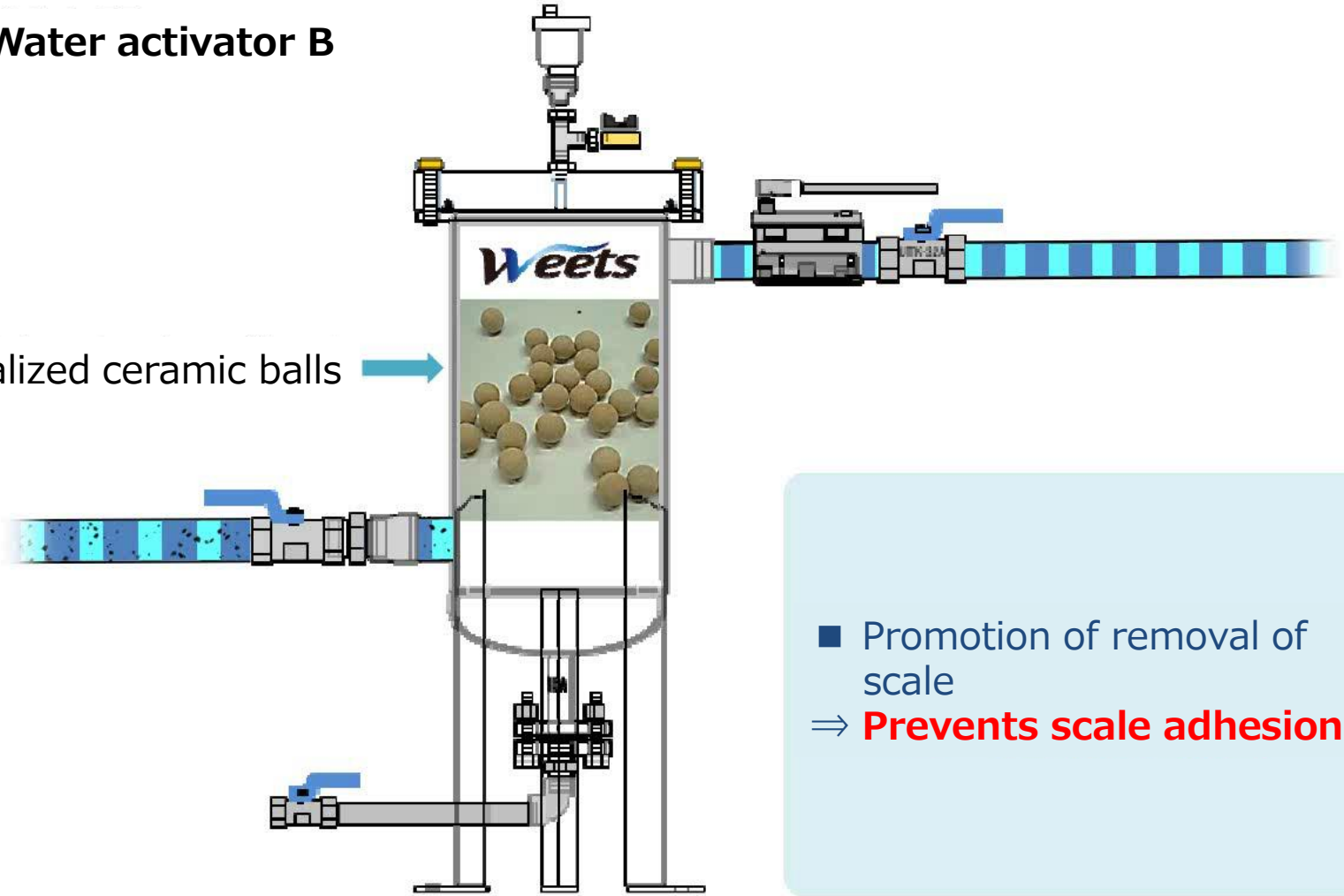


- Removal of scale and prevention of rust
  ⇒ **Recovers and maintains** cooling capacity
- Sterilization of cooling water
  ⇒ **Prevents scale adhesion**
- Effect of activated water
  ⇒ **Promotes removal of scale**

Overview of Water Environment Ecology Technology Systems

2) System details

②Water activator B



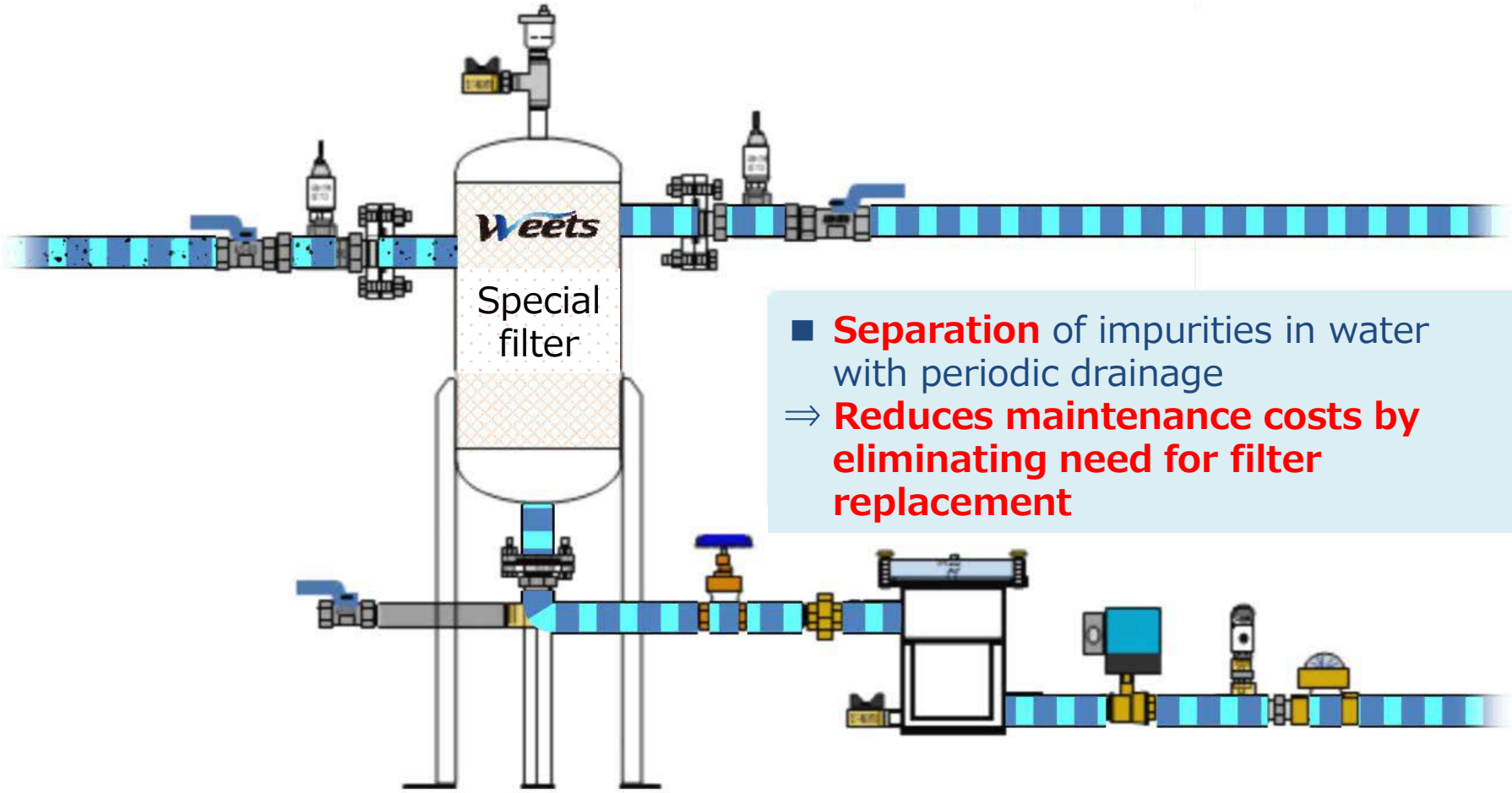
- Promotion of removal of scale

⇒ **Prevents scale adhesion**

Overview of Water Environment Ecology Technology Systems

2) System details

③Liquid-solid separator



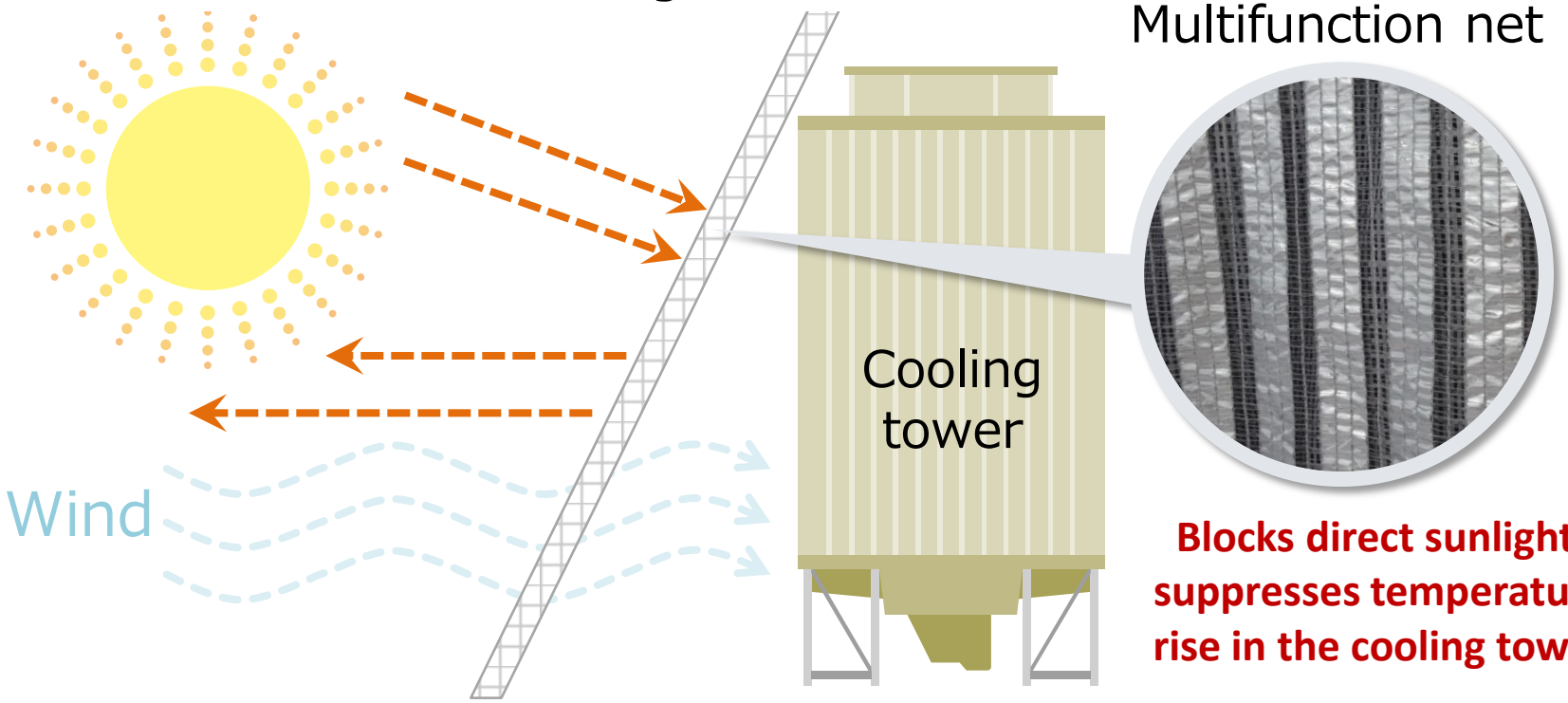
- **Separation** of impurities in water with periodic drainage

⇒ **Reduces maintenance costs by eliminating need for filter replacement**

Overview of Water Environment Ecology Technology Systems

2) System details

④Multifunction net for cooling tower



Blocks direct sunlight, suppresses temperature rise in the cooling tower

①Prevents the generation of bacteria from rising temperatures, prevents deterioration of water quality

②Reduces power consumption by cooling towers and air-conditioning equipment

Overview of Water Environment Ecology Technology Systems

A cooling and circulating water purification system for metal molds

Overview of Water Environment Ecology Technology Systems

Weets

3) Effects

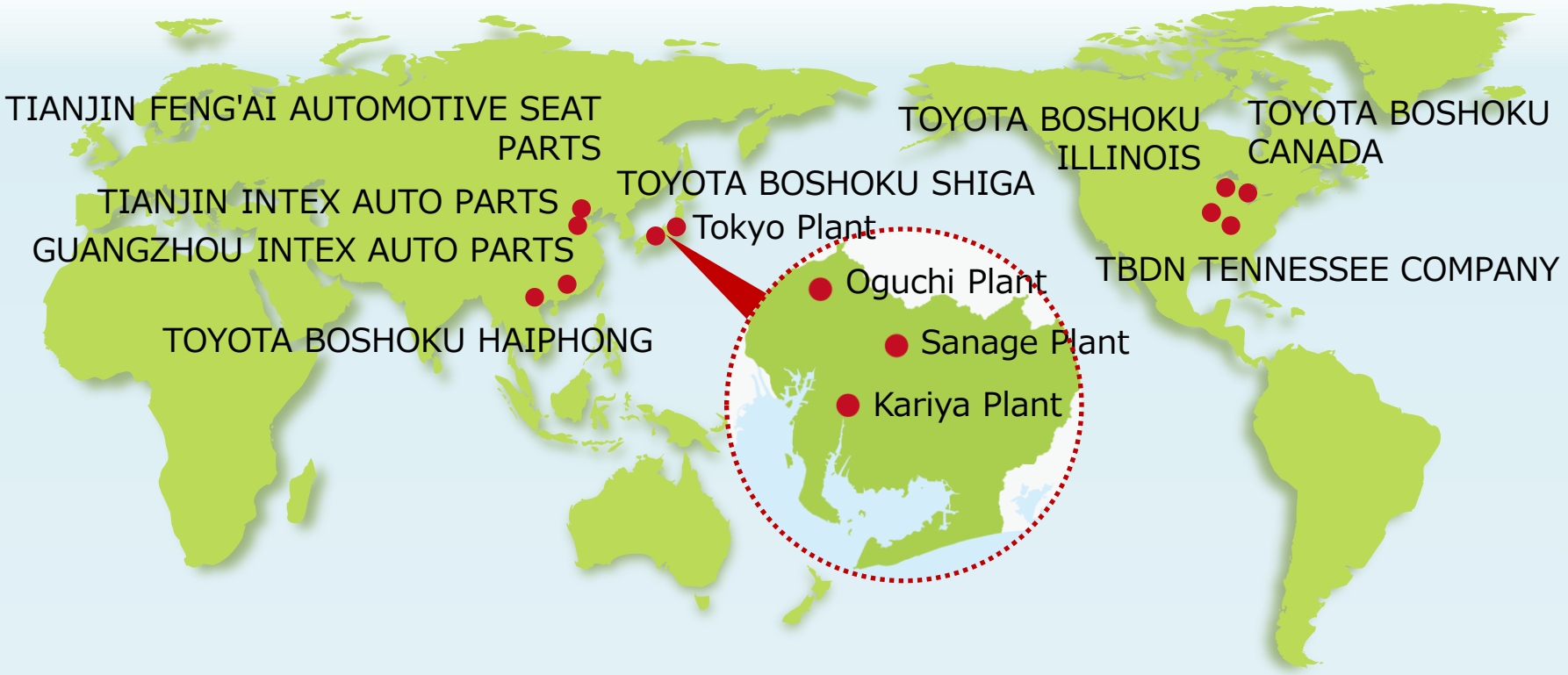
	Before adoption	1 month after adoption	1 year after adoption
Mold coolant piping			

① **Removal of scale adhering** to coolant piping, **maintenance of conditions, and prevention of rust**
⇒**Reduction in large-scale maintenance cost**
② **Suppression of scale adhesion and progression of rust** in piping
③ **Reduction in power cost increases** due to accumulation in piping (approx. **30% improvement** at Toyota Boshoku)

Adoption of measures at Toyota Boshoku 100 sets in 13 sites

Weets

(As of May 2018)



Currently being introduced, initially in areas with water issues

5 Summary

Weets

Toyota Boshoku's
water environment ecology technology systems

showing **continuous onsite improvement,**

and our commitment to manufacturing

through **application of our filtration technologies**

Cooling and circulating water purification system『Weets』

Features
(Benefits)

■ **Reduces rate of defects in molded articles**
・Removes scale in coolant piping

■ **Reduces cooling system maintenance costs**
・ Eliminates need for periodic cleaning due to scale adhesion

■ **Filters are maintenance-free**
・Eliminates need to replace special filters

■ **Energy-saving**
・Reduces power consumption by suppressing temperature rise in cooling towers

■ **Environmentally friendly**
・Natural water conditioner can be drained with conventional water drainage

Future Plans

Weets

Weets

Water **e**nvironment **e**cology **t**echnology **s**ystems

Plans for sales of the Weets,
our water environment ecology technology systems

(In current fiscal year)

(Reference) Size of Japan's domestic market

① Number of molding machines owned in Japan :

Approximately 70,000

(Toyota Boshoku's in-house survey data)

② Number of cooling towers owned in Japan :

Approximately 186,000

(Excerpted from results of survey of applicable facilities, from press release on Ministry of the Environment website)

Weets : **W**ater **e**nvironment **e**cology **t**echnology **s**ystems

(Trademark registration pending)