



KUKEN KOGYO CO., LTD.

*Export Group of Cooling Tower for Industrial Use,
International Business Division*





What is Kuken?

We, Kuken Kogyo, are a cooling tower manufacturer with the largest market share in Japan.

We are going to develop our high quality cooling towers all over the world in the future.

- *Main business*
 - *Domestic Market Share*
- *Establishment*
- *Headquarters*
- *Factory and Offices*

- *Subsidiary Companies*

Cooling Tower

Approx. 50% (For Building)

In 1956

In Fukuoka, Japan

A Factory in Fukuoka

6 Branches in Japan

▪ *SHIN NIHON REIKI CO., LTD*

▪ *Kucho Giken Co., Ltd*

▪ *Partner companies in various countries*



International and domestic lines of business

- **Air Conditioning System**
 - Cooling Tower
 - (A/C) Wind Outlet
 - Damper
- **Equipment Installation**
 - Government and Municipal Offices
 - Museum / Power Plant etc.
- **An agency for Mitsubishi Eclectic**
 - Packaged Air Conditioner
 - Elevator



Kuken Group



KUKEN KOGYO Co., Ltd.

- Major products : Cooling Tower for buildings / plants / factories
- Main market : All the countries in the world
- Number of employees : 454
- Website : <https://www.kuken.com/en/>

Shin Nihon Reiki Co., Ltd.

- Major products : Cooling Tower for plants / factories
- Main market : Japan
- Number of employees : 82
- Website : <http://www.reiki-ct.co.jp/english/index.html>



Kucho Giken Co., Ltd.

- Major products : Air-diffuser / Damper
- Main market : Japan
- Number of employees : 239
- Website : <http://www.kuchogiken.co.jp/>



Corporate Philosophy



CEO : Takashi Naraki

Corporate Philosophy

We, Kuken Kogyo Co., Ltd., have been providing total service of cooling tower including design and manufacturing to satisfy all customers' needs in various industrial fields for more than 50 years.

Our Business was originated in the spirit of nature conservation to protect the irreplaceable and beautiful earth from environmental pollution for all livings, therefore, we have been providing environmentally friendly cooling towers for saving precious water resources.

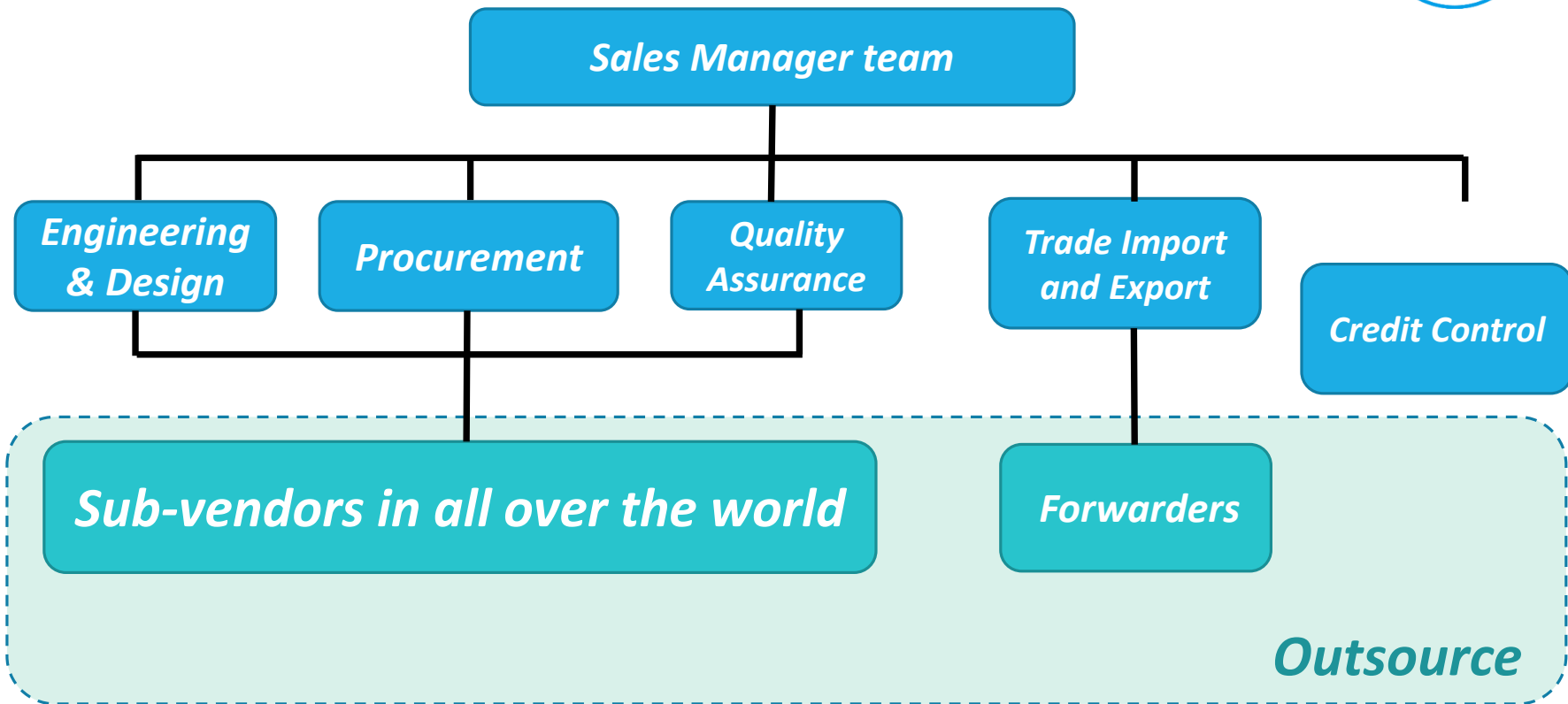
From the spirit, the energy efficiency technology on our cooling tower was investigated, which has been developing and will never stop.

We achieve high energy efficiency performance by the designing and manufacturing of efficient equipment which results in the best operational control.

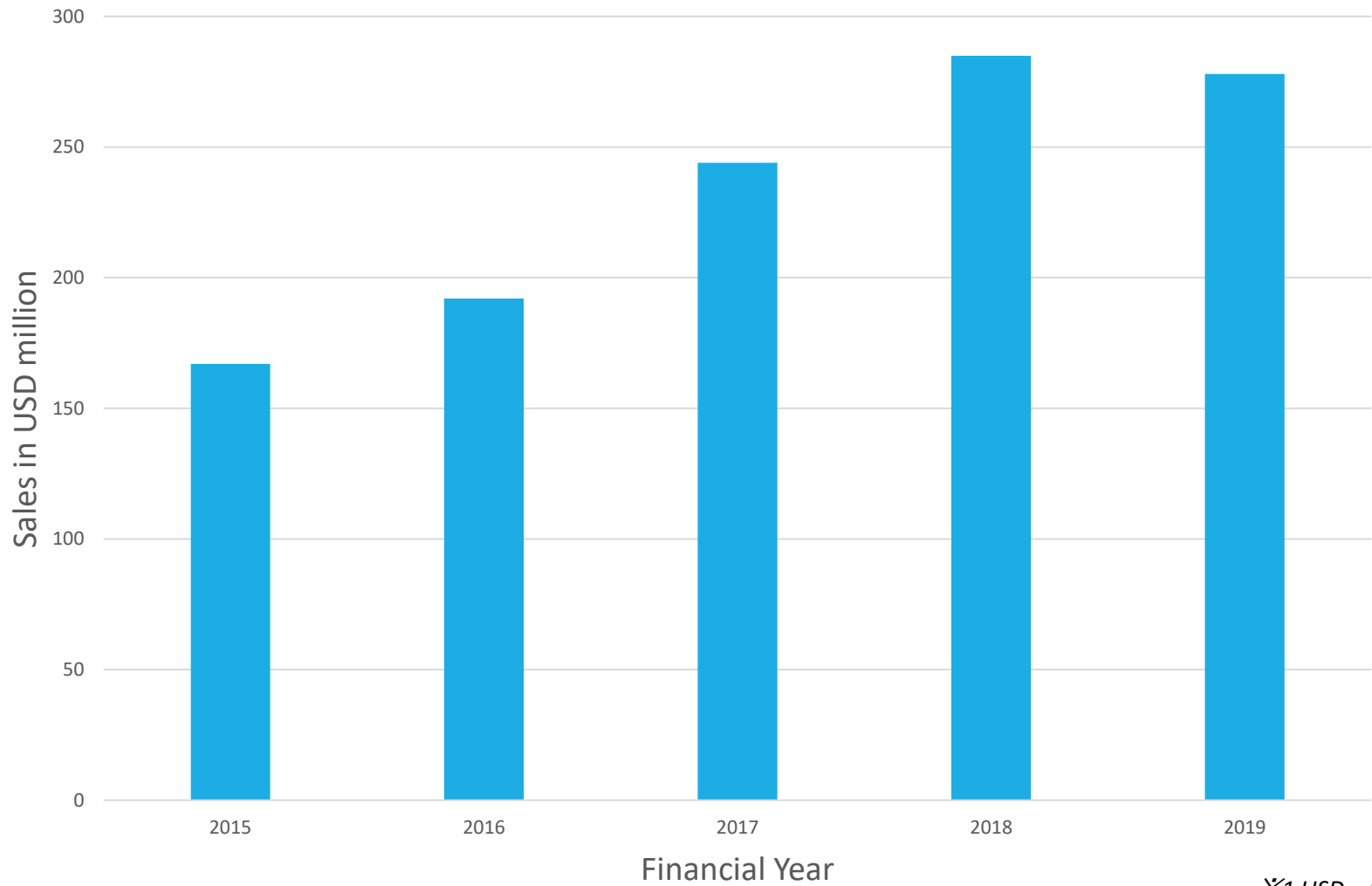
Furthermore, the simulation technology using the latest fluid and structural analysis and measuring techniques are optimized to ensure the design and manufacturing.

As a total solution provider of industrial cooling tower, we continue serving for every customer to satisfy what they need with concerning the environment.

Export Group of Cooling Tower for Industrial Use's Organization Chart



Annual Sales



※1 USD = 100 JPY

Our Experiences with Industrial CT



- *Maximum Water Flow: 42,000 m³/h*
- *More than 2,700 units (8,200 cells) in total to various factories*
- *Over 200 units were supplied to abroad
(Power generating plants in abroad: about 50 units)*



Structures



RC (Reinforced Concrete)

RC is the strongest type of all structures.



FRP (Fiberglass-Reinforced Plastic)

FRP is the lightest type of all structures, and it has high chemical resistance. We provide FRP with fire retardant and UV resistance upon requests.

Structures



HDGS (Hot-Dip Galvanized Steel)

*Steel with HDG is high durable structure.
Stainless steel (SS) can be applied upon request.*



WOOD

*Wood structure which is applied to rot-proof
has highly acid- resistance.*



Fiberglass-Reinforced Plastic



Reinforced Concrete

Geothermal Power Plant (Indonesia)

Our Experiences



2019
CT for Geothermal Power Plant (Japan)
11,700m³/h x 1 units (10 cells)

Our Experiences



2015

***CT for Geothermal Power Plant (Indonesia)
6,352m³/h x 2 units (each 3 cells)***

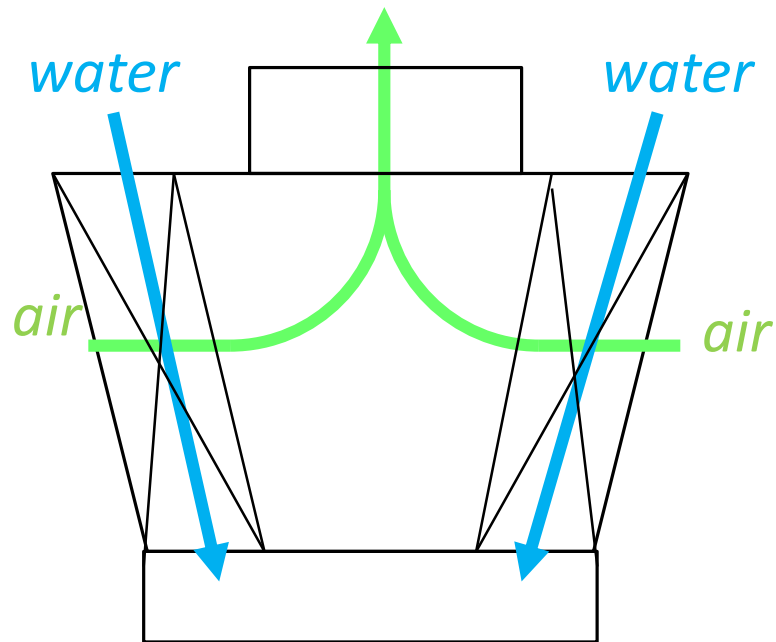
Our Experiences



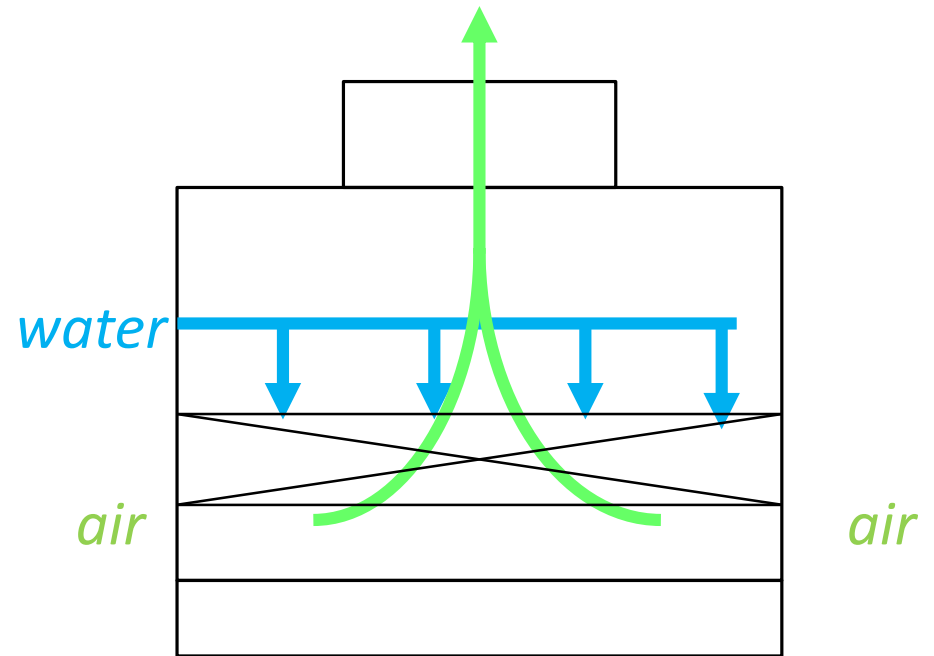
***CT for Power Plant (Japan)
30,000m³/h x 1 unit (10 cells)***

COOLING TOWER TYPE

CROSSFLOW



CONTERFLOW



CROSSFLOW COOLING TOWER (Japan)



PLANT / LOCATION	Power Plant
TYPE	Cross flow
CIRCULATING WATER FLOW	12,600 m ³ /h
HOT WATER TEMPERATURE	29.0 °C
COLD WATER TEMPERATURE	19.0 °C
WET BULB TEMPERATURE	10.9 °C
FRAME MATERIAL	Steel (Hot Dip Galvanizing)

CROSSFLOW COOLING TOWER (Japan)



PLANT / LOCATION	District Heating and Cooling / Chiba Station
TYPE	Cross flow
CIRCULATING WATER FLOW	6,034m ³ /h
HOT WATER TEMPERATURE	38.0°C
COLD WATER TEMPERATURE	32.0°C
WET BULB TEMPERATURE	27.0°C
FRAME MATERIAL	Steel (Hot Dip Galvanizing)

COUNTERFLOW COOLING TOWER (Japan)



PLANT / LOCATION	Power Plant
TYPE	Counterflow
CIRCULATING WATER FLOW	17,500m ³ /h
HOT WATER TEMPERATURE	42.5°C
COLD WATER TEMPERATURE	32.5°C
WET BULB TEMPERATURE	28.0°C
FRAME MATERIAL	Steel (Hot Dip Galvanizing)

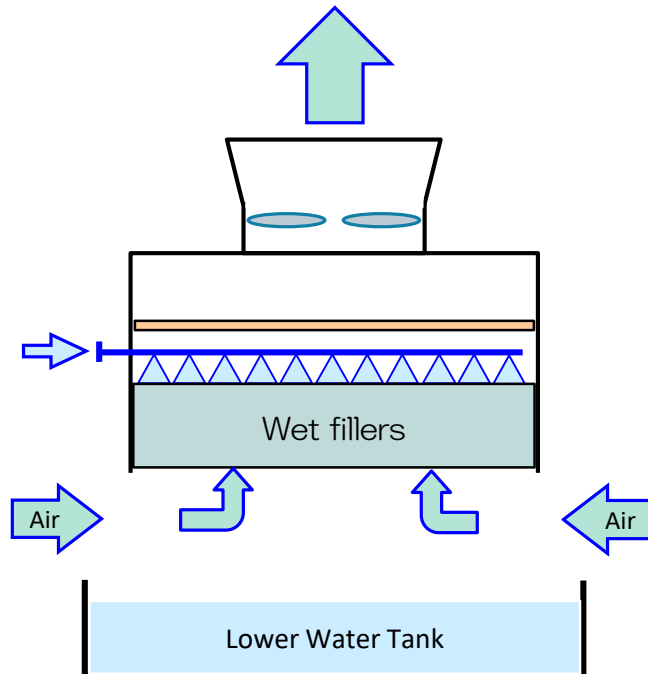
COUNTERFLOW COOLING TOWER (Japan)



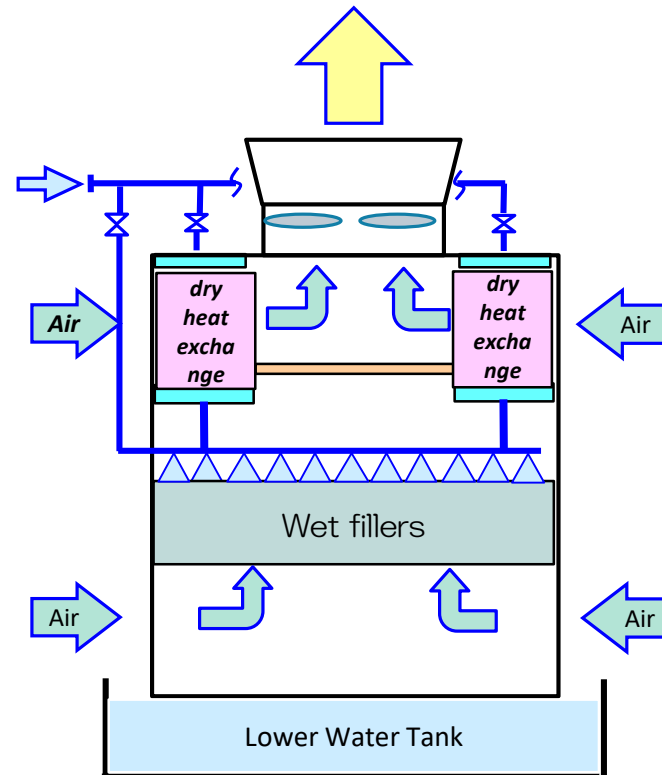
PLANT / LOCATION	Power Plant
TYPE	Counterflow
CIRCULATING WATER FLOW	10,700m ³ /h
HOT WATER TEMPERATURE	26.9°C
COLD WATER TEMPERATURE	17.0°C
WET BULB TEMPERATURE	4.0°C
FRAME MATERIAL	Steel (Hot Dip Galvanizing)
NOISE	Less than 85dB(A) at one meter from the louver / at a height of 1meter above cooling tower fan deck

Wet Type & Hybrid Type

Normal wet cooling tower



Hybrid cooling tower



COOLING TOWER WITH PLUME ABATEMENT (Japan)



PLANT / LOCATION	Power Plant
TYPE	Crossflow
CIRCULATING WATER FLOW	14,100m ³ /h
HOT WATER TEMPERATURE	32.2°C
COLD WATER TEMPERATURE	21.5°C
WET BULB TEMPERATURE	10.8°C
FRAME MATERIAL	FRP
NOISE	Less than 75dB(A) at 10 meters from the tower / at a height of 1.2 meters above the ground level
Invisible Plume	Less than 30 meters (Ambient DBT: 5.0°C, RM: 70%)

COOLING TOWER WITH PLUME ABATEMENT (Japan)



PLANT / LOCATION	Power Plant
TYPE	Crossflow
CIRCULATING WATER FLOW	19,000m ³ /h
HOT WATER TEMPERATURE	41.0°C
COLD WATER TEMPERATURE	31.0°C
WET BULB TEMPERATURE	27.0°C
FRAME MATERIAL	Steel (Hot Dip Galvanizing)
NOISE	Less than 77dB(A) at 10 meters from the opposite point of motor / at a height of 1 meter above the ground level
Invisible Plume	Less than 30 meters (Ambient DBT: 5.5°C, RM: 62%)

PLANT / LOCATION	Power Plant
TYPE	Counterflow
CIRCULATING WATER FLOW	30,000m ³ /h
HOT WATER TEMPERATURE	41.6°C
COLD WATER TEMPERATURE	32.0°C
WET BULB TEMPERATURE	27.0°C
FRAME MATERIAL	FRP
NOISE	Less than 85dB(A) at 1 meter from the louver
Invisible Plume	Less than 20 meters (Ambient DBT: 4°C, RM: 65%)

HYBRID TYPE



Maintenance Services

*Kuken offers the best solution
for all cooling tower*

① Inspection

② Performance and Vibration Analysis

③ Report



Maintenance Services

If your cooling tower has problems, it may cause unexpected shutdown not only on cooling tower but also on whole your plant.



- *Structure degradation*
- *Abnormal vibration*
- *Collapse by strong wind*



INSPECTION

Kuken provides total inspection service for various cooling towers.

Structure

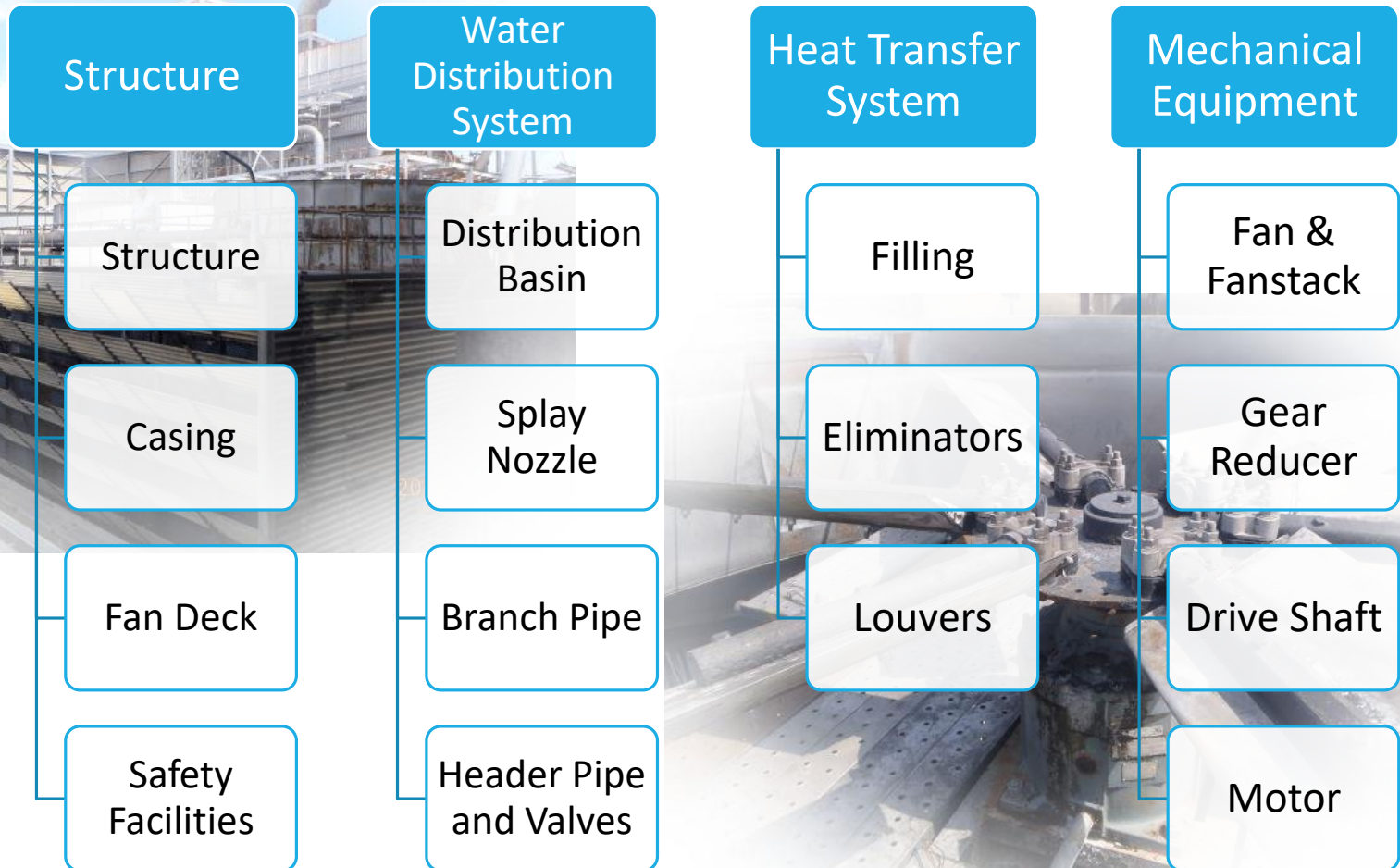
Water Distribution System

Performance and Vibration

Mechanical Equipment

Heat & Air Transfer System

① INSPECTION



① INSPECTION



Based on the data collecting by inspection, SNR offers the best maintenance for your existing cooling towers.

POINT: Wooden cooling towers are evaluated by using pilodyn wood testing machine



【Pilodyn wood testing machine】



【Intrusion testing machine for wood】



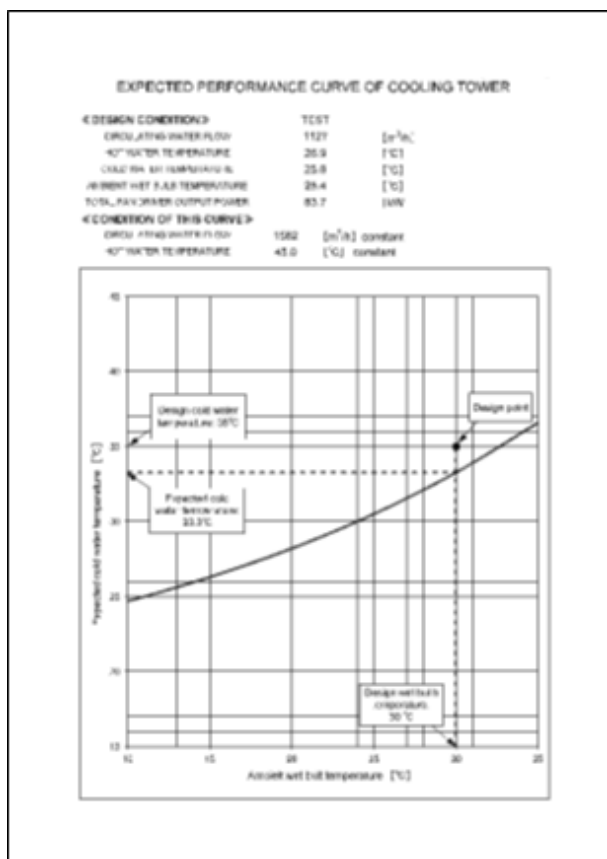
3. Check List (Corrosion and Degradation Condition)

Components	Material	Condition	Judgment				Remarks
			1	2	3	4	
Structure							
Pole, Pillar	CSZ	Corrosion		✓			
Fan Deck	CSZ	Corrosion		✓			
Distribution System	SGPW			✓			Painting necessary
Hot Water Piping		Corrosion					
Distribution Basin	SS	Corrosion, Over Flow				✓	
Nozzle (Hole Type)		Stop-up the Hole				✓	Cleaning necessary
Eliminator	PVC					✓	Degraded partially
Fin		Degradation					
Support	CSZ	Corrosion Degradation		✓			
Louver	CSZ			✓			
Pole, Pillar		Corrosion		✓			
Fin	ACB			✓			
Support	CSZ	Corrosion		✓			
Filling	PVC					✓	Replace
Type	UP-27	Scaling					
Support	CSZ	Corrosion		✓			
Casing	ACB					✓	Bolt, Support were Broken partly
Casing, Access Door		Damage					
Others	CSZ			✓			
Access Door							
Stairway	CSZ			✓			
Handrail	CSZ	Corrosion		✓			Painting necessary
External Ladder	N/A						
Stage for Riser Piping	N/A						

Please refer next page for the description of Judgment level.

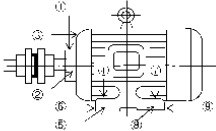
② PERFORMANCE, VIBRATION ANALYSIS

Cooling tower performance and vibration analysis of cooling fan are conducted.



2. VIBRATION OF MOTOR

Vibration inspection at cooling tower motor was conducted after construction on July 22nd, 2013.
This inspection was conducted again on Sep. 28th and we confirmed no significant vibration issue at motor.



測定機器 : 振動計
Tools : Vibrometer

モデル : VM-3004
Model No. : VM-3004

シリアル : A2726
Serial No. : A2726

VIBRATION DATA AFTER CONSTRUCTION (dated on July 22nd) [μm]

	①	②	③	④	⑤	⑥	⑦	⑧	⑨
A	27~55	6~14	27~59	28~60	6~14	18~42	54~78	6~12	5~37
B	20~44	8~22	25~41	23~57	7~17	16~30	40~78	8~16	13~23

VIBRATION DATA (dated on Sep. 28th) [μm]

	①	②	③	④	⑤	⑥	⑦	⑧	⑨
A	26~52	8~15	24~53	26~51	6~14	17~41	22~72	9~14	17~37
B	19~44	16~24	20~50	20~48	7~18	21~34	30~78	8~17	14~33

Vibration values at motor tested on July 22nd is similar to the one dated on Sep. 28th. In addition they are smaller than design initial value in below table. Therefore, no vibration issues were found.

Frequency (Hz)	rpm (min ⁻¹)	(Design initial value)	(Vibration tolerance)
		Vibration Quantile (μm P-P)	
50	1500	80	200
	1000	115	290
	750	153	390
	500	190	475
60	1800	65	160
	1200	95	240
	900	130	325
	720	180	400

Design initial value (JIS B 8330-2000): Full amplitude upon vibration speed 8mm/s
Vibration tolerance (JIS R 8330-2000): Full amplitude upon vibrator speed 15mm/s



【Vibration frequency analysis】

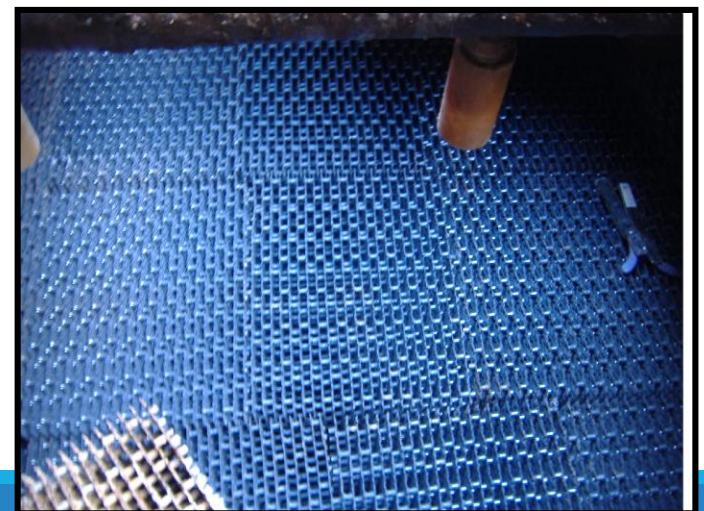
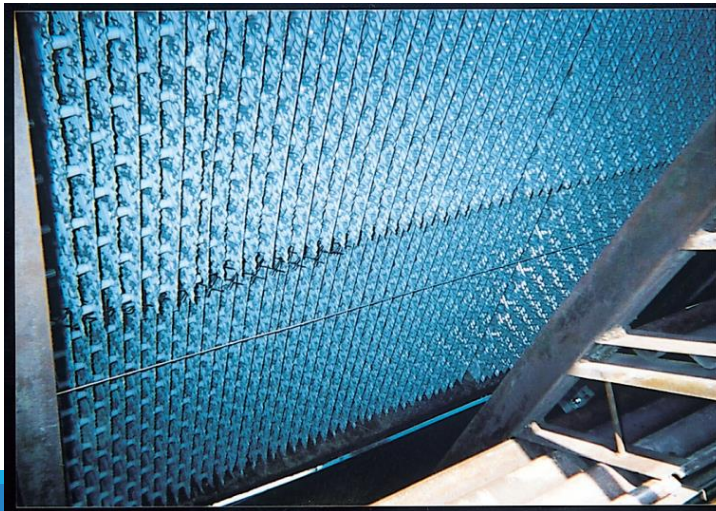
③ EXPERIENCE



Filling replaced due to low performance by adhering slime and dust



Filling replaced due to buckling by adhering slime and dust gaining the weight



③ EXPERIENCE (Wood → FRP)



Replaced top deck with FRP



Replaced structure with FRP



④ Repair (FRP fan blade)



Install stainless guard



Repair erosion of fan blade

SPARE PARTS

Kuken provides main spare parts for wet cooling tower.

(Both counterflow and crossflow type)

Motor

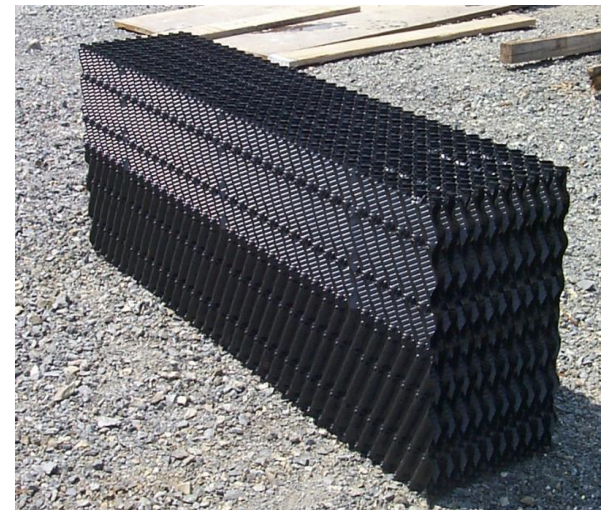
Gear Box

Fill

Fan Blade

Eliminator

Coupling etc.



Fill

COMPONENTS

- SPLASH TYPE FILLING

- For bad quality water



ACCESS POINT

Export group of Cooling Tower for Industrial Use,
International Business Division,
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***Kuken looks forward to working with you.
Thank you!***

