



Fullchance TECHNOLOGY

FLEXIBLE HEATING SOLUTION PROVIDER

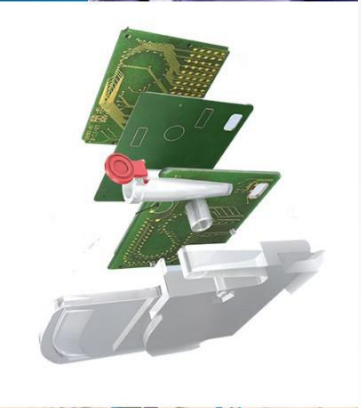
CUSTOM FLEXIBLE HEATER MANUFACTURER

Providing Excellence in Precision-Grade Heater Solutions

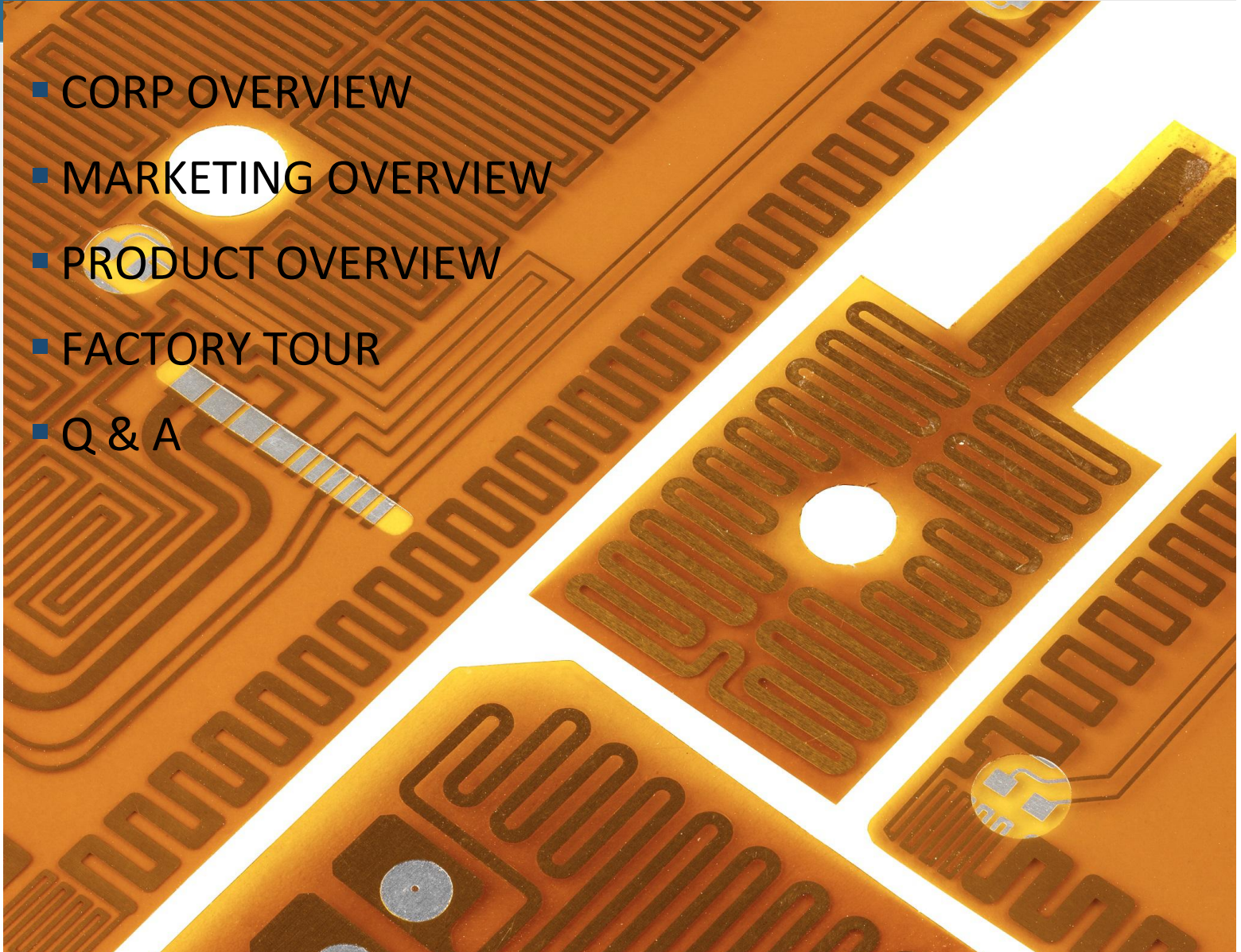
深圳市圣柏林电热

专业于生产柔性电热片，加热片，发热片

AGENDA



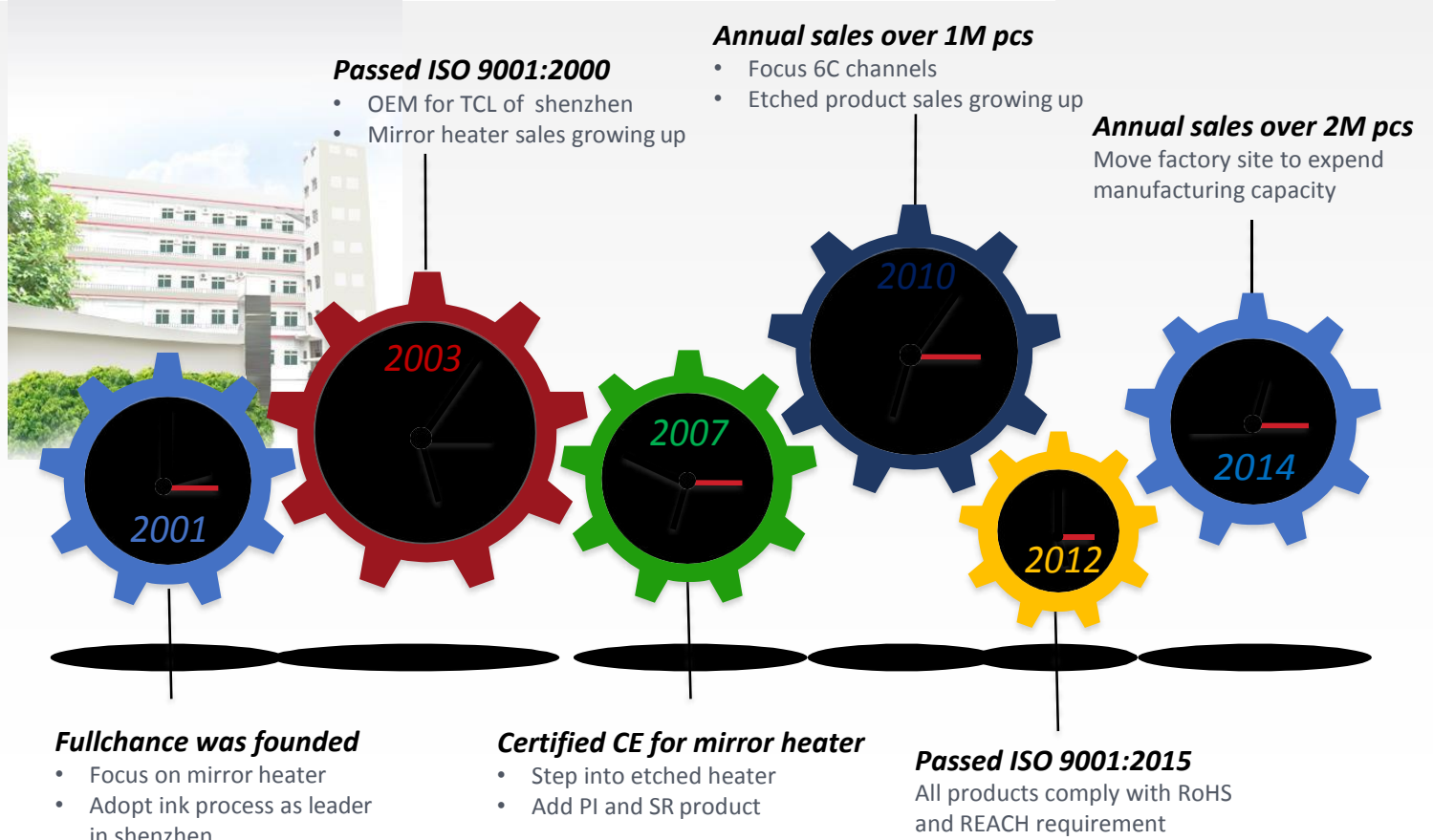
- CORP OVERVIEW
- MARKETING OVERVIEW
- PRODUCT OVERVIEW
- FACTORY TOUR
- Q & A



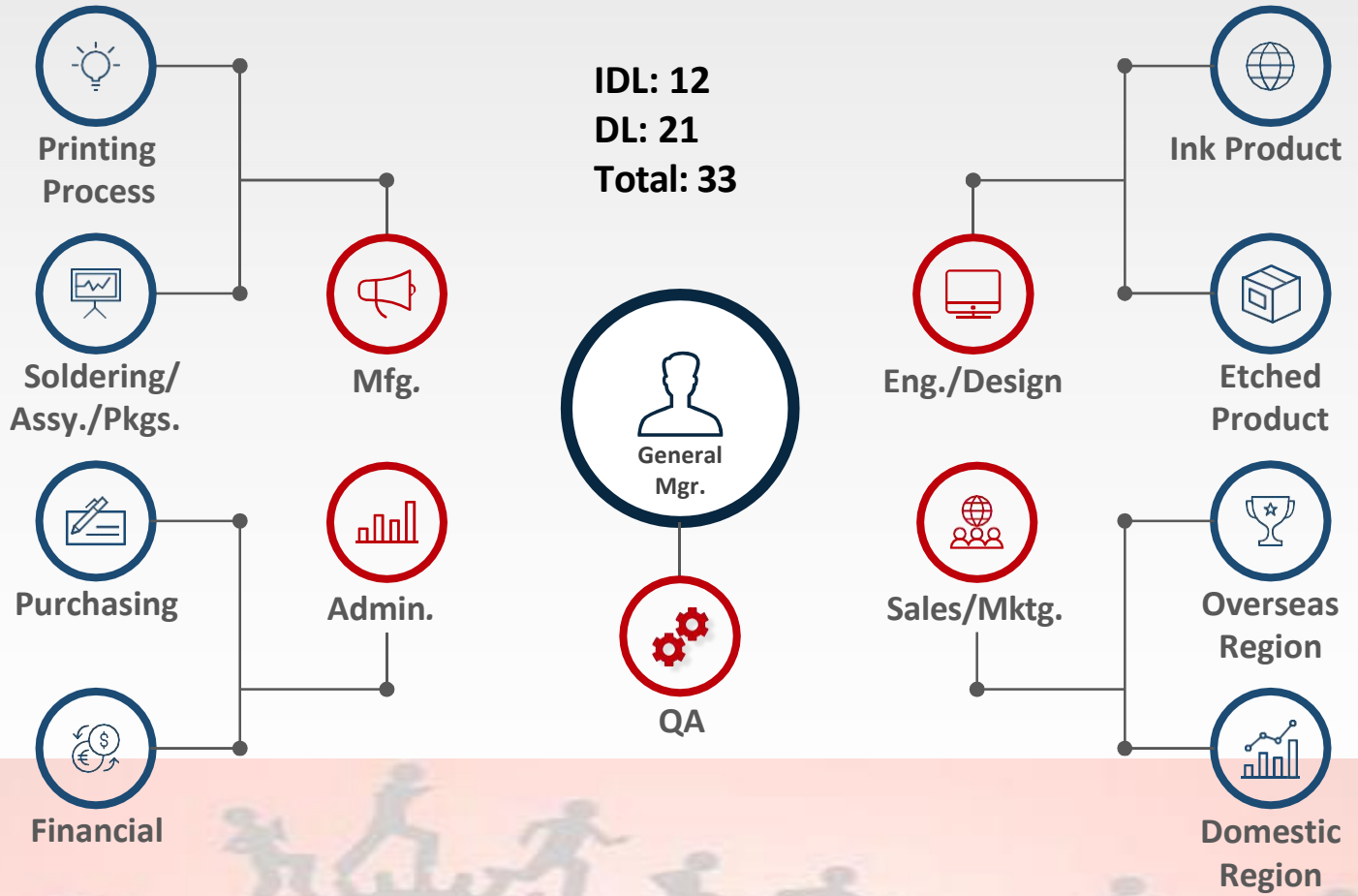
ANY PROFILE

FLEXIBLE HEATER SPECIALISTS

MILESTONES



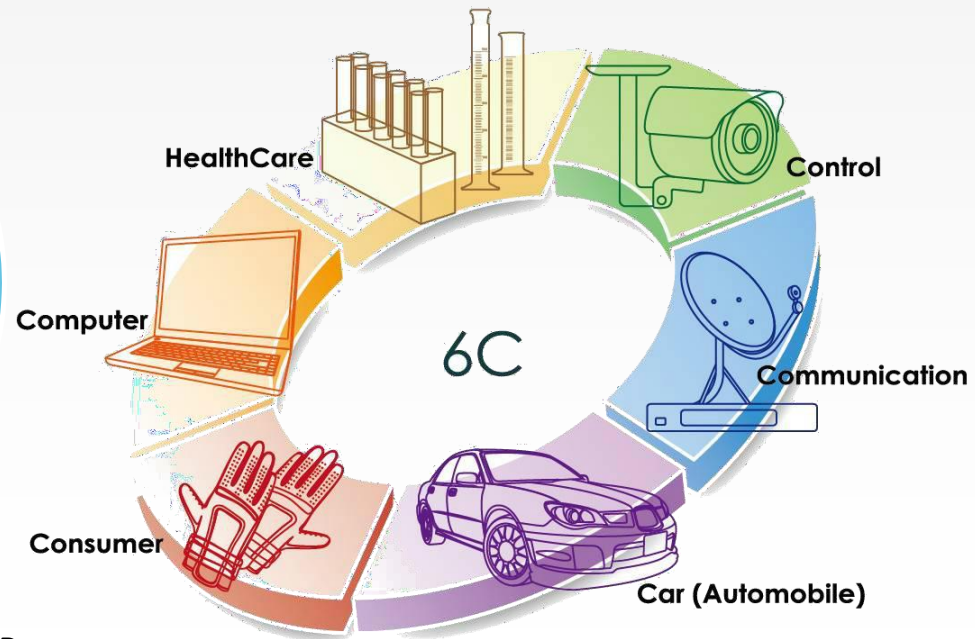
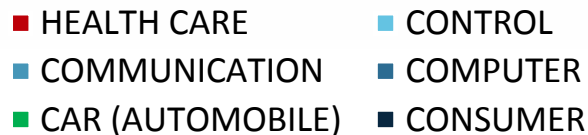
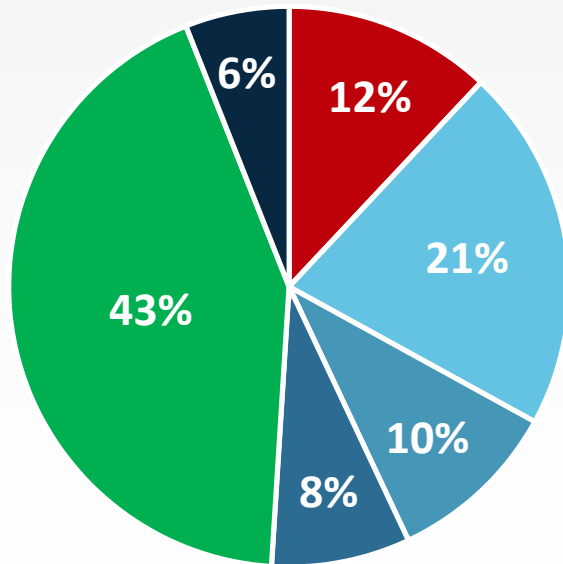
ORGANIZATION CHART



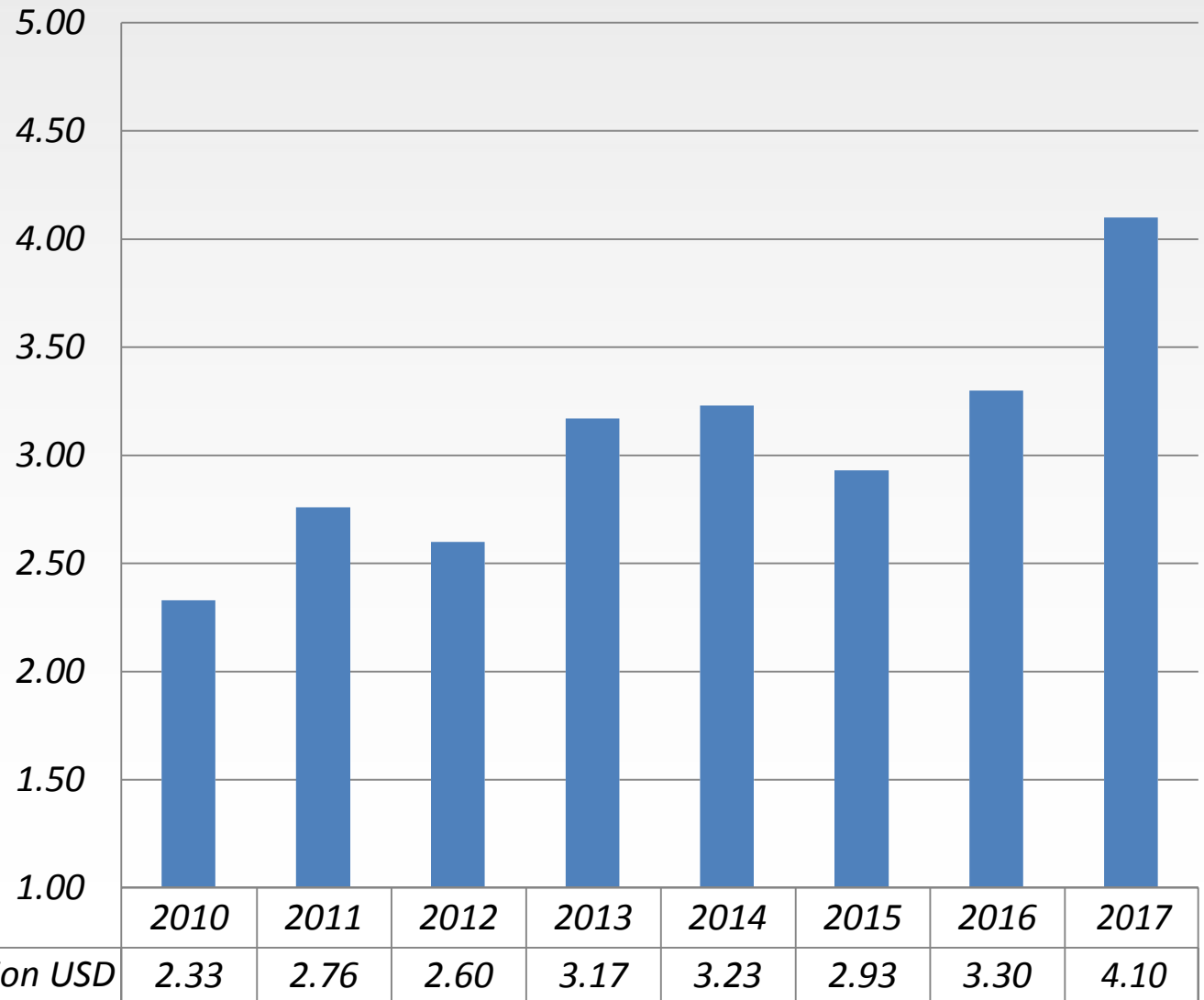
BUSINESS REVIEW



- Sales amount of 2017: US\$4.1 million dollars
- Shipping quantity : 2.6 million pcs(PET: Polyimide: Silicone, 3:5:2)
- Directly oversea customer: 16 country
- Production area: 1,200 square meter



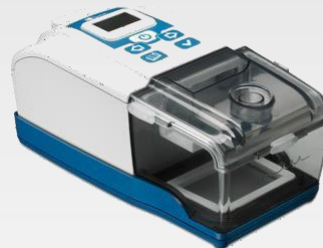
ANNUAL SALES TREND DATA



TARGET MARKETING



COMMUNICATION
Outdoor AP, Antennas



HEALTH CARE
DNA analysis, CPAP
Blood warming



CAR
Mirror heater
Ecall system

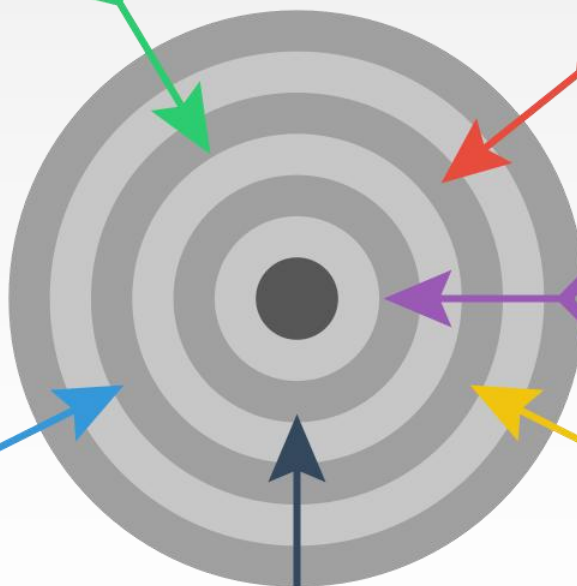


CONSUMER
Jacket heater
Glove heater

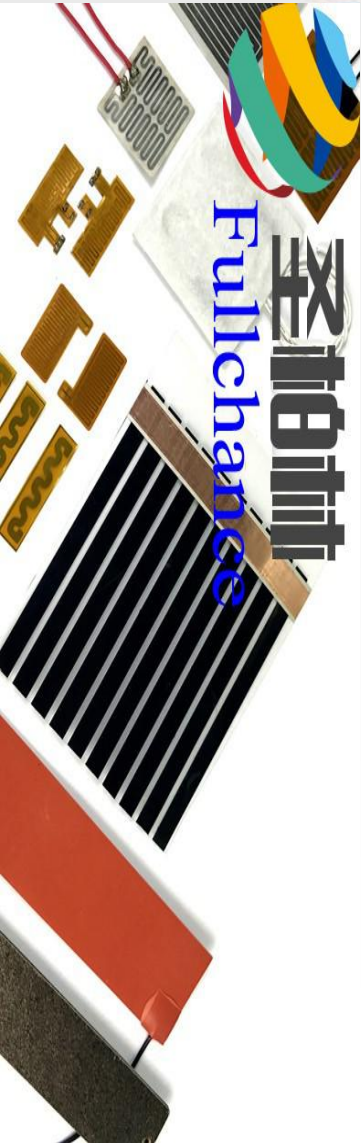


COMPUTER
Chip & LCD warm up
Battery system

CONTROL
IP camera, DVR
Chemical detection



KEY CUSTOMERS



HAGEN Pet Warmer

ANNUAL QTY 300K pcs



VARTA Microbattery Productss

ANNUAL QTY 400K pcs



KENSEAN Auto Rearview mirror heater for FORD 150K

ANNUAL QTY pcs



AVIGILON Outdoor Camera(TSX: AVO)

ANNUAL QTY 200K pcs



GETAC Military laptop (TPE: 3005)

ANNUAL QTY 50K pcs



ACCTON Wireless outdoor AP (TPE: 2345)

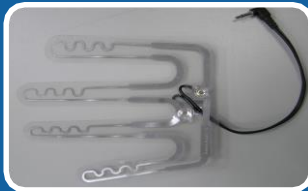
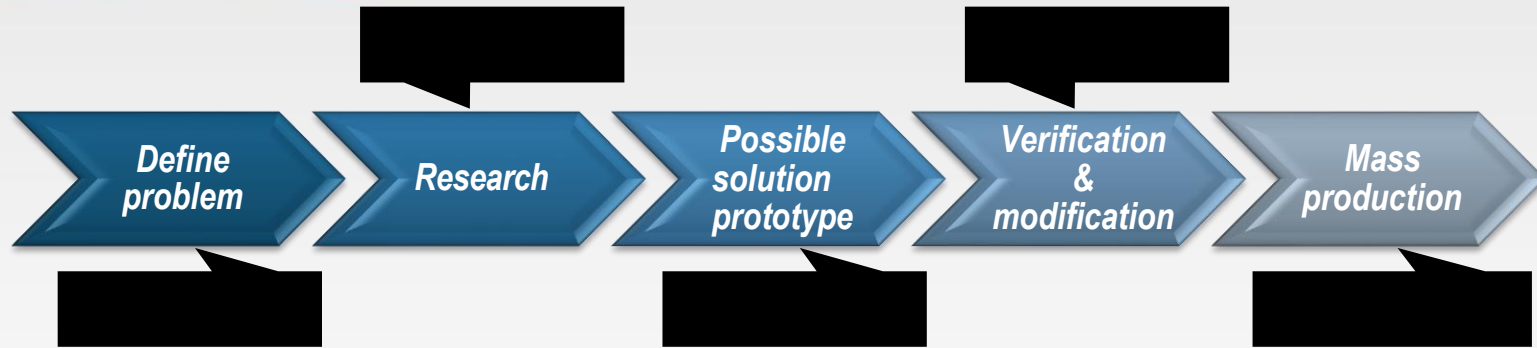
ANNUAL QTY 50K pcs



THERMO FISHER PCR Analysis heater

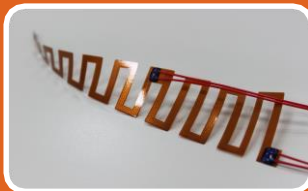
ANNUAL QTY 30K pcs

HOW TO SELECT Fullchance HEATERS



Polyester Heater

- Commercial low cost
- Etch & ink print element
- Max 90 deg C & power density up to 2W/cm²



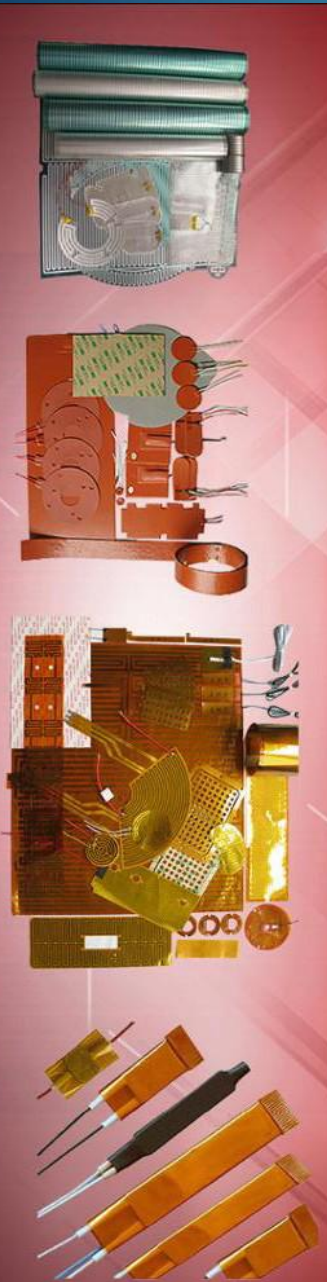
Polyimide (Kapton®) Heater

- General purpose with low out-gassing
- Etch element
- Max 150 deg C & power density up to 5W/cm²

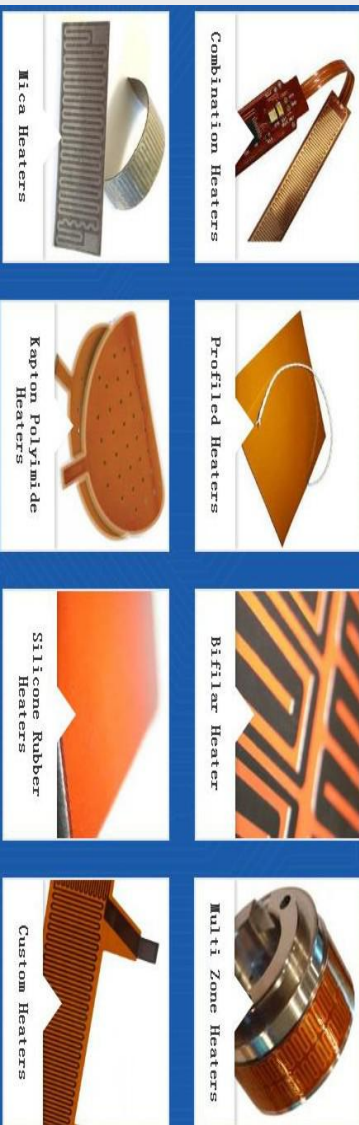


Silicone Rubber Heater

- Critical condition & resistant to most chemicals
- Etch element
- Max 230 deg C & power density up to 8W/cm²



TECHNICAL INFORMATION



Type of Element	Polyester Heater	Polyimide (Kapton) Heater	Silicone Rubber Heater
Technical Particulars	Description	Description	Description
Min Dielectric Strength	1000 VRMS	1000 VRMS	1000 VRMS
Flexibility Rating	High	Very High	Medium
Heater Min-Max Thickness Length	0.2-0.5 mm 750x750mm- Ink	0.18-0.25 mm 235x725mm- Etched	1.2-1.6 mm 750x2000mm- Wire wound
Insulation Film Thickness	0.05mm/0.1mm/0.188mm	0.025mm/0.05mm	0.5mm/0.8mm
Insulation Resistances	>100M ohms at DC500V	>100M ohms at DC500V	>100M ohms at DC500V
Operating Temperature	-50 ~ 90 deg C	-60 ~ 150 deg C	-60 ~ 230 deg C
Resistance Tolerance	As standard $\pm 10\%$ of nominal and down to $\pm 3\%$ available to special order		
Resistance Range	0.1 to 80 ohms/sq.cm		
Flammability Rating	UL94 HB	UL94 V-0	Horizontal UL94 HB Vertical UL94 V-0
Supply Voltage	1 to 240V AC/DC available		
Thermal Protection	On board thermal fuse, thermostat, thermocouple and thermistor are available		
Mfg. Process	Inking, Etching	Etching	Etching
Elements	Silver-Carbon Paste, Stainless 304, Nickel-Copper, Nickel-Zinc, Inconel 600		

CORE COMPETENCES

CUSTOMER SATISFACATION

QUALITY CONTROL

KEY MATERIALS

INTEGRATION

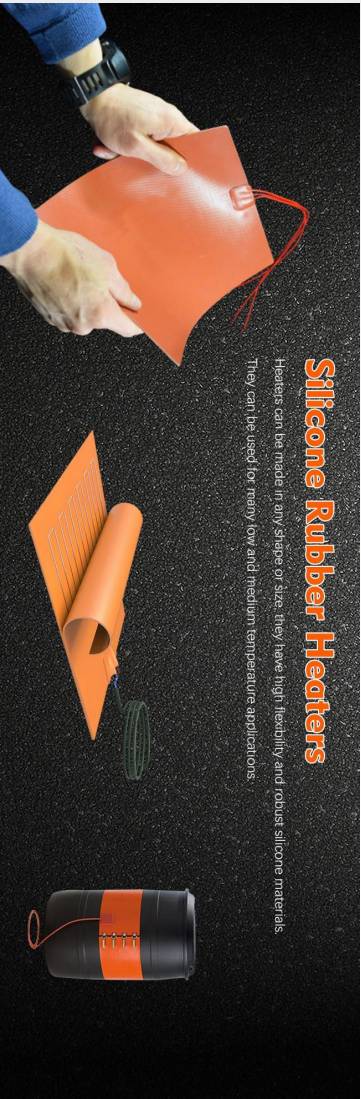
FILM
LAMINATION

ASSEMBLY
TECHNIQUE

CIRCUIT ON
SUBSTRATE

Silicone Rubber Heaters

Heaters can be made in any shape or size, they have high flexibility and robust silicone materials. They can be used for many low and medium temperature applications.



FROM IDEA TO RELIABLE SOLUTION

There's a lot of engineering knowhow and experience packed into our flexible heaters. By transforming customer's request into manufacturing solution and efficient design tooling to optimize production capability.



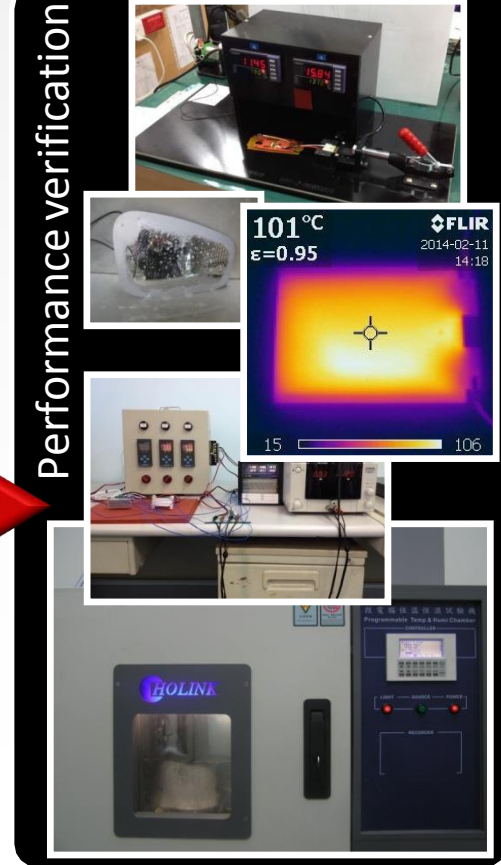
Circuit fabrication



Customized assembly



Performance verification



CONTROL PLAN

Kapton Polyimide Heaters

Heaters have a fast and efficient heat transfer, low thermal mass, and excellent resistance to chemicals, weather and radiation.

Process Number	Process or Operation Description	Item No.	Characteristic of Product/Process	Machine or Tools of Mfg	Specification or Characteristic	Evaluation or Measurement	Sample Size	Sample Frequency	Control Method	Reaction Plan
1	Part inspection	1-1	Heating element	-	CuNi44, 0.025 mm thick	Verify report	-	Each lot	IQC report	Return & change
		1-2	Thermal fuse	-	Tamura, N3F, Tf=115 deg C	Verify report	-	Each lot	IQC report	Return & change
		1-3	Adhesive	-	3M 467	Verify report	-	Each lot	IQC report	Return & change
		1-4	PI film	-	Taiflex, FHK1025	Verify report	-	Each lot	IQC report	Return & change
2	Heating element assy	2-1	Circuit etching	Etching machine	23~25Ω	Milliohm meter	10%	Ongoing	Mfg ctrl sheet	Scrap & sorting
		2-2	PI bonding	Bonding machine	No bubble and detached area	Visual inspection	100%	Ongoing	Mfg ctrl sheet	Scrap
3	Heating pad	3-1	PSA backside adhering	Rolling machine	No bubble and detached area	Visual inspection	100%	Ongoing	Mfg ctrl sheet	Rework
		3-2	Fuse bending	Fuse bending machine	Do not bend fuse lead inside	Milliohm meter	100%	Ongoing	Mfg ctrl sheet	Scrap
		3-3	Fuse soldering	Solder machine	Do not use excess or lack of solder	Thermometer & visual inspection	100%	Ongoing	Mfg ctrl sheet	Rework & change fuse
		3-4	UV coating	UV machine	Well encapsulated on fuse & solders	Visual inspection	100%	Ongoing	Mfg ctrl sheet	Rework
		3-5	Die cutting	Cutting machine	46.1x31.9 (+/-0.5 mm)	Smart scope & caliper	3 pcs	Each lot	Mfg ctrl sheet	Scrap & sorting
4	Functional check	4-1	Resistance test	-	23~25Ω	Milliohm meter	100%	Each lot	Mfg ctrl sheet	Scrap
5	Outgoing package	5-1	Packing, labeling & counting	Packing station	200 pcs per tray pack	Visual inspection	100%	Each lot	Packing guider	Rework
6	Outgoing QC sampling	6-1	Inspection	Caliper, ohm meter & voltage tester	Dims, outlook, resistance, voltage & package	Heating pad drawing	Dims & volt: AQL 0.65/S2 Outlook chk: AQL 0.15/S2 Resistance: AQL 1.0/L2	Each lot	FQC guider	Scrap & sorting

DESIGN GUIDELINE



- ▶ Process needs to be maintained at fix temperature for analysis accuracy
- ▶ Device needs to be heated in subzero temperature to work properly



- ▶ Possible heater size and heat transfer model
- ▶ Check system output capacity enough for heater working properly
- ▶ How to control heater ON/OFF? Any backup solution if control failure?



- ▶ Fullchance provide samples to simulate possible wattage consumption by voltage tuning
- ▶ Determine solution requirements and refine them with inputs from us who
- ▶ Generate a drawing to finalize electrical, mechanical and temperature control spec

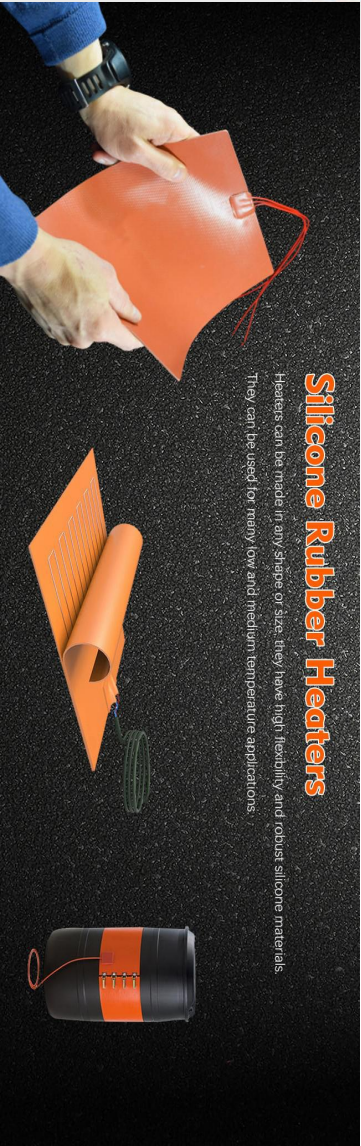


- ▶ Validate prototypes from experiments and verify expectations of chosen solution
- ▶ Determine if design, quality and function of product is enhanced by Fullchance
- ▶ solution Finalize all results to Fullchance



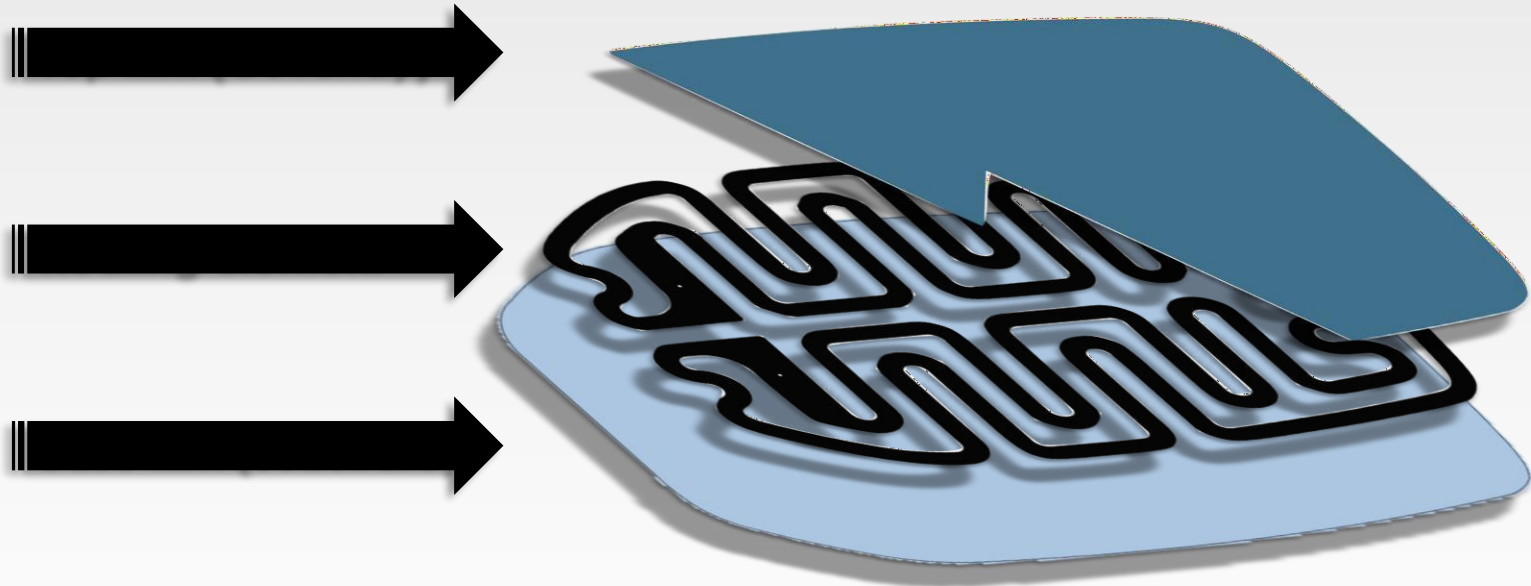
- ▶
- ▶

BUILD OF HEATER



Silicone Rubber Heaters

Heaters can be made in any shape or size, they have high flexibility and robust silicone materials. They can be used for many low and medium temperature applications.



Select insulation material by temperature range or application environment



Define circuit material, such as resistive alloy, wire wound or ink print element



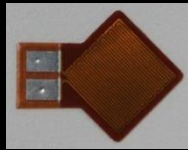
Design circuit layout to meet request electrical rating & needed function



Bond heaters into sandwich structure



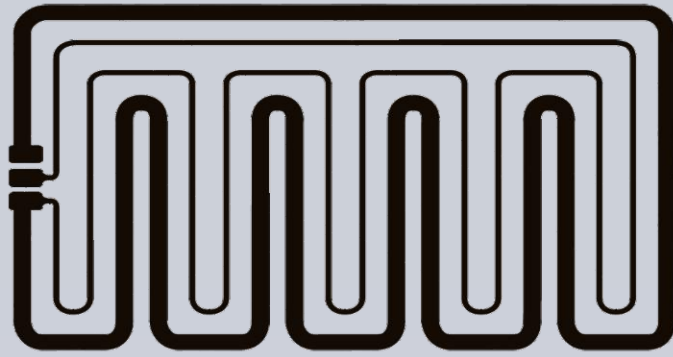
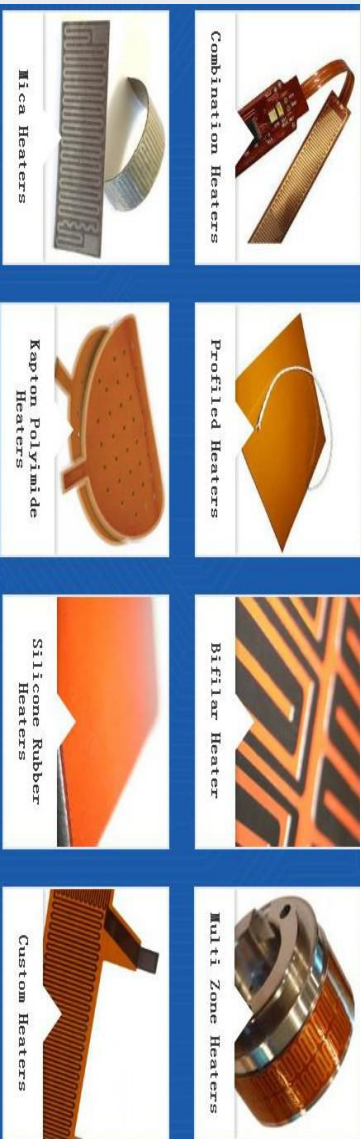
CUSTOM OPTIONS



- CUSTOMIZED ALL YOU NEED
- PRECISE SENSOR LOCATION
- EXCELLENT HEAT TRANSMISSION
- LIGHT WEIGHT & EASY ASSEMBLY

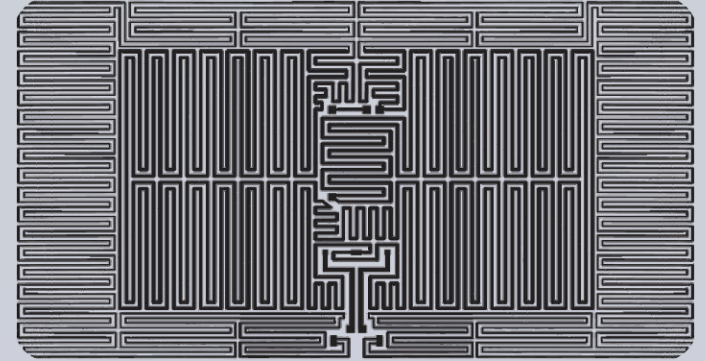


ADDED VALUE DESIGN



Multi Power Circuit

Circuit can be designed as dual wattage with independent zones. This allows more heat for the initial heat-up, but less heat to maintain the part at a given temperature. Sometimes different Input voltage is required for each element.



Multi Zone Circuit

Fullchance can design multiple sections of the flexible heater to have different watt densities. This can be done to compensate for edge loss on the outside perimeter of a part to supply more wattage to a given section of the part.

SOLID PARTNER FOR PRECISE HEATING

Kapton Polyimide Heaters

Heaters have a fast and efficient heat transfer, low thermal mass and excellent resistance to chemicals, weather and radiation.



Flexible Heating Solution Provider | Fullchance heater co.,limited | www.fullchance.com Office: 0755-27749405 | Fax: 0755-28145843 | Email: sales@fullchance.com
Address: Building B1, An'feng industrial zone .dalang street .longhua district shenzhen

Production workshop

