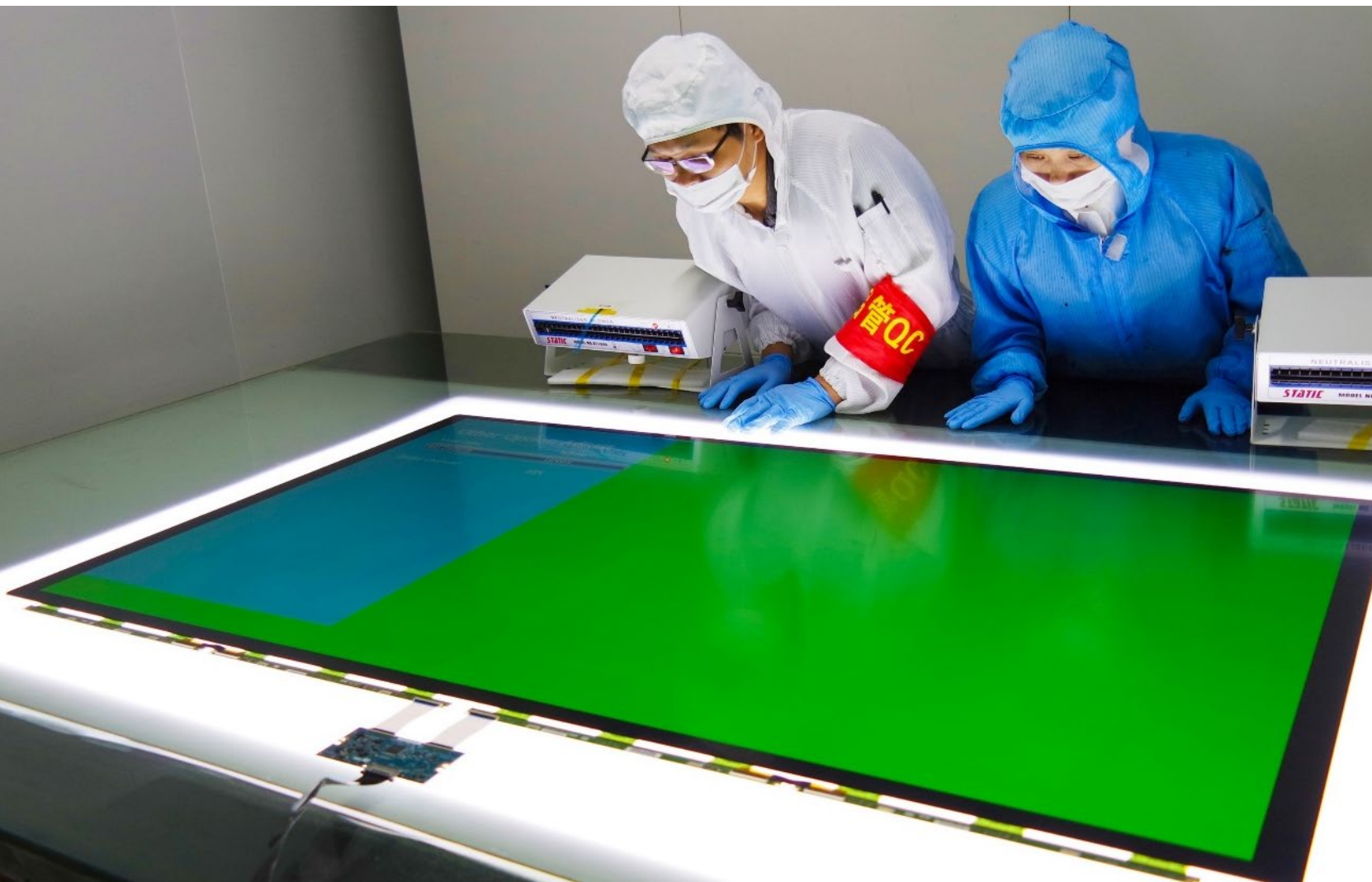


# Optical Bonding Solutions (detailed)

10.2023  
Pyramid group









# What is Optical Bonding?

"**Optical bonding** is the process of filling up the airgap between the cover glass / touch panel and LCD cell / module to improve the visual and material features and with that the quality and value of the bonded device."

**CLEAR  
BOND**

faytech  
Optical Bonding  
brand



Optically Bonded



Air Gap



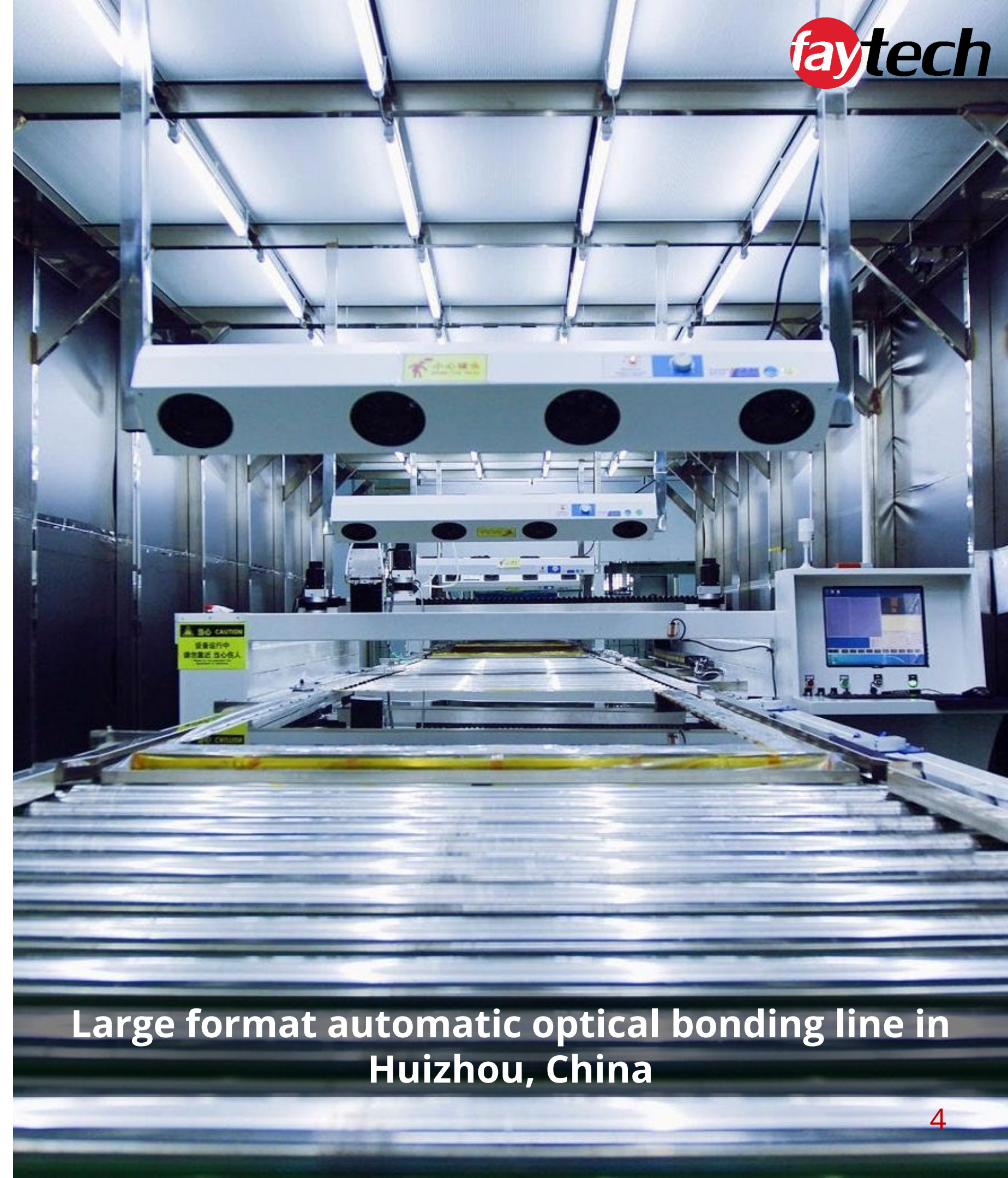
# Why faytech? I

faytech is the **#1** provider of large format optical bonding service globally and has its own glue formula of **CLEAR-BOND** – specifically designed for optical bonding.

## USPs

- Self-designed **automatic large format optical bonding line**, in own factory (#1 in the world!)\*
- Own optical bonding glue '**CLEAR-BOND**'
- Global team of **Optical Bonding specialist**

\*) To our knowledge

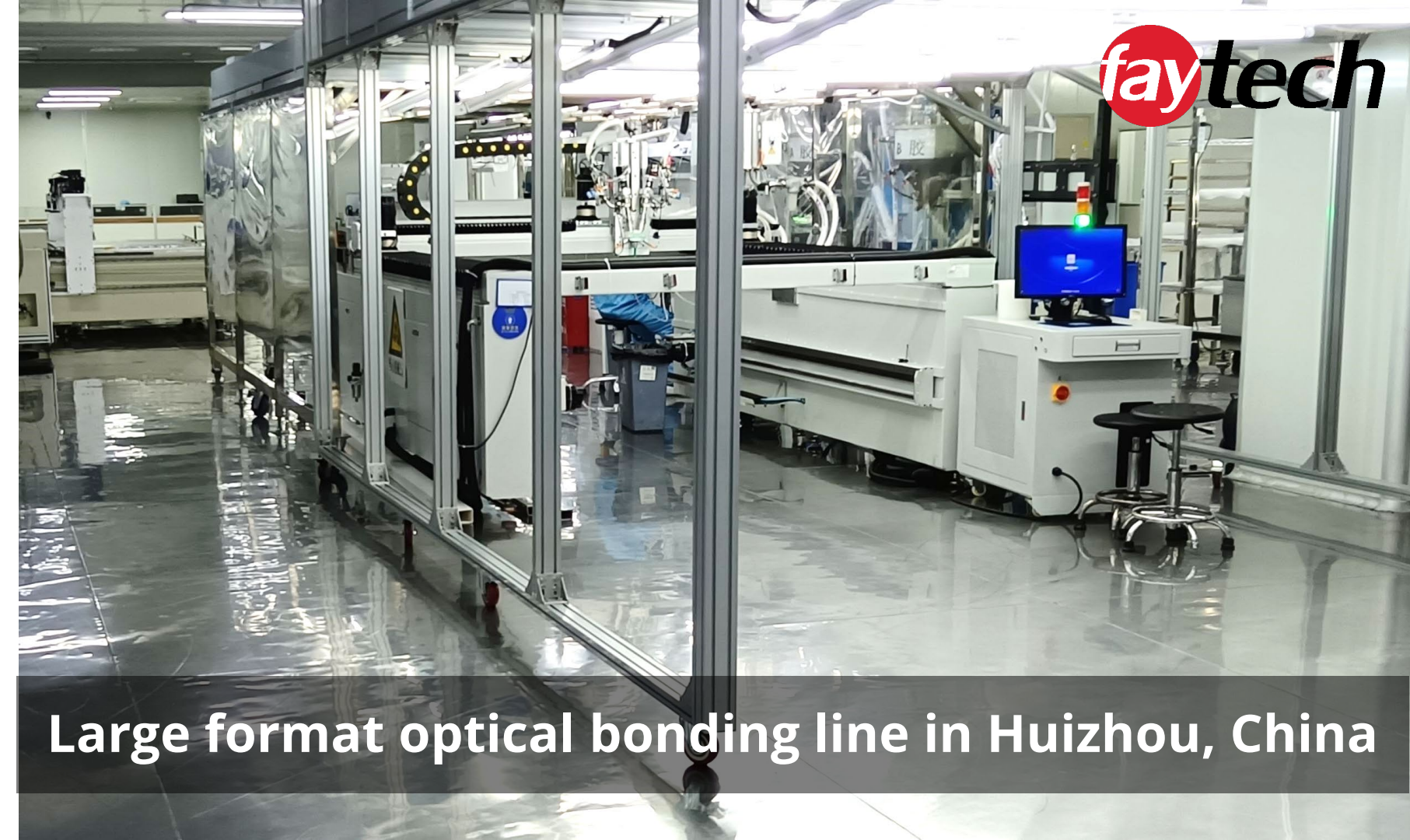


Large format automatic optical bonding line in Huizhou, China



# Why faytech? II

In January 2023 faytech moved into a completely new factory in **Huizhou, China**. Specifically selected for having the best optical bonding environment available.



Large format optical bonding line in Huizhou, China

## Features of new factory

- **Stainless steel floor** for best electrostatic discharge
- **Large-format automatic optical bonding** line (86"+)
- **Semi-automatic optical bonding** line (7-86")
- **Manual optical bonding / production** line (7-86")
- Self-designed **class 100,000 clean room**
- **>500 daily optical bonding output** of large formats daily



Clean room in Huizhou, China



# What is CLEAR-BOND? I

The silicone-glue formula used is the **faytech-X6-1688**, also known as '**CLEAR-BOND**'. This formula has been specifically created to provide the best optical bonding performance in the market.

This silicone-glue formula consists of two components, referred to in the documentations as component A and B.

**The silicone liquid AB-glue is especially suitable for:**

- Large size optical bonding
- Optical bonding to be used in extreme environments:
  - Temperature ranges of **-40°C to +85°C**
  - Tested altitudes of at least 6000 meters
  - Impact energy without damage increased by about 20%
  - Military usage standards



**Should you see this logo,  
you can be sure the device  
is optically bonded and  
meets the highest quality  
standards in the market!**

# What is CLEAR-BOND? II

**CLEAR-BOND** produces its glue in **Tongling, China**, under the highest quality standards. Every single batch is tested to meet the highest quality criteria, which guarantee the flawless optical bonding mass production.

With more than 100 ton of yearly glue production, **CLEAR-BOND** is the leading supplier of glue for large format optical bonding.

**CLEAR-BOND** focuses on all bonding related services & projects and is a separate business unit and registered trademark of faytech, the first company bringing a large format optical bonding process into mass production.

## Mechanical Test

Test Item	Measuring Method	Test Condition	Result
Vibration Test	TDS-US106	1 hour	No bubble or delamination
Shock Test	TDS-US106	40g, 11ms pulse ±X, ±Y, ±Z axes	
Altitude	15,000 feet above sea level, climb / descent change rate 10m/s decompression withing 15 seconds		
Pull Test	GB/T 1040.2-2006	Force until separation	0.278 N/mm <sup>2</sup>
Lap Shear Test	GB/T 1040.2-2006	Force until separation	0.205 N/mm <sup>2</sup>

Test Item	Measuring Method
High Temperature	MIL-STD-810-2003
Low Temperature	MIL-STD-810-2003
Constant Temperature & Humidity	IEC 60068-2-78-2012
Thermal Cycle	IEC 60068-2-14-2009
UV Resistance	G154-06
Mechanical Shock	TDS-US106
Vibration	TDS-US106

# What is CLEAR BOND? III

Besides the '**CLEAR-BOND**' formula **faytech-X6-1688**. There are 2 other standardized formulas in the market, allowing the client to pick the best bonding glue to suit their needs.

- '**faytech-XA-1688**' – Softer formula, allowing more flexibility
- '**faytech-T50-1688**' – Specifically created for low and high temperature applications of below -50 °C and +110 °C

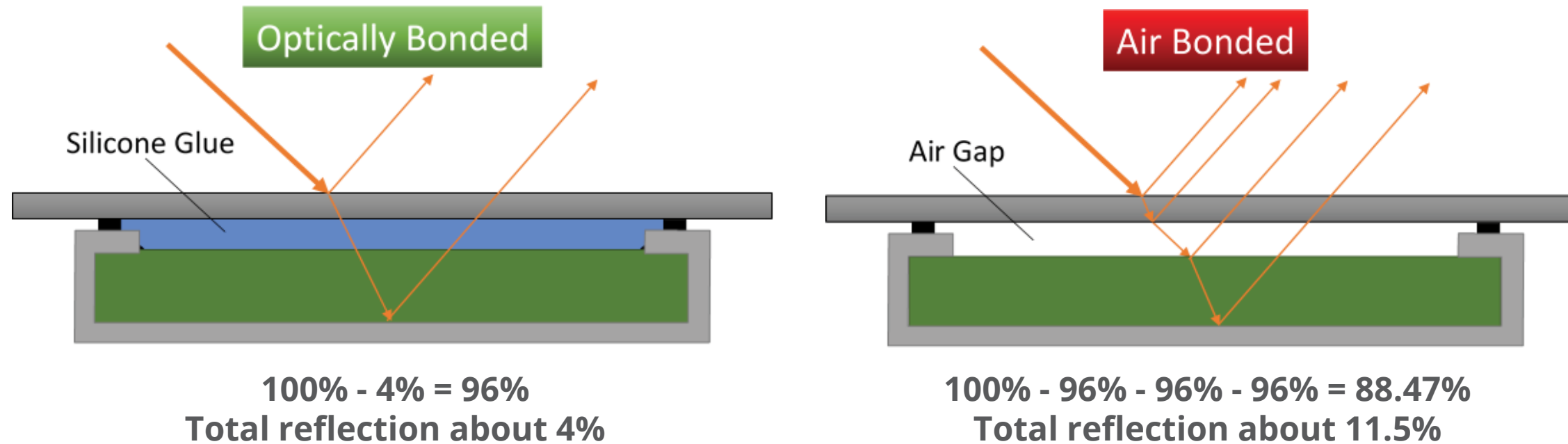
Additionally, faytech would be able to adapt the materials properties, such as hardness, viscosity, curing speed, etc., upon request. This is done due to possessing their own silicone formulations and own in-house production.

faytech-X6-1688 'CLEAR-BOND'	faytech-XA-1688	faytech-T50-1688
Standard formula – 1:1 ratio (component A and B). Specifically created to provide the best optical bonding performance in the market. Adjustable to a certain extend by adjusting the mixing ratio.	Softer formula, allowing more flexibility.	Specifically created for low and high temperature applications of below -50 °C. to 110°C

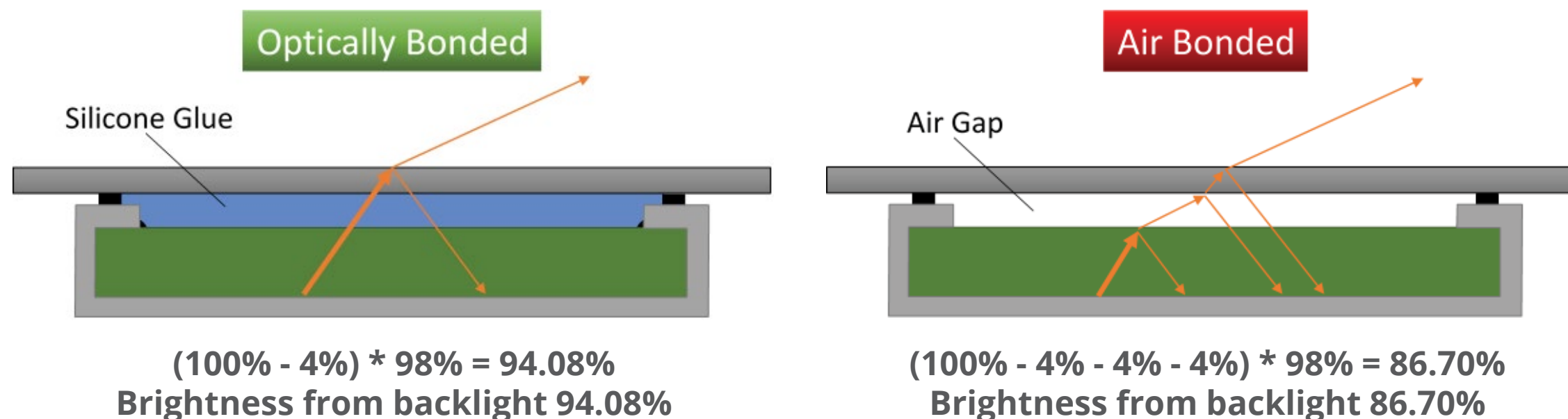


# Optical Bonding Advantages I

Optical bonding **reduce reflections** by about 65%



Optical bonding **increases the brightness** by about 10%

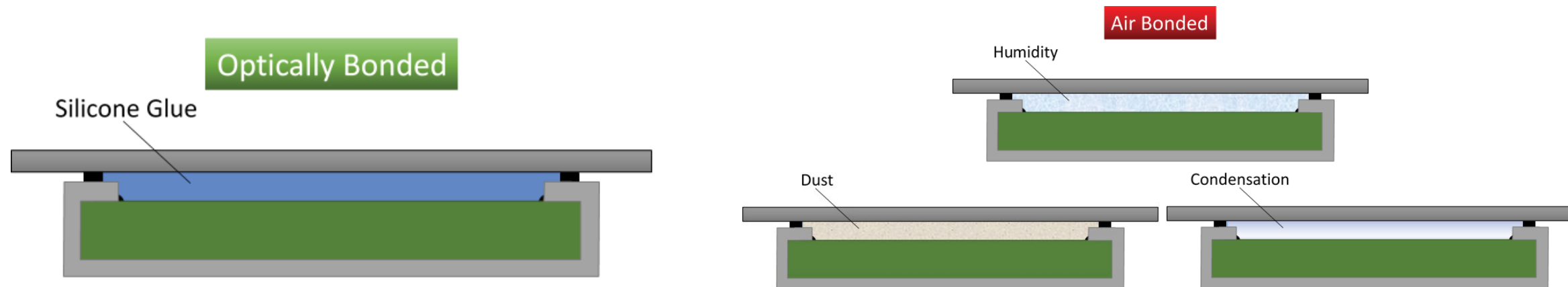


43" optically bonded A-frame digital signage kiosk

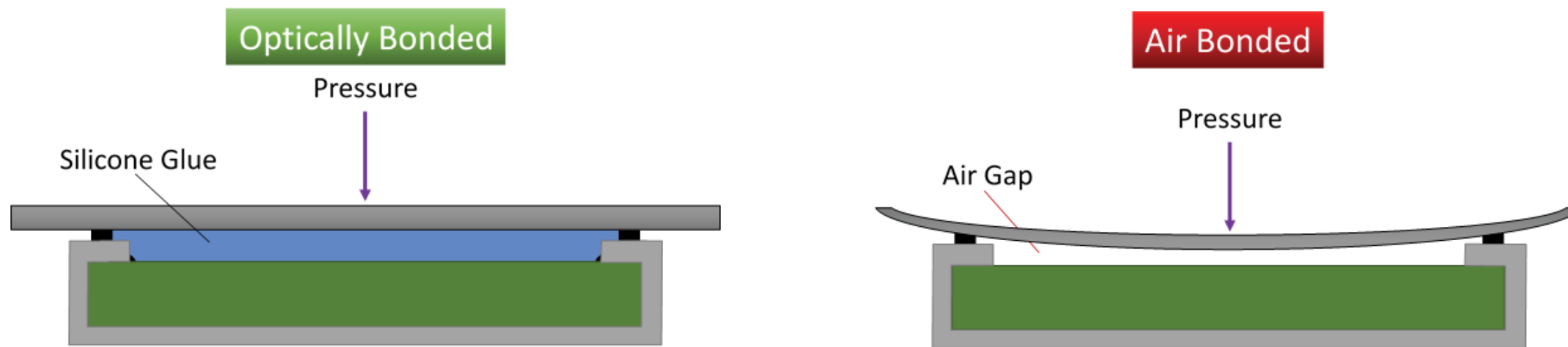


# Optical Bonding Advantages II

No humidity or dust can enter between the touch panel and LCD cell



Additional **resistance towards environmental forces** onto the glass



The impact energy without damage is increased by about 20%

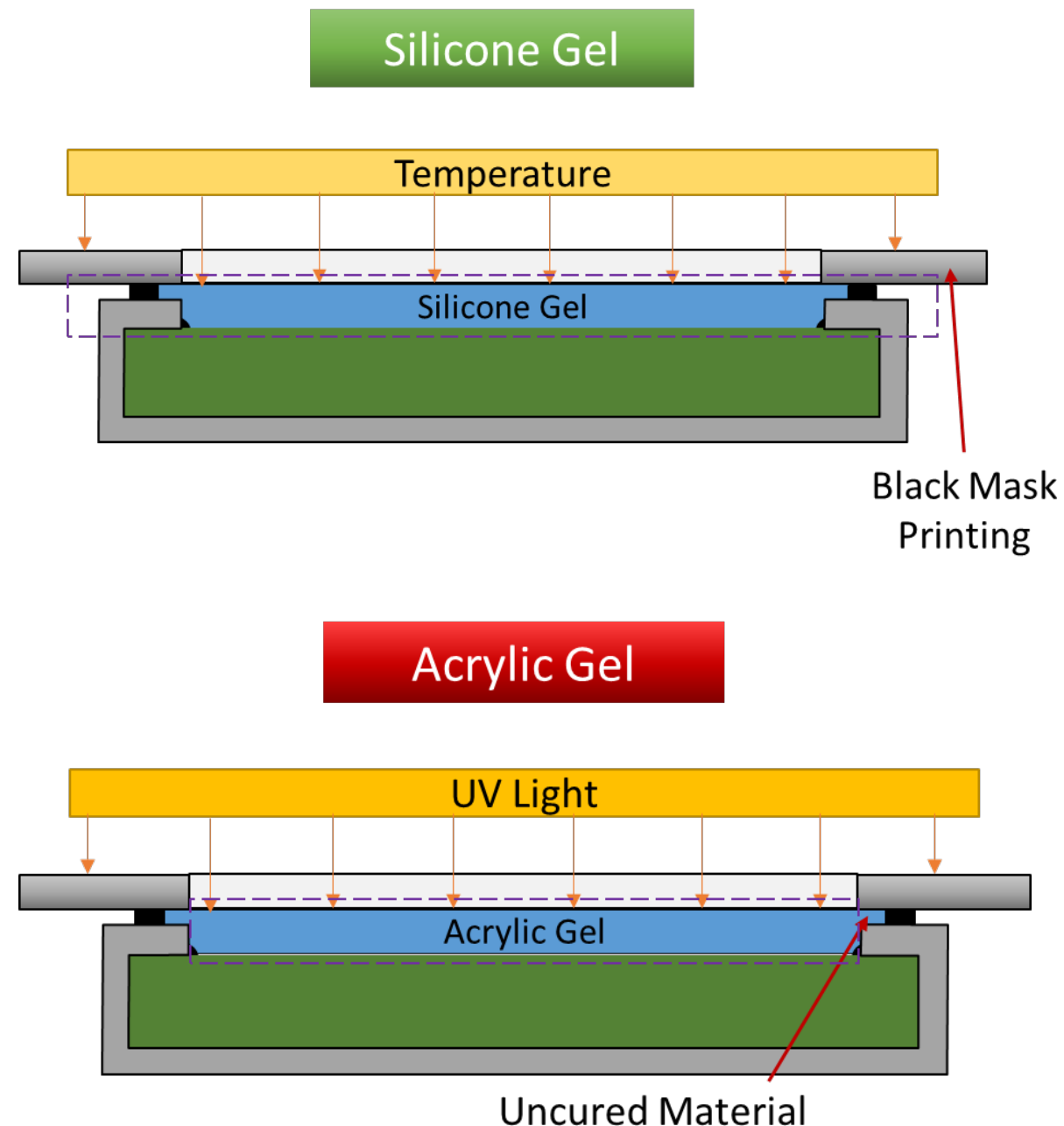


55" optically bonded high brightness outdoor kiosk



# Silicone Gel Advantages

## Over Acrylic Gel



**Silicone cures automatically** when the components get mixed and spread the cure to non-active material. However, acrylic only cures the areas exposed to the UV light

During curing, **the shrinkage rate of silicone is below 0.1%**, whereas acrylic is about 4%

**With silicone the hardness is flexible and depends on the mixture**, while acrylics have a predefined hardness

**Silicone barely yellows**, whereas acrylics does

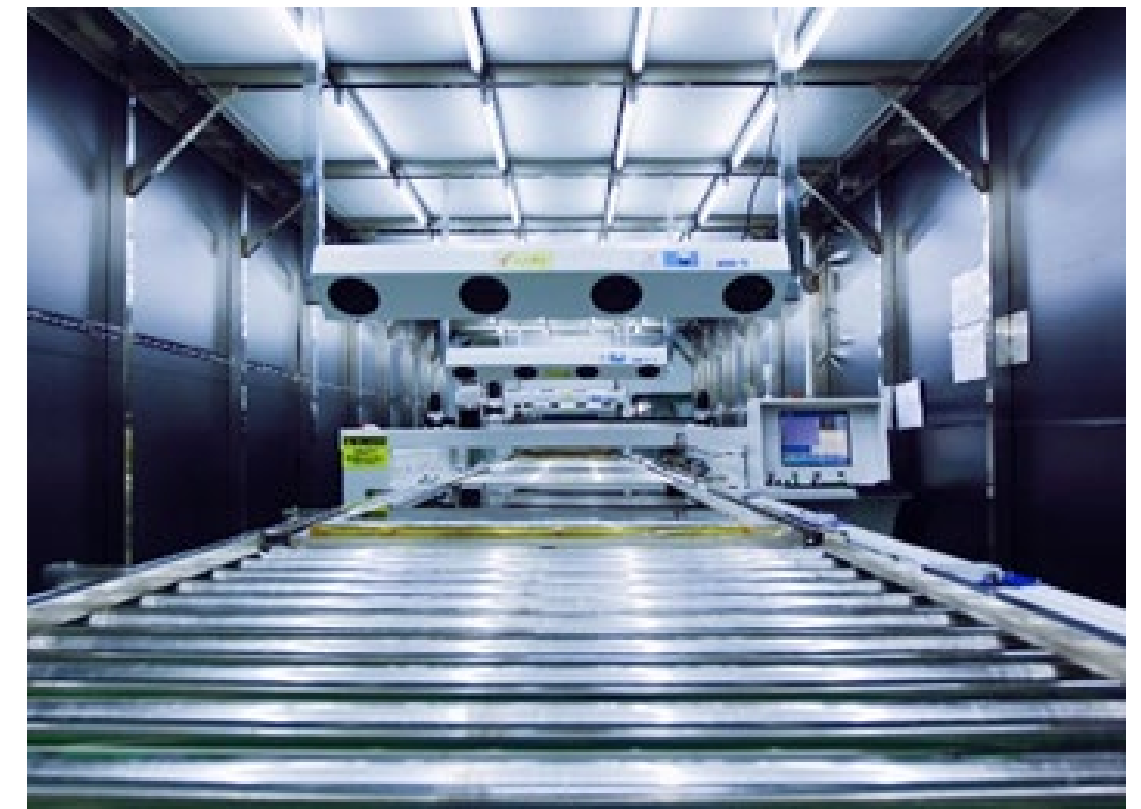
**Silicone is more stable over large temperature ranges**, whereas acrylics get very unstable



# CLEAR-BOND Machinery I

**CLEAR-BOND** completely developed own bonding machinery and unique processes for large format bonding. These processes offer an outstanding production yield of >97%.

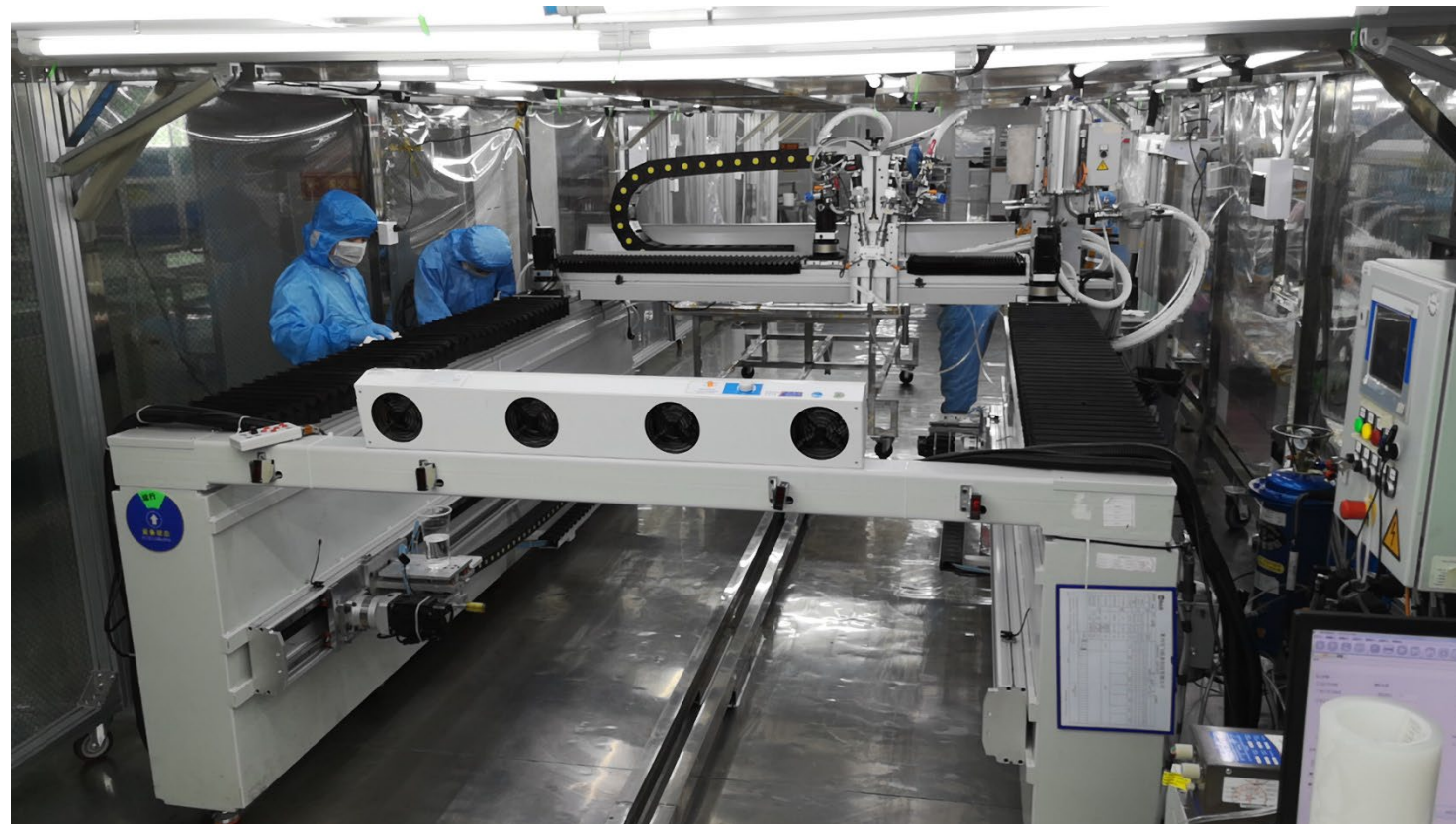
A total of three different bonding processes are available, those for small, middle and large formats. Besides this, other bonding processes include those for display modules and cells.





# CLEAR-BOND Machinery II

**CLEAR-BOND** provides training, machinery and glue to world leading (touch) device and whiteboard manufacturers to support their in-house optical bonding production.



**CLEAR-BOND** provides a tailored solution of German dispensers & equipment, self-developed machineries and processes (patented) together with experienced project managers.



# CLEAR-BOND Glue Production

**CLEAR-BOND** is produced within the clean room using high quality containers and equipment.



Samples of all production lots are stored and secured over long periods of time while being tested on a regular basis for stability and conformity (temperature, consistency, pull & shear test, haze, etc.).





# Technical Data faytech-X6-1688 I

Cured Mixture of components - **faytech-X6-1688** - 'CLEAR-BOND'

Typical Characteristics	Measuring Method	Value
Color		Clear
Yellowing Index	ASTM E313-15e1	<1
Density at 23 °C	ISO 2781	0.97 g/cm <sup>3</sup>
Needle Penetration (50 g)	GB/T269	220 ±20 mm/10
Relative Permittivity	IEC 60250	2.7
Dielectric Strength	GB/T 1693-2006	400 µm/m°C
Volume resistivity	GB/T 1692-92	10 <sup>15</sup> Ω cm
Surface resistivity	IEC 93	10 <sup>14</sup> Ω
Refractive index	n <sub>D</sub> <sup>25</sup>	1.404
Flame retardancy		94 HB
Transmission (path length 1.5 mm)		> 98.9 %
Thermal conductivity	GB/T 10297-1998	0.20 W/m K
Coefficient of linear thermal expansion	ISO 11359 - 1- 2014	300 x 10 <sup>-6</sup> m/m K
Temperature Range		-40 to 85 °C
Shrinkage		< 0.1 %



# Technical Data faytech-X6-1688 II

Uncured components A and B - **faytech-X6-1688** - 'CLEAR-BOND'

<i>Typical Characteristics</i>	<i>Measuring Method</i>	<i>Value</i>
Color		Clear
Viscosity at 23 °C	ISO 3219	Typ. 950 mPas
Density at 23 °C	ISO 2781	0.97 g/cm <sup>3</sup>
Haze	ASTM D 1003	< 0.3 %

Catalyzed Mixture of components A + B - **faytech-X6-1688** - 'CLEAR-BOND'

<i>Typical Characteristics</i>	<i>Measuring Method</i>	<i>Value</i>
Platinum-catalyst in component		B
Mixing ratio	A : B	1 : 1
Viscosity of mixture	ISO 3219	950 mPas
Pot life at 23 °C		150 min
Curing method		Hydrosilylation



# Technical Data faytech-T50-1688 I

Cured Mixture of components - **faytech-T50-1688**

Typical Characteristics	Measuring Method	Value
Color		Clear
Density at 23 °C	ISO 2781	0.99 g/cm <sup>3</sup>
Penetration (Needle)	GB/T269	240 ±15 mm/10
Relative Permittivity	IEC 60250	2.7
CTE	GB/T 20673-2006	400 µm/m°C
Dielectric Strength (25°C)	GB/T 1693-2007	20 kV/mm
Dielectric Constant (25°C)	GB/T 1693-2007	<3.0 (1MHz)
Refractive index	n <sub>D</sub> <sup>25</sup>	1.404
Transmission (path length 1.5 mm)	UV-VIS	> 99 %
Thermal conductivity	GB/T 10297-1998	0.20 W/m K
Temperature Range		-60 to 140 °C
Shrinkage		< 0.1 %



# Technical Data faytech-T50-1688 II

Uncured components A and B - **faytech-T50-1688**

<i>Typical Characteristics</i>	<i>Measuring Method</i>	<i>Part A</i>	<i>Part B</i>
Color		Clear	Clear
Viscosity at 23 °C	GB/T 10247-2008	typ. 500 mPas	typ. 650 mPas
Density at 23 °C	ISO 2781	0.99 g/cm <sup>3</sup>	0.99 g/cm <sup>3</sup>
Haze	ISO7027-1999	< 0.2 %	< 0.3 %

Catalyzed Mixture of components A + B - **faytech-T50-1688**

<i>Typical Characteristics</i>	<i>Measuring Method</i>	<i>Value</i>
Mixing ratio	A : B	1 : 1
Pot life at 23 °C		> 10h



# Cartridge / Glue Products II

Two component manual dispensing gun



Static Mixing Tube (consumable)



## Opening the cartridge

- Remove nut
- Remove protection insert

Nut



Protection insert



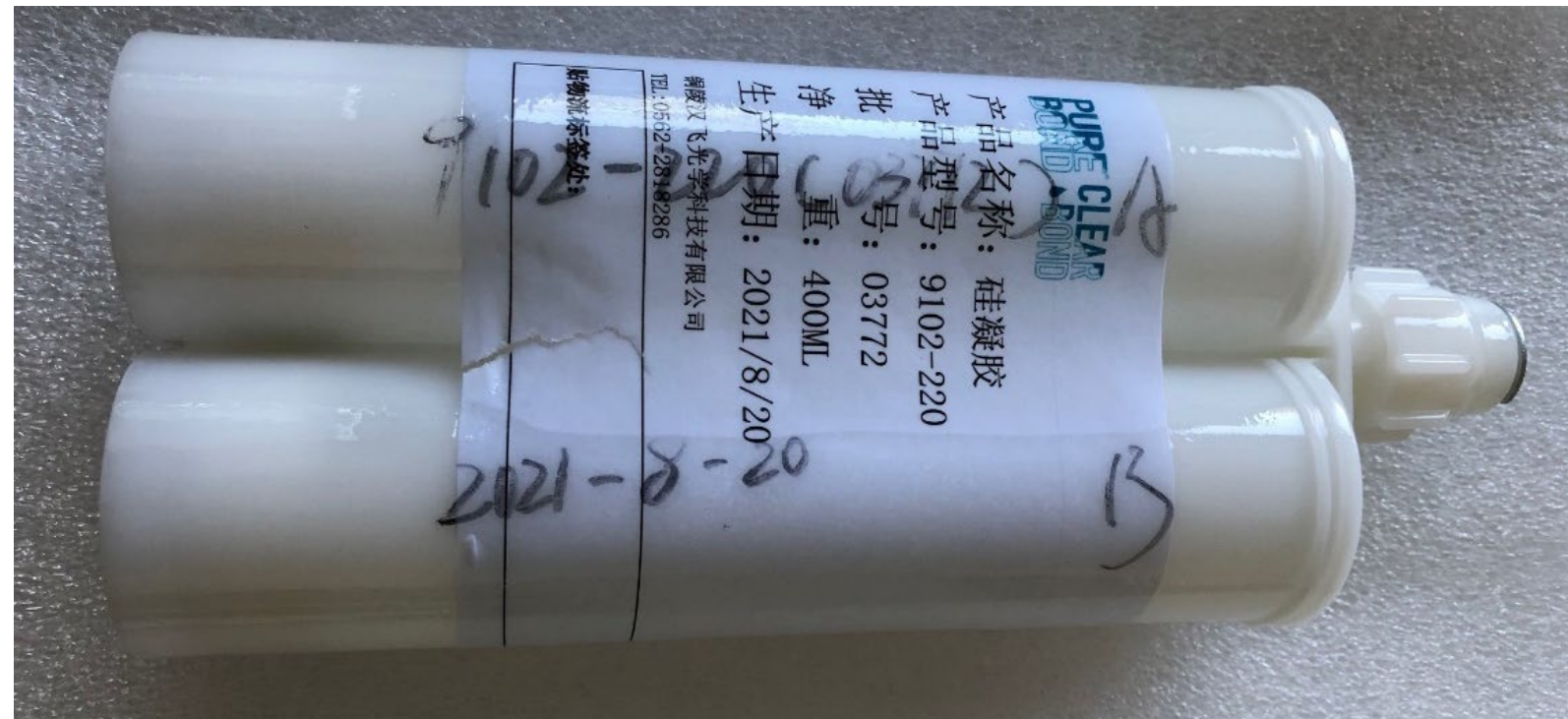


# Cartridge / Glue Products I

Besides the standard Optical Bonding services and products, we also offer **large quantities A + B containers** and **do-it-yourself cartridges**.

## Available in:

- Container / barrel form for users that are buying in large quantities
- 2-Component cartridge forms which are available in 2 sizes - 50ml and 400ml

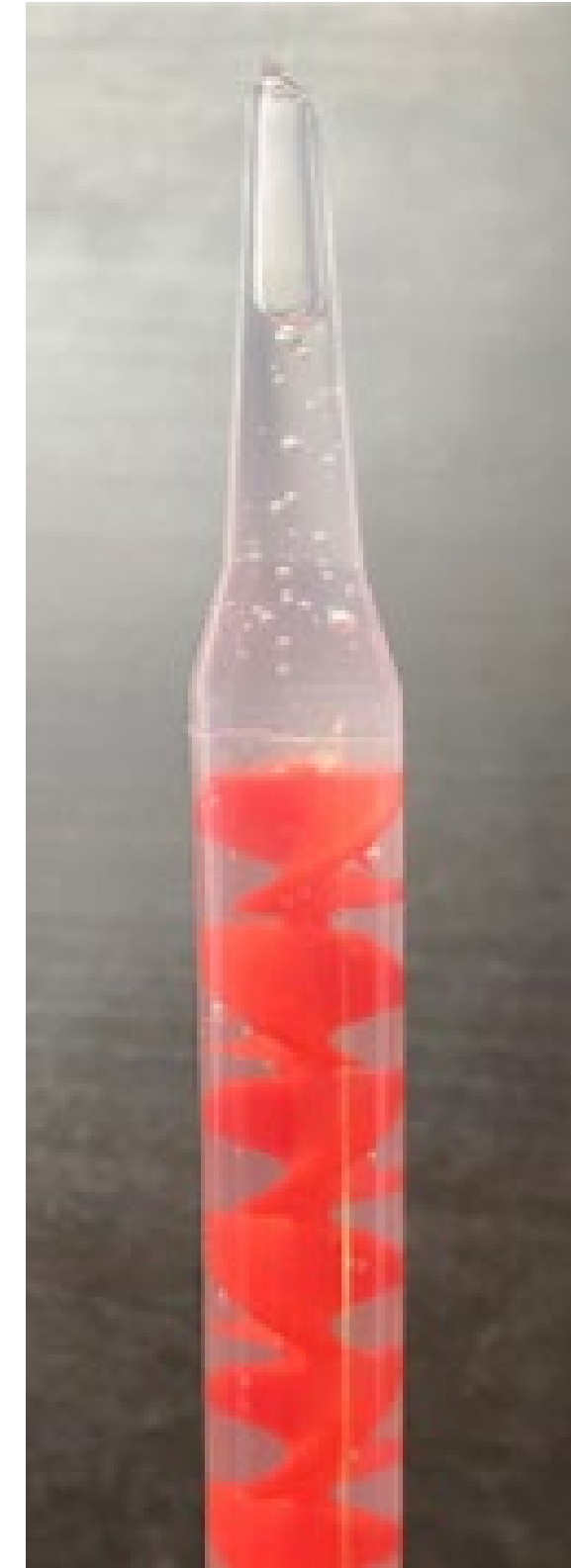




# Cartridge / Glue Products III

## Attaching the mixing tube

- Screw the mixing tube onto the cartridge
- “Degassing” before actual bonding process, by dispensing a few ml in upright position till there’s no bubbles visible
- Before usage, the cartridge should rest for about 1 hour in an upright position.





# Limitations of cartridges

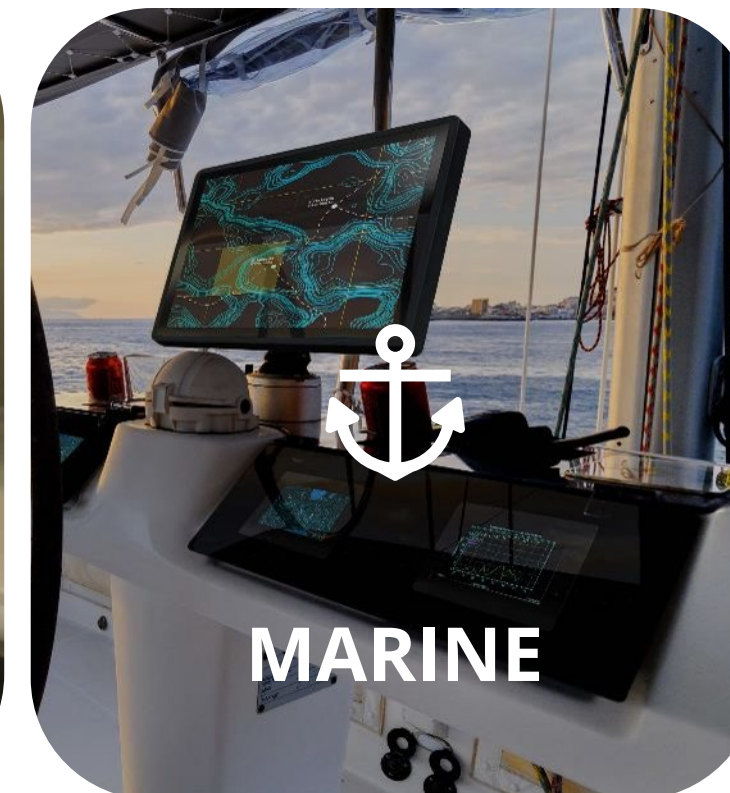
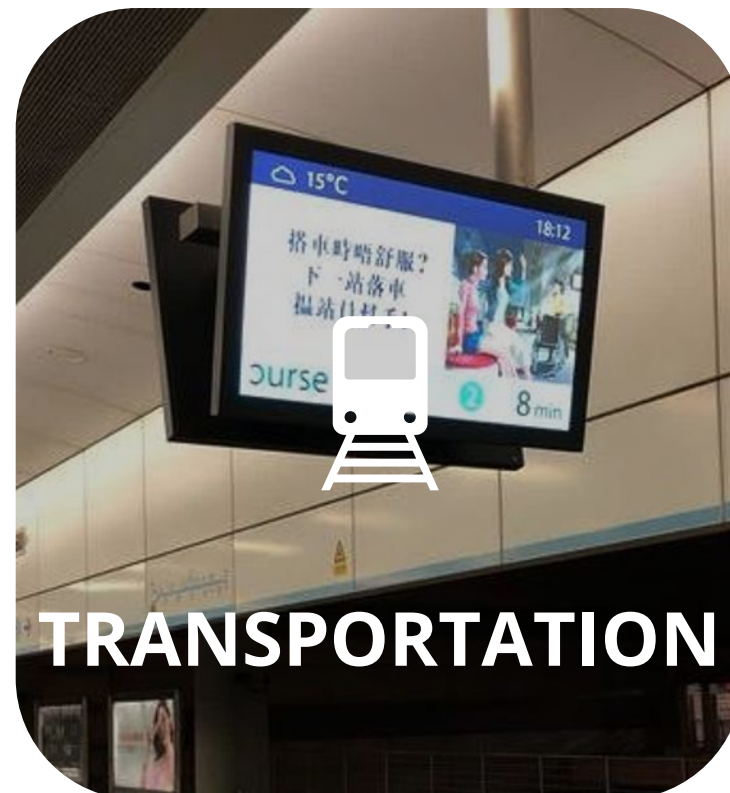
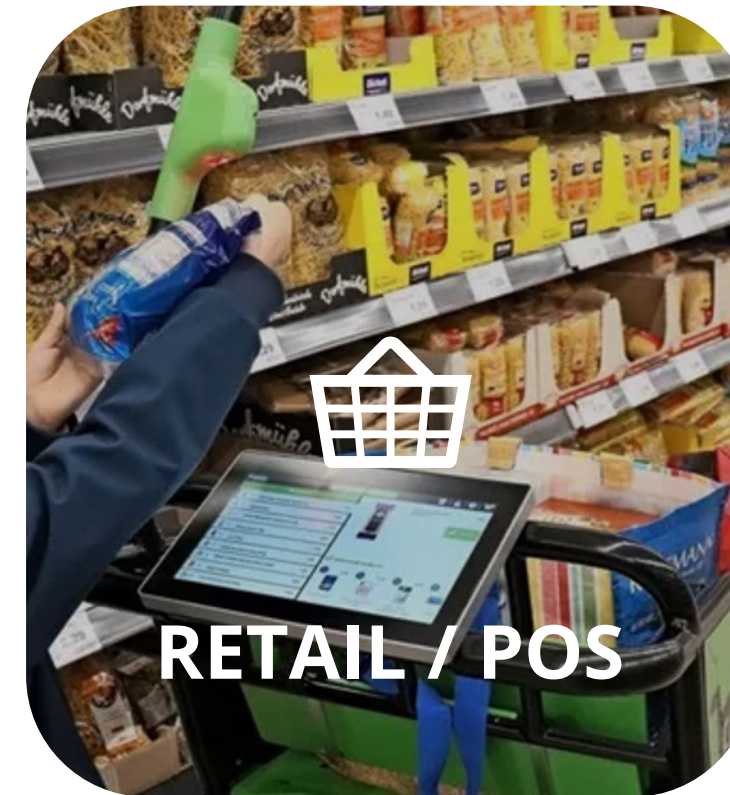
The silicone hardness is adjustable by varying the mixing ration between **component A and B**. The two-component cartridge does not offer this option. The standard mixing ratio / hardness must be used (mixing ratio 1:1).

For most applications, this mixing ratio of 1:1 is applicable.

For custom desired mixing ratios, **faytech** and **CLEAR-BOND** are always at your disposal, contact us directly for more details on that.



# Target Segments





# Renowned Global Customers





# About faytech

Since 2010, faytech has been a leading manufacturer of touch PCs, producing all touch devices in its ISO 9001:2015 certified production lines at its factory in China. With a strong commitment to German quality standards and rigorous guidelines, faytech ensures the highest level of precision and reliability in its products. We hold ISO 14001 and IATF 16949 certifications, further demonstrating our dedication to environmental sustainability and industry compliance.

In 2022, we joined the Pyramid AG group, marking a significant milestone in our growth and innovation journey within the touch devices market. This strategic partnership allows faytech to focus on leveraging its competitive advantage, fostering continued advancements, and delivering cutting-edge solutions to meet evolving customer needs.



**Huizhou  
CHINA**  
6,500 m<sup>2</sup>

Optical bonding, electronics assembly, R&D, sales and project business. 20k+ optical bonding and touch panels per month.



**Suining  
CHINA**  
12,000 m<sup>2</sup>

Optical bonding, electronics assembly and manufacturing of touch devices. 10k+ touchscreen devices per month.



**Suining  
CHINA**  
6,450 m<sup>2</sup>

Metal production and case manufacturing. 40k+ sets of cases per month.



**Ichtershausen  
GERMANY**  
3,800 m<sup>2</sup>

Kiosk production, design, R&D, and service center.

# About Pyramid Computer

**Pyramid** is a leading developer and manufacturer of IT solutions for medium and large enterprises. With their 3 brands they offer a comprehensive suite of solutions, supplying numerous industries and markets, including entire digitalization flows with industrial PCs and servers, touch screen and kiosk technologies from a single source.

## PYRAMID

**AKHET®**

Industrial PCs & Servers

**faytech**

Touch-Screen Monitors & PCs

**POLYTOUCH®**

Interactive Kiosk Solutions

**2022 REBRANDING in  
PYRAMID AG**



PYRAMID GmbH (1985)  
FAYTECH AG (2010)

**2004 PYRAMID AG**



(mic AG) M3BK • ETR  
Listed since 2004 (SCALE)

**600+ EMPLOYEES**



**WORLDWIDE**

**3 CONTINENTS**



We are active on  
three continents

**\$100 million in 2022**



PYRAMID GmbH  
and FAYTECH AG

 **Pyramid Computer GmbH**  
Freiburg, Germany

 **Pyramid Computer GmbH**  
Amt Wachsenburg, Germany

 **Pyramid Computer GmbH**  
Witzenhausen, Germany

 **faytech Tech Co., Ltd.**  
Shenzhen, China

 **Sichuan faytech Tech. Co.**  
Suining, China

 **Huizhou faytech Tech Co., Ltd**  
Huizhou, China

 **faytech Inc.**  
Tokyo, Japan

 **Deutsche faytech Korea**  
Seongnam-si, South Korea

 **faytech Private Limited**  
New Delhi, India

**Represented by**

 **Pyramid North America Inc.**  
Herndon, USA

 **faytech US dba Connect Tronics LLC**  
New York, USA









TODAY

FRIDAY

SATURDAY

SUNDAY

MONDAY

38° 24°

24° 18°

28° 24°

32° 25°

8° 12°

freezing  
average 18%

windchill advisory

and snowflurries

at night 50%

up to 10" expected  
by 7pm

April 2020

May 2020

29	30	31	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
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Thank You



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**Fl. 2, Bldg. 8, Winlead Intelligent Park  
Shenzhen, China**

**E-Mail: [sales@faytech.com](mailto:sales@faytech.com)**

**Tel: +86 755 89580612**

Part of the Pyramid Group