Influence of Belt Furnaces on High-Temperature Brazing Processes

Hengli

TORREY HILLS TECHNOLOGIES

Contents

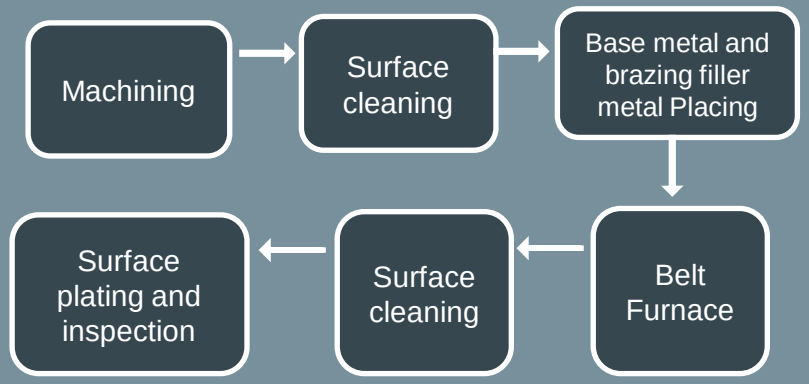
一 Introduction to the Continuous High-temperature Brazing Process

Introducing the Continuous High-temperature Brazing Process

Application areas:

High-temperature brazing products made out of stainless steel or copper such as: evaporator, auto engines, sealing device and aerospace shell brazing.

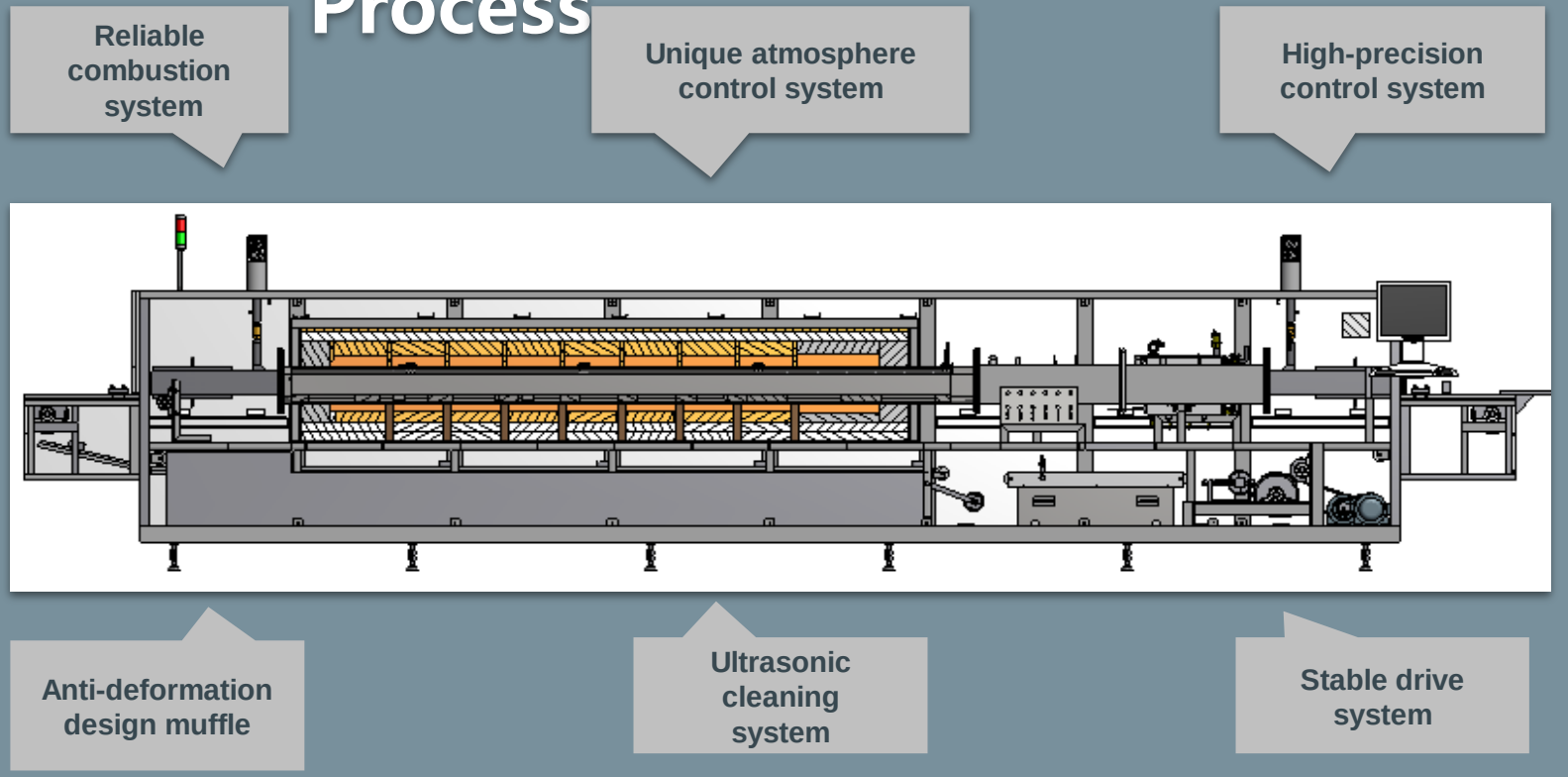
High Temperature Brazing Process Diagram:



Introducing the Continuous High-temperature Brazing Process

Features of Our Furnace:

Our specially designed atmosphere control system ensures that the reduced gasses flow uniformly in the furnace safely with pollution-free discharge. The high-precision temperature control technology greatly improves the temperature uniformity inside the furnace. The unique anti-deformation muffle design significantly extends the life-cycle of the muffle.



Model	Belt Width (mm)	Heat zone	Heated length(mm)	Peak Temperature(℃)	Height (mm)	Temperature uniformity (℃)	Atmo
HSA	100-400mm	8-10	300/330/450/600	1200	50-100mm	±1～2	N_2+H_2

二 Problems and Key Technologies in High Temperature Brazing

Problems and Key Technologies in High Temperature Brazing

dark color after brazing

Question 1: The product surface becomes dark due to oxidation

Main reason:
The dew point and oxygen content inside the furnace is bad so the product becomes oxidized.

Problems and Key Technologies in High Temperature Brazing

Low oxygen and low dew point technology

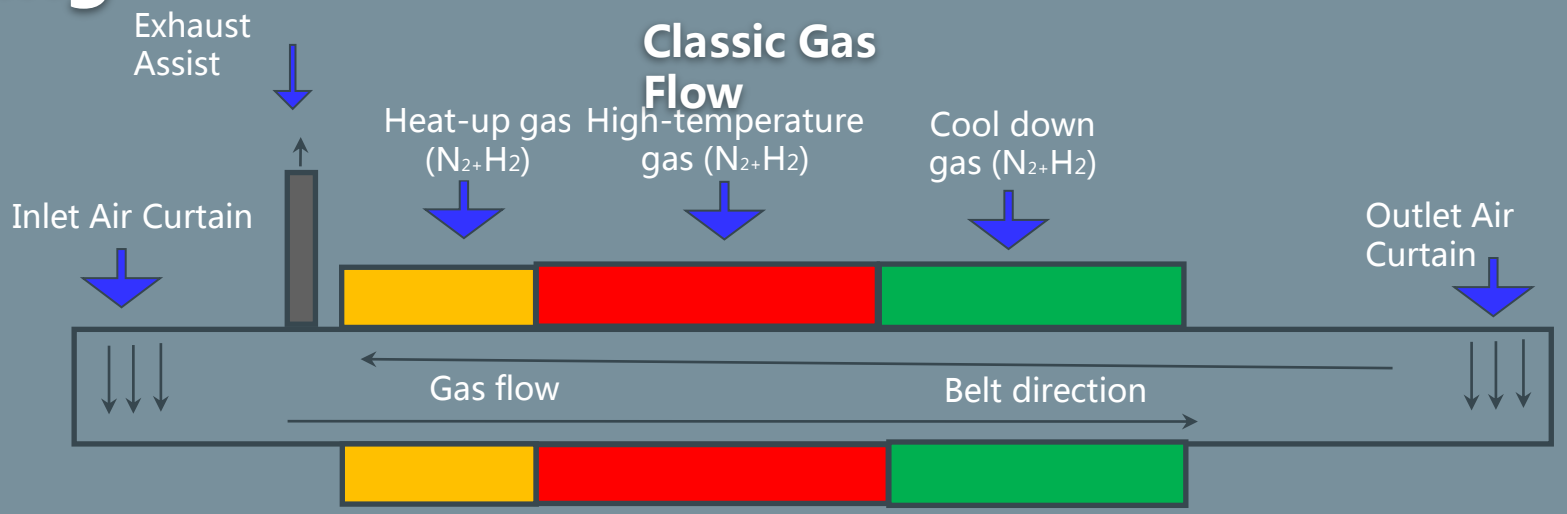
Gas sources

Purity of N2, H2 gas source needs to be at least 99.999%

If the purity of the source is low, please a add filter and drying system. It can remove water, oil and dust so the dew point can be reduced to -60C.

After filtration

Classic Gas Flow

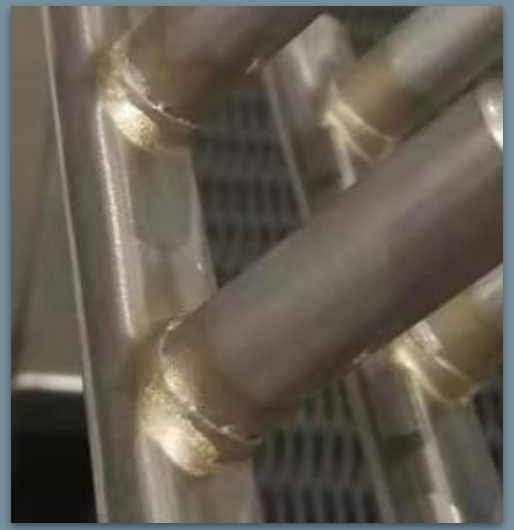


Streamlined inside, no dead end for gas, easy gas flow, Scientific gas inlet position, great gas exchange rate, low oxygen content

Controlled atmosphere, Oxygen < 10ppm, -60C Dew point

Problems and Key Technologies in High Temperature Brazing

Giant weld gap

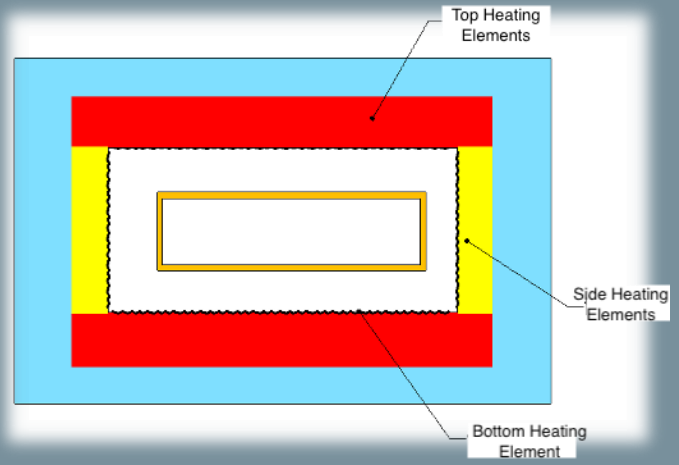


Grain coarsening

Question 2: Grain coarsening and giant weld gap

Problems and Key Technologies in High Temperature Brazing

Grain coarsening is a subject of uniform temperature distribution

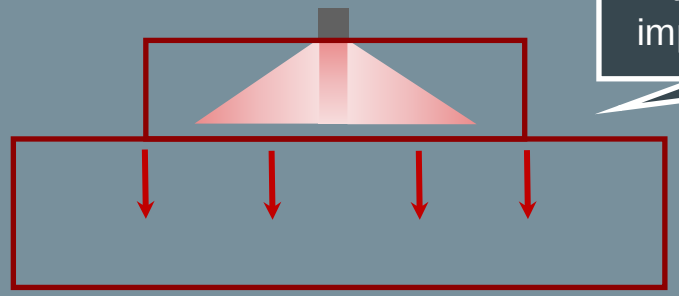


Improve the thermal layout, add auxiliary heating on the side

Controlled thermal layout, furnace temperature uniformity of ±1.5℃ with 400mm belt width

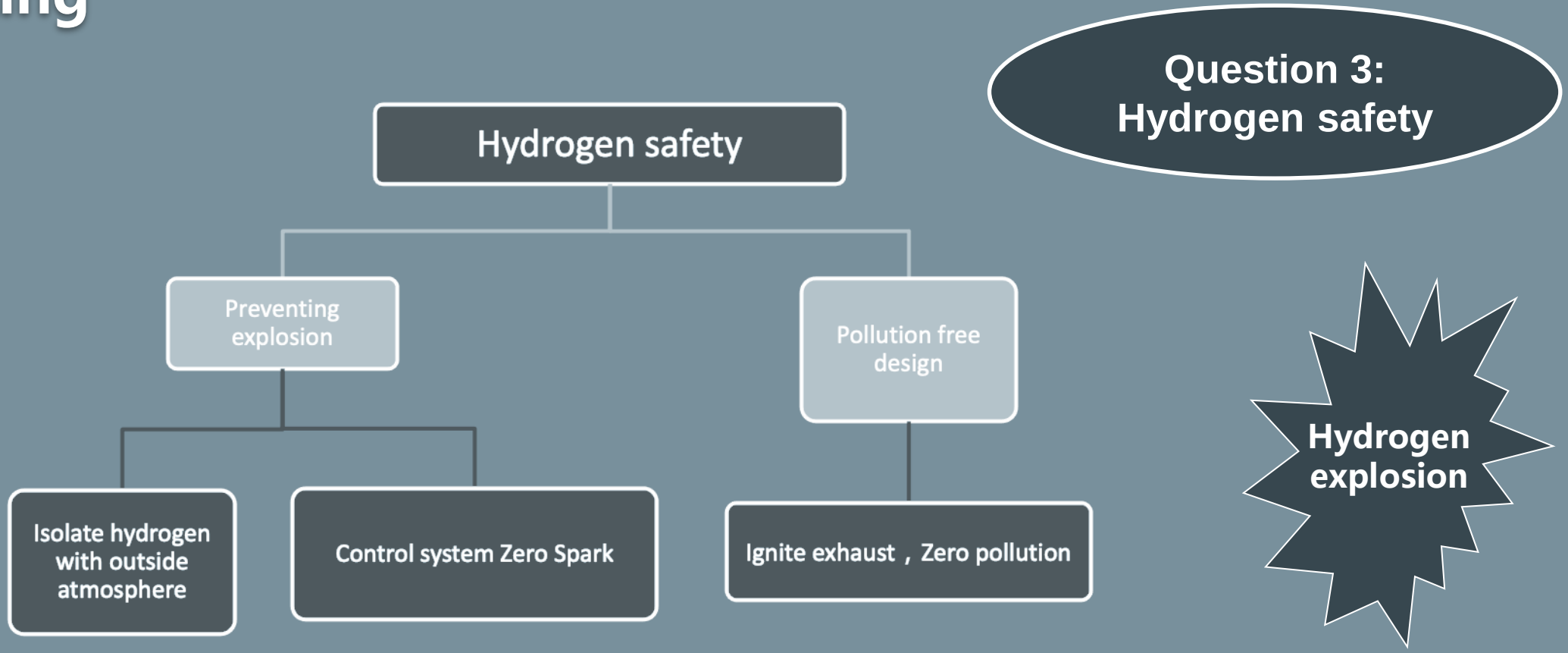
Poor weld gap is mainly caused by uneven reduced gas distribution. And not enough surface reduction will result in poor solder fluidity.

By improving the air intake method, reduced gases can enter the furnace fully and evenly; improving the surface reduction.



Special air box layout to form a uniform mixed atmosphere and improve filler metal mobility.

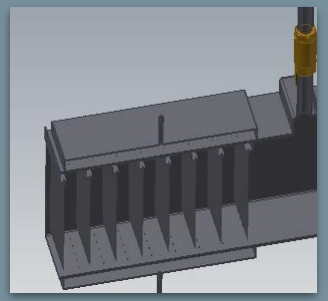
Problems and Key Technologies in High Temperature Brazing



Problems and Key Technologies in High Temperature Brazing

No explosion

Hydrogen isolation design		
multiple gas curtain at inlet/outlet design	Stainless steel pipe, no gas leakage	Scientific logic control



Oxygen content > 500ppm, automatic cut hydrogen feed

Nitrogen pressure < 0.15Mpa, automatic cut hydrogen feed

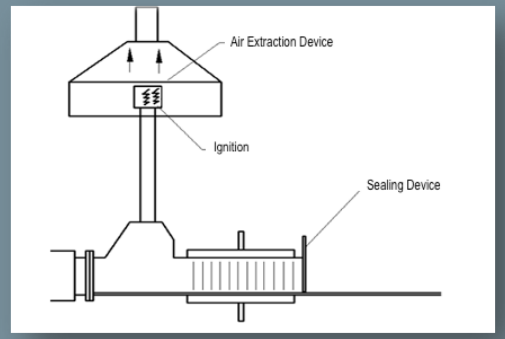
Gas Valve

No-electricity control system

Explosion-proof controller

Problems and Key Technologies in High Temperature Brazing

A reliable hydrogen exhaust design



Dealing with exhaust

Two ways of ignition

- Constant flame
- Spark plug wires

Both ignition systems are used to improve reliability

Problems and Key Technologies in High Temperature Brazing

Common muffle failure

- Wrong/cheap muffle can't resist high temperatures
- Muffle cracked and leaked
- Deformed muffle destroyed the surface balance of the belt

Question 4: Muffle anti-deformation design under the high temperature

How to design the muffle under a 1080℃-1100℃ environment to resist deformation and increase product life-cycle.

Problems and Key Technologies in High Temperature Brazing

Inconel601 Muffle

Anti-deformation arc design, muffle lasts longer

Muffle tracking devices can reduce the resisting force

Inconel 601 nickel-chromium-iron alloy is a general-purpose engineering material for applications that require resistance to heat and corrosion.

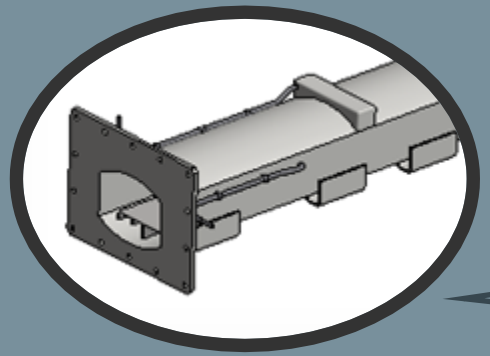
...

Mechanical Property Requirements.

Density	**8.1 g/cm cube**
Curie Temperature	-190 C
Melting Range	**1320 - 1370 C**
Thermal Expansion(10-6K)	14.9 (20-300 C)

Alloy 601 is a nickel-chromium alloy that offers outstanding oxidation resistance up to 1204°C

Muffle can be tracked under 1100℃



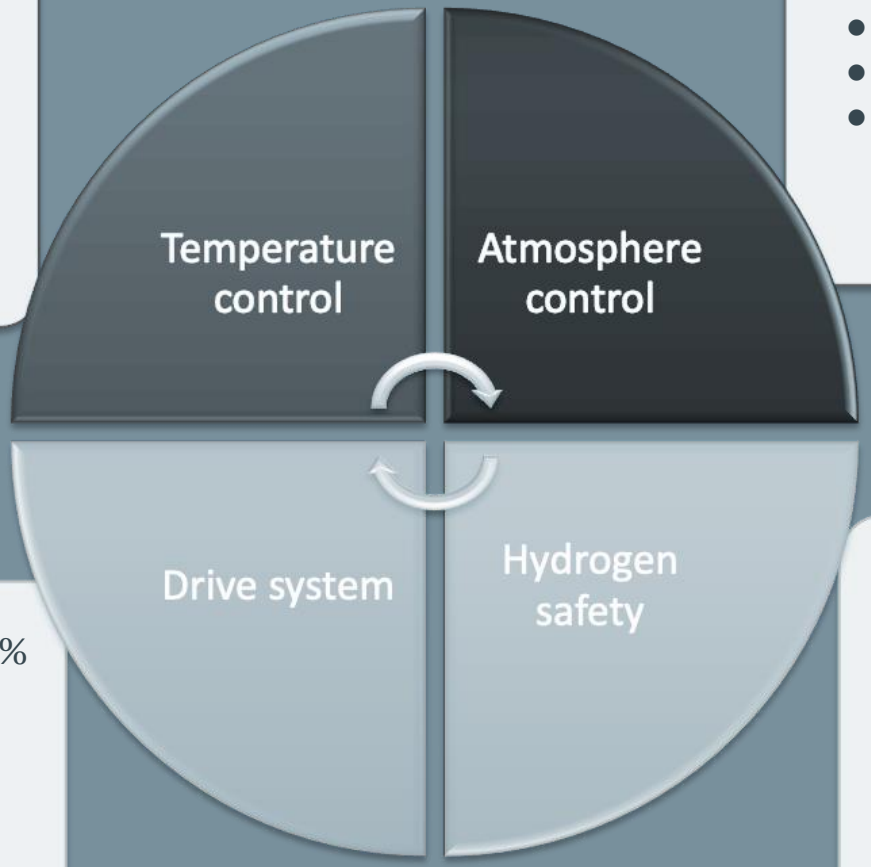
Arc designed to handle the high-temperature

Key Indicators

Key Indicators

HSA Belt Furnace (Brazing)

- The uniformity of mesh belt section is ±1℃
- Sintering platform uniformity ±1～2℃
- Control accuracy ±1℃



- Uniform intake and exhaust
- Product no oxidation
- Dew point -60～-50℃
- Oxygen content control at each point ≤10ppm

- Transmission accuracy 2%
- Width of the belt up to 400mm

- Exhaust gas combustion
- No pollution
- Safe and reliable use of hydrogen
- Scientific muffle layout and airflow design
- low hydrogen consumption

Thank you for checking us out!

(Our website)

If you are interested in our furnace line or want to save some money on your next furnace project, please also check our website:

https://www.beltfurnaces.com

If you want to talk to someone about your next furnace purchases, please contact:

Furnace sales <sales@torreyhillstech.com>
Torrey Hills Technologies, LLC
Tel: (858) 558-6666
6370 Lusk Blvd, Suite F111
San Diego, CA 92121