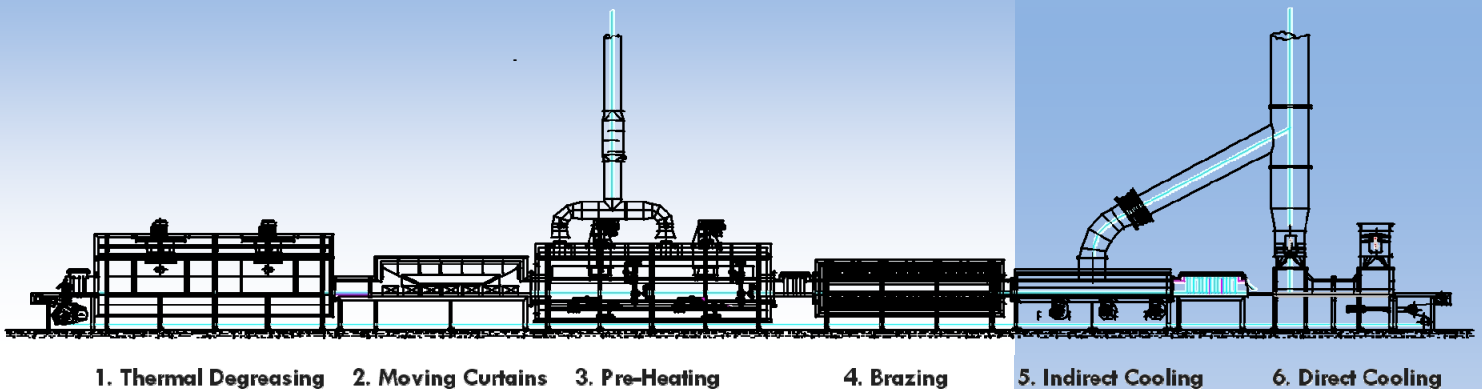


CAB Brazing Line for manufacture of aluminium components - under controlled atmosphere

Fundamentals:

CAB (Controlled Atmosphere Brazing) is a preferred brazing technology in the manufacture of aluminium parts, especially of finned heat exchangers. The CAB process takes place in an inert atmosphere such as argon or nitrogen with extremely low oxygen content (< 50 ppm in the brazing zone). The product typically undergoes the following CAB process steps:

- Thermal degreasing by convection, including offgas treatment by incinerator or filtration
- Preheating by convection or radiation
- Brazing by convection or radiant heat
- Indirect cooling
- Direct cooling

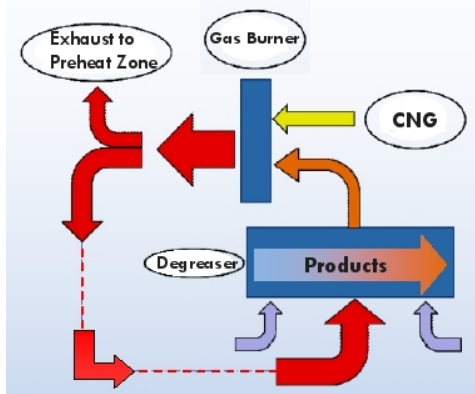


Specific features:

- Moving-curtain entry lock chamber
 - prevents atmosphere breakthrough
 - allows extremely small product gap of approx. 100 mm
 - reduces overall length of the CAB line by 20 - 40%
- Low inert gas consumption thanks to the moving-curtain entry lock chamber, low-section muffle and metal-to-metal flange connections
- Low energy consumption due to
 - minimum possible controlled external air ingress into degreaser
 - energy recovery from incinerator exhaust air
 - improved furnace insulation
- Belt conveyor width up to 1,000 mm
- Temperature uniformity across overall width of brazing furnace $\pm 3K$
- Gas input easy to adjust and check on central gas panel

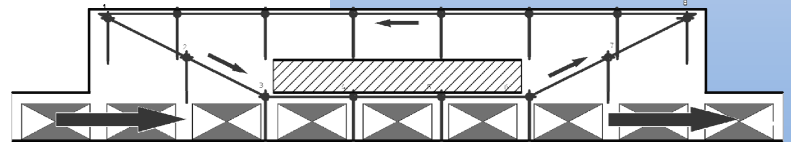
1. Degreaser and offgas incinerator

The combined degreaser/incinerator module is characterized by particularly effective oil removal and high energy efficiency. This is achieved by heating the degreaser module only and exclusively by incinerator exhaust heat. Moreover, the incinerator exhaust gas is utilized in heating the downstream preheat module. The controlled small amount of external air entering through the degreaser entry and exit openings makes sure that no explosive gas mixture can form in the degreaser and that the energy loss by heating-up this external air in the degreaser and then in the offgas incinerator is minimized.



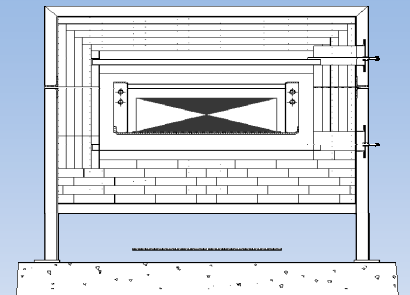
2. Moving-curtain entry lock chamber

The unique design of the moving-curtain lock chamber prevents uncontrolled air penetration into the brazing furnace, reduces the inert gas consumption and stabilizes the entire furnace atmosphere, from the degreaser through to the exit of the indirect cooling zone. The product passes through individual temporary chambers which are formed by moving curtains. The small product loading gap of approx. 100 mm allows the overall length of the CAB line to be reduced by 20 to 40 %.



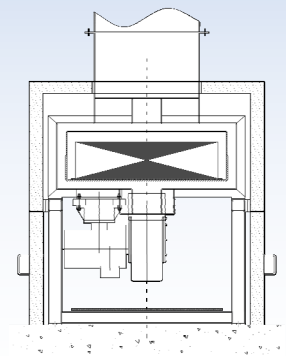
3. Convection preheat furnace

The product is heated directly in two separate furnace zones with fully enclosed circulating air flow. Heating is preferably effected by radiant-tube gas burners installed inside the muffle. The exhaust air from the degreaser/incinerator module is used for heating the muffle at the product entry end to boost heating energy efficiency.



4. Brazing furnace

In the brazing furnace itself only a small amount of heating power is required. This is why the brazing furnace is preferably heated electrically. The unique low-section muffle ensures a particularly low consumption of inert gas and provides uniform heating of the product across the entire conveyor width. Heating and gas input system are designed to ensure maintenance friendliness so that, for example, the muffle need not be removed for heating element or gas lance replacement.



5. Indirect cooling

For indirect cooling of products and conveyor belt, radial fans suck-in cooling air from the shop or from outside and blow it around the low-section muffle.

6. Direct cooling

Product and conveyor belt are most efficiently cooled by two axial fans installed in the air ducting such that one fan blows the air in while the other one sucks it off.