



THE DUBAI 2009 SPECIAL TECHNOLOGY SEMINAR

Process, Quality Control and
Production Machines

Agenda

Umicore company profile

Process

Paste & application

Key parameters

Quality control

Production machine matrix

Umicore company profile

Umicore BrazeTec company info

Umicore BrazeTec is a leading manufacturer of high-quality brazing alloys and solders, pastes and fluxes.

Its products are used to manufacture a wide range of products, from simple everyday objects to high-grade tools and industrial products.

Umicore produces manufactures and sells products through a global sales and logistics organization and has production facilities in

Hanau (Germany),

Vicenza (Italy),

Glens Falls (USA),

Sao Paulo (Brazil)

and Suzhou (China).

Umicore BrazeTec company info

Using its years of experience and expert knowledge of brazing and soldering processes in specific sectors of industry, Umicore's own Brazing Center develops solutions customized to the requirements of individual clients and develops techniques for joining metallic materials, hard metals and ceramics.

The most recent developments of Umicore concern brazing alloy pastes for the *CuproBraze* process and pastes for brazing of stainless steel components. The pastes developed by Umicore can be applied by different application techniques such as spraying, roller coating, dispensing and screen printing.

Umicore is the world leading producer of pastes for the CuproBraze process.

CuproBraze process

Composition of brazing paste

Properties of filler metal

Gas atomized powder, spherical

Grain size: < 90 μm ;

average particle size 15 - 30 μm

CPO 600 (OKC 600)

Cu rem.; Sn 15,6; P 5,3; Ni 4,2

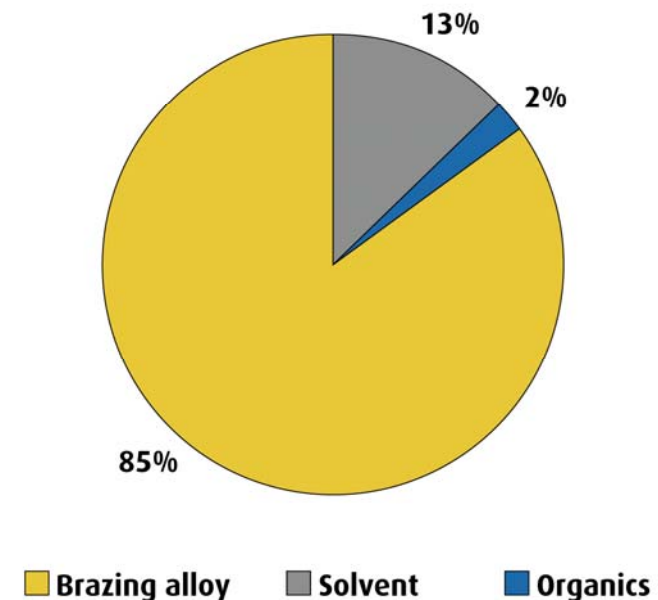
Melting range: 590-610 $^{\circ}\text{C}$

CPO 610

Composition similar to CPO 600

Melting range: 595-620 $^{\circ}\text{C}$

**General composition of a brazing paste
by wt. %**



Environmental issues

Brazing alloy

- Lead free

Brazing paste

- Flux free for fin to tube joint
- Solvent evaporation during drying process
- Organic decomposition during brazing
- Exhaust gas treatment according to local legal requirements

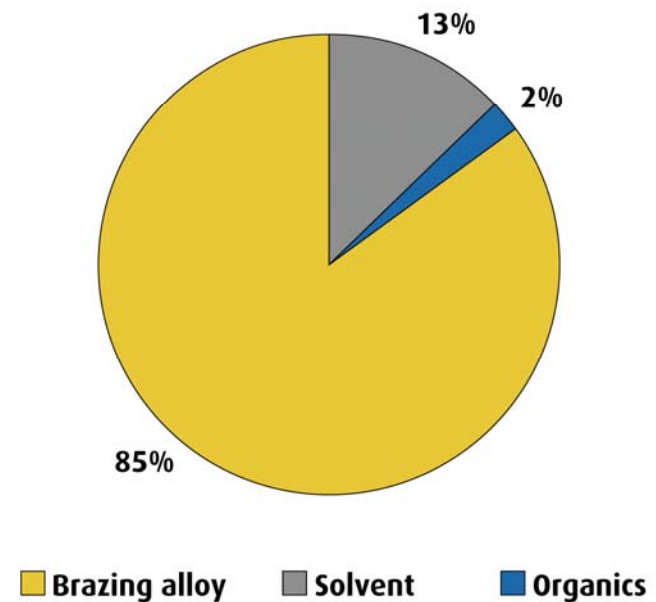
Aftertreatment

- No rinsing step required

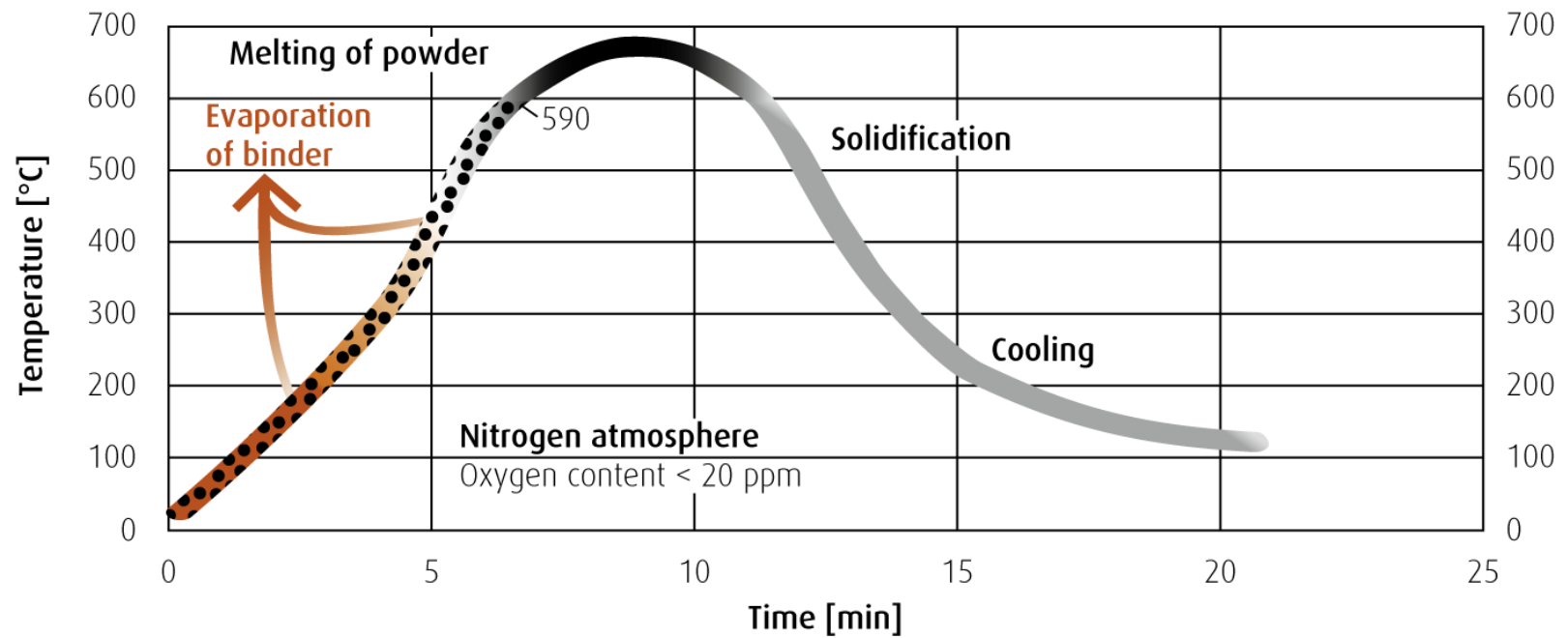
CuproBraze heat exchanger

- Recyclable

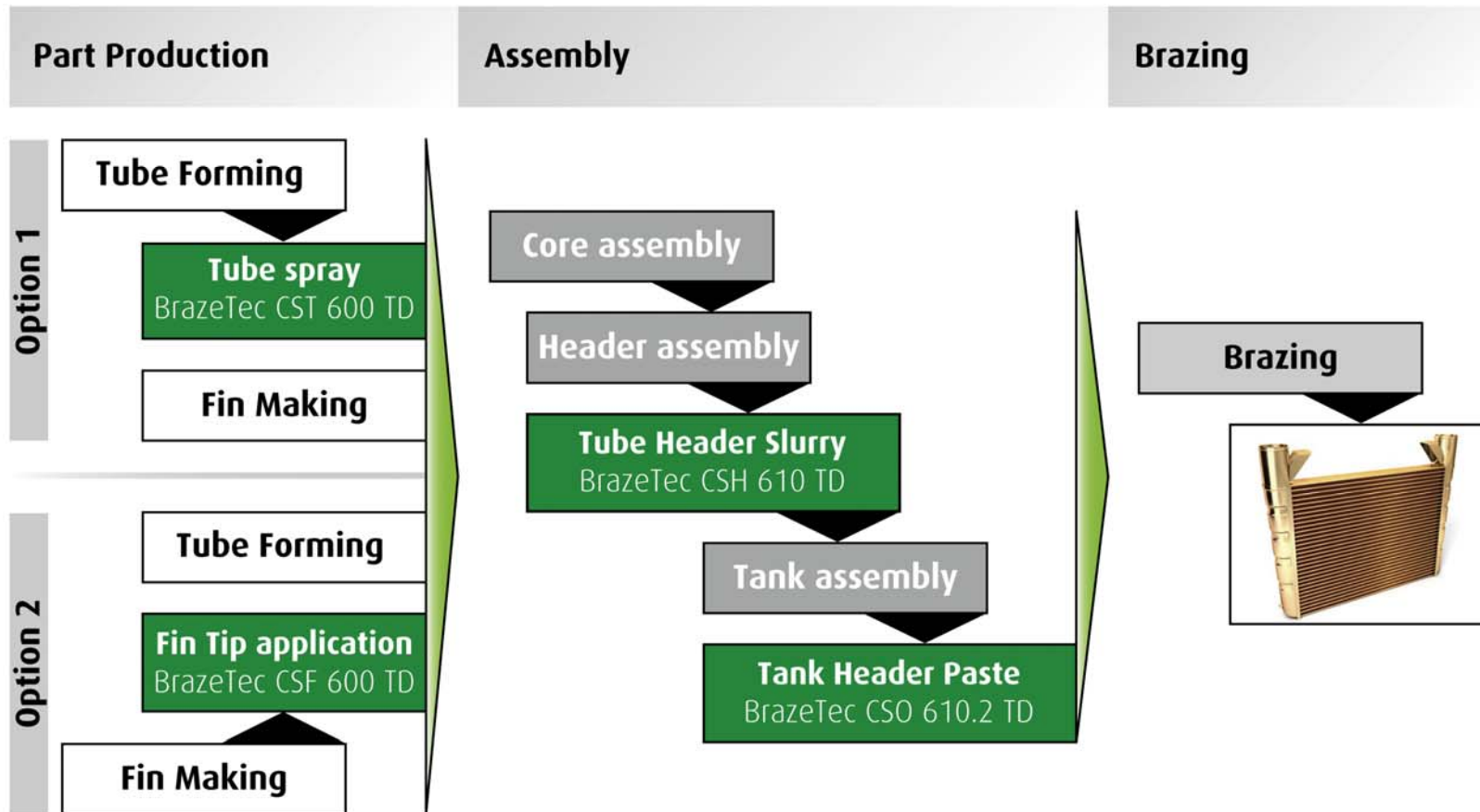
**General composition of a brazing paste
by wt. %**



Typical brazing process



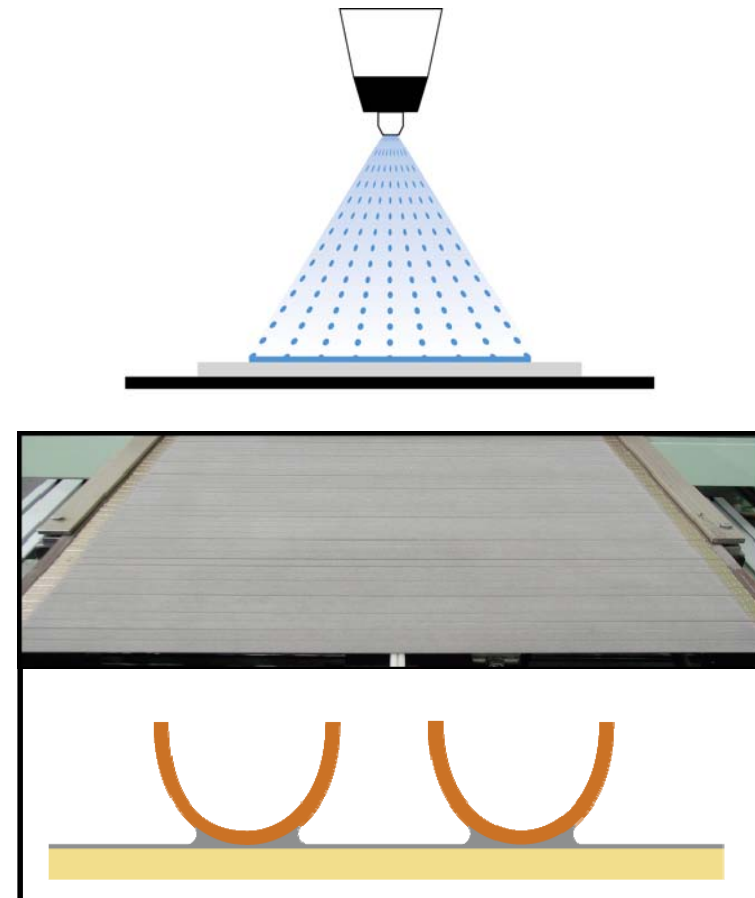
CuproBrazed process chart



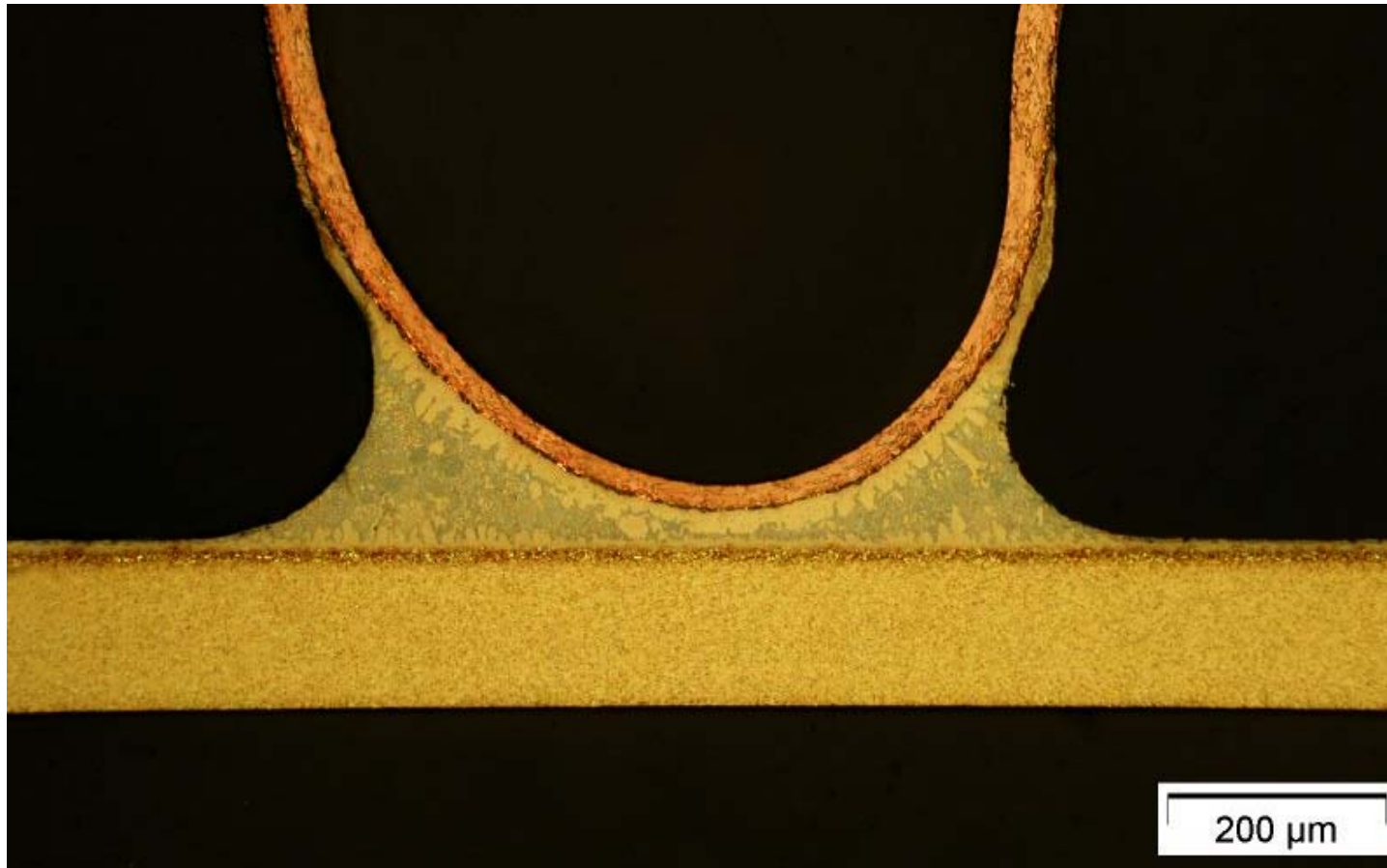
Paste & application

BrazeTec CST 600 TD

- Application: **Tube Spray**
- Alloy: CPO 600 (OKC 600)
- Easy to spray with conventional spraying equipment
- Homogenous paste layer - high quality joints
- No settling - only short homogenisation process
- No smelling during application and drying
- Quick drying time - high throughput
- Good adhesion - easy to handle coated tubes

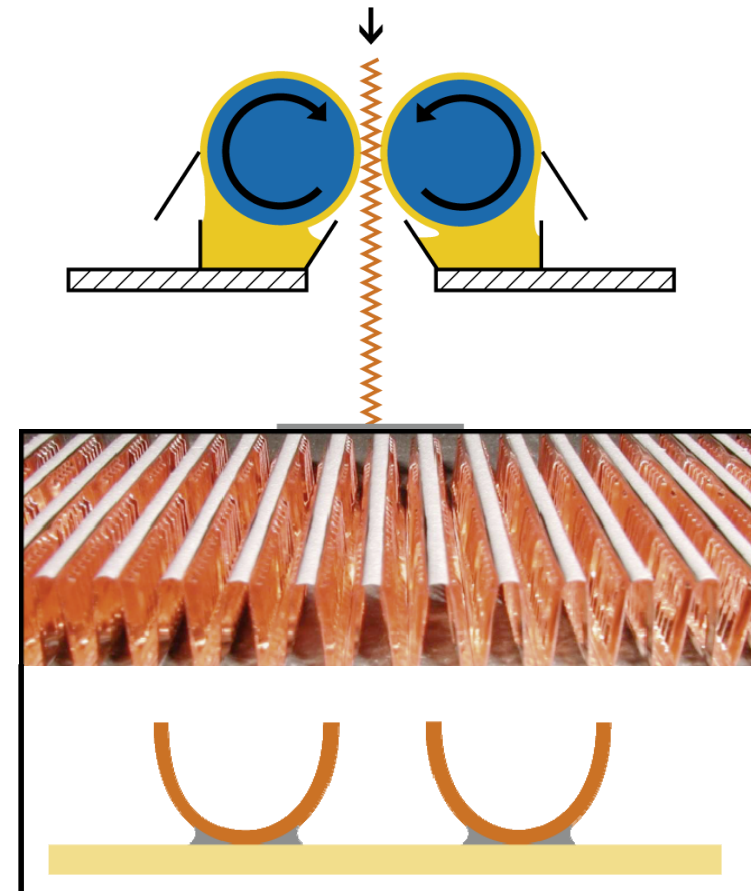


BrazeTec CST 600 TD: Cross sections of brazed tube-to-fin joint



BrazeTec CSF 600 TD

- Application: **Fin Tip Coating**
- Alloy: CPO 600 (OKC 600)
- No settling - only short homogenisation process
- Quick drying time - high throughput
- No smelling during application and drying
- Good adhesion - easy to handle

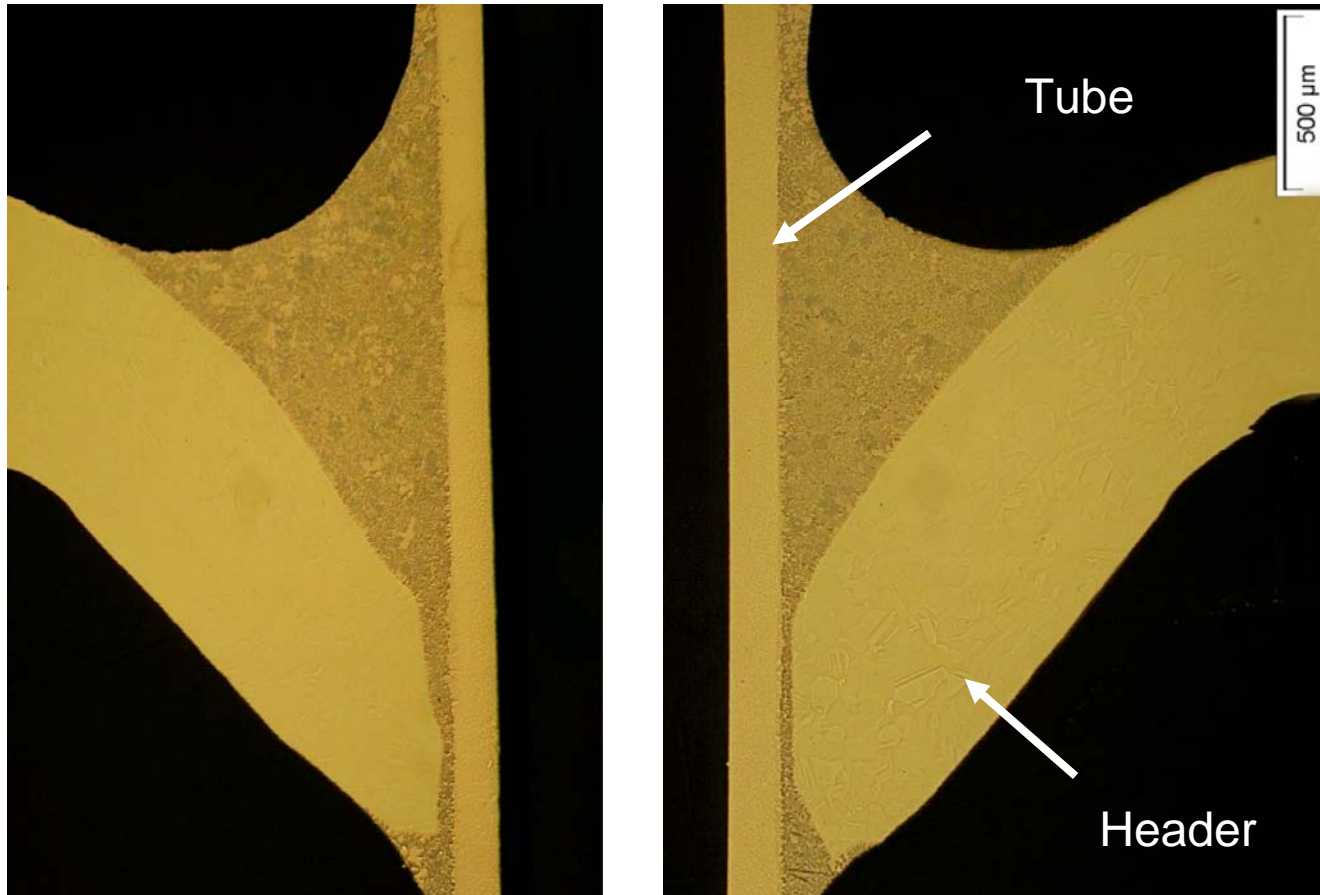


BrazeTec CSH 610 TD

- Application: **Tube - Header Joints**
- Alloy: CPO 610
 - Marginal flux content (2 wt.-%)
- No leakages with standard radiators & CAC's using standard CuproBraze parameters
- No settling - only short homogenisation process
- Quick drying time - high throughput
- No smelling during application and drying

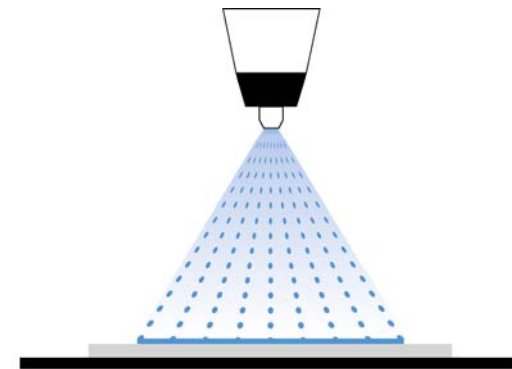


BrazeTec CSH 610 TD: Cross sections of brazed tube-to-header joints



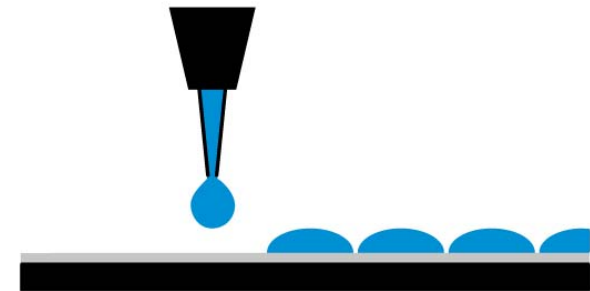
BrazeTec CSH 610.2 TD

- Application: **Fin Stiffing**
- Special powder composition
 - Marginal flux content (2 wt.-%)
- Wear resistance of fins
- No settling - only short homogenisation process
- Quick drying time - high throughput
- No smelling during application and drying



BrazeTec CSO 610.2 TD

- Application: **Tank-Header Joints**
- Special powder composition
 - Marginal flux content (2 wt.-%)
- Ready mixed paste - approved quality
- No settling - only short homogenisation process
- No smelling during application and drying
- Stays in brazing gaps during drying and brazing



One Shot Brazing

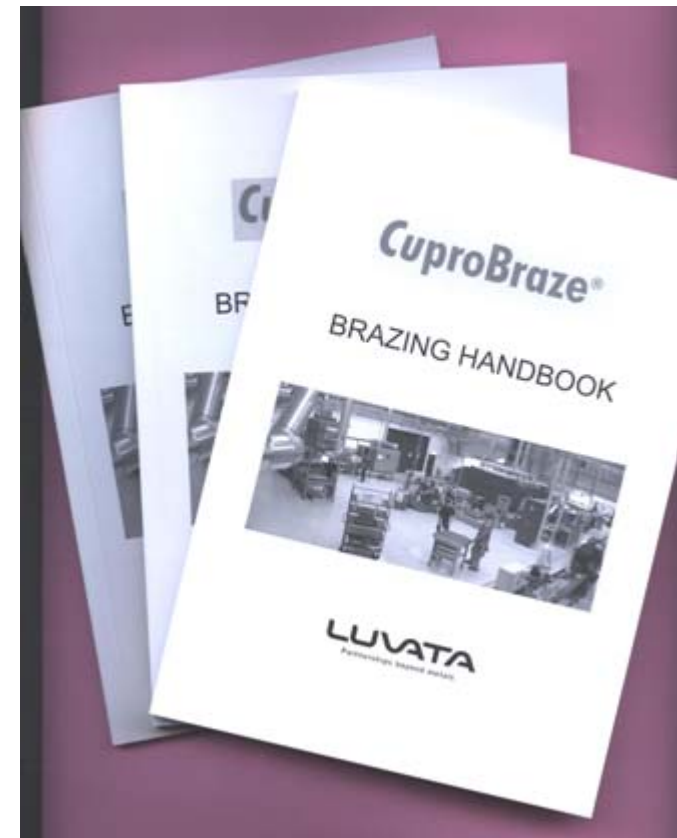
BrazeTec CuproBraze pastes

Paste	Joint	Paste Application Method	Flux content
BrazeTec CST 600 TD	Fin - Tube	Spraying	No
BrazeTec CSF 600 TD	Fin - Tube	Fin-tip	No
BrazeTec CSH 610 TD	Tube - Header	Slurry	2 %
BrazeTec CSH 610.2 TD	Fin stiffing	Spraying	2 %
BrazeTec CSO 610.2 TD	Tank - Header	Dispensing	2 %

Key parameters

CuproBraze key parameters

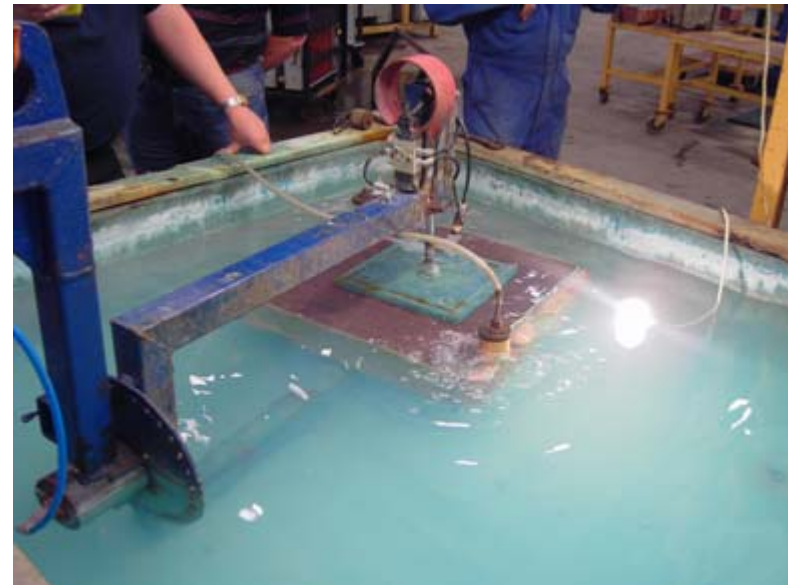
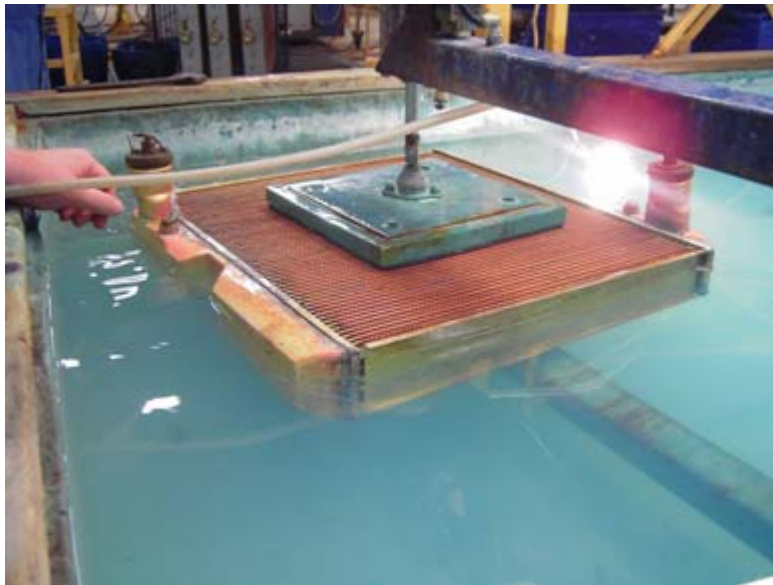
- Cleanness
- Tolerances
 - Brazing gap < 50 μm
- Brazing paste
 - Spraying 150 – 250 g/m²
 - Fin tip 0,008 g/tip (16 mm, 15 fpi)
 - Tube to Header 0,5 g/joint (16 mm tube)
 - Drying below 130 °C
- Brazing atmosphere & temperature
 - Nitrogen or N₂/H₂ 95/5
 - Oxygen content < 20 ppm
 - Dew point < -40 °C
 - Part temperature min. 650 °C



Quality control

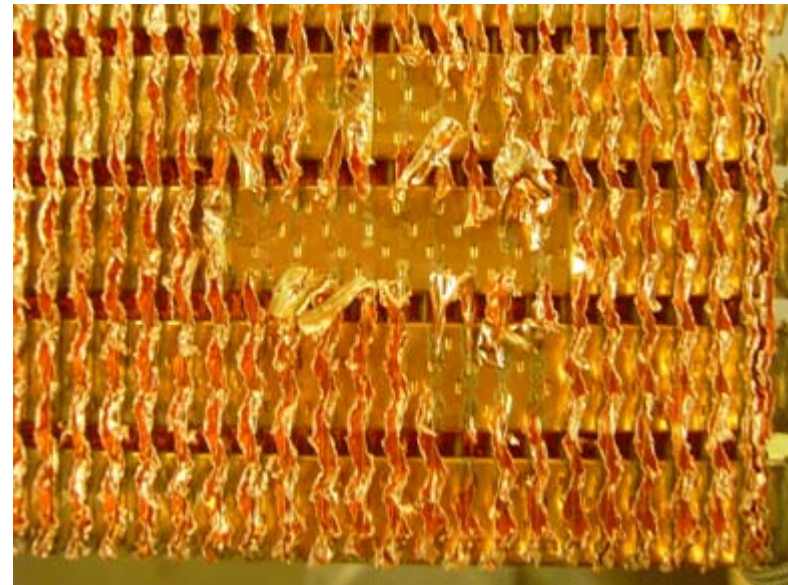
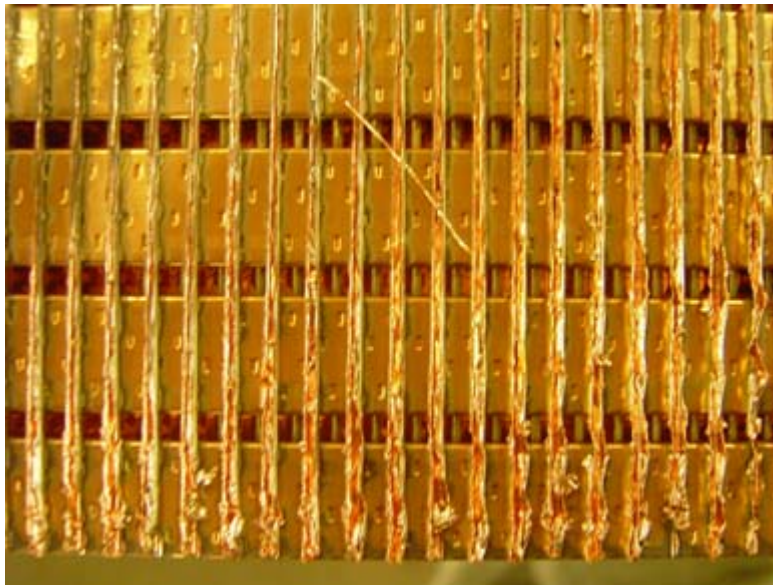
CuproBraze quality control

- Leakage test of all cores with compressed air
- Localization of leakages
- Take measures for error correction



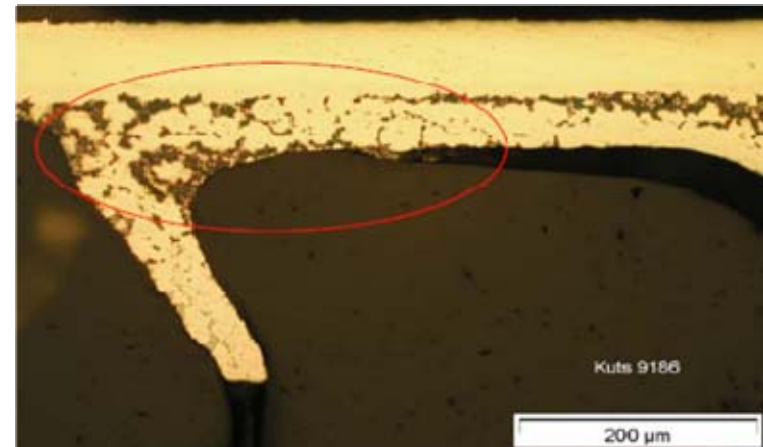
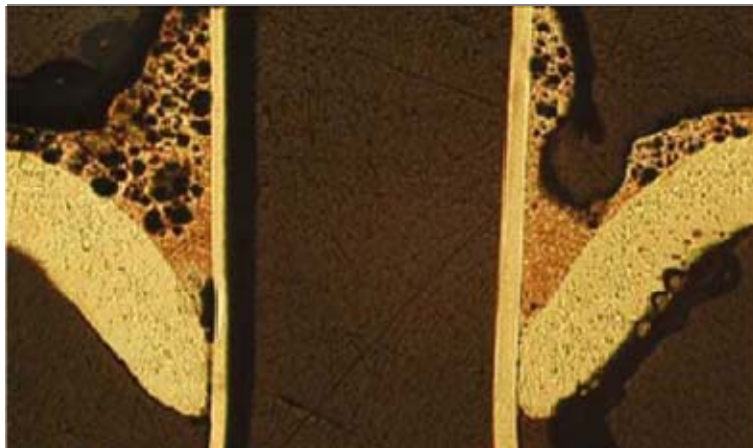
CuproBraze quality control

- Visual inspection
- Destructive visual inspection
- Take measures for error correction



CuproBraze quality control

- Metallographic investigation
- Take measures for error correction



Production machine matrix

CuproBrazo production volume matrix

	Low Volume < 10,000 units	Medium Volume < 50,000 units	Big Volume > 50,000 units
Tube forming	Purchase	Purchase / In-house	In-house
Fin / Header forming	In-house	In-house	In-house
Filler metal (tube-fin-joint)	Manual Spray / Foil	Fin Tip / Aut. tube spray	Automated tube spray
Filler metal (tube-header)	Manual squeeze bottle	Automated paste application	Automated paste application
Furnace	Batch type	Semi continuous	Continuous

Thank you

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