

Jornada V- AFAR (Lucena): 26-09-17

Innovación Componentes Frig. & Adap. Nuevos Gases Ref.

SANHUA Micro-Channel Heat Exchanger

Manuel Jiménez Díaz – 26/09/17

MCHE – Key Benefits



INNOVACIÓN COMPONENTES FRIGORIFICOS & ADAPTACIÓN A NUEVOS GASES REFRIGERANTES - MCHE

Dado que algunas tendencias en gases refrigerantes son:

- Gases Naturales: CO₂, NH₃, **Hidrocarburos** (bajo GWP)
- **Reducción de carga de refrigerante** en la instalación. (precio elevado y tasa ecológica en refrigerantes con alto GWP).
- **Reducción de la potencia frigorífica** por equipamiento. (Normativa F-Gas).

Tenemos una tecnología a nuestro alcance que engloba y conecta varias de estas tendencias:

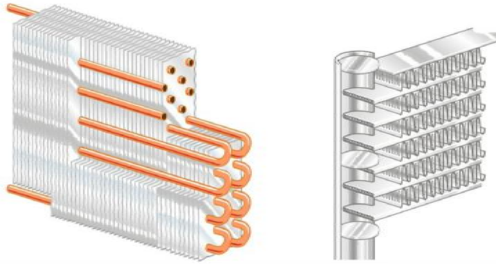
Intercambiadores de Calor por Microcanal (MCHE)



MCHE – Key Benefits



SANHUA MCHE: TECHNICAL SALES ARGUMENTS

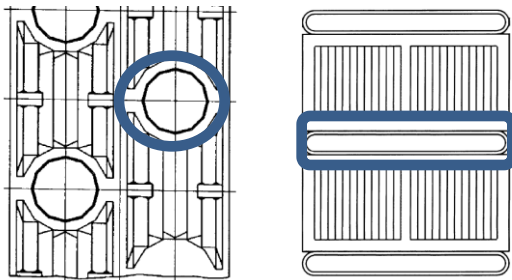


1. En base a unas mismas dimensiones, las baterías MCHE tienen un **coeficiente de transferencia de calor más alto** en comparación con las baterías de aletas y tubos.



2. Un **mayor coeficiente de tranf. de calor interno**: las lamas o tubos de aluminio proporcionan mayor velocidad al refrigerante y una mayor turbulencia, además de tener una superficie interna mayor.

3. Un **mayor coeficiente de tranf. de calor externo**: la superficie en general de los tubos, en contacto con el aire, es mucho mayor en las baterías MCHE que en las baterías T&F.



MCHE – Key Benefits



SANHUA MCHE: TECHNICAL SALES ARGUMENTS

- Comparando baterías con la misma capacidad frigorífica (mismo COP/SEER), la batería MCHE tiene una sensible **reducción de dimensiones** respecto a la de aleta y tubos.

VRF Systems: Coil Reduction in Height



T&F

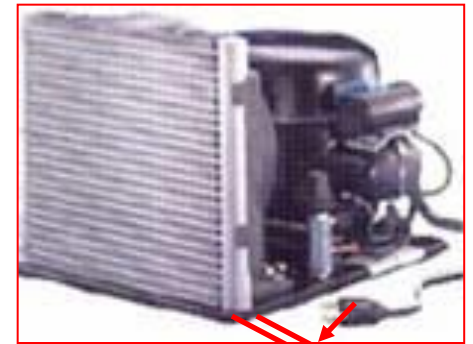


MCHE

MOTOCONDENSER Units: Coil Reduction in Depth



66mm

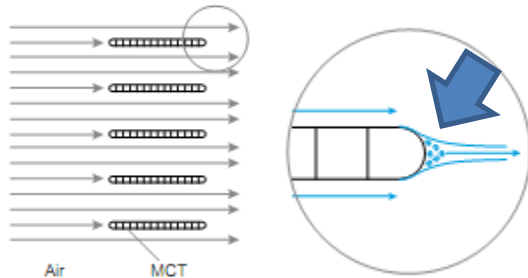


16mm

MCHE – Key Benefits



SANHUA MCHE: TECHNICAL SALES ARGUMENTS



5. Comparando baterías con la misma capacidad frigorífica, la de MCHE tiene **Menor Pérdida de Carga en el lado de Aire**. No hay régimen turbulento, en las lamas/tubos.

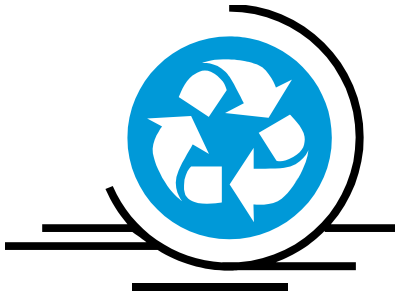


5. Comparando baterías con la misma capacidad frigorífica, la de MCHE tiene un volumen interno menor. La principal ventaja es una reducción de la carga total de refrigerante.

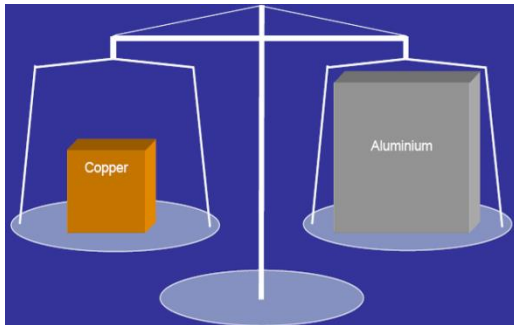
MCHE – Key Benefits



SANHUA MCHE: TECHNICAL SALES ARGUMENTS



8. MCHE coils are made in 100% aluminum structure and they could be **easily recycled**

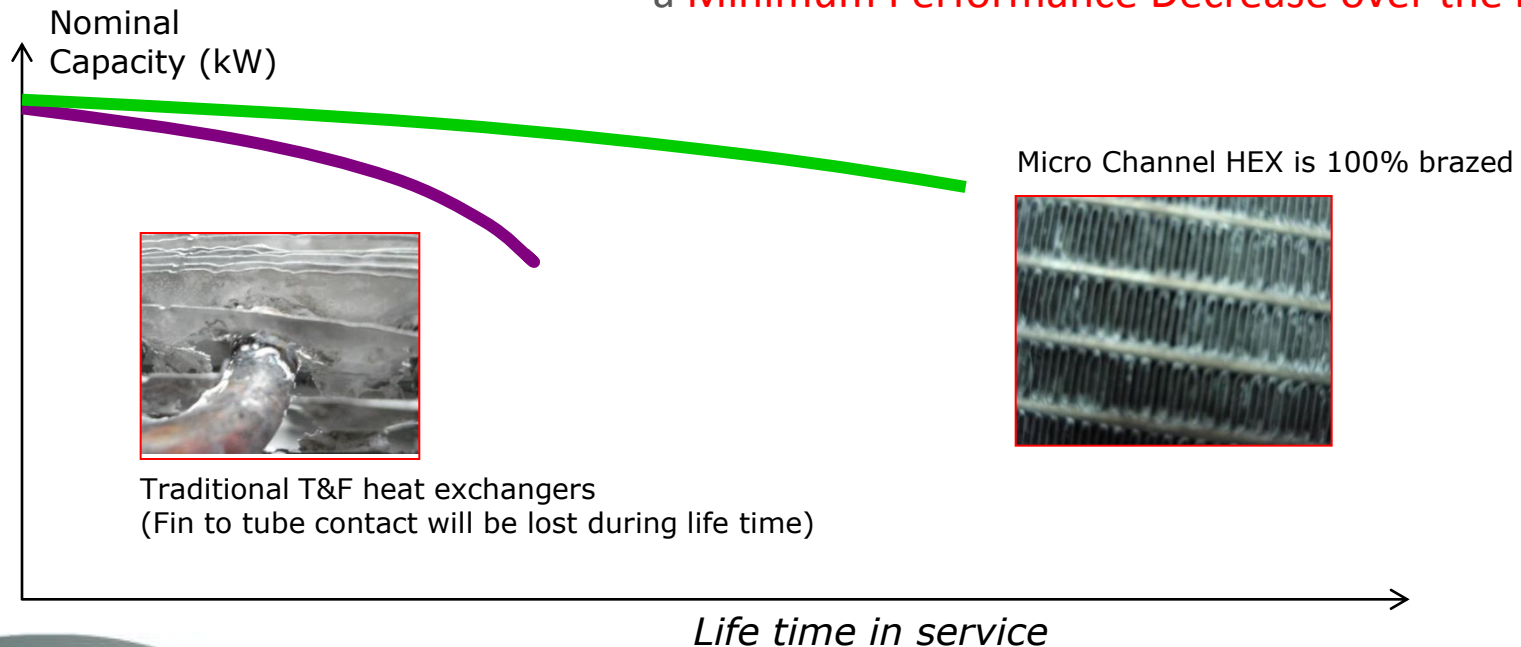


9. MCHE Coils have a **Lighter Weight** and could be **Easily Handled**

MCHE – Key Benefits

SANHUA MCHE: TECHNICAL SALES ARGUMENTS

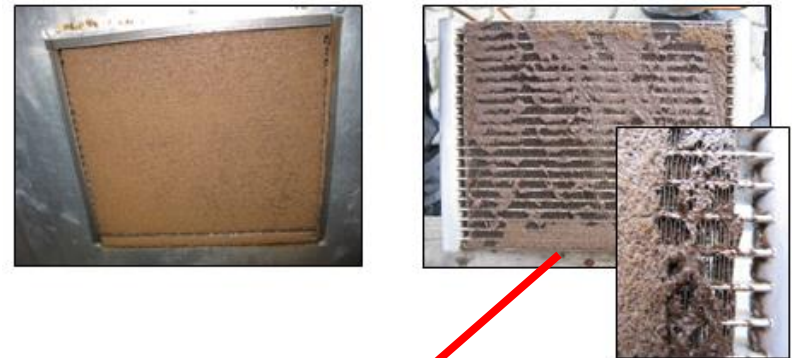
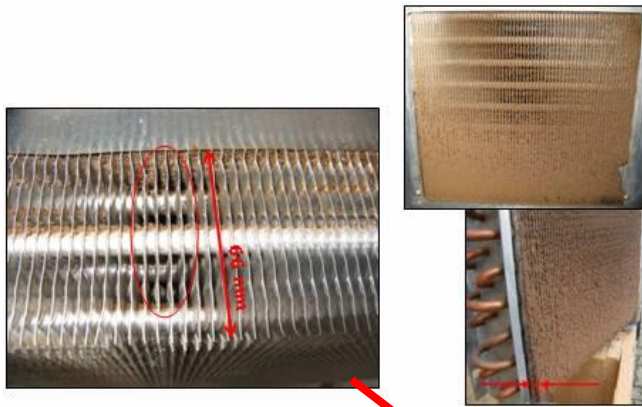
10. MCHE coils are made in 100% aluminum, there is no presence of copper like in F&T coils. For this reason there is **no risk of Galvanic Corrosion**.
11. No corrosion on the Aluminum fins guarantees only a **Minimum Performance Decrease over the life time**



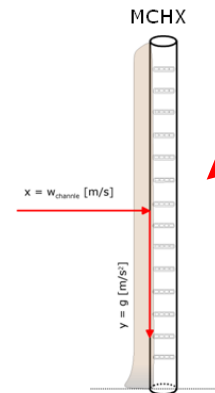
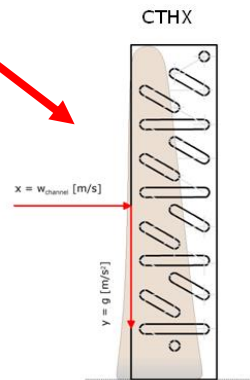
MCHE – Key Benefits

SANHUA MCHE: TECHNICAL SALES ARGUMENTS

12. MCHE coils assures a **better reliability over dust threat** in comparison to similar F&T coils



In F&T coils Difficult to remove dirt without damaging fins



In MCHE coils Dirt accumulates only on front surface & can be removed easily without damaging fins

MCHE – Product Range



Sanhua MCHC: Condensers – Applications



VRV Systems



Split Units



Roof Top



Chillers



Transport refrigeration



Bus Air Conditioning



Commercial retail Refrigeration



“Legislative” drivers for MCHE technology



1) F-Gas Directive

Products: all typical ComRef systems

Requirement: limitation of HC charge

MCHE benefit: reduced refrigerant charge

2) Eco-design / Directive 2009/125/EC

Products:

- Professional refrigerated storage cabinets
- Condensing units

Requirement: Minimum targets of efficiency (Cus: tier 1 – 2016, tier 2 – 2018)

MCHE benefit: high efficiency

3) ErP Directive – fan part (No 327/2011, part of Eco-design / Directive 2009/125/EC

Products: Fans (fans of CUs in ComRef systems) with $P_{input} > 125 \text{ W}$

Requirement: minimum targets for fans efficiency (tier 1: 2013, tier 2: 2015)

MCHE benefit: low pressure drop at air side – high air flow – less powerful fan (less power for same air flow)

MCHE – Key Benefits



New technologies towards EU regulation compliance

F-Gas regulation

ErP Directive
fan part ($P > 125$ W)

ECO design directive
(CU part, tier 1: July 2016,
tier 2: July 2018)

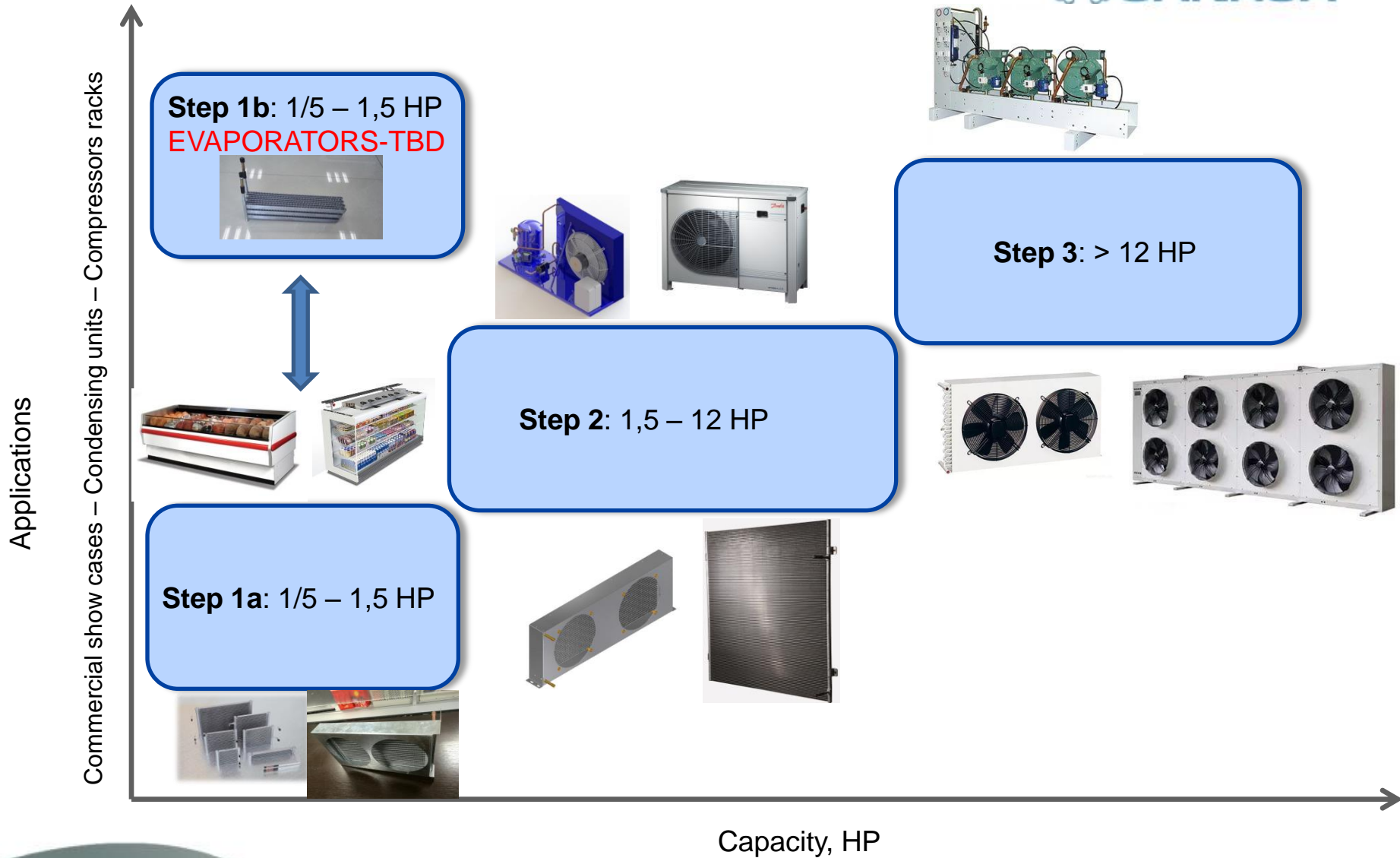


Reduced refrigerant charge
(R290) at same system capacity

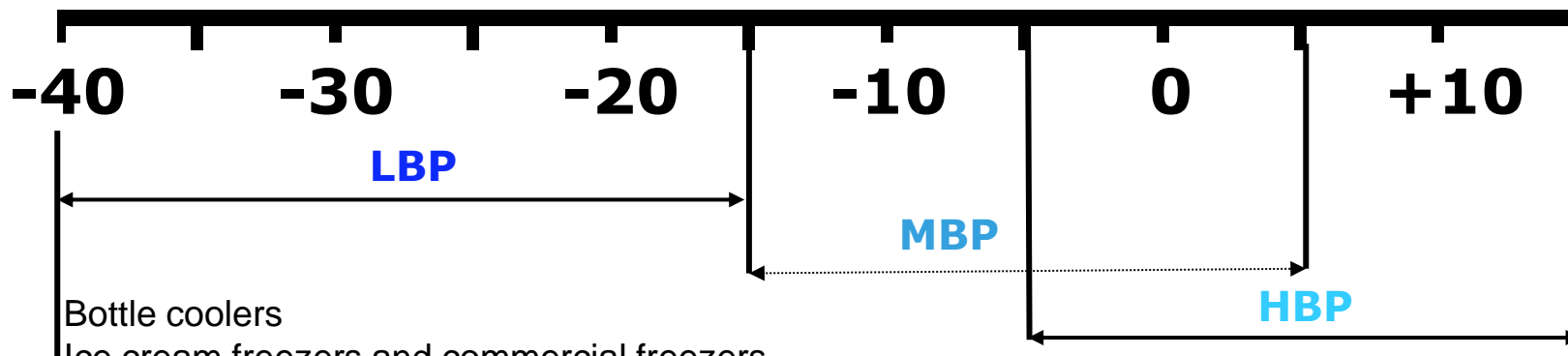
Less powerful fan motor
for same condenser capacity

Higher condenser efficiency –
higher CU COP

MCHE for ComRef - Macro Product Strategy



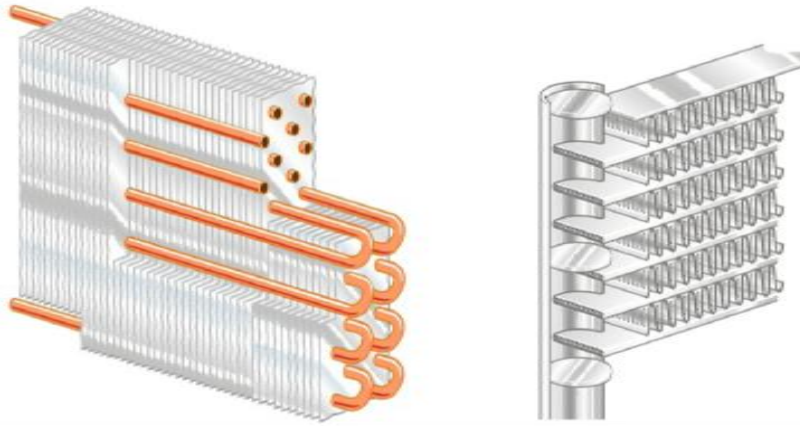
Step 1a: Commercial refrigeration applications (below 1,5 HP) - Condensers



- Bottle coolers
- Ice cream freezers and commercial freezers
- Commercial refrigerators
- Display cabinets
- Beer coolers
- Beverage dispensers
- Dehumidifiers
- Heat pumps

LBP (low back pressure) $-25^{\circ} \text{C} \pm 10 \text{K}$
MBP (medium back pressure) $-10^{\circ} \text{C} \pm 10 \text{K}$
HBP (high back pressure) $+5^{\circ} \text{C} \pm 10 \text{K}$

MCHE – Key Features & Benefits



1. Compactness and light weight
2. Lower refrigerant charge
3. High efficiency
4. No risk of Galvanic corrosion
5. Easy cleaning

MCHE – Product Range

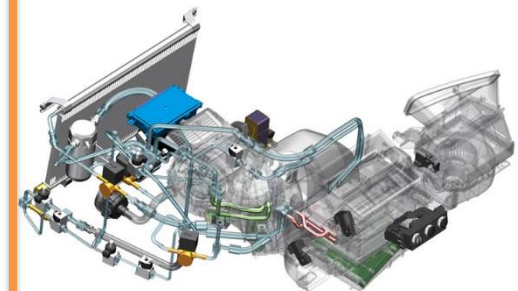
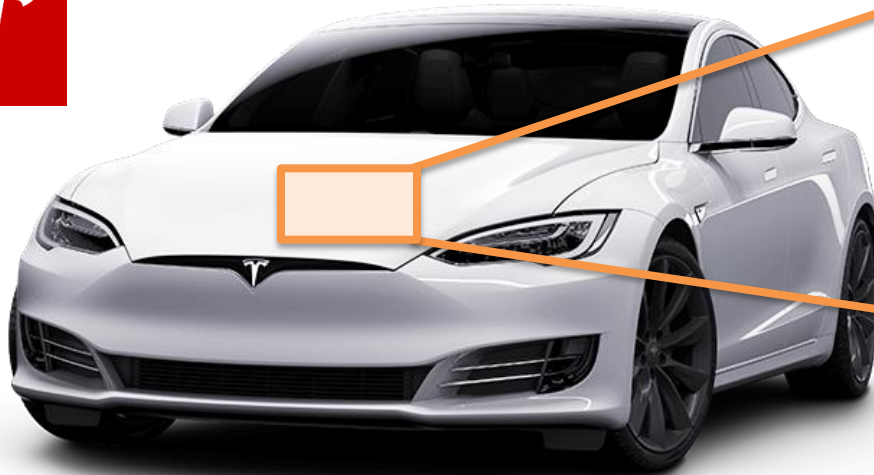


Sanhua MCHC: Remote Condensers units



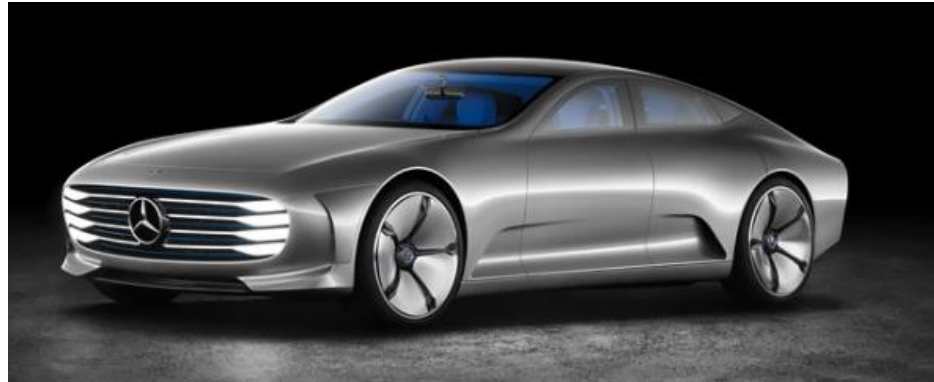
1. Standard range in a definition stage
2. Design with vertical manifold (standard)
3. Design with serpentine coil for extreme internal volume reduction
4. Casing in galvanized steel – Compact design
5. Remote condenser can be provided with fans

Collaboration case: Sanhua and Tesla



- ❖ Sanhua is the exclusive supplier of critical thermal management components in Tesla Model S, Model X and Model 3
- ❖ Sanhua is the only China supplier invited to Tesla prestigious suppliers conference in May/2016
- ❖ Sanhua is going to build new factories at America and Europe for Tesla

Collaboration case: Sanhua and Daimler



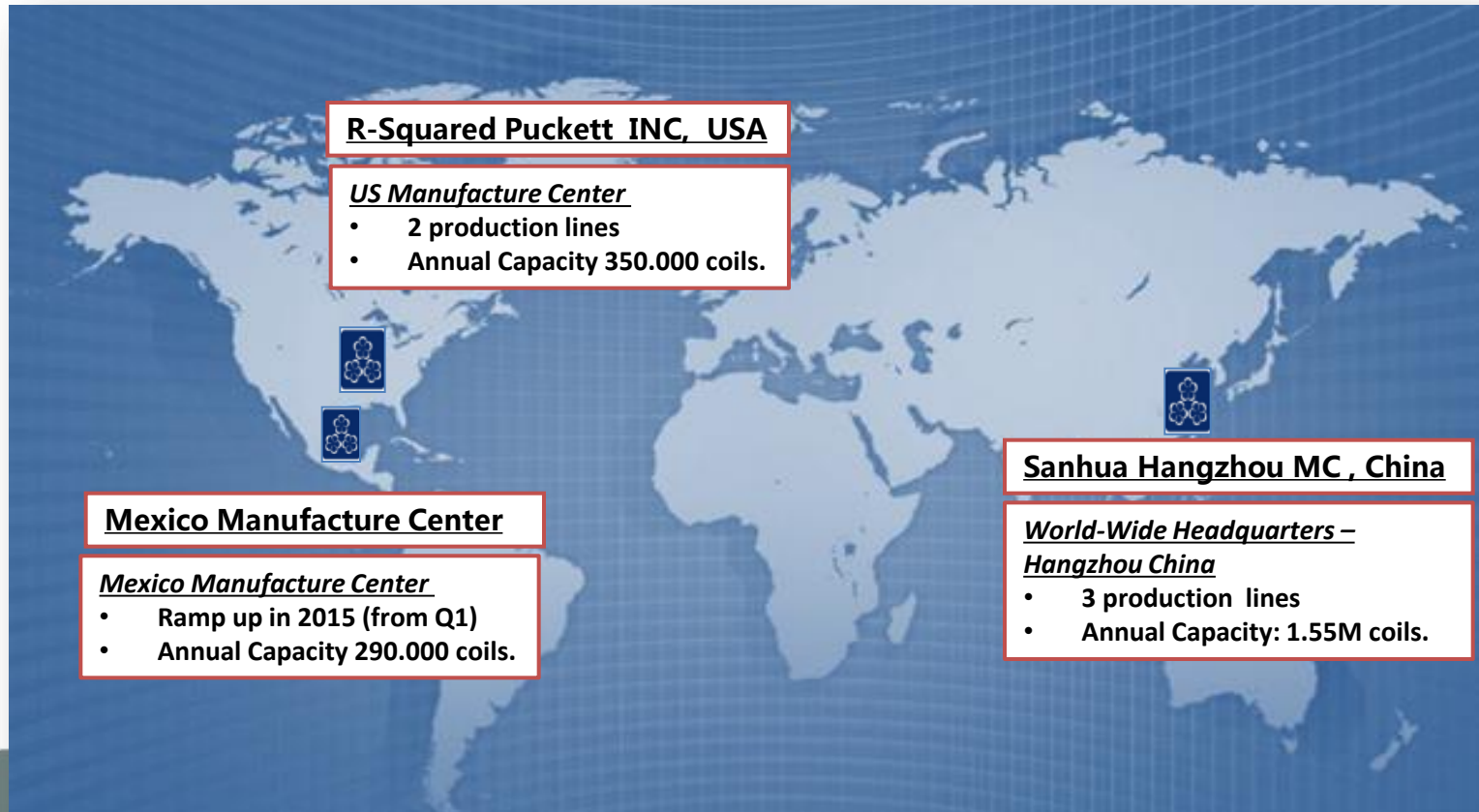
- ❖ Sanhua is the exclusive thermal management solution provider to Daimler Maybach, MRA2, EVA2 and subsequent platforms

MCHE – Corporate Overview



Sanhua MCHC facilities: Hangzhou, R-Squared and Mexico

- Hangzhou: Production since 2007, 3.0M coils shipped
- R-Squared: Back up Capacity for US and Mexico, other than from China
- Mexico: New Plant opened in February 2015



MCHE – Corporate Overview



Sanhua MCHC: Historical Market

MCHE Condensers:

since 2007 – more 5 Million pieces produced

MCHE Evaporators:

since 2010 – 900.000 pieces produced

MCHE Heat Pump coils:

since 2013 – 60.000 pieces produced

