

Indus Engineering
Heat Exchanger Design Case Study
Tumble Dryer

Customer Requirement

- ❑ **An existing customer wanted to develop a heat pump dryer with next generation of low GWP refrigerant gas to meet requirement of reduction of environmental impact of HFC**



Task

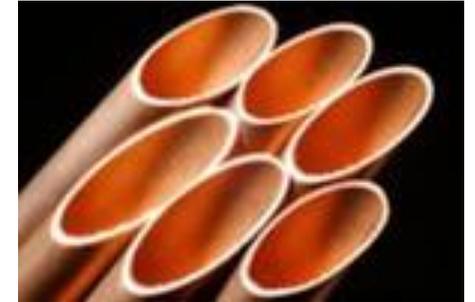
- ❑ **Indus International had to design the heat pump dryer coils (Evap & Cond) with new natural low GWP refrigerant R290 to replace existing refrigerant R134a**
- ❑ **Task is to keep refrigerant charge within safety limit and meeting requirement of drying capacity**

Solution

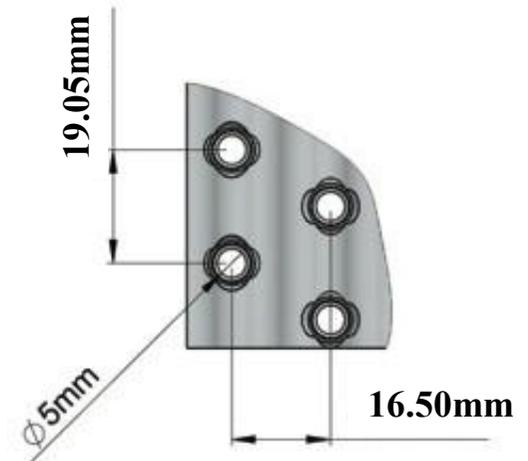
- ❑ **We simulated existing coil performance and its water removing capacity. Based on existing refrigerant coil simulation output, we started design of new coils suitable for usage of R290 refrigerant.**
- ❑ **We simulated coils with different tube diameters to minimize internal volume of coil, so that refrigerant charge of R290 can be managed within safety limit and keeping desired performance of dryer**

Solution

- ❑ Also, we have simulated coils with different fin surface to achieve optimum moisture removing capacity
- ❑ Based on various iterations, we choose our new mini-channel tube of 5mm OD and compact fin geometry pattern 19.05 x 16.5mm and sine wave type fin, which gave desired drying capacity and meeting refrigerant charge limit.



5MM DIA TUBES



Benefits

- ❑ **The designed coil gave 15% more performance and drying capacity compared to existing coil**
- ❑ **Use of mini channel Cu tubes gave 20% reduction in total Cu weight**
- ❑ **R290 Refrigerant charge meet safety limit**