5MM CUTCUBE/ALFIN COILS
(PRODUCTION LINE AND PROCESS)

Burr OAK Tool Inc.

Presented By:
Anand Sharma
Tushar Sharma

Oak India Pvt. Ltd.
Why go to 5mm Coils?

- Economic Drivers
- Regulation Drivers
- Technology Drivers
- Coil Design Factors
- Lower capital investment vs. micro-channel
- Current coil manufacturing processes are proven and economical
- Durable/reliable
- Lower material / Manufacturing costs
- Energy efficient
- Less Refrigerant
- Field technicians are familiar with this type of coil
Regulatory changes in refrigerants
- Copper’s metallurgic properties allow high system pressures.
- Regulated improvement in system efficiencies (Star Rating Requirements)
Reduced or no refrigeration distribution issues
More flexibility of coil/circuit design
More surface area / volume of coil
As tube diameters get smaller there is a surface gain in relation to the amount of refrigerant in the tube.
Smaller diameter tubes can hold the same operating pressures as larger diameter coils with thinner tube wall
COIL DESIGN FACTORS

- Reduction in distance between tubes
- More fins per inch
- Less Volume of Coil with Increased surface Area
- Better Heat Transfer
How to manufacture 5mm (micro-groove) Coils

- Fin Production
- Hairpin Bending
- Expansion
- Return Bend Assly and Brazing
- Testing and Forming
FIN PRODUCTION MACHINES

FIN LINE:

- FIN PRESS
- STACKER
- UNCOILER
- FIN DIE
FINPRODUCTIONCHALLENGES

- More holes / unit area ... denser pattern .. more work for die
- Feeding Issues
- Die design, complicated louvers and profiles
- Stacking issues
- Restriking issues when progression changes
- High tonnage press requirements
OAK SOLUTIONS - FP1000/1400 FIN PRESS

- FP-1000/1400 Fin Line
- Reduced floor space
- Reduced capital costs
- HD stacker
- Servo Feed
OAK SOLUTIONS – REMOTE FEED AND CUT OFF

- Improved Stacking
- Higher speeds
- Elimination of progression changer from most dies
- Press vibrations are isolated
- Better quality fin
HAIRPIN PRODUCTION AND LACING CHALLENGES

- Feeding of tube through rollers, belts and guide tubes
- Peg leg problems
- More tubes needed per coil
- Potential bulging while lacing the coil due to hairpin straightness
- Designed specifically for small tube
- 70% increase in productivity
- More tubes/cycle, reduced changeover time, faster speeds
- Reduced floor space
- Reduced capital costs
- Improved quality
- Stretch Straightening
EXPANSION CHALLENGES

- Increase in the force required to expand as hoop strength of tube increases
- Hairpin’s column strength decreases with Diameter
- Coil can easily bend
- Flaring Issues

- Too Short = No Flare
- Too Long = Splits
- Peg Leg = Splits & No Flare
- No vertical forces on the tube – zero shrink
- No peg leg issues when combined with OAK Triumph Hairpin Bender
- No derogation of internal groove of the tube
- Potential advancements of internal grooves
- Innovative Bell and Flare
OAK SOLUTION – MECHANICAL EXPANDER

- Auto Height Control
- Auto Rod Storage
- Automatic Back plates
- Extra guide plates for 5mm
- Shrinkage synchronized back plates
- Rod Short out
- Tube entry guide
Straight Tube Production

Straight Tube Cutoff
Return Bend Cleaning Unit
Coil Forming

Coil Form Machine