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APPLICATION OF STAINLESS STEEL TO ACC FINNED TUBES

Topics

- ISSUES PLAGUING THE AIR COOLED CONDENSERS
- SURFACE CONDENSER VERSUS ACC'S
- STAINLESS STEEL TUBE DEVELOPMENT
- STAINLESS STEEL TUBE MANUFACTURING
- STAINLESS STEEL TUBE IMPLEMENTATION

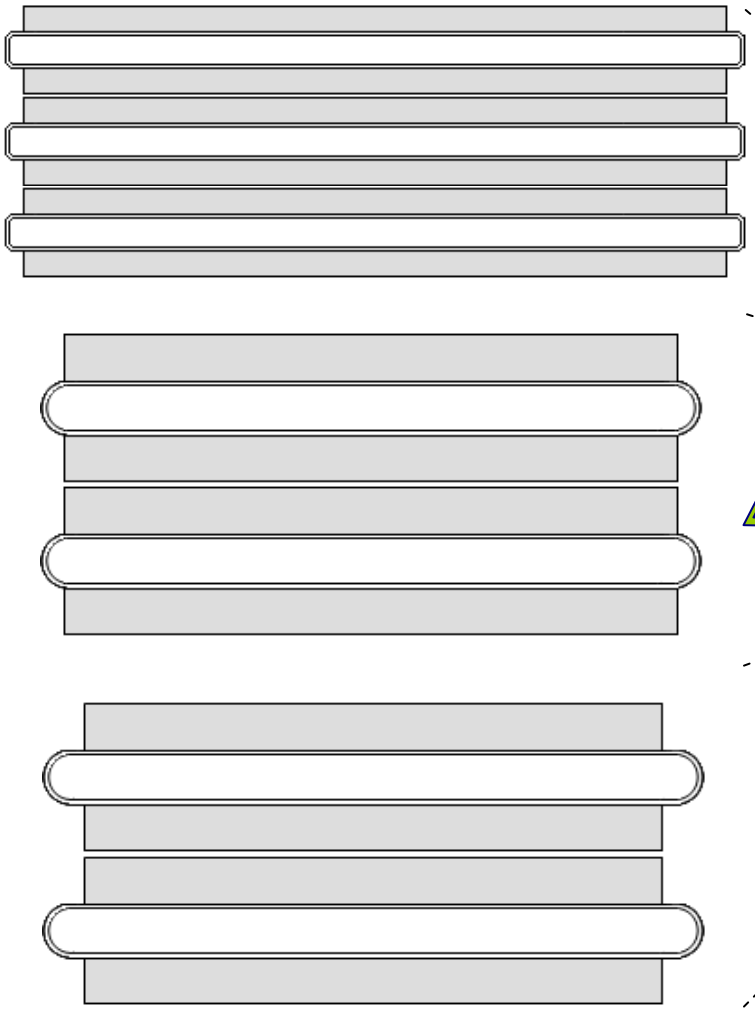
Issues Plaguing the ACC Industry

- COLD WEATHER OPERATION – EARLY 1990'S
- LOW NOISE OPERATION – MID 1990'S
- WIND EFFECTS – LATE 1990'S
- FAC AND IRON TRANSPORT – EARLY TO MID 2000'S
- OTHER ISSUES – RAISED BY INTEREST GROUPS

SSC – ACC Comparison

Nominal 400MW ST	SSC	CS-ACC	HI-MAX SS™
Total Internal Surface, ft^2 (ST flange to cond drain)	28,100	132,600 *(5x)*	205,500 *(7x)*
SS Surface, ft^2	26,300	0	195,000
CS Surface, ft^2	1800	132,600 *(75x)*	10,500 *(6x)*

Result: Bundle Geometry Provides Enhanced Effectiveness



Extended Surface, m^2	X Sectional Area, m^2
146.8	0.752
~123.1	~0.586
~117.3	~0.586

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Holtec's Material Solution

- Competition

- Holtec

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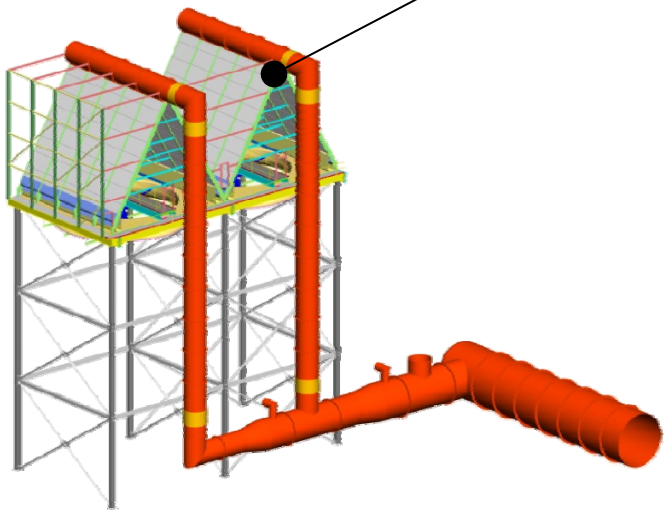
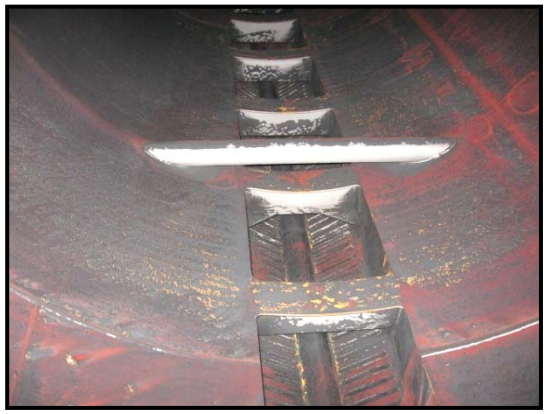
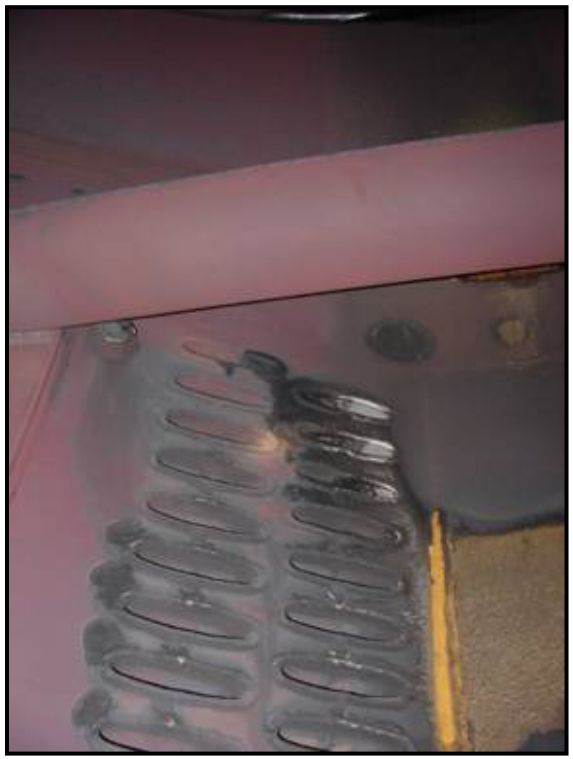
Flow Accelerated Corrosion

- Exacerbated by high velocity condensate droplets eroding the protective magnetite layer
- Noted occurrences in ducting and tube inlets
- Area most sensitive to breach:
  ACC TUBES





Flow Accelerated Corrosion



- FAC causing material wear and pressure boundary breach
- Time to failure depends on chemistry, steam velocity, and plant cycling

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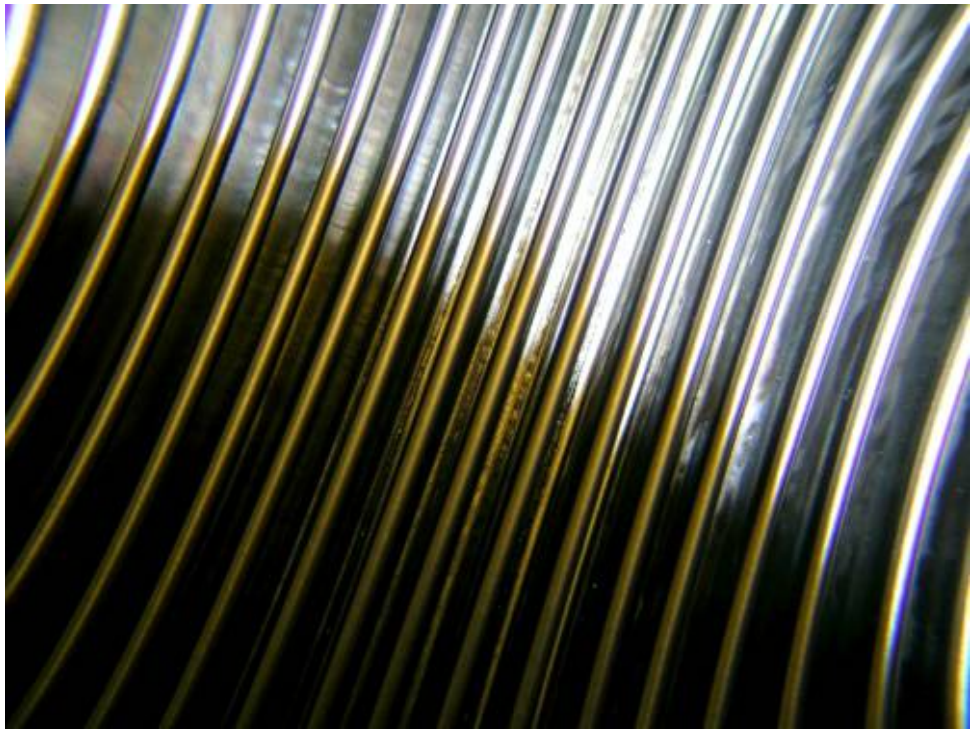
Iron Transport

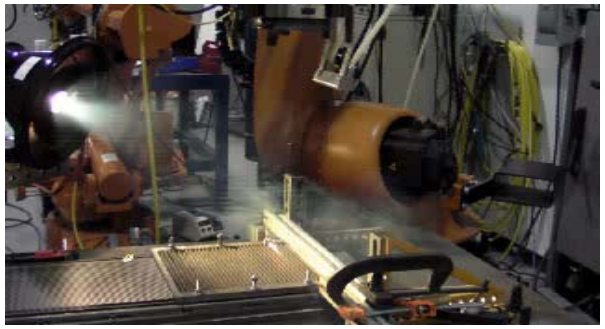
- Water requirements becoming more stringent
- ACC's extend plant commissioning activities = significant time and cost penalties
- Holtec's HI-MAX SS bundles replace ~95% of an ACC's internal surface area with stainless steel

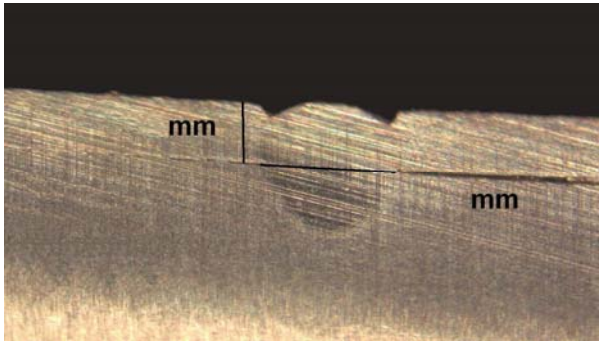
Result: Market Leading Tube Bundle Technology

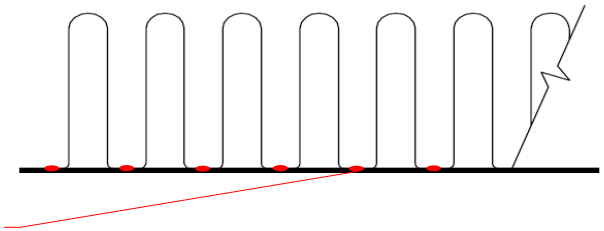
- Geometrically Optimized
- Materially Optimized
- Performance Verified
- Corrosion Resistant

Market Leading Tube Bundle Technology









- High Speed Continuous Weld of each fin valley
- Up to 5200 welds per tube

Fin & Tube Forming

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Automated Material Handling & Laser Welding Process

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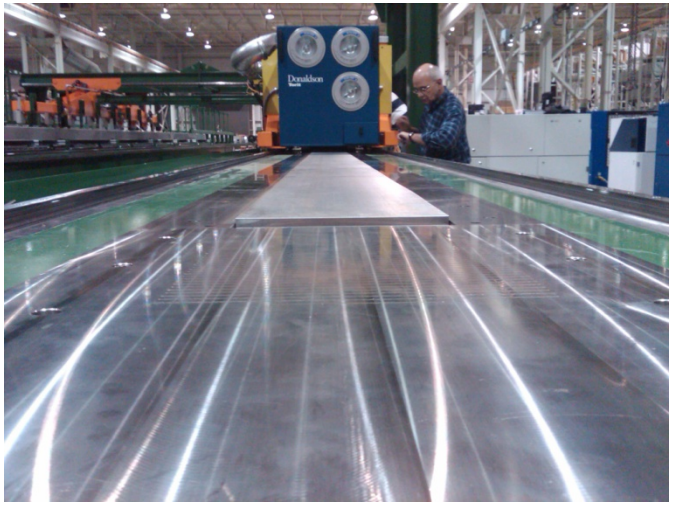
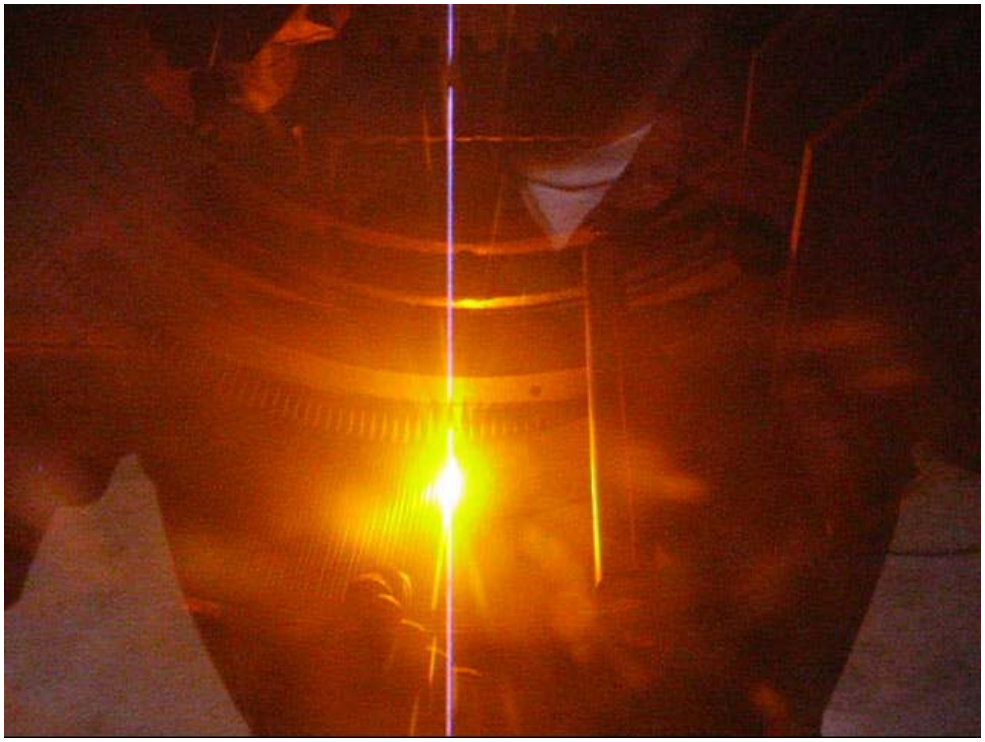
100% Laser Welded Fin to Tube





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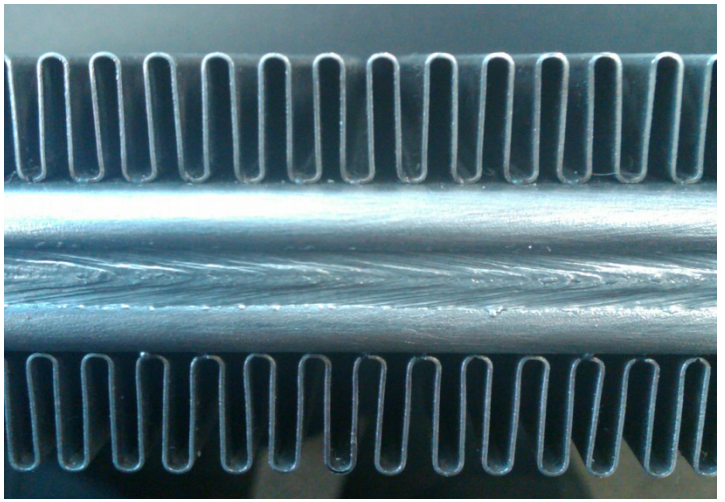
Tube MIG Welding



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Robotic Tube to Tubesheet Welding

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Pressure & Vacuum Testing

- 100% Tube Pressure Testing
- Engraved Serial Numbers

- 100% Bundle Vacuum Testing

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THANK YOU