Weil-McLain

Computer Simulation Helps Optimize Boiler Efficiency While Reducing Prototype Cost

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Weil-McLain, a unit of SPX Corporation, is a long-established leader in the space conditioning and water heating industries. Based in Michigan City, Indiana, U.S.A., the company manufactures and markets the Ultra™ line of high efficiency gas and oil-fired boilers.

TECHNOLOGY USED

FLUENT® CFD Software

CHALLENGE

The challenge was to develop a new three-pass, oil-fired, horizontal-flue water boiler and:

- Increase heat transfer efficiency and reduce combustion gas pressure drop
- Reduce six month lead time to build and test prototypes
- Avoid prototyping ill-fated designs
- Gain competitive advantage by speeding time-to-market, lowering design and production costs, and building superior products that are both unique and reliable

SOLUTION

The engineering team used a computational fluid dynamics (CFD) software solution to:

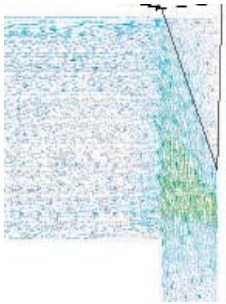
- Simulate and highlight the performance of the designs, specifically the effects on fluid flow patterns and heat transfer
- Guide the selection of a final set of prototypes in order to choose the most efficient and economical design

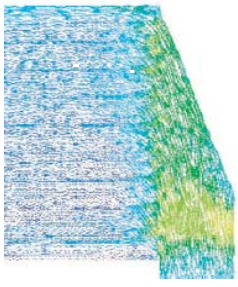
A solid model of the design that had been developed using PTC's Pro/ENGINEER® computer-aided design software was imported into the CFD preprocessor GAMBIT® and prepared for analysis. Consultants worked with the Weil-McLain team to move the project along quickly while they rapidly came up to speed on CFD technology.

RESULTS

- Increased the efficiency of the heat exchanger to a near-industry-leading 86+ percent while keeping manufacturing costs low
- Eliminated the need for additional baffles, reducing design complexity, manufacturing requirements, maintenance issues and product cost
- Performed a series of rapid design iterations that took much less time and expense than relying solely on building and testing physical prototypes would have taken
- Saved approximately $300,000 in prototyping expenses by using simulation to minimize the number of physical prototypes tested and made it possible to bring a new product to market six to 12 months faster than using traditional build-and-test methods

stagnant recirculation zone





COMPANY INFORMATION

Country: U.S.A.

Industry: Space conditioning and water heating industries

WEIL-McLAIN
Without compromise -1881-

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KEY IMPACTS

- Increased heat exchanger efficiency 86+ percent
- Cut $300,000 in prototyping expenses
- Introduced new product to market 6 -12 months faster

Far left: Velocity vectors show a large area of stagnant, recirculating gas that promotes little additional heat transfer potential
Near left: A much higher average velocity is in contact with the back wall which will promote better heat transfer effectiveness

CASE STUDY