EFFICIENCY
Energy for the Future

case study

New Kiln Offers Dramatic Performance Improvements

SUMMARY

Increased demand for Pacific Clay Corporation's bricks and related clay products prompted the company to seek new ways to expand capacity at its plant in Lake Elsinore, California. Pacific Clay's international search ended with the selection of a Swindell Dressler low-thermal-mass (LTM) kiln that not only increased capacity, but also yielded a number of other key benefits, such as reduced breakage, quicker heat-up after shutdown, and lower gas costs.

BACKGROUND

Pacific Clay has been supplying the Los Angeles area with brick and clay products since the early 1900s. For decades, the plant has been using two 1950-vintage natural-gas-fired tunnel kilns. Bricks were formed and stacked six-feet high on cars with high-refractory characteristics. The cars then ran through the tunnel dryers and kilns, which fired the products in about 48 hours.

As the kilns grew older and production needs grew, Pacific Clay began looking for an additional kiln that would improve productivity and reduce production costs. In particular, the company wanted to improve the quality of the final product, since variations in product quality stemmed from uneven heat distribution.

NEW KILN SELECTED

Pacific Clay conducted an international search for alternative kiln designs and opted for an LTM kiln from American manufacturer Swindell Dressler.

The new kiln has a number of key features and benefits. It achieves low thermal mass by using LTM kiln cars and by replacing the traditional refractory brick on the inside walls of the kiln with a ceramic fiber insulation. As a result, the kiln heats up more quickly. In addition, the kiln cars' lower profile design improves heat penetration into the center of the brick mass. Improved burner placement, which enhanced heat circulation, also reduced firing times.

Left: Pacific Clay's Plant
Right: New LTM Kiln Cars

PERFORMANCE CHARACTERISTICS

The new kiln delivers dramatically improved performance compared to the previous technology. Production capacity increased by 100%, while production loss rates dropped from 10% to 5%. In addition, drying and firing times were decreased by 50%, while natural gas consumption was reduced by 28%. Further, the new kiln reduces NO_X emissions by 20%.

Pacific Clay has yet to see labor and maintenance savings, because new firing cycles must be established for new products, and startup problems caused delays. Further, the lack of energy-use metering and current records precludes the direct comparison of some characteristics.

Table 1 summarizes the performance results of the new LTM kiln.

Table 1. Comparison of Old and New Kiln Plants

Characteristic		Old Kiln	LTM Kiln	LTM Kiln Improvement
Production capacity	tons/year	30,000	60,000	100%
Product height (on kiln car)	inches	72	14	na
Production loss	%	8–13	5	50%
Firing plus drying time[1]	hours	96	48	50%
Preheat time (cold start)	hours	96	24	75%
Natural gas consumption	therms/ton	67.3	48.7	28%
NO_X emissions (oxidizing)	lb/ton brick	0.377	0.302	20%

[1]Exact duration depends on product requirements.

With such obvious environmental benefits, Pacific Clay sought funding assistance from organizations supporting such projects. Through a grant from the U.S. Department of Energy's Office of Industrial Technology (OIT), the California Energy Commission (CEC) provided $385,973.00. DOE's funding was available from OIT's NICE[3] program (National Industrial Competitiveness through Energy, Environment, and Economics), which was established to help promote the installation of advanced, energy-saving industrial technologies.

As an indication of the project's success, Pacific Clay is considering purchasing another LTM kiln for a similar plant in Nebraska. In the words of Allen Cunningham, Pacific Clay's vice president, "Yes, we'd definitely do it again!"

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U.S. Department of Energy Office of Industrial Technology, www.oit.doe.gov/nice3