

SAVING Space

Two very different pottery operations are enjoying increased kiln capacity and other benefits through the use of advanced NSiC kiln shelves.

by **Susan Sutton**, Editorial and Production Manager

Potters often view kiln furniture simply as a means to an end. You've worked hard to create your ware, and you just need something to put it on while it's fired in the kiln. The shelves have to be able to withstand high temperatures, and they've got to stay flat without warping over time. It would be nice if the furniture were lightweight and easy to store, but sometimes you can't have everything—so the cheaper the better, right? Well, maybe not. Two potters have discovered that paying a little bit extra up front for advanced nitride-bonded silicon carbide (NSiC) kiln shelves is saving them a lot in the long run.

A Big Operation

Peter Deneen owns Deneen Pottery in St. Paul, Minn. With about 20 employees, Deneen's primary product is custom-made, hand-thrown stoneware coffee mugs, which the company markets to country inns and bed and breakfasts across the country. Deneen fires its 48-cu-ft electric kiln daily to around cone 5 (2167°F) and produces about 3000 mugs a week.

The company had been using high-alumina kiln shelves for years, but Peter was disappointed with the warping, sagging and cracking that occurred over time. "The furniture lasted only about three to four years," he says. "Eventually, the shelves would sag in the center, and then after that they'd crack."



The kiln at Deneen Pottery. The company can load 100 additional pieces per firing using the 5/16-in. Advancer shelves.

Peter had heard good things about Advancer® NSiC kiln shelves.* "I was told that these shelves wouldn't warp over time and that they'd outlast the shelves that we had been buying," he says. He began testing the shelves in November 2004 and moved them to full production in January 2005.

While not enough time has passed for Peter to evaluate the shelves' resistance to warping, other benefits were obvious right away. At 5/16 in. thick, the new NSiC shelves are considerably thinner than the 5/8-in.-thick kiln shelves he had been using, which enables the company to load an additional 100 mugs in the kiln for each firing. "We used to get 600 mugs in the kiln," explains Peter. "Now we can get 700 mugs in it with

the Advancer shelves." Because of the increased capacity, the company is going to be able to cut back on its firing schedule, saving both electricity and wear on the kiln.

In addition, Peter was surprised by another immediate benefit. "The new shelves cut the firing time down by about an hour and a half over the other shelves we had been using," he says. "We were really pleased with that. The shorter firing cycle I didn't expect. It should reduce our electric bill by a couple hundred dollars a month."

A Smaller Setting

In Chicago, Ill., Eric Jensen runs what is basically a one-man operation. (He has someone come in one day a week to help out.) He produces primarily high-temperature (about cone 9, 2300°F) porcelain dinnerware, which he sells to craft, gift and art galleries all over the country. Eric fires about once a week, with a minimum of 100 pieces in each kiln load. "For one person, it's a fairly big number because I'm making a lot of smaller items," he says.

Eric creates his own glazes, hand builds each piece, and loads and unloads his natural-gas-fired kiln for each firing. Every plate, bowl and cup represents a large investment in his time and energy, and losses can be devastating.

About five years ago, he decided his cordierite kiln shelves were more bother than they were worth. As the shelves

*Manufactured by Saint-Gobain Ceramics, Worcester, Mass. For more detailed information on these and other lightweight kiln furniture options, see "Lighten Up," *Pottery Production Practices*, March 2004, pp. 3-10.

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Perspectives on Durability

Deneen: *We accidentally knocked an Advancer shelf off the top of our stack. It fell onto the concrete floor probably from about 5 ft and it didn't break. I couldn't believe that.*

Jensen: *I consider them very sturdy, although I treat them like a pane of glass. I'm very careful with them and I have had no problems.*

Browne: *With older silicon carbide shelves, sometimes you'll see little cracks in the edge that just go in a little bit. You can't get that with Advancer. If you've got a crack, it's going to make its way right through because the shelves are so dense. However, the nice thing about Advancer is that all the corners are rounded, so you can bump a shelf on the edge of the kiln or something and it's not as likely to just snap off.*

degraded over time, they spit off tiny bits onto his ware during firing. He could either spend more time to grind down the bits and try to salvage the ware, or consider the pieces a loss. Neither option was attractive. "I had a lot of ruined plates," says Eric. "As the years went by with these shelves, it was an increasing headache."

The cordierite shelves caused other problems as well. At 12 x 24 x 1 in. thick, the shelves took up a lot of storage space and were very heavy. "As you get older, that wears on you when you're trying to load that top shelf in the back," he laughs. The shelves also warped and cracked. This was especially problematic for the plates, which need to remain flat during firing.

Eric, who was in the process of building a new studio at the time, had heard about Advancer shelves on the Internet and through his contacts in the pottery industry. He had already budgeted for new kiln furniture, so he decided to try out some Advancer shelves. "I believe I bought 10 at first, which was already a sizeable investment, and I was sold on them right away," he says. "The major thing for me is that it has completely solved that spraying bits problem. For that alone, I think I'd pay 10 times what I paid for these things."

Eric now owns 50 Advancer shelves, and while they solved his main complaint, that wasn't the only benefit. "These are only $\frac{5}{16}$ of an inch thick, so I'm firing more ware with each firing, which makes a considerable difference, and that's also a lot of shelf mass that I no longer have to heat," he says. "Plus, the weight differential is magnificent. To not have to struggle with those heavy shelves anymore is a relief. And I can store my 50 shelves on one cart now, where in the past it would have taken three times that space or even more."

And warping has never been a problem. "After five years, these shelves are still dead flat," Eric says.

To Wash or Not to Wash?

Depending on what's being fired, and how, advanced NSiC shelves may not require the application of any kiln wash. According to



Eric's kiln loaded with ware and Advancer shelves.

Marshall Browne, application specialist for Smith-Sharpe Fire Brick Supply of Minneapolis, Minn., factors such as body and glaze formulation, firing temperature, and the level of reduction in the firing could all influence the amount of sticking potters might experience with Advancer shelves. "Most people that fire porcelain at cone 6 or above will experience some sticking if they don't use any wash," he says. "On the other hand, a lot of people can fire stoneware with no wash on their shelves and the body doesn't stick. Glaze drips tend not to get a very good grip on Advancer shelves, because the product is very dense (less than 1% porosity). Additionally, glaze drips usually happen later in the firing, so the glaze doesn't have a long time to sit on there and react the way a foot ring would."

Peter and Eric have had different results with the need for kiln wash on the shelves. "Our glaze volatilizes during the firing and coats everything in the kiln," Peter says. "The shelves were starting to get a thin coat of glaze on them, which could have been problematic after many firings." Glaze dust on the mugs also fell off during stacking, so small bits ($1/32$ in. diameter) would coat the shelves and

cause the mugs to stick. Peter decided to test the shelves with kiln wash. After some trial and error, the company is using the same kiln wash formula it had developed for its high-alumina shelves, and sticking is no longer a problem.

Eric's experience with kiln wash has been completely different. "These shelves are so hard that my glaze does not get below the surface at all. I've now dripped glaze onto these Advancer shelves a number of times," he says. "I have no kiln wash

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Eric markets his high-temperature porcelain dinnerware to galleries across the country.

on them, no alumina dust, nothing. They're bare shelves, and it's impossible—as far as I can tell—for my glaze to adhere to these shelves so it won't come off. You can almost pick the glaze off these shelves with your fingers." In fact, on the rare occasions when Eric finds that he does need to use a grinder to remove the glaze bits, he has to be careful. "If I bear down too hard, I'll wear down the nib on my grinder, because the shelves are considerably harder than the grinding bits are," he says.

Eric's porcelain bodies don't even stick to the shelves on a regular basis, which is very unusual, though he does sometimes use a bit of alumina powder in wax resist on the feet of pieces that he thinks might cause problems. The bottoms of most of Eric's ware are typically flat, about 2 in. in diameter, and they don't incorporate foot rings. According to Marshall, spreading the weight across the larger area on the bottom, instead of concentrating it on the relatively small foot rings, could help explain why Eric's pieces don't tend to stick.

Most people, Marshall cautions, will experience a certain amount of sticking when firing porcelain at higher temperatures. "Porcelain bodies are typically very fluxed," he explains. "When the flux sits in the body on a foot ring for a long enough period of time, it will typically interact with that glass layer [on the shelves], and the foot ring will stick. The cure for that is to use a kiln wash that is high in alumina. Silica washes don't really help with that

problem. If you have a wash that normally uses flint with kaolin, I recommend substituting alumina hydrate, and that usually takes care of the problem."

Firing with a smaller amount of reduction, as Eric does, might also contribute to less sticking. "It's a rule of thumb in the refractory business that refractories melt at a lower temperature in the absence of oxygen," explains Marshall. "Most people who fire porcelain are firing in reduction, and that does cause things to flux a little bit more."

As is usually the case in the ceramic industry, there is no "one size fits all" solution to the kiln wash question. The good news is that there are solutions, and your supplier should be willing to help you discover the perfect one for you and your firing situation.

You Get What You Pay For

In this increasingly cost-conscious world, it's tempting to make decisions based on price alone. As Peter and Eric have found, though, spending more in the short term can sometimes save money in the long run. "All of the benefits outweigh the costs," says Peter. "This furniture's going to last longer, we get more layers in the kiln because it's so much thinner, and it reduces our firing time. The expense is outweighed by the savings we're going to see by having the product in production." ☉

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For more information about advanced NSIC kiln shelves, visit www.refractories.saint-gobain.com or contact Marshall Browne at Smith-Sharpe Fire Brick Supply, 117 27th Ave. S.E., Minneapolis, MN 55414; (612) 331-1345; fax (612) 331-2156; e-mail marshall@ssfbs.com; www.kilnshelf.com.