Herb's Corner: 2001031

One slab and a side of silicon carbide to go, please.

by Herb Tobben
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Herb Tobben creates solutions to customer problems at ZERO's Sample Processing facility.

The Problem:
A glass manufacturer was experiencing a lot of stress while cutting glass slabs. These "glass ingots" measure up to three feet by two feet, three inches thick, and weigh up to 150 pounds. The customer uses a diamond saw to cut the slab into strips, with the cut pieces going on to further processing, including meticulousness grinding and polishing. They eventually become precision laser lenses.

The sawing process, however, often caused the super-pure glass to crack. At tens of thousands of dollars a piece, each broken slab represented a significant financial loss as well as a costly production delay. The customer traced the cracking problem to residual stress in the outermost layer of glass. They needed to remove 1 to 3 mil of glass – consistently – from the top, bottom, and sides, and 2 to 3 mil from both ends of the slab. Machining seems like a good choice, but CNC machining broke the glass at about the same rate as the saw.

The customer's available air supply limited the proposed blast system to 500 cfm at 80 psi (about 9 automatic guns with No. 6 nozzles, plus air blow-off). The production requirement is low, just 32 parts a day.

The Solution:
We ate up a few slabs of glass experimenting with different blast media, gun positions, blast pressures, and feed rates. After a lot of micrometer measurements, we settled on 46/70 mesh silicon carbide media and on blast parameters that successfully shaved away the surfaces.

We designed a simple work-car-conveyor cabinet to process the six surfaces of the slab in two passes – hitting the leading edge, the top, and one side in each pass. After the first pass, the operator would flip and rotate the glass slab and send it through again to blast the three non-blasted surfaces.

So far, so good.

But, no matter how you flip and/or rotate a slab, you can't position all three untouched surfaces in place of the blasted surfaces. Trust me, we wrestled with this for a long time. (You can demonstrate our dilemma by placing a book face-up on your desk. Stick Post-It® notes to the top, spine, and front cover to represent the areas blasted in the first pass. Now, flip and rotate the book until you get the "non-blasted" surfaces into the positions formerly occupied by the sticky notes. If you get this to work, please call me immediately. I have a job in our lab for you.)

The machine we developed blasts the top, leading edge, and left side as the part enters. Then the operator flips the slab end-over-end, shuts off the air to the left-side guns and turns on the air to the right-side guns. The second pass through the cabinet hits the top, leading edge, and right side. By having the operator switch manifolds for left- and right-side blasting, we maintained the air-consumption requirements.

Just when you think you're an expert on a particular subject, some little forehead slapper will come along to challenge your assumptions.

Got a question about shot peening, abrasive blasting, or sample processing? Clemco can help. Call 636 239-8135 or submit your request online at www.clemcoindustries.com.

Herb Tobben is Sample Processing Manager for Clemco Industries Corp. He is a regular instructor at the Shot Peening Workshops.