KL ENGINEERING

CASE STUDY:

NEAR NET-SHAPE MACHINING: RING SEGMENTS CASE STUDY

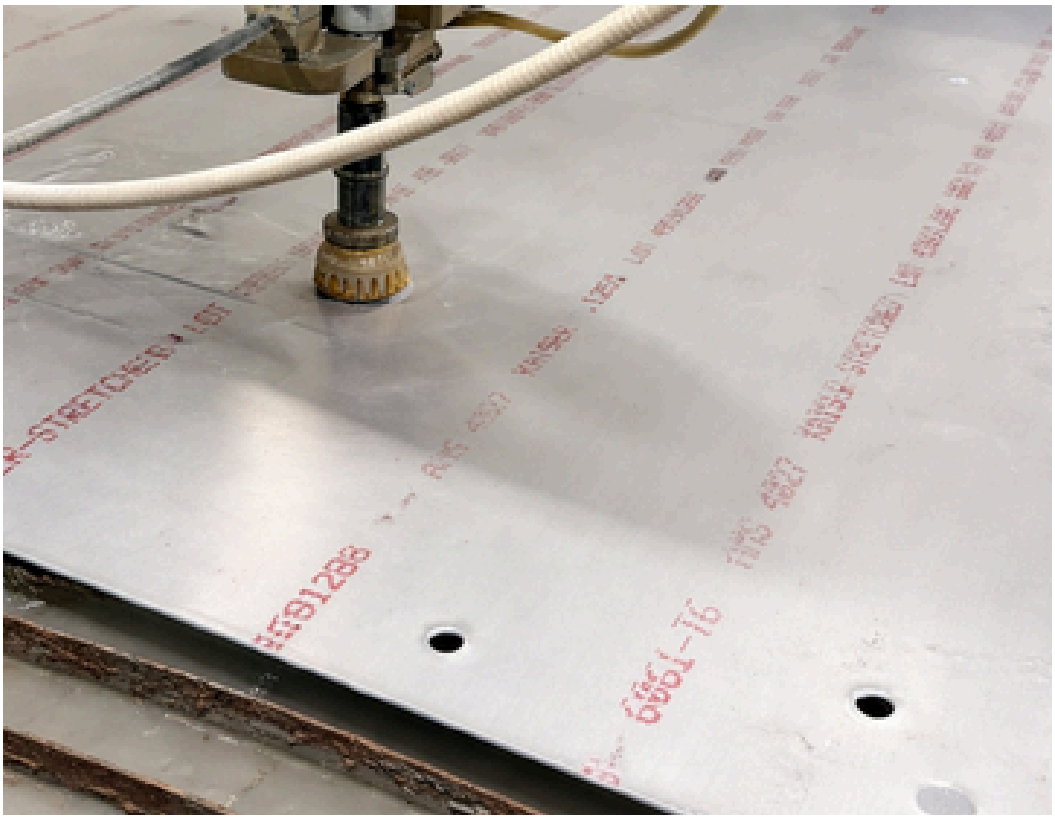
(408) 966-6940
www.kle-inc.com

CASE STUDY: CUTTING COST AND LEAD TIME WITH NEAR-NET SHAPE WATERJET PARTS

When a customer approached us seeking several sets of stainless steel ring-segment clamps for use on a large circular base plate, we saw an opportunity to approach the job differently. Rings are notoriously inefficient to machine from rectangular sawcut plate – you end up paying for (and wasting) a significant amount of material that never makes it into the finished part. This job turned out to be about as ideal an example of near-net shape manufacturing as we typically see.

The Parts

The finished parts are a set of manufacturing fixtures – specifically, ring segments used as clamps in a downstream operation at the customer's facility. In cross-section, each ring is L-shaped, with a substantial undercut that allows it to clamp down on a mating surface. There are two versions: a larger and a smaller ring segment.



Quoting Both Ways

As we do on jobs where the material geometry lends itself to it, we quoted the work two ways – starting from sawcut plates and from near-net-shape waterjet blanks. When the near-net approach comes back more expensive or doesn't offer a meaningful lead-time benefit, we go with the conventional route. In this case, the nesting advantage was substantial. By stacking and nesting multiple rings on the waterjet, we dramatically reduced the starting material compared to what we would have needed for a rectangular sawcut plate.

Lead Time: The Bigger Win

The cost savings were real and were passed along to the customer, but the lead-time story was the headline. The sawcut plate would have to come from the Midwest and would have to ship via LTL, meaning we would have been waiting on material for 2-3 weeks before we could even start cutting chips. On top of that, machining the parts completely from a rectangular plate would have meant somewhere in the neighborhood of two to three times more spindle time on the mill.

Start to finish, we delivered finished parts in about three weeks – roughly the same amount of time it would have taken to receive the sawcut plate and begin machining.

The Machining Work That Remained

Near net shape doesn't mean no machining. These parts were CNC-finished on every surface – no raw waterjet edges remain on the final product. Roughly 25 to 30 percent of the material still had to be removed in the mill to create the L-shaped undercut, add holes and counterbores, and put generous edge breaks on everything for safe handling.

The work ran in two setups:

1. **Larger ring segment.** We built a dedicated fixture plate with tapped holes. The first operation used toe clamps at the top of the part to hold it against the fixture while we machined the initial features, including holes aligned with the fixture's tapped holes. Once those holes were in, we bolted the part down through them, removed the toe clamps, and finished the perimeter without clamps in the way.

2. **Smaller ring segment.** To simplify workholding, we designed fixturing features directly into the waterjet blank – flats that let us grip the part in a standard vise. First op from the top, then flipped into soft jaws to finish the backside.

Why This Job Worked So Well

A few things lined up to make this a textbook near-net shape application:

- Ring geometry is inherently wasteful when cut from a rectangular plate. The nested waterjet layout recovered a large share of that wasted material.
- The sawcut plate supply chain would have added weeks before any machining could begin. Waterjet blanks eliminated that delay.
- Stainless steel is hard on tooling. Reducing mill time by 2–3x meant real savings in both runtime and tool consumption.
- The customer got finished parts faster and at a lower price, and we kept a mill free for other work instead of tying it up hogging out stock.

Let's Build the Right Solution – Together.

At KL Engineering, capability and flexibility unite to serve one purpose: your goals. We don't believe in one-size-fits-all. Instead, we tailor every project to fit your unique needs, seamlessly aligning with your processes and priorities. Ready to move forward with a partner who adapts to you? Visit our website or contact us today to get started on your next project: www.kle-inc.com.