

## **Aluminum Forging Innovation by Oak Ridge National Laboratory & Queen City Forging**

Queen City Forging Company is a 130 year old plus company. The company was incorporated originally in 1881. Over all those years, it's had lots of ups and downs. The company was really in a state of decline because so much of the business had gone offshore, which was really clear to me that we had to take some different direction.

That's really when we made a change from what I'd call just being concerned with bulk deformation, to being concerned with metallurgical properties, and how do we achieve the superior metallurgical properties that forgings can offer.

The whole forging story in Queen City, it was really born out of more basic science. We discovered through a rapid heating technology that we developed using infrared heating, that we could get extreme grain refinement, and getting the extreme grain refinement, we have an enhanced fatigue property. We went all the way through to doing the first 50 turbochargers, and did testing with their supply chain to show that it would work in Diesel engines, and then we went one step further, and we put a prototype system on Queen City Forging's floor.

The electric infrared, that was provided by Oak Ridge, was obviously superior, and the metallurgical results, we were actually so shocked that there was such a great difference, I absolutely insisted they had to do it again.

We took pre-heating times from multiple hours to 10 to 15 minutes, so that in itself was very significant in reducing the energy to actually make a turbocharger.

What we've got is a revitalization of where we are today. New technology, like infrared heating, producing much different, and much superior, metallurgical results, really saved our bacon. The parts we're making through that infrared furnace everyday, we're producing tens of thousands per month. We're producing hundreds of thousands per year. That's all been very positive, and it's all helped grow the business, so it's been a stepping stone.