

**GS: You joined the company in February. What attracted you to the position?**


**RN:** I had worked with the president of Eldec U.S.A. years ago at another company, and when he contacted me about the job I did a little research and found that it has a unique induction hardening technology that I found very interesting. It's called simultaneous dual frequency induction hardening, or SDF, and it involves a specialized induction power supply that allows for the use of different frequencies at the same time to generate a hardness pattern on geometrically complex shapes, such as gears. Induction heating induces the flow of electrons to create an eddy current that generates heat in the surface of a part. These power supplies are self tuning, and by using different frequencies the heat is generated in different places on the part. For instance, a higher frequency generates heat in thinner places, such as the tooth profile, and a lower frequency does the same in more massive areas, such as the root of a gear. So the magnetic field that is created via the flow of an AC current through the coil in an induction heating system basically causes the part to generate its own heat.

**GS: In what way would this be of benefit to gear manufacturers?**

**RN:** First of all, it's the fastest way of hardening a gear, much faster and much more efficient than either standard or vacuum carburizing, because it takes less than a second rather than hours. And it also hardens one part at a time, which really makes sense when you consider the way gears are manufactured. What you'll often find is that a manufacturer has developed a system where gears proceed individually through a number of processes, and when it comes to the hardening step the parts are gathered into batches and loaded into the oven. There are a number of problems with that. Number one, you've just introduced a bottleneck in your one-piece workflow. Plus you're using a ton of energy to heat up this carburizing oven. And if something should go wrong, you've ruined the whole batch. With the

SDF process you maintain your one-piece workflow, and it only uses about 10 percent of the energy required by standard carburizing.

**GS: How about the initial capital expenditure required to invest in this technology?**

**RN:** It's really no different than what a standard or vacuum carburizing oven would cost, and sometimes much less. A big oven could cost a million dollars or more, while our system could come in at five or six hundred thousand dollars—or more, depending on the size of the generator and the complexity of the work handling. One thing to point out is that a manufacturer may need different coils and part-handling components for gears of different shapes and sizes, so the SDF technology really works best for those who are producing large volumes of gears that are of similar size and configuration. A key benefit is that the system is highly flexible, allowing the operator to vary the power level of the respective frequencies. For a manufacturer who's producing many different types of gears, this gives them the ability to immediately adapt according to their product demand. And you essentially have three inductive processing capabilities in one package, since you can operate at medium or high frequency, or a combination of both, which is ideal for complex gear designs. Another great thing about SDF induction hardening has to do with its affect on the actual part. When we're talking about gears, the heat is generated right at the place that needs to be hardened rather than the whole part. That's very different from carburizing, where the whole gear is subjected to the same amount of heat, which can cause distortion. So there's negligible distortion associated with SDF induction hardening, and once the proper process is put in place you can get very close to eliminating the final machining after heat treating. We think that's a huge advantage for any gear manufacturer. The SDF system can increase throughput, decrease distortion, and slash energy costs, all of which should be very attractive to the gear manufacturing industry. 



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### FOR MORE INFORMATION:

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