Jon Trout

Manager of Transmission Design
FirstEnergy

Interview with **Jon Trout**

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Jon Trout's current role is Manager – Transmission Design for FirstEnergy, responsible for the Transmission Design activities in the Akron, OH office. Jon's previous experience at FirstEnergy included significant experience with Transformer specification and purchasing. Jon also has experience at SD Myers, working with industrial applications on Transformer Life Cycle analysis, including condition assessments, online DGA monitoring and transformer electrical testing.

Jon Trout is Manager of Transmission Design for FirstEnergy, an electric utility headquartered in Akron, Ohio. FirstEnergy is involved in distribution, transmission, and generation of electric power. Trout previously worked with transformer manufacturers to supply FirstEnergy with reliable electric power system equipment. He has experienced many changes in the world of transformer technology over the years, and we were curious to find out what changes he considers to be the most important. Alan Ross spoke with Trout about what changes he's seen so far in terms of design, manufacturing, and application, and how those changes might affect resiliency and reliability in years to come.

Transformer Technology: What is the most significant transformer design and manufacturing change you have seen in your career?

Jon Trout: The increase in the accuracy of our design techniques has really changed the way transformers are manufactured and built. Transformer design continues to advance, and the technology around analyzing the various aspects of the transformer continue to improve. Manufacturers optimize their designs to smaller and smaller margins. That optimization impacts how the transformer gets built, how much safety margin is involved, and how much additional material is in the transformer.

TT How will technology change either for transformers or substations in the future, and what does that mean in terms of operation and maintenance of transformers and substations?

JT I would love to tell you the future, but I don't fully know what it's going to be. But it is going to be interesting to see how the optimized designs perform over time, and what that means for reliability and for maintenance. Exactly what that looks like, though, I don't really know. But I'm curious to see.

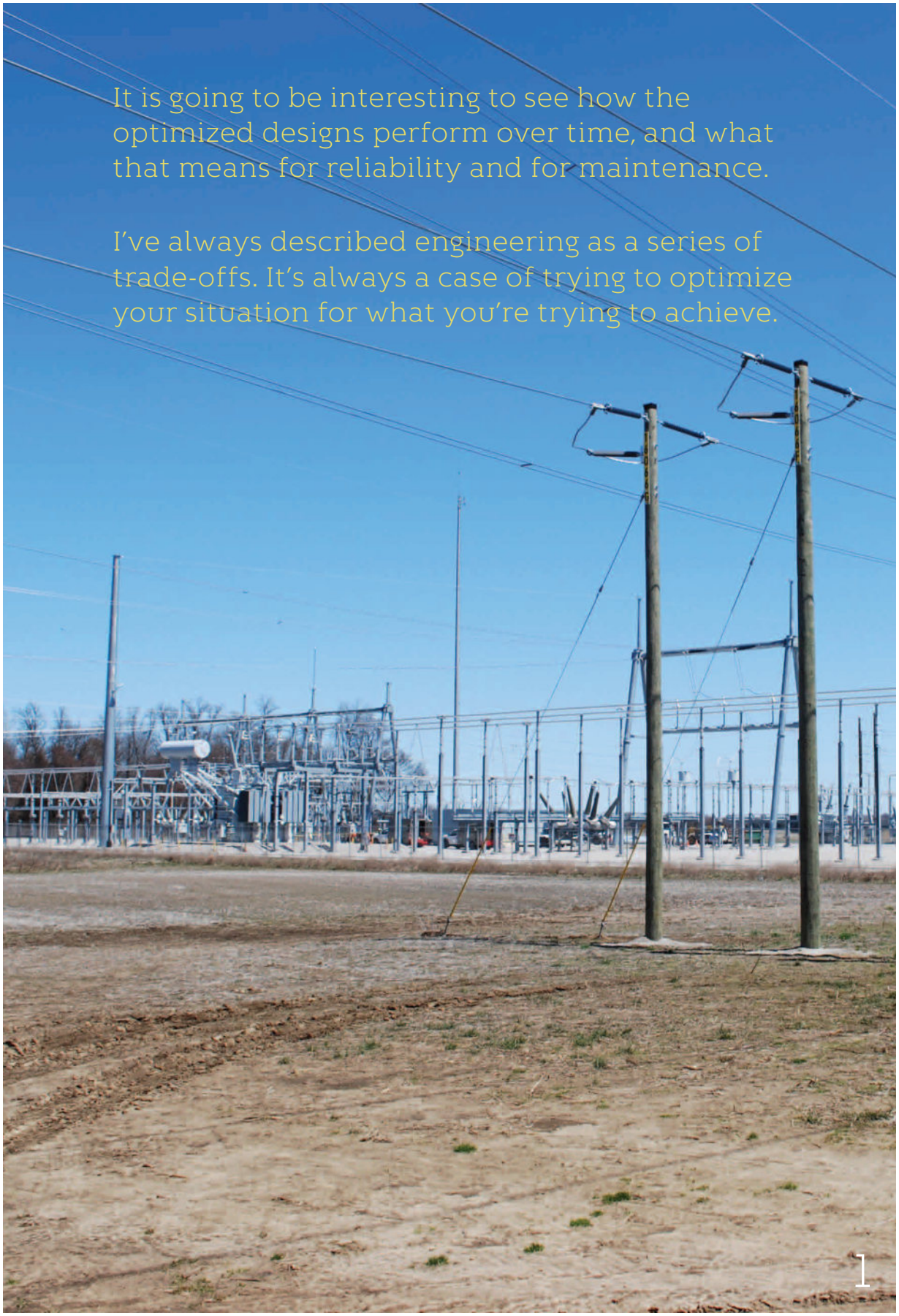
TT You have probably seen more transformer manufacturing in your career so far than most of us in the transformer business will see in a lifetime. When you evaluate buying a new transformer, what is your process?

JT There's a lot of very capable people out there who've seen a lot more than me, but I have seen quite a few. The process that I go through when I'm evaluating a manufacturer is to look at the different aspects of their design process and their manufacturing process. When I'm evaluating a plant, I'm looking to see how they control the flow of material through the plant, how they handle transformer windings, how the material is handled, and make observations on the press board and wire. Cleanliness is very important. What sort of set up is there to maintain the cleanliness of the windings? Because the contamination of the windings can be a big problem, and maintaining good cleanliness around the winding room is very important.

I look for how they maintain the other areas of manufacturing too. There might be dirtier processes like welding, or steel cutting, and I need to see how they keep the contamination generated by those processes away from the windings. Then I ask how they maintain dryness and maintain the moisture content in the winding of the core and coil assembly, and what different drying processes they use to maintain those levels of moisture. I also consider the testing facilities, because once they build the transformer they have to be able to test it to the applicable standards. Do they have sufficient test equipment? Do they have knowledge of the testing standards?

I also look to see how integrated the engineering is with production, because having the engineer readily available to answer questions about the design can be very beneficial to eliminate issues in the future.

There's a lot more that goes into it, but that's a high-level overview of how I'd evaluate a manufacturer.



1) FirstEnergy nearing completion of transmission project to support Northern Ohio.

Photo by FirstEnergy

Sometimes older units have a little more resiliency, in that they could be used in applications that they were never intentionally designed for.

2) FirstEnergy's grid modernization program in Pennsylvania.

3) In 2016 FirstEnergy completed work on a new transmission substation to help support shale gas industry in West Virginia.

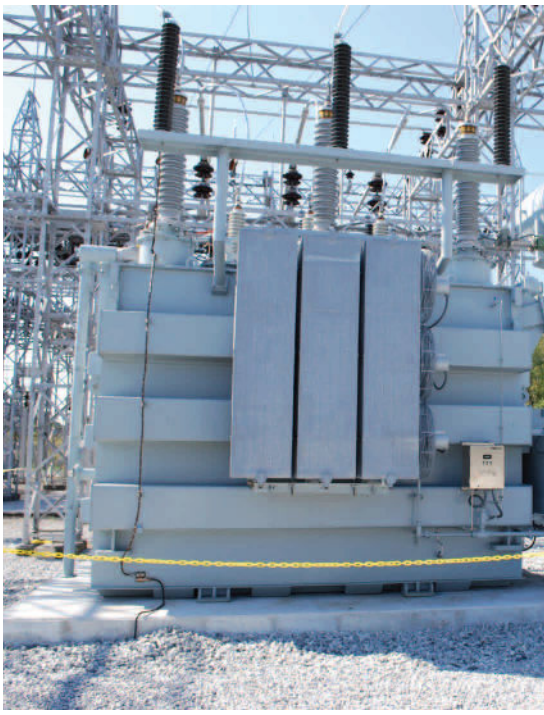


Photo by FirstEnergy

TT You mentioned that reduced margins are an aspect of new transformer designs. We've seen an 840 MVA utility transformer being replaced by a 950 MVA utility transformer, with the new transformer weighing in at five tons lighter than the old transformer. That's a lot of this margin that you talk about! When you consider the build of today's transformers versus the ones that are already 30 or 50 years old, what do you think the impact of that will be, in terms of resiliency and reliability?

JT I've always described engineering as a series of trade-offs. It's always a case of trying to optimize your situation for what you're trying to achieve. Manufacturers and utilities and the owners of these transformers are all playing that balancing act of how to optimize the situation. Utilities and transformer owners have financial constraints around the available resources they have to acquire the equipment that they need. Likewise, manufacturers have constraints around their resources of what materials they can purchase. So everyone is looking to optimize the situation.

I think that we're going to find that the designs that are being put out now will be adequate and perfectly capable for the applications to which they're being applied. Sometimes older units have a little more resiliency, in that they could be used in applications that they were never intentionally designed for. That flexibility may not be there any longer, where you could apply a unit in an application that it wasn't initially designed for and it would function adequately. Now we might have a little more of a challenge if we try to follow that same process.

TT Gassing is probably the number one test in the utility industry. What transformer gassing issues cause you immediate concern?

JT Gassing is an excellent indicator of potential problems. Sometimes the gassing is in a situation where you need to be able to trend the information to see what's happening. I have some experience working alongside a steel manufacturer, helping them evaluate the conditions of their transformers based on some online gas monitoring, and we were able to watch some units over the course of time that were gassing. By observing trends, however, we could see that the gassing was steady over time, which meant there was no apparent incipient fault happening.

One particular unit had a significant spike of gassing at a very specific time, and that unit then settled back down there very little gassing over the next few months. And if you don't know what you're looking for, you may see a spike like that and overreact, or maybe under react to a gassing situation that seems under control when you haven't seen the spikes. It's a challenge in the industry that everyone's trying to get their hands around. But we've got a lot of experience in the industry, and it's ever-evolving. There's always new challenges and new opportunities to understand the condition of transformers based on the gassing and other oil quality tests.

4) FirstEnergy invested about $371 million in 2017 on distribution and transmission infrastructure projects to help enhance reliability for customers in the Ohio Edison service territory. Major projects included building new substations and transmission lines, installing equipment in existing substations, adding remote control equipment on circuits, and the inspection and replacement of utility poles.