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What do you do? I sell gears!

What reaction do you get at a cocktail party when you try to explain your profession?

This year, my 11-year-old daughter asked me to be one of the parents who presented their profession on career day. She is very proud of her dad and wanted to show all of her classmates the cool job that her dad had. After all, being a gear engineer is just as cool as being a firefighter, or a police officer, or a teacher, or a social worker, or an orthodontist. The biggest difference between being a gear engineer and all of these other professions is that the others are all public-facing professions that people have a good understanding of, whereas they have little or no understanding of what a gear engineer is or does.

I get the same response from both adults and children when I explain that I sell gears and gear designs as a career. They all say, "Oh, like for cars!" When I start to explain that I don't sell gears for automotive applications but for ordinary industrial applications, their eyes glaze over, and they just nod their head.

When I presented to the sixth-graders this year, they answered just like their parents. The only concept of gearing that they knew was automotive in nature. It was my responsibility to educate them and expand their understanding. My first attempt at bringing a real-world gearing example to their attention was to show them the inner workings of the mechanical pencil sharpener. It contains two conical gears that intersect in such a way that they grind the pencil into a sharp point. Unfortunately, they no longer have mechanical pencil sharpeners in the classroom, as the students all use mechanical pencils these days. My next example was the gearing that operates the local drawbridge leading to the beach. They all knew the bridge, but as the gears are hidden from view, they couldn't visualize that example either. Next on my list was the conveyor belt used on the self-checkout at the local supermarket. I asked the students how they thought the belt was able to move. This finally clicked in their heads. They understood that a motor created the motion and a gear train moved that motion to the conveyor.

There are so many examples of gearing in everyday life, but they are mostly hidden and therefore go unnoticed. It could be the elevator that takes you up to the eighth floor of the hotel or the escalator that takes you up to the second floor of the mall. It could be the cash dispenser at the ATM or the postage machine in the post office lobby. It could be the electric can opener in your kitchen or the paper shredder in your den. Each of these items has gears inside of them, and their job would be impossible to do without gearing.

For each gear application, a gear engineer has used their knowledge of physics, strength of materials, thermodynamics, stress, strain, and mathematics to design the optimum gear for the usage conditions assumed for the project. When the gear is used as designed, the general public never realizes that it is working. Unfortunately, gears typically do all of their good work behind the scenes. It is only when they fail that they become exposed. This is when most people become aware of the gears around them in everyday life.

If I do find a sympathetic ear to listen to me describe my career as a gear engineer, the conversation will eventually turn to the availability of 3D CAD models and how they can simplify and prove out a design before producing physical gears. With the use of 3D printing, generating a physical prototype is becoming easier. However, just because you can draw something in CAD and have it 3D printed, doesn't mean that it can be produced using traditional gear machinery.

When you were a child, I am certain that you drew pictures that represented ideas that you had but were not possible in real life. Like the picture that you drew of your family. Mom and Dad, the cat, the dog, and your siblings, all standing in front of your house. In the picture Mom and Dad were almost the same height as the house. Either you had very tall parents or you lived in a very short house. In reality, neither was true. You just sketched out your thoughts, and the concept of scale was absent from your young mind.

Similar situations occur within CAD designs. It is certainly possible to draw a gear with a 20mm hub that has an 18mm bore, but is it practical to have a 1mm wall thickness on the hub? How could you machine this and maintain the concentricity of the hub? How about a gear with a Module 6 pitch and a face width of 4mm? It might look OK in CAD, but it wouldn't be practical in a real application.

I have always enjoyed being a gear engineer because each project brings unique challenges, but sometimes I wish that it was easier to explain what I do and where gears affect our everyday lives.

ABOUT THE AUTHOR

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