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Optimizing Cylindrical Roller Bearing Measurements
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Over the past summer, I travelled to China's Tsinghua University to work on a collaborative research project with a fellow Notre Dame student, two Tsinghua students, and a professor. The Timken Company, the largest manufacturer of bearings in the world, sponsored our research efforts. We were tasked with researching possible apparatuses and solutions to measuring a ribbed cylindrical roller bearing's, or CRB's, diameter. CRBs are used in everything from construction equipment to wind turbines to gear shafts. Like most bearings, CRBs are cylindrically shaped; however, they have ribs along the interior and exterior that prevents precise diameter measurements. In essence, our research can be broken down into the simply goal of researching ways to measure diameters. However, this task proves severely more difficult considering CRBs require a precise measurement with only an allowable tolerance of 0.001 millimeters and ribs that prevent ordinary diameter measuring devices from achieving precision. My research took me through circle geometry, precision manufacturing, and material science. By the end of the research internship, my team and I had compiled several plausible methods and mechanism concepts that could be used to measure CRB diameters.

At the conclusion of my time in China, I felt like I had grown intellectually and professionally. I had never done formal research before I went to Tsinghua, and really could not believe the intellectual freedom. When I take classes, I am told a specific way or approach to problems; when I did the research, there really were no limitations on the possible ideas that I could throw out there to approach problems. It was the first time where I truly believed that I was intellectually free to pursue my ideas and then support them with conclusive research and evidence.

Outside of the research aspect of the trip, I had the opportunity to live in Beijing for a little over seven weeks. I did not know any Chinese except "ni hao" (hello), never had been away from my family that long, and never had the opportunity to be completely independent. Though cliché, I felt like I had become an adult over the duration of the trip. There was no one to tell me what to do outside of my work. I had to be mature and take care myself.

By far the best experience of my trip to China was my interactions and the relationships I had built with my Chinese colleagues. Americans are infused with so many stereotypes of foreigners that we often miss out on necessary experiences that help deter ignorant worldviews. I will admit that I was scared to go to China...I hear so many awful things about their government from the US media. However, from talking with my Chinese colleagues, I realized that we really were not too different. I highly advise everybody to try and have an international research experience. You really need to step out of your comfort zone before you realize who you are and what you can achieve.