Sabbatical Summary
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Introduction:
The four main goals of this sabbatical were to observe international commence in New Zealand, become involved and connected with New Zealand Industry, to observe the technology education system and to establish international education opportunities in New Zealand.

Notes on New Zealand:
The average Kiwi knows much more about global markets than the average Wisconsinite for several reasons: Their market is influenced greatly by the exchange rate with the American dollar. Their news media spends about half of the airtime on US and news from around the world. New Zealand is a Socialist State and Health Care, Schools, Retirement, and a Safety Net (like welfare) exist via the government. They pay fairly high taxes, but people are generally happy and lead simple active lives. This experience has shown me that state education and healthcare can work and does in NZ.

International Commerce:
Through interviews with industrial and university personnel the goal was to establish what makes Kiwi industry different from the industry in Wisconsin and in the US. New Zealand’s main exports are Lumber, Milk powder, and some food products to are sent primarily to China and in just about 10 years because of the milk powder industry, farming has changed dramatically. During the last trip to NZ in 2002 there were a majority of Sheep farmers in New Zealand, and today, the largest dairy company in the world (Fonterra) is owned by 13,000 Kiwi (slang for New Zealander) Farmers. The farmers simply made the switch when economic conditions favored milk production. Now, when you drive down the motorway in NZ it looks like a volcanic version of Wisconsin.

The isolation of New Zealand works both for and against companies there. It is much easier to do business with a company on the islands, but the raw materials generally cost more and are more scarce, and nearby Asia is much closer to NZ than the US. There are free trade agreements with China and the government does not give much in the way of aid to industry. Therefore, the companies there need to be exceedingly clever and also very lean to survive.

The main industry under study for this sabbatical was the metalcasting industry and how they compete in the global arena. This part of the study was accomplished
during tours of metalcasting facilities and meetings with the owners and engineers from these companies. The response to the global competition varied greatly in both optimistic and pessimistic view on the subject.

**A&G Price:**

From Leab bulbs for the America's Cup to steel military castings for the Singaporean army this foundry made a large array of castings varying in size up to about 20,000 lbs. It is located in the Firth of Thames and is next to the water giving it both water and land access. The foundry has been in existence since 1868 and is one of the largest engineering works on the islands. It at one point in its history, it competed for railworks business and the powers that be promptly had their rail spur removed, after that the trains were brought in via the water and it continued to make railway parts and manufactures over 200 locomotives. They employ about 140 people and are a major source of income for Thames NZ.

Their niche is to make rapid response repair parts and other highly engineered parts. They employ several mechanical engineers for engineering work on the front end. This is different from the US because most of the engineering work (stress analysis, etc.) is done by the customer of the foundry and the foundry is usually only expected to cast it. This company was one of the few companies utilizing solidification modeling (Nova Cast and Nova Flow). Most of their senior engineers were imported from South Africa or England and this is fairly prevalent in NZ. I personally visited this company and witnessed a steel pour and toured the entire facility.

**Progressive Casting:**

This company has done well by buying up the customer base and equipment from other companies that have gone out of business in NZ by the outsourcing that is occurring. The owner Joe Crowler takes a very pessimistic view of the industry in that “the work that is still available here in NZ is only here because the purchasing agents are either too stupid or lazy to take the business elsewhere” and also has the philosophy “Whatever your requirements, give us a call. No job is too large, too small nor too difficult for us”. The can-do attitude of NZ business is that they have to adapt or they will no longer be in existence and I think that this is the major advantage of NZ foundries is that the people are highly skilled and will “have a go” at most projects that come their way. The US attitude is one of extreme caution and sticking to a particular type of cast product.

Progressive also agreed to help me with the senior design project I was helping with at AUT University. Since the foundry at AUT was not up to the task of casting the
cannon for the maritime museum in Auckland, Progressive agreed that we could use their facilities to cast the cannon.

**Hillside:**

Hillside foundry is located in Dunedin on the South Island of NZ and makes railway parts, locomotives, and cars for all of NZ. The foundry is part of the facility and makes mainly ferrous casting. The equipment is somewhat antiquated and re-investment has been neglected for some years it seems. When touring this facility it was part of a large group and I did not get a tour as detailed as the one at A&G price, but it seems that because the leadership and I believe the ownership was so closely linked to the government, this was not a company that looked to take on large complicated jobs, but was interested in the status quo.

The gating systems employed and general shop cleanliness and utilization of the equipment were very poor. This company would have about the same role as A&G price, but from what I saw was not a company destined for long life without government support.

**Centracast/Katipo:**

Centracast and later Katipo were foundries under meteoric growth when I arrived in NZ. The owner Martyn Newby is a personal friend and we attended graduate school together. The company Centracast was purchased a few years prior to my visit and makes centrifugally cast components in light alloys using permanent mold. Martyn also bought a company called Haag Blocks, which was a high performance aluminum engine manufacturer that supplied to the domestic, Australian, and US markets. Several false starts of large orders took away much of the working capitol and when customer in the US did not continue to take the agreed number of blocks per month the cash flow became unworkable. The banks took the equipment and auctioned it and both companies no longer exist.

This entire scenario happened while I was there in NZ and was sad to say the least. The lesson learned is that when small countries deal with the US, when there are problem with the US economy it is felt throughout the world and it is amplified.

**Skellerns:**

This is a small foundry run by two English immigrants and has about 8 employees. They make mostly copper bases castings and the owners came out of the British apprenticeship program. Both are highly skilled and can make anything, and solve
most problems for a fraction of the price that we would spend in the US. Equipment is one of the main difficulties for NZ foundries and an example of making do is the use of a Royer sand shredder being utilized to add water to the sand. This is ancient technology and the machine must have come from the US because Royer is in Wisconsin and still in business.

This company makes everything from winch drums for Maxwell Winch to parts that go on Mercury Marine engine in Fon Du Lac, WI. Their foundry was slow for nearly a year and was picking up when I left in July 2010.

**Glucina Metals:**

Ian Payne is the owner and Glucina metals, which is a secondary aluminum processor. They buy scrap aluminum, melt it down and alloy it for foundries and other users of aluminum. Glucina sponsored the project for Churchill Park School Tin Keels and paid a $500.00 donation for the project. Ian had a positive attitude toward the industry and was very helpful while I was in NZ. It is interesting to note that Ian Bought Centracast (Katipo) from the bank when it went out of business.

**Methven:**

Methven is similar to a NZ version of Kohler here in Wisconsin. They have very modern designs and make nearly every aspect of their products on site. They cast brass in permanent mold and when I visited it was with AUT University on a consulting project. We were trying to determine what the solution was for the shrinkage and leaking of a faucet they were trying to get into production. I spoke with them about the upcoming low lead alloys that would be necessary soon and they were interested in getting into the low lead alloys, but they can not recycle their machining chips on site though or even in New Zealand. This is an example of where it is difficult for NZ to keep up with the rest of the world because of the small market and the unavailability of certain items.

**CTNZ**

Casting Technology New Zealand is similar to the American Foundry Society in the USA. They promote learning and support for metalcasting in New Zealand. It is a small organization and only has one individual organizing it. Bill Lovell is the organizer and does a good job getting meetings organized and other events. I was the keynote speaker at the CTNZ conference in August 2009 in Dunedin, NZ. Bill organized several meetings and tours when I was there and was also a very helpful resource.
**Metalcasting Summary:**

Kiwi’s live on an island and had to find a way around shortages in replacement parts and may other hardships due to isolation. Because of this companies have a “can do” attitude that is rare in the states. Their business lies in quickly adapting to the changing market or to just satisfying small quantities for local customers. Many companies have relied on the customer to “come walking in the door” and that worked in the past.

Since the mass production from China and other “low cost” countries has flooded the market there, the need for some of the commodity castings previously made in New Zealand has ceased or has been cut down dramatically. Many companies have gone out of business for lack of work and some have kept busy by buying up the remaining old business when companies close down. The need to seek oversea markets is paramount to survival.

When seeking oversea business NZ can’t compete on price, therefore it must be something else, service, delivery times, quality, supply chain management, and trust. New Zealand sees much of its opportunities in the US because of the common language and the much larger market. What would be a too small of a job for a US foundry to consider, a NZ foundry would be happy to service in most cases. Shipping has become relatively inexpensive and is not much of a consideration in the overall cost. It seems that the companies observed compete on real engineering and the “we’ll give it a go” attitude, lean management and willingness to travel to get the job. Trust is also major factor in getting contracts from European and North American companies. There is still a major risk in doing business in Asia, and lead times can be long for startup of complicated parts. Highly talented, “hands-on” engineers in NZ know what it takes and how to get it done.

**Technology Education in New Zealand:**

The system of education in New Zealand is based on the British system. Many differences exist compared to our education in Wisconsin. Some are likely superior to our system and there are some shortfalls as well. The observations of the education system are based on personal experience teaching in a classroom, touring schools, interviews with teachers, navigation of the qualifications in NZ, discussions about teaching there with government officials, my spouse’s experience teaching, professors, and the national education ministry.
**New Zealand Schooling Background:**

New Zealand has a most complicated system in place for schooling and even though it has a national school board it has several differing approaches to grading and assessment, which can coexist at the same school! Their education system has been rated very high, with world standards and many students from Asia come and study in NZ in primary, secondary, and tertiary schooling. The education system is “free” for primary and secondary schooling, although there is a “donation” required per year for each student. The donation in the case of our children was about NZ$450.00 (US$300) per year per student. Foreign students pay very high tuition (NZ$4500) and helps with revenue for some schools.

**University of Auckland:**

I had the opportunity to visit the Technology Education Department at the University of Auckland which is the foremost teaching school besides Otago in Dunedin. I had a lunch with all the staff and asked questions about what kind of training they require and how they teach skills that would be needed in Technology Education. I was very surprised at the answer which was “they get some training here, but they should bring some skills with them and when out in the field call on experts to help in the classroom.” In fact the training facilities were inadequate by our standards to say the least and the class size was about 35 to 40!

The new technology curriculum that has been developed with the Ministry of Education (with the help of the University of Auckland) is centered on design without much time spent with manufacturing processes. Most people actually teaching this subject in the classroom (that I spoke with) do not agree with this approach and believe that nearly all bookwork for the first semester of the class will turn off students toward the subject, especially visual learners who excel at manual arts.

The majority of teachers take a 1 ½ year course of study that gives them a teaching degree in addition to the manual skill diploma they already had. In the past this is all that had to be done, but higher requirements for a university degree is now barring access for many highly skilled people to enter the teaching field. The ability for teachers to come through a relatively short course and rely on their trade apprenticeship skills for the technical part of their teaching is a major advantage of the NZ system. People from all over the world that desire to teach in NZ can bring their knowledge to the classroom relatively easily. In Wisconsin, that same person would have to take nearly a 4 year study to get certified to teach in Wisconsin, thus barring access to most because of lost income for such a long time.
Wisconsin Model:

Wisconsin uses technology education as electives and is considered in addition to the “normal schooling” that a student receives. This makes funding of these programs optional in the eyes of the administrators and principals. The New Zealand system whereby every student must take technology education as a countrywide requirement is a major advantage. Giving trades people that go through reasonable teacher training is also a good idea, because this allows technically talented people with real life experience to become teachers without a 4 year detour in their life.

UW Platteville does do a better job at training students then Auckland University, however the required number of technical classes versus the number of education classes at this university is skewed because of the requirements for a teaching license in WI. Input from former students here support the idea that technical content needs to be increased.

Many high schools in Wisconsin are changing their program to “Project Lead the Way” due to grants and funding to get more students interested in engineering. This is a great program for students that are not visual learners, but tends to put off students that need hands-on education. Project Lead the Way is similar to the new National Technology Curriculum in New Zealand which moves from a hands-on project based approach to a theoretical and design based approach. Design without technological understanding of the process that is being designed for is not useful and is the major complaint of employers around the country. Therefore, a design based approach in only applicable after taking the knowledge building classes that teach manufacturing processes in a hands-on manner. Wisconsin needs compulsory technology classes during their entire primary and early secondary education just as New Zealand currently does. After a hands-on background there should be two paths for students who are interested in attending college in engineering and a path for students that want to continue to build skills for a job in the trades. Sacrificing one for the other will create a society that either can’t design things properly or one that can’t build what has been designed.

Technology Education Summary:

New Zealand currently does a good job with technology education for primary and secondary education in their schools. Their teacher education, however, does a poor job at training technical skills and therefore relies on skilled teachers from other countries or trades people that become trained as a teacher in an abbreviated course allowing highly trained technical teachers in NZ.
Based on what is happening in NZ with a design based approach in high school, this teaching style needs to be coupled with classes for students who are likely to go into the trades, otherwise the hands-on students will not likely be engaged in theory or design only classes.

In Wisconsin, Project Lead the Way classes need to be coupled with hands-on classes to prepare students to design for manufacturability and give a thorough understanding of manufacturing processes.

**Sabbatical Summary:**

This sabbatical helped me to understand how the US is viewed by the people of NZ, the industry, the education system, and insight into the culture of NZ. My family and I have been very fortunate to have had this experience and it will change the way I look at everything around me for the rest of my life. I believe this insight will also make me a better teacher here at UW Platteville with worldwide experience.