

Visit the Alpine Projekt Capstone website to access our blogs and other information:

<https://sites.google.com/site/self2013capstone/>

For more information about the KU School of Engineering or the SELF Engineering Leadership Fellows Program, please visit our Web site at www.engr.ku.edu. Application information for the SELF Program can be found at www.engr.ku.edu/self.

If you have any questions about the SELF Program or Capstone project, please contact us:

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SELF Mission Statement



The mission of the Madison A. and Lila Self Engineering Leadership Fellows Program is to develop passionate engineering and computer science graduates who are strongly goal-oriented and who bring the business skills and vision needed to guide the technology-based corporations of tomorrow. The SELF Program will recruit, select and financially support students at the University of Kansas and administer to them an ongoing four-year personal development program that leads to a continuing supply of exceptional graduates at the Bachelor of Science level. By active participation in the program, the students will expand and refine their leadership, managerial, business, interpersonal, entrepreneurial, communication and engineering skills through mentoring, coursework, seminars and leadership opportunities. Graduates from the SELF Program will possess the personal attributes needed to become effective leaders who are motivated to make a real difference during their careers.



SELF Program Overview



SELF Fellows are actively involved in the KU and Lawrence communities and are a major part of over 100 student organizations on campus. In an effort to give back to the community, the SELF Fellows have volunteered with the local chapter of Habitat for Humanity and raised money for Haiti earthquake relief through Habitat for Humanity International, as well as Big Brothers, Big Sisters. Individually, the contributions of the SELF Fellows in the community are much greater, as each Fellow is expected to find their own way to give time every semester. In addition, the Fellows attend on campus events that expose them to perspectives and topics outside the scope of engineering.

Students in the SELF Program embody a wide range of involvement and leadership qualities at the University of Kansas. SELF Fellows are involved with Engineers Without Borders, Engineering Student Council, KU Dance Marathon, KU Student Housing, KU Band, and many more organizations in all areas of campus life. The SELF Program also leads and supports many on-campus events, such as the School of Engineering's High School Design Competition, Engineering EXPO, Flapjacks for Philanthropy, the Crunchy Chicken Challenge, Future Cities competition, and Engineering Family Day.

The SELF Fellowship is an undergraduate engineering program at KU comprised of students that exhibit noteworthy drive and initiative, as well as a strong working knowledge of the business world and engineering challenges that await them after graduation.



Introduction

The SELF Program derives its success through the development of several skills referred to as the "SELF Pillars": leadership, entrepreneurship, management, communication, engineering, business and interpersonal skills. Through mentoring, struggling through and eventually conquering intensive coursework, attending seminars with industry leaders, organizing fundraisers, and designing and hosting competitions for the School of Engineering, these skills are continually being developed.

The goal of the Capstone Project is to incorporate all skills learned thus far into a single experience while continuing to hone these skills. The Capstone Project serves not as a final developmental experience, but as a springboard to life after the University of Kansas and the continual development of ourselves as leaders. A complete capstone project encompasses each of the seven pillars, as well as every engineering major offered at the University of Kansas. The SELF Fellows understand the School of Engineering's push to increase KU's potential to train new engineers to sustain society's current technological growth. As a result, we also hope to inspire local middle and high school students to pursue a career in Science, Technology, Engineering, or Math-based degrees (STEM) disciplines. In order to maximize exposure to the pillars of the SELF Program and experience cultural diversity, the Class of 2013 SELF Fellows spent 11 days in Germany and Switzerland.

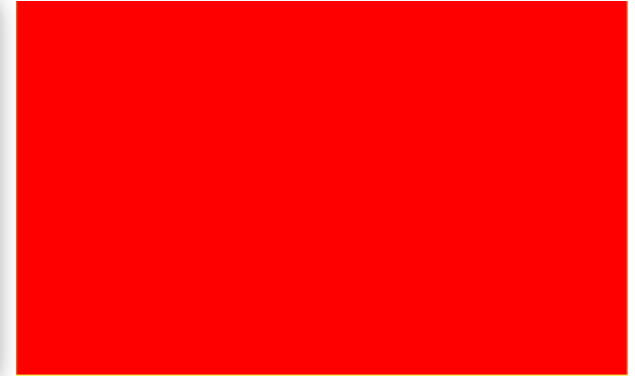
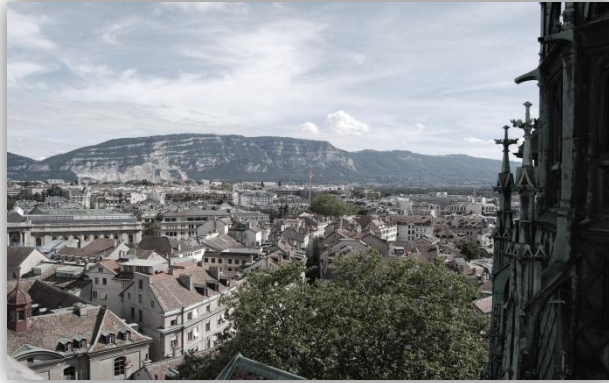


About Alpine Projekt



The Alpine Projekt focuses on a two-part primary goal. The first part of this goal centered on journeying to Germany and Switzerland to explore and experience these countries' prestigious engineering and business practices. This was to include their globally recognized educational system. The second was to share this experience with middle school, high school and potential engineering students throughout Kansas in order to inspire the pursuit of STEM disciplines. After much research and preparation, the Alpine Projekt has taken form as a website, an internet blog, video documentaries, presentations to donors and fellow KU students, and most importantly a series of interactive, mixed-media presentations to Kansas middle schools and high schools for the purpose of STEM outreach.

The website was first developed to serve as a point of reference about our Capstone Project. It became a useful and easy access database outlining our itinerary while abroad, as well as explaining the goals of the project. Linked to the website is our daily online blog, which allowed us to keep our generous donors as well as friends and families up to date on our experiences and activities while abroad. The short video documentaries serve as a supplement to the blog, with individual thoughts and feelings about our travels in Germany and Switzerland.



We hope to educate our peers, community, and sponsors about the international presence of Germany and Switzerland in the engineering and business world through group presentations. These presentations will also allow us the opportunity to voice our truly incredible experiences, both professional and cultural. This whole adventure has really given us the chance learn so much about German and Swiss culture, unique innovations in various technologies, and possible new career paths that could impact our futures. We aim to share our newly gained knowledge and these invaluable experiences that mean so much to us with students in hopes of enlightening and exciting young minds to pursue engineering.

The class of 2013 SELF Fellows truly feels that the completion of the Alpine Projekt will have a significant positive impact on all parties involved. First of all, the fellows have gained an extensive amount of real-world knowledge from this journey that has raised our global awareness and allowed us to learn much more about ourselves, each other, and what else is out there in the world. Efforts with S.T.E.M. outreach will help inspire young students to pursue engineering which will also aid in recruitment of new students at the KU School of Engineering as the school continues to grow. The generous sponsors and donors of the Alpine Projekt will also benefit knowing that they have not only invested in our personal futures as engineering leaders, but also the futures of younger students who may be influenced to become engineers as a result of our efforts.

-By Hans Walther

Engineering Heritage



When Nikolaus Otto and his partner Karl Benz coined and developed the combustion engine during the 1870's, Germany was both placed on the map as the cradle of the modern auto industry and recognized for its supreme engineering. During the 1920's and 1930's, the Great Depression took its toll on the German automotive industry due to low sales in foreign markets like the United States, one of the prime consumers of the German car. This forced Karl Benz and Nikolaus Otto to merge with Daimler in 1926. The merger was a success and thrives today as the well-known, Daimler-Benz (Mercedes-Benz) Company. In the decade preceding the start of WWII, the Nazi party came to power in Germany and created a significant change in the German auto industry. Adolf Hitler put many well-known automotive engineering companies to the task of producing cars to increase the living standards of German natives. This new drive led to the design of unique highway systems, production of inexpensive, practical cars for the middle class, and patents for new technological breakthroughs in the trucking business. WWII also created a large need for skilled engineers and technicians who were able to manufacture and repair military vehicles. In the late 1940's and early 1950's these engineers and technicians soon became the face of the professional industry in Germany and promoted the growth of their economy. Since then, German engineering is still considered the backbone of their solid economy, ranking in the top 5 in the world both in terms of nominal Gross Domestic Product and purchasing power.

Scarce raw materials and unforgiving conditions for agriculture, forced Switzerland to depend on the export of its goods for many years including watches, specialized chemicals, machinery, and pharmaceutical drugs. Even in the 1930's one third of the Swiss population earned their living from these types of exports. The same effects of the Great Depression seen by the German auto industry also severely impacted the Swiss economy. Not until the aftermath of WWII were the Swiss able to shake off the economic crisis that had wreaked havoc on their exports. In 1945, when much of Europe lay in rubble and ruin, the Swiss were able to make their major return to the European and World markets. Germany and the other European nations relied on Swiss machinery for their economic and structural rehabilitation as they entered a new era. In tandem with these efforts, the Swiss economy gained momentum through development of Swiss railways and industrial expansions. These gave rise to the now popular Swiss banking and insurance companies. Today, the Swiss economy is based around a highly qualified labor force working in science and technology where close to fifty percent of the country's exports are in the form of mechanical engineering or chemicals.



Industry

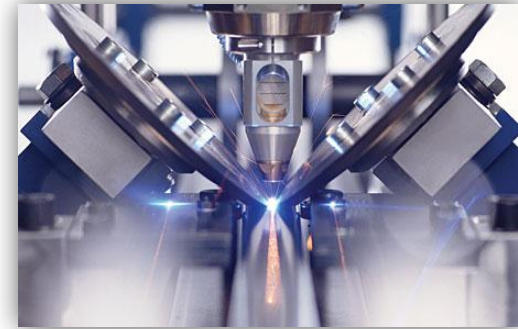
Over the duration of the Alpine Projekt, we had the privilege of visiting many highly regarded companies in both Germany and Switzerland. Amid visits to universities, research facilities, and museums, we also met with TRUMPF, Werner Sobek, Google, Shook, Hardy & Bacon, Mercedes, Porsche, and BMW. These visits covered an extremely wide range of the STEM industries, a key aspect that we were in search of as part of our primary capstone goals. While all of us had some type of industry experience within the United States, we were curious to explore how our United States exposure differentiated from European industry. Each of these companies gave us unique insight into the culture of the European workforce.



WERNER SOBEK: Werner Sobek displayed another side of German industry, the architectural and structural side. This company collaborates with academia, specifically the Technical University of Stuttgart. As a result, the architectural firm produces novel designs coupled with the highest quality of sustainable design. Werner Sobek designs façades in projects that highlight creative and artistic genius in harmony with structural and environmental excellence. German façades coupled with the regions climate allow for high levels of vitalization such that air conditioning is not used in a majority of buildings. The company revealed more on the background of Germany's notable global influence.



AUTOMOTIVE INDUSTRY: Germany is renowned as a frontrunner in the automotive industry. We were able to experience the tradition and power behind Porsche and Mercedes-Benz in Stuttgart and BMW and Audi in Munich. Automotives are essential to the country's industry, especially since it involves many other sectors of robotics and metal working. We saw the history and future of the backbone of Germany's economy as we visited museums and showrooms of Germany's biggest automotive companies.

The TRUMPF logo consists of the word "TRUMPF" in white, bold, sans-serif capital letters on a red rectangular background. Below the text is a solid blue square.

TRUMPF: Trumpf exemplified the precision and technology of the German industry. Furthermore, the company visit expanded on the state of their economy and archetypical business principles. Trumpf specializes in metal working in the form of punching, cutting, welding, bending and other types of processing useful for production lines ranging from the automotive industry to commercial washing systems. The company is a leader in the field, implementing completely automated systems of metal working and organization as well as collaborating with German universities, including the Technical University of Munich, in laser cutting technology. Trumpf boasts a welding robot that is capable of complex welding operations. With Trumpf equipment, a production line can be completely automated from metal feedstock to laser cutting or automated punching to bending and welding to designed storage and recycle system. Central beliefs of Trumpf are customization, demand driven production, and efficient storage systems. The company emphasizes that they build equipment to the needs of the customer and will not produce equipment to have any shelf life. Trumpf believes that quality is of utmost importance and customers can wait to receive exceptional products. In assembly lines, output and input is such that the minimum needs are provided for each day so there is no storage or back-up limiting the cohesiveness of operation and data flow. These distinct ideals and characteristics of Trumpf demonstrate the strength and innovation of the German Industry. The company alone grew from 8500 employees to 9500 in the last year showing the resilience of the German economy during unstable times.



GOOGLE: While in Bavaria, we arranged a visit with Google Munich, which was located in a small office building in the heart of Munich, only a few blocks from St. Mary's Plaza. Upon entering the office, the layout of desks and monitors was striking, as there were no individual offices. Instead, the floor plan was extremely open, allowing employees to work side-by-side with ease. Colors were overwhelmingly bright, which was to be expected for an office that demands relentless creativity. No matter where you stood in the office, we were guaranteed that we were always within 100 steps of food. On top of the abundant snacks, chefs prepared free meals for all employees each and every day. As the branch director told us, "If you're given a bonus, you're only happy for a certain amount of time, and then you forget about the bonus. If, instead, we provide you with free food every day, you will be constantly reminded of how Google treats its employees."

Google Munich specializes in transparency and control, corporate engineering, and Chrome's Java Script engine V8. Heading into this meeting, many of the fellows expected Google Munich to focus their efforts on the German version of Google, as the website's options and functionality vary greatly from country to country. By instead having each branch focused on a few certain tasks, Google expects the overall performance of its branches to be much more achieving and consistent. In support of STEM fields, Google Munich holds a "girl's day" to introduce young females to the fascinating work done at their office. While many American companies offer similar experiences, it was evident that Google took their outreach programs extremely seriously.

CERN: European Organization for Nuclear Research



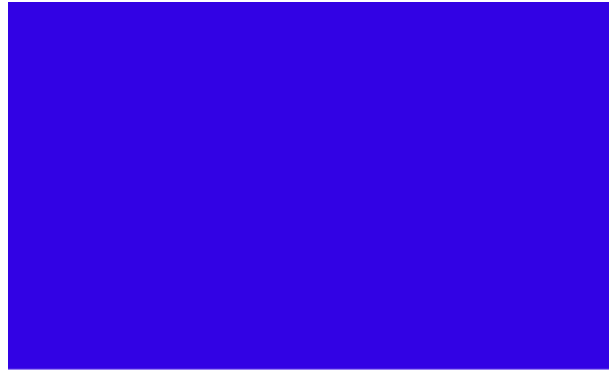
CERN: CERN is the largest particle physics laboratory in the world, and runs on about as much power as small city. It houses the biggest particle collider, the LHC, which measures twenty-seven kilometers (about seventeen miles) in diameter! The facility is so massive that CERN is almost its own country, complete with internal taxes and driver's licenses! So what exactly does CERN do? These scientists are tackling some of the hardest questions out there. What are we made of? What is dark matter? How do particles gain mass? This last question was actually answered last month, when experiments finally confirmed the discovery of the elusive Higgs boson, which made it an especially exciting time to be there. What determines how much mass a particle gets and how the process actually works? That's still anyone's guess, but thanks to the work CERN does, one day we just might know. We ended with a tour of the underground facilities at the CMS (the Compact Muon Solenoid), which left us wide-eyed and amazed.



SHOOK, HARDY, & BACON: Shook, Hardy & Bacon, a law firm headquartered in Kansas City, KS, provided us with a different view of how STEM fields can truly affect each and every industry. This particular division of the firm, located in Geneva, Switzerland, focuses primarily on defending the tobacco industry. On the surface, it may appear that this visit may have been completely unrelated to the purpose of our trip – STEM fields. Instead, the employees of Shook, Hardy & Bacon did an excellent job of tailoring their presentation, and the ensuing discussion, to our technical backgrounds.

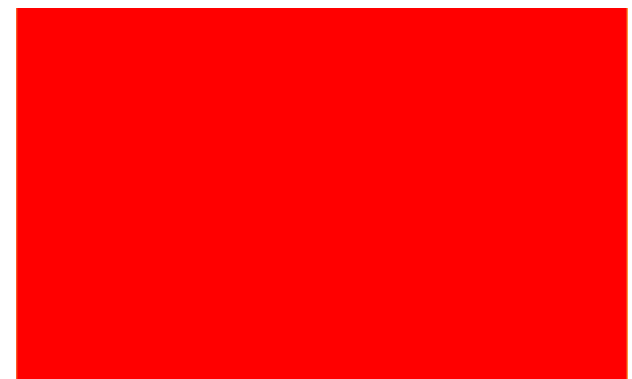
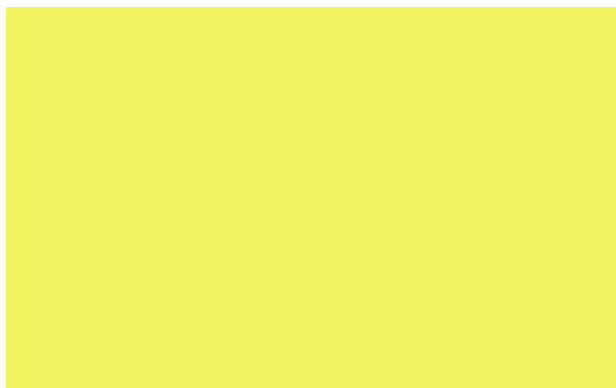
To be a successful corporate lawyer, we were told, it is absolutely necessary to have a thorough understanding of the product being taken to court. In most cases, these products are technical in nature, and many law firms think extremely highly of those with technical experience. Due to the medical nature of most cigarette-based cases, Shook, Hardy & Bacon has an employee who focuses only on the medical details of the case. Before working in Geneva, he attended medical school and never quite expected to end up at a law firm.

By the end of our discussion, we not only had a better understanding of how law firms operate, but also how it takes more than just attorneys to make a firm successful. This concept can be applied across a number of industries, making us all the more aware of the value of our chosen degree paths.



CONCLUSION: As iterated on our Capstone blog, each of us felt a very strong connection with the industries we were able to visit. Each of these companies was dynamic, successful, driven, and innovative in their own respective ways. In the end, however, success is based upon leadership, and this is characteristic of what we saw again and again. The SELF Program is providing us a platform from which we will have the tools to change the world. This is not an exaggeration, but a simple fact. We have seen success in action, and there is no better motivator than getting a small taste of what you're capable of achieving.

-By: Austin Smith



Education System

The University of Kansas spends a significant amount of time and effort recruiting and retaining engineers through various forms of events and activities. STEM outreach is a main focus of the SELF fellow's Germany experience. Because Germany is a hub for sustainable engineering, the SELF fellows explored their University system. First, an understanding of the process to become an engineer in Germany is necessary.

German schools do not have required kindergarten, but all children attend elementary school from age six to 10. After the initial four years, students and parents choose a secondary school. After a two year orientation period into the chosen secondary school, students remain in their school until age 18 when they take exams that determine what choices they have at university. While the German school system is adapting and becoming more flexible with changes in secondary school choices, students still must show technical strengths and aptitude at an early age to have the opportunity to attend university.

Germany sustains its production of engineering partly due to a completely funded university. If students have met the requirements to attend university, the education is highly affordable with an approximate cost of 200 euro (\$257) per semester. Students can also choose any area of study they want to pursue, however their "general education" requirements are minimal so all programs are quite rigorous. Unlike the American educational structure, German universities do not see it as their job to excite students about technical fields of study. Instead, the government has developed an elementary and secondary education that guides students into the needed fields.





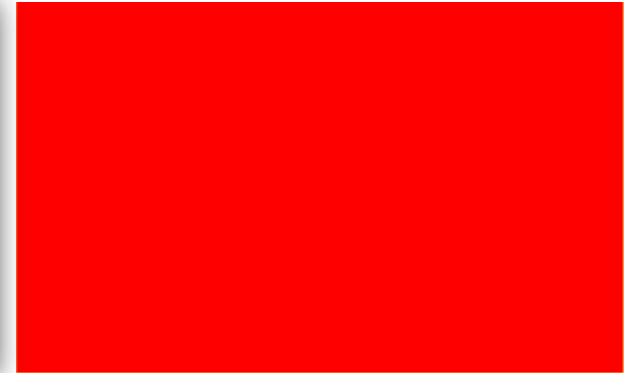
It is interesting that despite this thorough system of preparing students for university, both the University of Stuttgart and the Technical University of Munich reported about a 50% dropout rate--almost equivalent to the dropout or transfer rate seen at KU. The preparation system and university structures differ completely from the United States to Germany, yet perhaps engineering truly is “hard” no matter what country you are in.

In Germany, the classroom structure would take any typical American student by surprise. Instead of grades being a result of homework, participation and exams, the courses in German universities often consist of lecture and a final exam only. Students are encouraged and required to explore and learn the material outside the classroom to be successful.

The students who stick through the three year undergraduate program for engineering in Germany are equipped with a multitude of industrial applications and in some cases industrial experience. Most students stay to complete a Master’s Degree which is important to equip students with the skills to advance projects and research at the university.

-By Camille Fittell and Hayden Maples

Cultural Enrichment



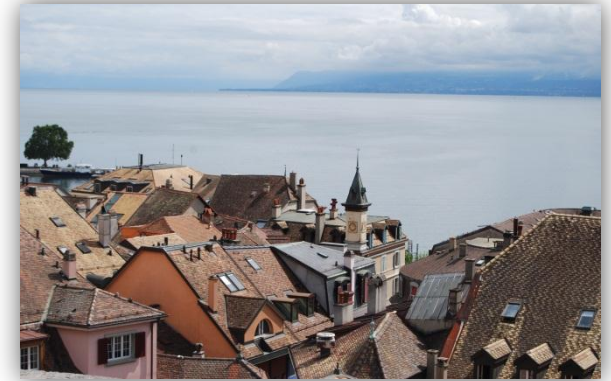
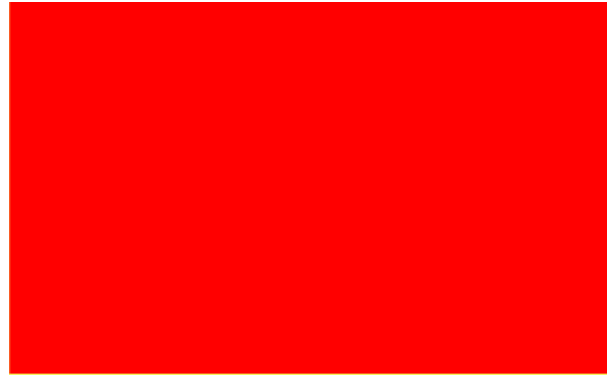
The months leading up to our departure for the Alpine Projekt were hectic. Trying to coordinate visits and nail down a final itinerary proved to be a significant challenge especially with the seventeen of us scattered throughout the United States. But in the early hours of August 7, we were all at Kansas City International Airport excited to finally embark on an experience that had been in the works since January 2012. We were ready to embrace every moment as a new adventure and learning experience. Yes, we had every detail of this trip outlined before we got on the plane, but the lessons we have taken away from this project turned out to be something we never could have expected.

While some of us have had the opportunity to travel to Europe and beyond, the Alpine Projekt was a chance for our class to grow as a group in a foreign setting and also as individuals who, in seven short months will be taking on the real world. This experience gave us the



opportunities to stop in the midst of our crazy lives and truly see what we are capable of doing if we apply ourselves. No longer is the phrase “you can go anywhere” just a cliché, we’ve witnessed it firsthand. With an engineering background and proficiency in the seven SELF pillars as well as others we really can do anything in the realm of our imaginations.

Submersion in another part of the world, even if it was only for ten days, made us more socially aware of cultural differences as well as the overwhelmingly common humanistic traits. People may live half way across the world, speak a different language and drink wine before they can do basic algebra, but overall, humans are the same. We work towards the same goals, face the same challenges, experience the pressure to succeed and want to make a difference in the world. However, without knowing the world and experiencing these overarching truths first hand this is impossible. The Alpine Projekt gave us the opportunity to break stereotypes that often



surround foreign cultures and widen our global perspective, preparing us for future encounters in the variety of career paths we may choose.

Being in a foreign culture also gave us the opportunity to take ourselves out of our comfort zones and apply skills the SELF program has instilled since freshman year; communication, leadership and initiative to name a few. Whether it was attempting to speak German or feigning a proficiency in the countless varieties of French and Swiss cheeses, we eagerly embraced another culture and integrated ourselves into local customs and lifestyles.

Beyond lessons in group dynamics and elaborate German engineering, the Alpine Projekt taught each of us quite a bit about ourselves and what goals we want to pursue after graduation. While the future is daunting, we are making sure to make as many memories as we can during our last year at KU. We look forward to sharing our experiences on the Alpine Projekt with the KU community and beyond.

-By Matthew Fowler and Hanna Cosgrove

