

# **A new Joint Engineering Program between Shanghai University of Engineering Science and Lawrence Technological University**

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## **Abstract**

This paper describes a new joint engineering program established in 2003 between the Shanghai University of Engineering Science (SUES) and Lawrence Technological University (LTU) located in Southfield, Michigan. This Bachelor of Science program in Automotive Engineering is offered by SUES. Eight courses in this program are delivered in China and taught in English by LTU faculty. Chinese students are exposed to at least one American professor teaching a LTU course each semester of this 8-semester program. The remaining courses for this program are taught in Chinese by local faculty from SUES. SUES issues the Bachelor of Science in Automotive Engineering degree and a Continuing Education Certificate is issued by Lawrence Technological University for students who complete this program. This program was established in response to the growing American Automotive presence in China and the need for Chinese engineering graduates who appreciate and understand a Western perspective of automotive engineering and business. Graduates of this program will be practicing automotive engineering in global automotive companies located in China. This paper describes the challenges, benefits, and rewards of this unique program addressing issues such as course equivalency, language barriers, cross cultural issues, and the challenges of staffing this program with qualified faculty.

## **Background**

Lawrence Technological University, a private undergraduate and graduate institution located in the center of the Detroit Metropolitan Area, has an enrollment of nearly 5,000 students in day and evening degree programs and continuing education/professional development programs. Lawrence Tech has been a dynamic partner to the Detroit area's engineering, manufacturing, and automotive industries for nearly 70 years. Lawrence Tech's College of Engineering is the oldest and largest program at the university comprising nearly half the enrollment with programs of Mechanical, Electrical, Civil, and Computer Engineering. With close proximity to the headquarters of the world's top automotive manufacturers, Lawrence Tech has a strong legacy in Automotive Engineering, which is offered as a concentration in its BSME program and at the graduate (Master of Science in Automotive Engineering) level degrees.

Engineering, technology, and advanced manufacturing are becoming increasingly global. Nearly every technical product is designed, engineered, and/or manufactured globally. At some point in their career, most of today's engineering graduates will likely be working on projects that require interfacing with engineers in other countries.

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Recognizing the growing need for engineering graduates with a global perspective and experience, LTU created the undergraduate Global Engineering program in 2002. Because of the concentration of German owned companies in the Metropolitan Detroit area, the first phase of this program has focused on German/American engineering and technology companies and German Fachhochschulen (University of Applied Science). LTU's Global Engineering partnership with German institutions is described in detail by Howell.<sup>1</sup>

After initial successes with German academic and industry partners, LTU administration decided to expand its global engineering program in early 2003 to include Chinese institutions. LTU's President and Provost visited various Chinese universities in late 2002 and early 2003 resulting in a Memorandum of Agreement with the *Shanghai University of Engineering and Sciences (SUES)* in 2003.

### **LTU's Global Engineering partnership in China**

Beginning in the 1980's China initiated a multitude of internal and external reforms designed to align its economic and educational infrastructure with Western standards. According to Li Deshui, head of the Chinese National Bureau of Statistics (NBS), China's economic growth reached a seven-year high at 9.1 percent in 2003. Official statistics show China's automobile production amounted to over 2.07 million cars in 2003, up 80.7 percent over the previous year. A total of 112 million people subscribed to new telephone lines, equal to the populations of Britain and France combined. China had 532 million telephone subscribers by the end of 2003, more than the population in any other country worldwide except India.<sup>2</sup> The U.S. automotive market has focused on the potential for growth in China with all major U.S. automotive companies locating engineering and manufacturing centers in China. With the expansion of demand for domestic consumer goods, China has seen a growth in high tech industries, creating a demand for engineers and technologists.

With this background, Lawrence Tech administration decided to expand its Global engineering program to China. In 2002, LTU initiated a partnership with the Shanghai University of Engineering and Science (SUES) to offer a joint program in undergraduate Automotive Engineering leading to a Bachelor of Science in Automotive Engineering or Automotive Administration degree. Shanghai University of Engineering Science (SUES) is a modern, highly diversified institution of higher education, characterized by its unique combination of engineering technology disciplines with management and art design. It has fifteen colleges, five training centers with advanced facilities. SUES is one of the first 200 Chinese universities granted permission by the Chinese State Education Committee to enroll foreign students. The initial graduating class from this new joint Automotive Engineering program is anticipated for May 2006. This program has experienced rapid growth since its inception in 2003. While the degree is offered by SUES, Lawrence Tech faculty and administrators provide oversight and instruction of some of the courses on site in Shanghai.

A Memorandum of Agreement was signed in March 2003 between the Presidents of SUES and LTU. This MOA described the new Bachelor of Science in Automotive engineering and Bachelor of Science in Automotive Administration degrees. These degrees will be conferred by SUES with support and direction offered by LTU faculty and administrators. A goal of this new program is preparing and equipping Chinese nationals to work and provide leadership in the rapidly growing Chinese automotive industry. This is accomplished by having LTU faculty teach select English language automotive engineering courses delivered in China each semester. Select LTU Mechanical and Automotive Engineering courses will be offered in Shanghai and be taught using the same syllabus, textbooks and content as covered in the U.S. The graduates of this program will be employed by Chinese based “joint venture” automotive companies such as General Motors Shanghai. Chinese students are exposed to standard “North American automotive engineering” practices through these courses taught by LTU faculty. The SUES Automotive Engineering program is eight semesters in duration and the SUES students will have at least one English language course per semester taught by a LTU faculty member for a total of 8 courses.

The initial freshman class for the Fall 2003 semester consisted of 114 SUES students. The freshmen class during the 2<sup>nd</sup> year of this program (Fall 2004) saw a 100% increase in enrollment to ~240 students. A Lawrence Tech “expatriate” faculty member spent 5 weeks in Shanghai to teach the initial freshmen course, “Introduction to Vehicle Systems”. This is a compressed version of LTU’s own 15 week course. During the second year of this program (Fall 2004) two courses were offered by LTU faculty in Shanghai, Introduction to Vehicle Systems (freshmen) and Engineering Cost Analysis (sophomore). Once the program is fully operational, LTU will teach a total of 8 courses per year (4 per semester) on site at SUES.

### **Challenges and Successes**

SUES and LTU both operate on a standard 15 week semester calendar. Ideally, LTU faculty would teach courses in Shanghai on the same 15 week calendar as the LTU version of the course. However, the logistics of locating LTU faculty and their families for a 15 week duration proved to be a challenge that required adjusting the length of courses taught in Shanghai. Therefore, a standard 15 week course is taught in a “compressed” mode over a 4 week duration. Because a standard 3 credit course meets for 45 contact hours during a 15 week semester, the compressed courses meet for 9 hours per week. The SUES students are taking many other courses during each semester, requiring creativity and flexibility in scheduling class meeting times in order to allow contact hours for the LTU taught courses during this 5 week period.

Staffing the SUES/LTU program in China has proven a challenge due to limitations of available LTU faculty and staff that have the autonomy to locate in China for a 5 week period during the regular LTU semester. The SUES/LTU program is expected to be fully staffed by 2006, at which time four LTU faculty will reside in Shanghai during each semester of the program. LTU does not have the faculty resources to support this program completely with regular, full time faculty. With its close proximity and

affiliation with major Automotive OEMs and Automotive suppliers, LTU has access to a highly qualified pool of adjunct faculty. Most of these adjunct faculty have advanced engineering degrees with specialized experience in advanced engineering fields. Since 2001, many Michigan based companies have encouraged early retirement of engineers and engineering executives. These recent retirees have a wealth of automotive engineering and management experience combined with an energy and enthusiasm to impart their expertise to engineering students. Because the North American automotive industry has become increasingly global, many of these retired engineering executives have traveled and lived in a variety of countries including China and are very keen to travel to Shanghai for a 5 week assignment. Therefore, the initial two years of this joint venture have been staffed with North American engineers recently retired from Detroit based automotive companies. They have provided a perspective and wealth of experience that goes beyond what is covered in the textbook for these classes.

Although SUES has dormitory housing for its students, it does not offer on campus housing and accommodations for visiting faculty and staff. Fortunately, the recent growth in Western businesses and industries in greater Shanghai has resulted in many new Western style hotels. The visiting LTU faculty have been housed in hotels adjacent to the SUES campus. The hotel closest to the SUES campus is located about 2 miles from the classroom. There is no public transportation between the hotel and classrooms, so LTU faculty have used taxis or bicycles to commute. With early morning classes, the bicycle proved to be the most efficient and dependable form of transportation between the hotel and classrooms. Fortunately, the LTU faculty who've participated in this venture have the physical conditioning and desire to use a bicycle to commute to the campus. Although taxis are available and affordable, they are not as efficient and timely as a bicycle. SUES provided bicycles for all LTU faculty.

SUES students have several years experience studying English. Lack of exposure to hearing and speaking English limited the effectiveness of the initial communication between the instructor and students. Each class had a "teacher's assistant" assigned who was fluent in English, but all instruction was given to the students by the LTU faculty in English. At the beginning, LTU faculty spent more time covering vocabulary and terminology than they would in the U.S. By the end of the semester, all LTU faculty had reported significant progress in the student's ability to understand and communicate in English. Improvement of English communication skills is one of the goals of this program, so both SUES and LTU felt a measure of success in achieving this goal.

## **Conclusions**

Collaboration between SUES and LTU has a mutual benefit of building understanding and enhancing higher education at both institutions. LTU is able to provide expertise in "North American" automotive engineering to the next generation of Chinese engineers and business leaders. This in turn can result in increased economic development and improved quality of life.

The logistics of staffing this program have proven challenging. Tapping its pool of qualified adjunct faculty with recent automotive engineering experience has provided

high quality instruction and provided SUES students with a fresh North American perspective on their future careers in the design and manufacture of automobiles. Although the SUES students have studied English for several years, lack of oral communication experience in English required additional time explaining technical vocabulary by the LTU faculty.

The LTU faculty who've participated in this program have returned to the U.S. with a new appreciation of the Chinese culture and people. They've developed strong friendships with SUES faculty, administrators, and students. Nearly all of the LTU faculty have expressed a desire to return to SUES in the future.

## References

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<sup>1</sup> Howell, S.K., Schneider, G., Miller, J., "The Global Engineering Program at Lawrence Technological University", *Proceedings, ASEE/SEFE/TUB International Colloquium*, American Society for Engineering Education, Berlin, Germany, October 2002.

<sup>2</sup> Xinhua News Agency January 21, 2004

## Biographical Information for STEVEN HOWELL

STEVEN HOWELL is the Chairman and Professor of Mechanical Engineering at Lawrence Technological University. Prior to joining LTU in 2001, Dr. Howell lead a Knowledge Based Engineering project for Visteon Automotive Systems and taught Computer Aided Design classes for Ford Motor Company. He has a combined total of twenty year's experience as an engineering faculty member at Lawrence Technological University, Northern Arizona University, University of Pacific, and University of Zimbabwe. Since joining LTU Dr. Howell has provided leadership in the direction and implementation of LTU's Global Engineering Program.