

# **Sustainable Global Engineering Education Program with the USA and China**

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## **Abstract:**

A number of professors from a Midwestern engineering university have teamed up with the technical university in China to provide a global aspect to engineering education. The American university offers four different undergraduate certificates for students in automotive engineering and electrical engineering in Shanghai. The program has been operating for ten years, and a number of sustainability issues are ongoing, and the results are presented in this paper.

## **Summary:**

A Midwestern technological university [Lawrence Technological University, LTU, in Southfield MI <http://www.ltu.edu>] has teamed with a Chinese technological university [SUES] to teach specific technological courses in English only. Shanghai University of Engineering Science [SUES] is a strong regional engineering college in Shanghai China and it focuses on undergraduate engineering in China. Lawrence Tech [LTU] is also a strong regional engineering college and LTU is in Southfield, Michigan. The present focus of the program is to exchange students, introduce the Chinese students to the various teaching methodologies as presented by the various engineering professors, encourage further higher education among both LTU and SUES students, and to make inroads in research in both universities. Many of the professors who accept this visiting professorship in China are adjunct faculty who has recently left the automobile industry, and many have taught engineering courses in Southfield, MI at LTU. This is viewed, in general, as a distinct advantage as it is hoped [and believed] that the recently obtained manufacturing and automotive knowledge gained by these adjunct faculty will provide a vehicle for the transfer of the latest engineering technology to the Chinese. This results in approximately 15 faculty comprising the cohort of the English spoken only program, and approximately 800 engineering students per year.

Evolving Points:

1. Recruit different majors
2. Tailor different certificates
3. Recruit and facilitate different adjuncts and full time professors
4. Enhance professor training, both American and Chinese
5. Assessment of program, and changes for improvement

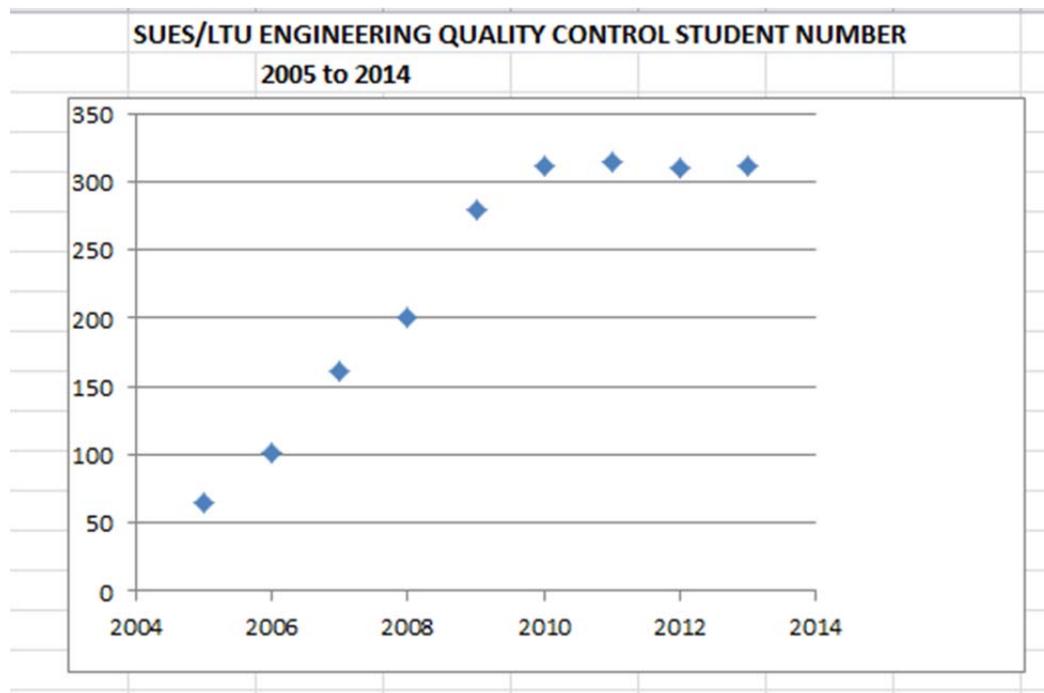


TABLE 1: SUES/LTU Engineering Quality Control student growth

## ENGINEERING SPECIFIC COURSES

The specific courses in the program include Introduction to Engineering, Introduction to Electrical ND Computer Engineering, Engineering Quality Control, Automotive Microcontrollers, Automotive Electronics, Automotive Principles, VLSI design, Project Management, Engineering Cost Analysis, Electrical Machines, Engineering Materials, Project Management, and Control systems. The LTU courses are different in substantial ways from the SUES courses. For instance, the LTU courses

have a computer aspect to them, including Matlab and Excel. The Controls class exams require Matlab programming clips, which is unique.

Furthermore, the Engineering Quality Control and Computer Networking classes require a project and presentation. The topic is a company that has won a Malcolm Baldrige National Quality Award, or any other national quality award. The students have a rubric for the presentation. The rubric is: company choice, award choice, award criteria, year criteria, and improvement. Each year, the students discover various quality aspects, enhancing their learning and awareness of industry in a wide variety of countries.

National Quality / Business Excellence Awards in different countries							
Research undertaken on behalf of NIST by Musli Mohammad (m.mohammad@massey.ac.nz) and Dr Robin Mann (r.s.mann@massey.ac.nz)							
Centre for Organisational Excellence Research, www.coer.org.nz. (Date of research: 9-13 January 2010)							
(Please contact COER if any errors or omissions are noticed in the spreadsheet)							
Region	Sub-region	Country	N	Name of award	Model used	Administrative organisations(s)	Website
AFRICA	Eastern Africa	Mauritius	1	Mauritian National Quality Award	National model (developed from Baldrige)	Mauritius Export Processing Zone Association	<a href="http://www.asq.org/qic/display-item/index.pl?item=10615">http://www.asq.org/qic/display-item/index.pl?item=10615</a>
AFRICA	Northern Africa	Egypt	2	The National Award for Excellence in Quality	National model (developed from Baldrige)	Industrial Modernisation Centre (IMC)	<a href="http://www.nationalawards-eg.com/">http://www.nationalawards-eg.com/</a>
AFRICA	Northern Africa	Morocco	3	Moroccan National Quality Award	National model (developed from EFQM Excellence Model)	Moroccan Association for Quality	<a href="http://www.atento.com/content/national_quality_award_en.mmp">http://www.atento.com/content/national_quality_award_en.mmp</a>
AFRICA	Southern Africa	South Africa	4	South African Excellence Award	National model (developed from EFQM Excellence Model)	South African Business Excellence Foundation	<a href="http://www.asip.org.ar/en/revistas/39/kapp/kapp_01.php">http://www.asip.org.ar/en/revistas/39/kapp/kapp_01.php</a>
ASIA	Eastern Asia	China	5	China Quality Award	National model (developed from Baldrige)	China Association for Quality	<a href="http://www.caq.org.cn/htm/english/Activities.asp#">http://www.caq.org.cn/htm/english/Activities.asp#</a>
ASIA	Eastern Asia	Hong Kong SAR	6	Hong Kong Management Association Quality Award	Baldrige Criteria for Performance Excellence	Hong Kong Management Association (HKMA)	<a href="http://www.hkma.org.hk/qa/front.htm">http://www.hkma.org.hk/qa/front.htm</a>
ASIA	Eastern Asia	Japan	7	Japan Quality Award	National model (developed from Baldrige)	Japan Productivity Center	<a href="http://www.jqac.com/website.nst/NewMainPageE?OpenPage">http://www.jqac.com/website.nst/NewMainPageE?OpenPage</a>
ASIA	Eastern Asia	Japan	8	Deming Prize	National model (unique)	Japanese Union of Scientists and Engineers (JUUSE)	<a href="http://www.juse.or.jp/e/deming/">http://www.juse.or.jp/e/deming/</a>
ASIA	Eastern Asia	Mongolia	9	National Productivity Award (NPA)	National model (developed from Baldrige)	National Productivity and Development Center	<a href="http://www.npdc.org.mn/">http://www.npdc.org.mn/</a>
ASIA	Eastern Asia	Korea	10	Korean Quality Grand Award	National model (unique)	Korean Standards Association (KSA)	<a href="http://www.ksa.or.kr/eng/html/promotion.html">http://www.ksa.or.kr/eng/html/promotion.html</a>
ASIA	Eastern Asia	Taiwan	11	Taiwan National Quality Award	National model (unique)	Ministry of Economics Affairs	<a href="http://w1.csd.org.tw/english/Quality.htm">http://w1.csd.org.tw/english/Quality.htm</a>
ASIA	South-central Asia	India	12	Rajiv Gandhi National Quality Award	National model (unique)	Bureau of Indian Standards	<a href="http://www.bis.org.in/other/rgnqa_geninfo.htm">http://www.bis.org.in/other/rgnqa_geninfo.htm</a>
ASIA	South-central Asia	India	13	CII-EXIM Bank Award for Business Excellence	EFQM Excellence Model	Confederation of Indian Industry and Export-Import (EXIM) Bank of India	<a href="http://www.cii-iq.in/CII-Exim%20Bank%20Award%20for%20Excellence.htm">http://www.cii-iq.in/CII-Exim%20Bank%20Award%20for%20Excellence.htm</a>

TABLE 2:

[http://www.nist.gov/baldrige/community/upload/National\\_Quality\\_Business\\_Excellence\\_Awards\\_in\\_Different\\_Countries.xls](http://www.nist.gov/baldrige/community/upload/National_Quality_Business_Excellence_Awards_in_Different_Countries.xls)

The Computer Networking project at SUES has been evolving each year, and the topics relate to their other coursework. For example, the students choose to research and investigate topics in microcontrollers or electronics, and the professors coordinate the veracious topics to ensure that selections are unique. For both classes, the Chinese students now work in a structured group: a leader, a researcher, a presenter and a designer. A structured approach to the assignment and a well-explained rubric help to make the project and presentation successful.

## CONCLUSION:

The SUES/LTU collaborative undergraduate engineering program will continue to concentrate on improving aspects of the program, especially involving student attitudes and improvement. Rubric development and course assessment for improvement will be enhanced. In conclusion, we both find this collaborative program dynamic, exciting, evolving, and further assessment in the area of pedagogy and program accreditation [i.e. ABET] will be investigated.

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