UNIVERSITY OF LOUISIANA AT LAFAYETTE

STEP Committee

Technology Fee Application

College of Engineering: Upgrade of Large Materials Testing System Title

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UL Lafayette College of Engineering Department of Civil Engineering Department of Chemical Engineering Department of Electrical & Computer Engineering Department of Industrial Technology Department of Mechanical Engineering Department of Petroleum Engineering

Organization

Title: College of Engineering: Upgrade of Large Materials Testing System				
Date:	01-15-2018			
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Department/College/Org:	Civil Engineering/Engineering			

Abstract

The main purpose of this grant is to upgrade the existing large 110 ton capacity Materials Testing System (MTS) in the Infrastructure and Materials Testing Laboratory (IML) at the College of Engineering. Over the past four decades, the unit has served well conducting materials testing for both undergraduate and graduate laboratory works. However, due to its extensive utilization the load cross head that applies forces on test specimens cannot be used to its full capacity. The hydraulic clamps that hold the upper portion in place is no longer work properly. The old clamping system must be replaced with a new and redesigned hydraulic clamp system. Therefore, there is a pressing need to upgrade the existing condition of the large MTS for effective and quality undergraduate teaching.

College of Engineering: Upgrade of Large Materials Testing System

A. Purpose of grant

The main purpose of this grant is to upgrade the existing materials testing equipment in the Infrastructure and Materials Testing Laboratory (IML) at the College of Engineering. For the last four decades, the IML laboratory has served well for both undergraduate and graduate teaching, and conducting funded research in the areas of advanced materials and characterization. However, the current state of the materials testing equipment in the laboratory does not allow effective undergraduate and graduate teaching.

The large Materials Testing System (MTS) has 110 ton capacity load frame. This MTS unit has been utilized to conduct undergraduate and graduate laboratory exercises in materials testing on large scale construction materials such as concrete, metals, and composites to determine the materials' strength and endurance. The 110 ton MTS unit was purchased in the early 1980s. During 2006, its controller was also upgraded to advanced compact system. However, due to the MTS extensive utilization the load cross head is no more functional to its full load capacity. Hence, the MTS cannot be utilized to its full capacity for materials testing and to train and educate students. Therefore, it is imperative to upgrade the existing condition of the large 110 ton MTS for quality undergraduate teaching.

The proposed project addresses the need to provide students with an access to excellent undergraduate education in science, engineering, and technology where students can learn by direct experience with the methods and processes of inquiry using the laboratory equipment. Advanced experimental-based components in the undergraduate curriculum exploits the hands-on experience of students and enhance their understanding of fundamental materials science and its practical implications. Providing such advanced IML facility enhances students' potential to compete in today's high-tech market. Through their specialized training, graduates can support and improve their employers' competitiveness and therefore, perform at optimum level, increase productivity and ultimately benefit the state's economy.

Impact on student body

Modern technology, best curriculum and dedicated faculty can generate an excellent educational program, thereby attracting the best and the brightest students to the college. The proposed enhancement will substantially improve and promote the engineering program by exposing and training the students to the latest equipment and modeling techniques. It is vital note that the MTS is extensively used for undergraduate teaching for the college of engineering.

This initiative will impact students as follows:

- One of the key components of the ABET accreditation is the up-to-date and functional laboratory facilities. Unworkable and outdated laboratories do not make a good impression during accreditation visit. Advanced and fully functional IML would be an added bonus to the College of engineering.
- With the utilization of the upgraded equipment the laboratory requirements for engineering course-work will be met.

- Providing such advanced facility will enhance students' potential to compete in today's high-tech market. Through their specialized training, new graduates can support and improve their employers' competitiveness and therefore, benefit the state's economy.
- Student projects from all Departments can benefit from having access to the equipment as it can verify and prove calculations and designs.
- Students may contribute in materials testing required for community businesses. Thus, providing access and exposure to the students to our local industry.
- Not only the students from College of Engineering but students from other Colleges, such as the Geology Department and Renewable Resources could also benefit from the use of this equipment in materials and rock mechanics.

B. The projected lifetime of enhancement

This project is expected to benefit students for at least the next ten (10) years.

C. Person(s) responsible for project

- 1. Implementation: Dr. Mohammad J. Khattak, Dr. Ahmed Khattab, Mr. Mark LeBlanc
- 2. Installation: MTS Corporation
- 3. Maintenance: MTS Corporation
- 4. Operation: Mark LeBlanc
- 5. Training: Mr. Mark LeBlanc, Dr. Mohammad J. Khattak, Dr. Ahmed Khattab

Qualifications:

Dr. Mohammad Jamal Khattak- Dr. Khattak is a full Professor in the Department of Civil Engineering and Director for the Infrastructure and Materials Testing Laboratory (IML). Dr. Khattak joined the Civil Engineering Department in 2000. Dr. Khattak has extensive experience in the field of materials performance modeling, pavement management, and advanced materials design and characterization.

Dr. Ahmed Khattab- Dr. Khattab is the Associate Dean of Engineering and the Interim Director for UL Institute for Materials Research and Innovation.

Mr. Mark LeBlanc – Mark is the Laboratory Assistant for the Civil Engineering Department. He has maintained labs in the College of Engineering since 1997. He attended MTS equipment factory training class in 2000.

D. Budget

The budget proposal is presented in the table provided below.

Budget proposal

No.	Main Offer Description	Unit price	Qty	Net
1	New 311.31 Crosshead lock Upgrade kit	\$22,618	1	\$22,168
2	On site installation of 311.31 Crosshead lock Upgrade kit	\$11,426	1	\$11,944
3	New Valve assembly and FTSE Cable	\$3,044	1	\$3,044
4	New Switch assembly PN 006-317-502	\$1,190	1	\$1,190
5	Axial Extensometer Calibration	\$640	3	\$1,920
6	Labor	\$238	8	\$1,904
	Total			\$42,170

E. Timeline:

Year 1:

- Complete order of all equipment and supplies.
- Schedule installation with MTS Corporation.

Year 2:

• Maintain equipment.

Year 3:

• Maintain equipment.

F. Additional information relevant to this application. $N\!/\!A$

G. Previous funded STEP projects:

LeBlanc, M., and McManis, K (June 2016) Upgrade of Network Infrastructure for Civil Engineering STEP Lab. Funded through UL Lafayette STEP Committee, Funded amount (321709), \$7,396

LeBlanc, M., and McManis, K (January 2016) Upgrade and Maintenance of Computer Lab. Funded through UL Lafayette STEP Committee. Funded amount (32016), \$29,999.97

LeBlanc, M., Sun, X., and Habib, E. (November 2007) Upgrade of Civil Engineering Computer Lab. Funded through UL Lafayette STEP Committee. Funded amount (G298R1), \$31,416

Khattak, M. J., and LeBlanc, M., (2006)-Upgrade of MTS- Controllers. Funded through UL Lafayette STEP Committee. (G298R2), \$77,000.

LeBlanc, M., and Sun, X. (April 2006) Upgrade of Computer Labs. Funded through UL Lafayette STEP Committee. Funded amount: G298H2). \$1,600

LeBlanc, M., Sun, X., Lyman, S., and LeBlanc, L. (September 2002) Upgrade of Computer Labs. Funded through UL Lafayette STEP Committee. Funded amount: (G2985U). \$18,422

LeBlanc, M., Sun, X., and Lyman, S. (April 2002). Upgrade of Computer Labs. Funded through UL Lafayette STEP Committee. Funded amount: (R2983H). \$12,680