SAIT grad receives nomination for Capstone Project Award

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Photocaption Cochranite David Kaytor, left, and his teammate Jason Single are up for nomination for the Association of Science and Technology Professionals of Alberta's Capstone Project of the Year Award.

Two recent graduates of the Southern Alberta Institute of Technology's electrical engineering technology program are being recognized for their innovative project which retrofits industrial boilers to become more cost-effective and energy-efficient.

David Kaytor, a Cochranite of three years, and his teammate Jason Single are nominated for the Association of Science and Engineering Technology Professionals of Alberta's (ASET) Capstone Project of the Year Award. They are among six nominees for the award.

Emissions from classic industrial boilers do not meet today's standards, accounting for 37 per cent of total energy use in the United States industrial sector, according to findings from the US Environment Protection Agency (EPA).

Kaytor said he and Single capitalized on the aspect of energy consumption by boilers while doing research for the project.

"In part of our research we saw the amount of energy that's consumed, specifically by natural gas boilers in North America, and it's an enormous component — like more than a third of all the energy in the industrial sector is used by boilers," he said. "We thought, wow, this could have a really big impact in terms of emissions improvements and even cost savings with the efficiency improvements."

Industrial boilers are used to produce steam or heat water for use in various industrial applications. For example, hot water from industrial boilers is necessary for the pulp and paper industry.

Kaytor and Single improved the outdated design of these types of boilers "by introducing a modulating gas control valve, variable speed water pump and variable speed flue gas fan," according to an ASET press release.

A modernized control system would replace the outdated on/off, low/high system, effectively lowering its fuel consumption and reducing the amount of energy wasted.

"It's very binary," said Kaytor of the classic industrial boiler design. "They're kind of like on/off systems. When we apply our technique, that's a very modern technique, it's more of an on-demand system that can operate at any point in between ... Other systems don't monitor their emissions and eventually they fall out of tune to where their emissions become even worse. So, we incorporated a system to make sure they are outputting what they're supposed to output."

This would include monitoring levels of emitted gases like carbon dioxide (CO2), carbon monoxide (CO), nitrogen oxide (NOx), and oxygen (O2) of which the levels could be optimized by varying fuel and combustion air rates, creating ideal values of excess air (O2) and minimal values of carbon monoxide.

"According to findings from the EPA, the type of upgrades the team made to the boiler could potentially yield an efficiency increase of as much as 21 per cent," said the ASET press release. "Classical older boilers operate with an efficiency of 55 to 60 per cent while new boilers operate at 90 per cent."

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