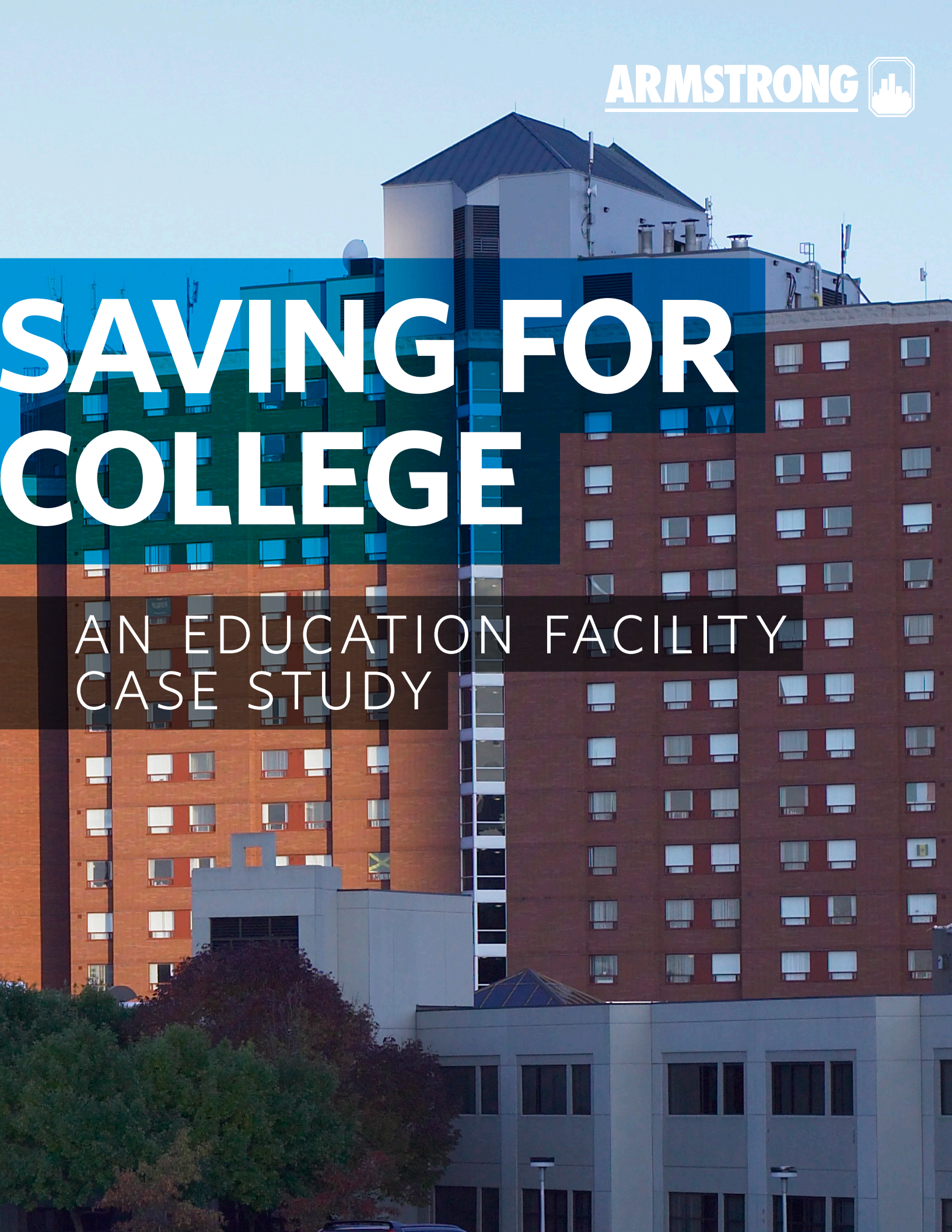

ARMSTRONG

SAVING FOR COLLEGE

AN EDUCATION FACILITY CASE STUDY

ARMSTRONG

Annual energy costs will be reduced from $11K to $2K, a savings of over $9K per year for each pump!

Seneca College

Armstrong Design Envelope Pump Retrofit - June 2011

Background

The recreation complex on the Newham campus of Seneca College, known as 'the sports centre' was first opened in 1972. As part of an upgrade to the heating system, two new boiler pumps were installed in 2009.

Two years later as part of an initiative to extend the installed base of Design Envelope pumps, Armstrong measured the pressure at the gauges on either side of the two pumps. It was discovered that the pumps were actually operating at a much lower performance point than originally specified. Based on the actual requirements of the system, the pumps were oversized, and operating away from their best efficiency point.

Armstrong suggested that Seneca replace the pumps with Design Envelope variable speed pumps that would adjust operating speed to match the requirements of the system. To make the retrofit as easy as possible, and avoid any changes to piping, it was suggested that they use the same size pump as originally specified, and take advantage of the variable speed capabilities of the new Design Envelope pump to continually adjust speed and pressure.

Benefits

The results of the upgrade project are detailed below.

Power consumption:

Before (design): 16.14 bhp / 12.04 kW
(25 hp motor at 60 Hz)

Before (actual): 24.12 hp / 18.00 kW
(measured in the field - unbalanced system)

Post-retrofit using an Armstrong Design Envelope Vertical In-Line pump: 4.40 bhp / 3.28 kW
(20 hp integrated controls at 35 Hz)

Annual energy cost (assuming 5110 hrs or 7 months)

Annual energy cost = Power consumption * $0.12/kWh * 5110 hrs
Before (design):
12.04 kW * $0.12/kWh * 5110 hrs = $7,383

Before (actual):
18.00 kW * $0.12/kWh * 5110 hrs = $11,038
After with Design Envelope:
3.28 kW * $0.12/kWh * 5110 hrs = $2,011

Annual operating cost savings

(assuming 5110 hrs) = $9,027 per pump!
With the installation of the Design Envelope pump operating to produce the exact flow and head required by the system, the pumps will draw only 3.28 kW. Annual energy costs will be reduced from $11K to $2K, a savings of over $9K per year for each pump.

Tech-Facts

The boiler heating system in the recreation complex typically operates for 7 months of the year (an estimated 5110 hours).

The original specification was for 300 USgpm at 150 feet of head. Armstrong supplied two Vertical In-Line 4300 3 × 3 × 8 pumps with 25 hp motors operating at 3600 RPM (60Hz).

Following the actual system curve using data provided by the pressure sensors, a new design point was selected at 300 USgpm and 40 feet of head. With this performance point in mind, Armstrong selected Design Envelope 0308-020.02.

This selection uses pump casings with identical flange to flange measurements for a perfect drop-in replacement. The Intelligent Variable Speed capability reduces the pump speed to match the performance requirements of the system. Prior to delivery, Armstrong pre-programmed the integrated controls to operate at a maximum of 35 Hz. The integrated controls on the Armstrong Design Envelope pump mean that no wall space is required for mounting the controller.

Note that with the previous pump installation, operators could have throttled the pump using the Flo-Trex valves. Had they throttled the valve to create the required system resistance, the pump would have operated at the planned 12.04 kW and annual spending could have been reduced to $7.3K. The savings difference between the throttling solution ($7.3K) and the variable speed solution ($2.01K) illustrate the value of switching to variable speed pumping solutions.

"I've had no failures and no unplanned maintenance. The installation went well, and the pumps and heat exchangers have been working exactly as expected."

Darren Riemer
Operations Manager

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