GPG FINDINGS **031**

JANUARY 2017

VARIABLE-SPEED DIRECT-DRIVE SCREW CHILLER

OPPORTUNITY

What is the impact of improved chiller operations on GSA?

MOST LARGE COMMERCIAL BUILDINGS (> 100,000 FT²) USE WATER-COOLED CHILLERS

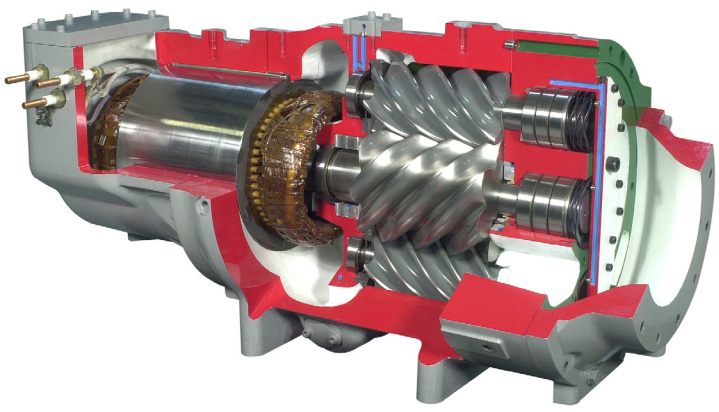
80% of GSA floor space is in large buildings[1]

TECHNOLOGY

How does the Variable-Speed Screw (VSS) Chiller work?

CAPACITY CONTROLLED BY REGULATING MOTOR SPEED ALONE

THREE SCREW ROTORS AND A VARIABLE-SPEED MOTOR ARE THE ONLY MOVING PARTS[2]



M&V

Where did Measurement and Verification occur?

OAK RIDGE NATIONAL LABORATORY assessed the variable-speed direct-drive screw chiller alongside the current state-of-the art chiller technology, the variable-speed magnetic levitation (maglev) chiller. The chillers were installed at the Sidney R. Yates Building in Washington, D.C. and connected to the same chilled water and condenser water loops, creating operating conditions as close to identical as possible within a real-world environment.

RESULTS

How did the Variable-Speed Screw Chiller perform in M&V at the test bed location?

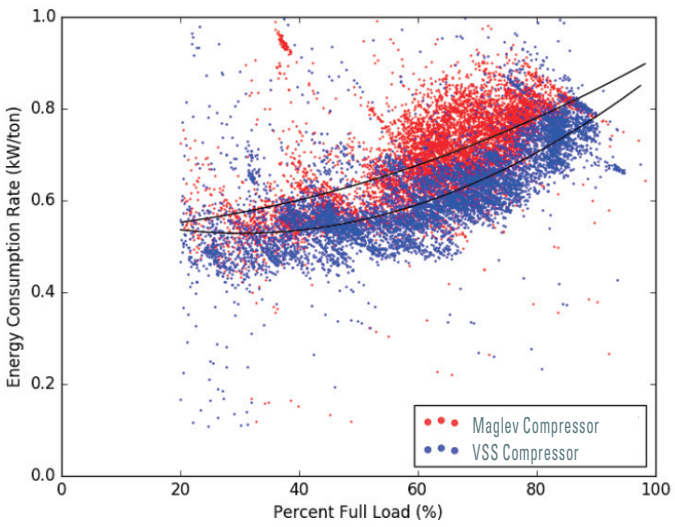
11%
MORE EFFICIENT
THAN MAGLEV CHILLER[3]

Quiet
PERFORMANCE
77-83 DECIBELS
For both VSS and Maglev (sound level similar to a vacuum cleaner)[4]

Wider
RANGE OF OPERATING CONDITIONS
THAN MAGLEV CHILLER
Condenser water temperature ranged from 55°F to over 95°F[5]

Average Energy Consumption—VSS: 0.62 kW/ton; Maglev: 0.70 kW/ton

At 20-100% of Full Load



DEPLOYMENT

Where does M&V recommend deploying the Variable-Speed Screw Chiller?

END-OF-LIFE REPLACEMENT
FOR ALL WATER-COOLED CHILLERS

While VSS and maglev both provide improved operating performance compared to chillers meeting minimum FEMP performance criteria, the VSS chiller's ability to tolerate swings in condenser water temperature make it more robust and especially attractive for critical applications like data centers.

[1] *Variable-Speed Screw Chiller, Sidney Yates Building, Washington, DC*, Dan Howett (PE), Mark Adamsl (ORNL), December 2016, p.4
[3] Image cortesy of Carrier, used with permission [3] *Variable-Speed Screw Chiller, Sidney Yates Building, Washington, DC*, Dan Howett (PE), Mark Adamsl (ORNL), December 2016 p.1 [4] Ibid, p.28, 31 (as measured in a lab setting) [5] Ibid, p.18