



# Navy Techval Program

Technology Deployment Working Group

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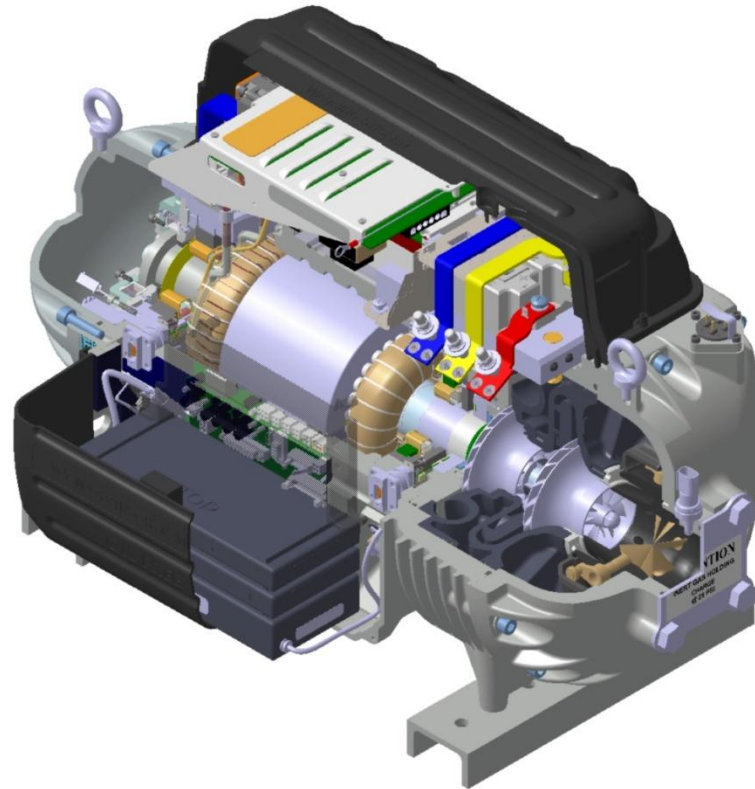
## Magnetic Bearing Chiller Compressor

- What is it, how does it work?
- Data from projects
- Where does it work best?

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## The Magnetic Bearing Chiller Compressor at a Glance



Drawing courtesy of Danfoss  
TurboCor Compressors, Inc.



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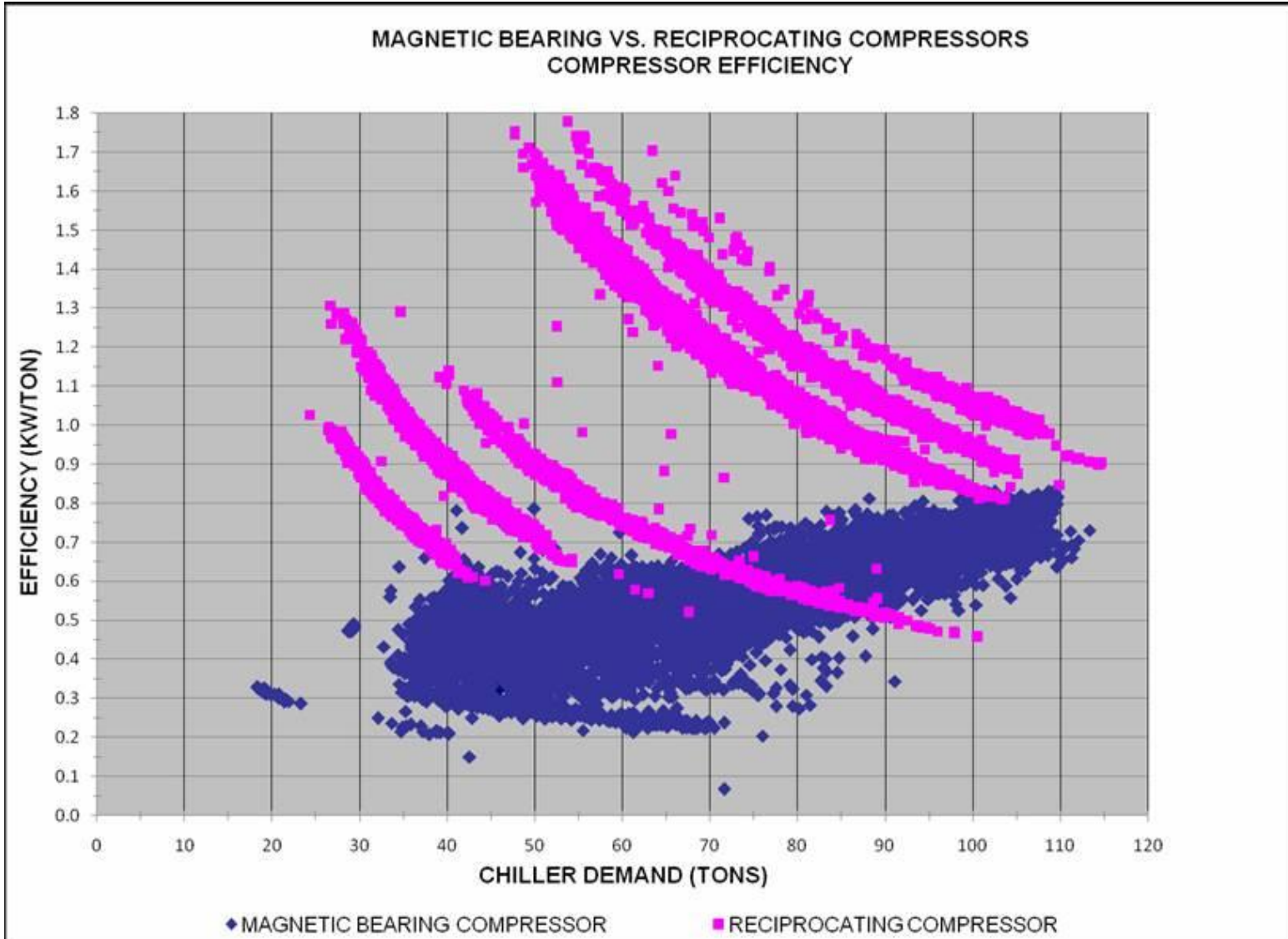


2 ea. 60 ton chiller compressors with magnetic bearings

*NAS Jacksonville FL*



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## JAX Data

	Compressor Efficacy	Plant Efficacy	Average Load	Average Compressor Power	Cooling Tower Power	Plant Power
New	.57 kW/ton	.61 kW/ton	75.4 ton	45.9kW	2.44kW	48.3 kW
Existing	1.02 kW/ton	1.04 kW/ton	76.7 ton	78.5kW	1.55kW	80.1 kW

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## Cost for installation in Jacksonville

Mechanical Subcontractor (including compressor)	\$95,150
DDC Subcontractor	<u>\$12,442</u>
Total	\$107,592

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The Table below presents a synopsis of the data collected for these three projects:

Project Site	Project Type	\$/KWH	Tons	Annual kWh savings	Annual Energy \$ Savings	% Savings	Cost	\$/Ton	Payback (years)
San Diego 2006	Add 3 <sup>rd</sup> compressor	\$0.121	240	176,717	\$21,206	40%	\$178,787	\$744	8.4
Newport Sep/Nov 2005	New Chiller	\$0.115	80	227,760	\$26,192	65%	\$100,783	\$1260	3.8
JAX Dec/Apr 2006/2007	Compressor Retrofit with Cond. Water reset	\$0.054	120	284,407	\$15,358	41%	\$107,592	\$897	7.0



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The Table below is the simple payback using the incremental cost:

Project Site	Tons	Annual Energy \$ Savings	Incremental Cost	Payback (years)
San Diego 2006	240	\$21,206	\$24,000	<u>1.1</u>
Newport Sep/Nov 2005	80	\$26,192	\$8,000	<u>0.3</u>
JAX 2006/2007	120	\$15,358	\$12,000	<u>0.8</u>

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## Maintenance

- |   |   |
|---|---|
| 1. Quarterly tightening of terminal screws<br>(could be done in conjunction with #2<br>once per year) | 2 work-hours per service                              |
| 2. Annual blowing dust off circuit boards   | 2 work-hours per service                              |
| 3. Change capacitors every five years   | 8 work-hours per service<br>plus \$250 for capacitors |

**Over 10 years that would be 96 work-hours plus \$500 for capacitors.**

## Other advantages of the compressor

- **Quiet** – In San Diego the chilled water pumps make more noise than the chiller. Could be a plus if installation is in an area where noise is an issue.
- **Light weight** – If compressor needs to be changed out, can be accomplished manually by two persons.
- **Low startup draw** – about 2 amps. Could be a plus if you are replacing or installing a backup generator since generator can be downsized to handle full load draw, not startup. Smaller generator may pay for incremental cost of compressor.

## Best Places To Install Magnetic Bearing Chiller Compressors

- Relatively high electric rates ( $> \$0.06$  kWh)
- Long run hours at part load
- Where existing compressor is in need of replacement

# Contact Information



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