

FIELD TEST
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Application:

The HVAC system at the Rockwell Space Operations facility located at 600 Gemini is comprised of (30) Trane direct expansion units of a Variable Air Volume type. Each of the (30) units has (2) compressors for a total unit capacity of (40) tons. The compressors are dual stage and (20) tons each.

FRIGI-TECH, a refrigeration oil supplement, was added to the twin compressors of (1) one of the Trane units to analyze the proclaimed increased efficiency of the compressor when the **supplement** is used with the compressor oil, For purposes of the study and comparison, (2) two identical unit models were chosen. These units had the same design capacity, same model compressors, similar run times, similar design conditions, and were in close proximity of each other.

Measurement:

The units were monitored daily and the consumption of each unit was read from a KWH meter installed for this study. The meters were the same model, "NETA Register". The daily consumption levels were documented by Rockwell maintenance employees and Johnson Controls' mechanics, whoever was working near the units on that day.

The units were measured for approximately 38 days (from March 29, 1990 through May 6, 1990) before introducing **FRIGI-TECH**. This was performed to acquire a trend of how the units would compare to each other, and whether or not they were compatible units to analyze. The results were good. Both units trended with each other during this 38 day period. As can be seen from the graph, Unit 28 consistently trended higher than Unit 30, approximately 25 percent, which we contribute to a higher heat load in the space. This could be due to more people, more computers, more lighting, etc.

The important point of this preliminary monitoring is it showed both units trended identical from day to day. The graph shows how both units responded to the temperature each day and how each unit's consumption reflects the heat load increase or decrease.

The general weather data during the test period was as follows:

	Average Daily	Degree Days	
	Temperature	Cooling	Heating
March	62.9 F	65	122
April	69.4 F	31	2
May	78.1 F	406	0
June	84.8 F	595	0

To address the consumption for weekends, holidays or missed readings, we took the total lapsed meter reading for that period of days and averaged it over the days that were omitted. In other words, a normal weekend reading was taken on Monday then subtracted from the previous Friday reading and divided by 3. This consumption figure became the consumption for each day during that weekend or missed day.

Introduction of FRIGI-TECH:

On May 6, 1990, **FRIGI-TECH** was introduced to the higher consuming unit, Unit 28. For a period of 2-3 days, the consumption of Unit 28 was still approximately 25 percent above Unit 30. By May 14, 1990, the consumption of Unit 28 was near or below the consumption of Unit 30.

Conclusion:

The conclusion derived from the documented consumption and graphical analysis supports the fact that **FRIGI-TECH** did reduce the consumption of Unit 28 by at least 25 percent.

FRIGI-TECH seems to have dropped the average consumption difference between the two units by 78KWH per day. Cooling is needed in Houston 45 weeks of the year.

During these 45 weeks, there would be 225 work days at 5 days per week. The average daily savings of 78 KWH and 225 work days would equate to a unit savings of 17,550 KWH per unit. With 30 units treated, this saving would equal 526,500 KWH for the Rockwell Space Operations facility. Using an average cost of \$0.05 per KWH the annual dollar savings would be \$26,325.00.

The total cost will depend upon the number of units treated. For preliminary analysis, costing has been provided on an incremental basis and for the total complex.

Costing:

Per Unit - Material	\$672.00
Labor	110.00
Mileage	38.50
Total	\$820.50

Per Complex Lump Sum \$22,526.00 (30 units with (2) comp. ea.)

Simple Payback:

Project Cost / Project Savings

\$22,526.00 \$26,325 .00

Payback of .86 years or 10 months

Assume electricity is costing Rockwell \$0.05 per KWH, and no annual increase in electrical rates.