NORAD – CHEYENNE MOUNTAIN AIR FORCE STATION CASE STUDY

WHO: The North American Aerospace Defense Command (NORAD) is a United States and Canada bi-national organization charged with the missions of aerospace warning, aerospace control and maritime warning for North America. Located 2000 feet under Cheyenne Mountain, Colorado and built during 1962 through 1968. Formerly the center for the United States Space Command and NORAD, the Complex monitored the air space of Canada and the United States for missiles, space systems, and foreign aircraft through its worldwide early-warning system. Since 2008, NORAD and the United States Space Command have been based at Peterson AFB in Florida, and the complex, re-designated as an air force station, is now used for flight crew training and as a back-up command center if required. In early 2015, NORAD communications systems were moved into the complex to shield it from electromagnetic pulse attack.

THE PROBLEM: Command wanted to decrease electrical power demand and consumption inside the mountain by reducing current consumption inside the base because every amp of current added heat into the mountain that had to be removed with air-conditioning. Other goals included minimizing the cost of electricity brought into the base and the cost of electricity to remove the heat from the buildings inside, provide clean power to the mission critical equipment inside the base, increase the reliability and safety of the electrical network, reduce equipment failures and increase longevity of all equipment, and to minimize the total electricity purchased by recycling wasted electrical power.

THE TEST: Accentz was invited to demonstrate the MPTS over a ninety-day test period during 2013. A MPTS unit was installed on the dedicated electrical circuit for an industrial air compressor.

THE RESULTS: The 21st century technology proved itself by reducing the compressor's energy consumption by 60 percent. The MPTS was connected in the electrical network to increase the energy efficiency of Air Compressors by providing clean power, recycling wasted electrical power, and decreasing the electrical demand and consumption significantly. The savings resulting from technology is paying for the investment in MPTS devices. Additional testing over the several years resulted in NORAD Command purchasing an additional ten (10) units which has resulted in Command realizing significant decreases in current and KVA, maintaining stable voltage for connected equipment thereby protecting their investment in expensive electrical and mechanical equipment, reducing total cost of operating that equipment with reduced service, repair, replacement and maintenance, and reducing total electrical demand, consumption and CO2 emissions.

TransPower Company: Based in Aurora, CO, introduced the MPTS in North America in 2011 and received UL certification in 2013. MPTS uses dynamic impedance matching and synchronous processing through solid state electronic switching, providing dynamic, accurate and precise corrections based on Jacobi's Law (1840) optimizing each phase in the electrical current to attain maximum efficiency. When MPTS is installed in electrical networks, the results include clean electrical power, fewer failures, reduced maintenance, lower electrical demand, and less downtime.

21ST CENTURY POWER SAVINGS SOLUTION = CASH FLOW OPPORTUNITIES

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Benefits from MPTS

MPTS Lowers Operating Costs

- **Decrease** Current and KVA significantly
  - Avoids Overload conditions and hot spots in panels and equipment
  - Decreases I^2R losses, KVAr, Harmonics
  - Releases electrical capacity, decreases the load on panels and transformers, creates capacity for additional loads
- **Maintains** stability of voltage for connected equipment
- **Protects** investment in expensive electrical and mechanical equipment
- **Reduce** service, repair, replacement, and maintenance costs
- **Reduce** total cost of operating mechanical and electrical equipment
- **Reduce** total electrical power demand and consumption
- **Reduce** C02 Emissions

Significant Reduction in CO2 Emissions

Significant dollars savings from the benefits of MPTS

MAXIMUM POWER TRANSFER SOLUTION - MPTS

Reduction in Power Generation and Carbon Emission

Power monitoring Base line without MPTS
Power analyzer model C.A. 394, Serial number 200671 1:1
Trend monitoring for Air Compressor CO1
Monitoring Start and End:
Date: 11/26/2014, 10:42:00 AM to 01/12/2014, 10:42:00AM

Power monitoring with MPTS
Power analyzer model C.A. 394, Serial number 200671 1:1
Trend monitoring for Air Compressor CO1
Monitoring Start and End: Date:
3/31/2015, 08:26:00AM to 4/4/2015, 08:26:00AM

Power Analyzer - Monitored Data

Interval Data Attached

Improvement in power quality metrics

Item	Existing values without MPTS		Values with MPTS	Changes in Values with MPTS	
Volts	278		279	No Change	-
Load Amps	124		37	Decrease in Line Amps	87
Load PF	0.298		0.811	PF improvement on load side	0.513
Load KVA	104		31	Decrease in Line KVA	73
Load KVAr	95		13	Decrease in KVAr	82
CO2	97,240		28,985	Decrease in CO2	68,255

Power quality improvement and energy efficiency at
NORAD - Cheyenne Mountain Air Force Station, USA

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