



Packaged Central Plants

August 4, 2005



Success Has Partners

=== ISO 9001:2000 ===

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Agenda

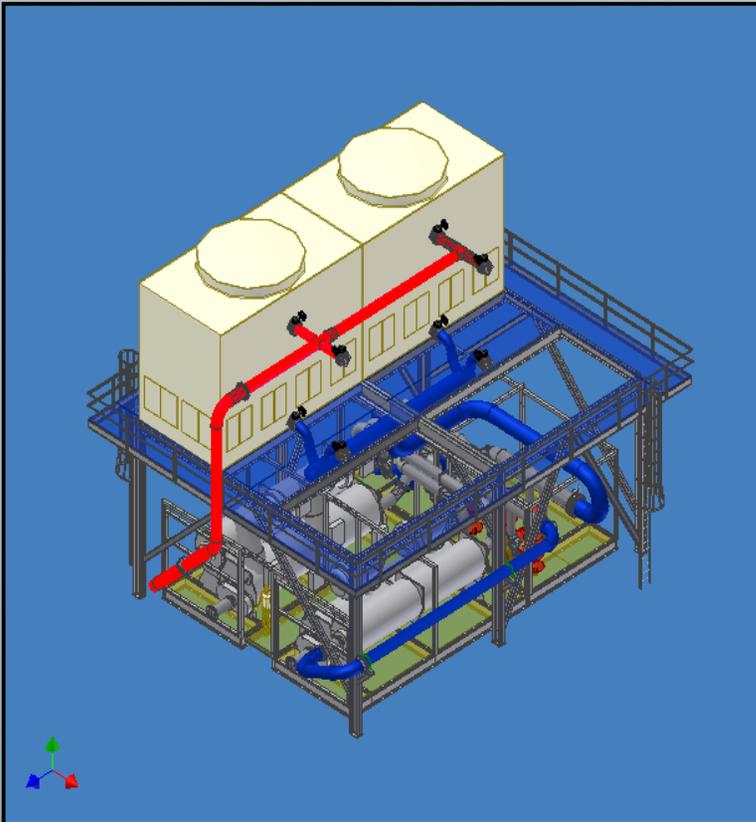
- ✓ **Packaged Central Plant Product**
- ✓ **Capabilities/Value Proposition**
- ✓ **Application**
- ✓ **Summary**

Guaranteed
Innovation → Efficiency → Savings = ^ Best Value



Packaged Plant Product

Innovation → Efficiency → Savings = ^ Best Value
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- ✓ Engineered Package:
 - Single or Multiple Chillers
 - Boilers and/or Plate & Frame HX
 - Chilled water pumps (N+1)
 - Condenser water pumps (N+1)
 - Hot Water Pumps (N+1)
 - Motor Control Centers
 - Controls: DDC or PLC
 - Fully Air Conditioned Enclosure
 - Optional “Convertible” versions
 - Cooling Tower
 - Tower support structure and piping
- ✓ Guarantees:
 - Cost (\$/ton)
 - System Efficiency (kW/ton)
 - Completion date (months)

Benefit of Packaging: Contract to Require Performance Liquidated Damages (LD's) for Efficiency, Tons, etc.



Quantitative Advantages

- ✓ **Cost** – Typical installed cost savings of \$200-\$300 per ton versus field-erected systems
- ✓ **Schedule** - can save up to 50% (6 months) versus typical design/bid/construct
- ✓ **Industrial Quality**
 - ✓ ISO 9001:2000 Manufacturing Processes
 - ✓ B31.1 Piping
- ✓ **High System Efficiency**
 - ✓ Chiller/Pump/Tower Optimization
- ✓ **Equipment Enclosure**
 - ✓ Realize use of building space once reserved for mechanical room(s)
- ✓ **Compact Footprint**
- ✓ **Standardized O&M service and parts**

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Qualitative Advantages

- ✓ **Single-source responsibility**
 - ✓ Integration
 - ✓ One set of submittal, P&ID, PFD documents
- ✓ **Simplified project execution**
- ✓ **Flexible - customizable to fit specific site conditions**
 - ✓ Various scope options: compatible with TES, BCHP, and Cogeneration
- ✓ **Portability**
 - ✓ On-site as processes/needs change
 - ✓ Different sites
- ✓ **Guaranteed and predictable performance**

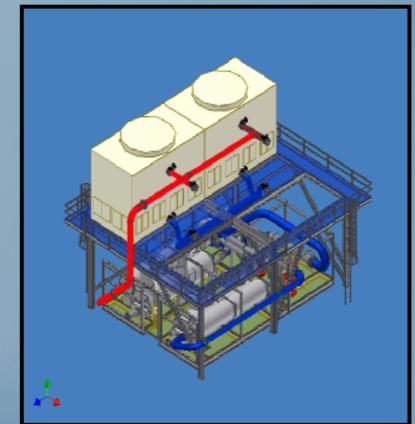
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Plant Maintenance and Serviceability

- ✓ Dry room for switchgear and controls
- ✓ Minimum 5 foot aisle between chillers
- ✓ Clearance for compressor removal
- ✓ Overhead monorail hoist (pumps)
- ✓ Removable end-walls or doors for tube access
- ✓ Internal catwalks and ladders
- ✓ Cooling tower catwalk & railing

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PACKAGED CENTRAL PLANTS

Project: 2000 Ton Central Plant
TAS Proposal Number: 2004-1
Customer Name: Medical Building



Option 1: Field Erected 2000 ton plant

Option 2: TAS H-Series with 2 x Long barrel simplex chillers

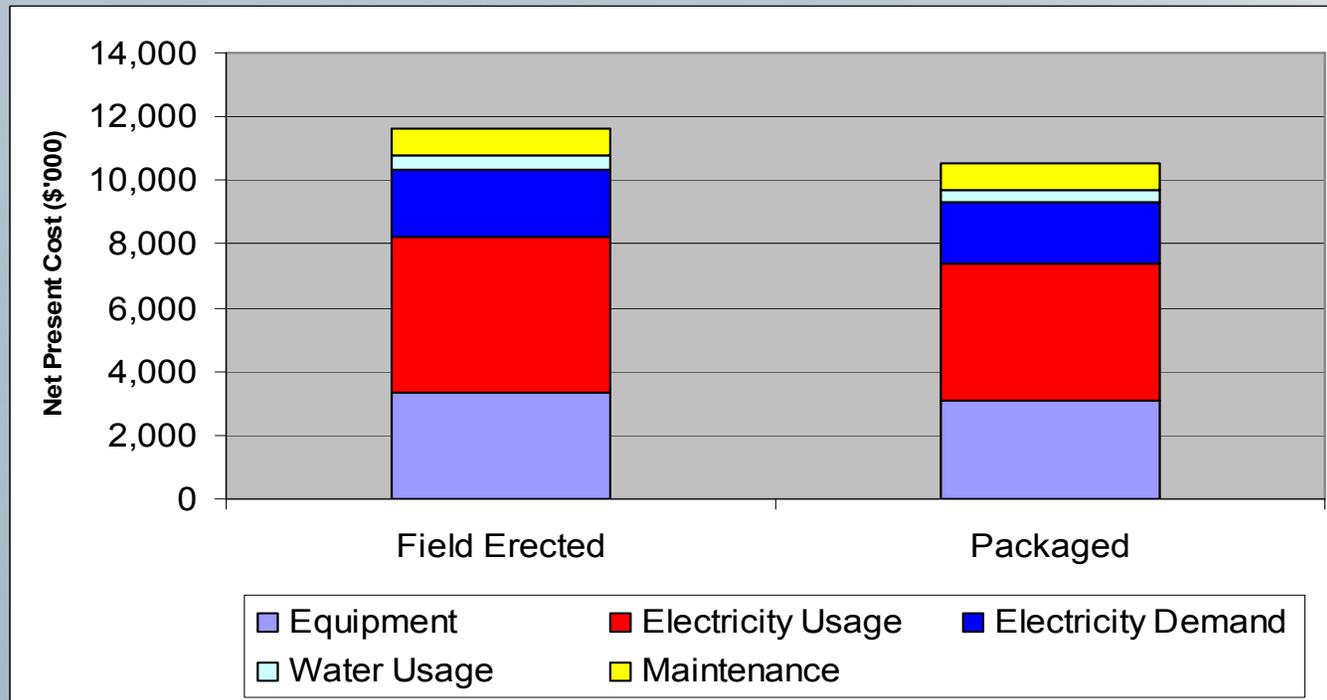
Input:
 Total Installed Tons: 2000
 Planned Full Load: 100% *Use if redundancy exists*
 Running Full Load Tons: 2000

	Option 1 (MC Estimate)	Option 2 - TAS PCP (actual)
Concrete Slab:	0	26,250
Chillers:	400,000	2,350,000
Cooling Towers:	170,000	included
Cooling Tower Structure:	48,000	included
Pumps:	96,000	included
Piping/Valves/Instrumentation:	370,000	included
Insulation:	148,000	included
Controls:	88,000	included
Chiller Plant Building:	320,000	included
Startup:	37,200	included
Commissioning:	64,000	included
Electrical:	344,000	included
Shipping:	74,000	90,000
Rigging:	56,000	45,000
Water Treatment:	35,000	35,000
Building HVAC:	48,000	included
Refrigerant Monitoring System:	30,000	included
Field Labor:	170,000	130,000
Warranty:	70,000	included
Subcontractor Mark-up	337,230	31,500
General Contractor Mark-up	435,815	406,163
Construction First Cost:	3,341,245	Actual 3,113,913
(\$/ton)	1,671	1,557
Performance Input:	(ESTIMATED)	(ACTUAL)
kW/Ton:	0.85	0.75
Running Load kW:	1,700	1,500
Connect Load kW:	1,700	1,500
Full Load Hours/Year:	4,117	4,117

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Net Present Cost Comparison



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Packaged Plant Product Benefits

Benefit	Packaged	Conventional
Energy Efficiency (kW/ton)	.70-.80	.85-1.0+
Eliminates Need for Building	Yes	No
Installed Capital Cost (\$/ton)	950-1500	1600-2200+
Deployment Schedule (mos.)	6-9	18-24
Compactness	Yes	No
Portability	Yes	No
Modular Concept	Yes	No
Constructability	Simple	Complex

Innovation → Efficiency → Savings → *Guaranteed* Best Value



Packaged Central Plant Interior

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Integrated Switchgear

Innovation → Efficiency → Savings → *Guaranteed* Best Value



Electrical/Control Dry Room
separate from Chillers and
Pumps



Pumps and Headers

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Accessibility

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Typical Package Installation

Installation Statistics:

- 7-Man Crew
- 4 x 10 hour Days
- 4 Days per week

Plant Installed in 16 Working Days

Project Information:

- 1,200 tons Installed Now (2 x 600TR Centrifugal Chillers)
- Additional Expansion Planned (2 x Centrifugal Chillers)
- Expansion to be inside shown package and will require less than 10 days to install and require zero plant outage

Receipt, Unloading, and Setting of Modules

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Single Lift

Re-Connection
Electrical Bus Duct

Re-Connection
Chilled & Cooling Water
(8)-Victaulic Couplings

Re-Connection
Controls
<30 Pre-tagged & tested
#12 Wires

75 Ton Crane
1-Day

JAN 19 2004

Pump Module

ASHRAE Ventilation
Lighting & Utility
Receptacles Built In



Internal Package & Cooling Tower Structure Major Assembly Complete

Innovation → Efficiency → Savings → Best Value



Lt Weight Hoist Truck
10 Days



Cooling Tower scheduled for Just-in-Time Delivery and Placement

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1200 Ton Facility Installed

Bossier City, Louisiana



29 calendar days to install

24 weeks from order to chilled water

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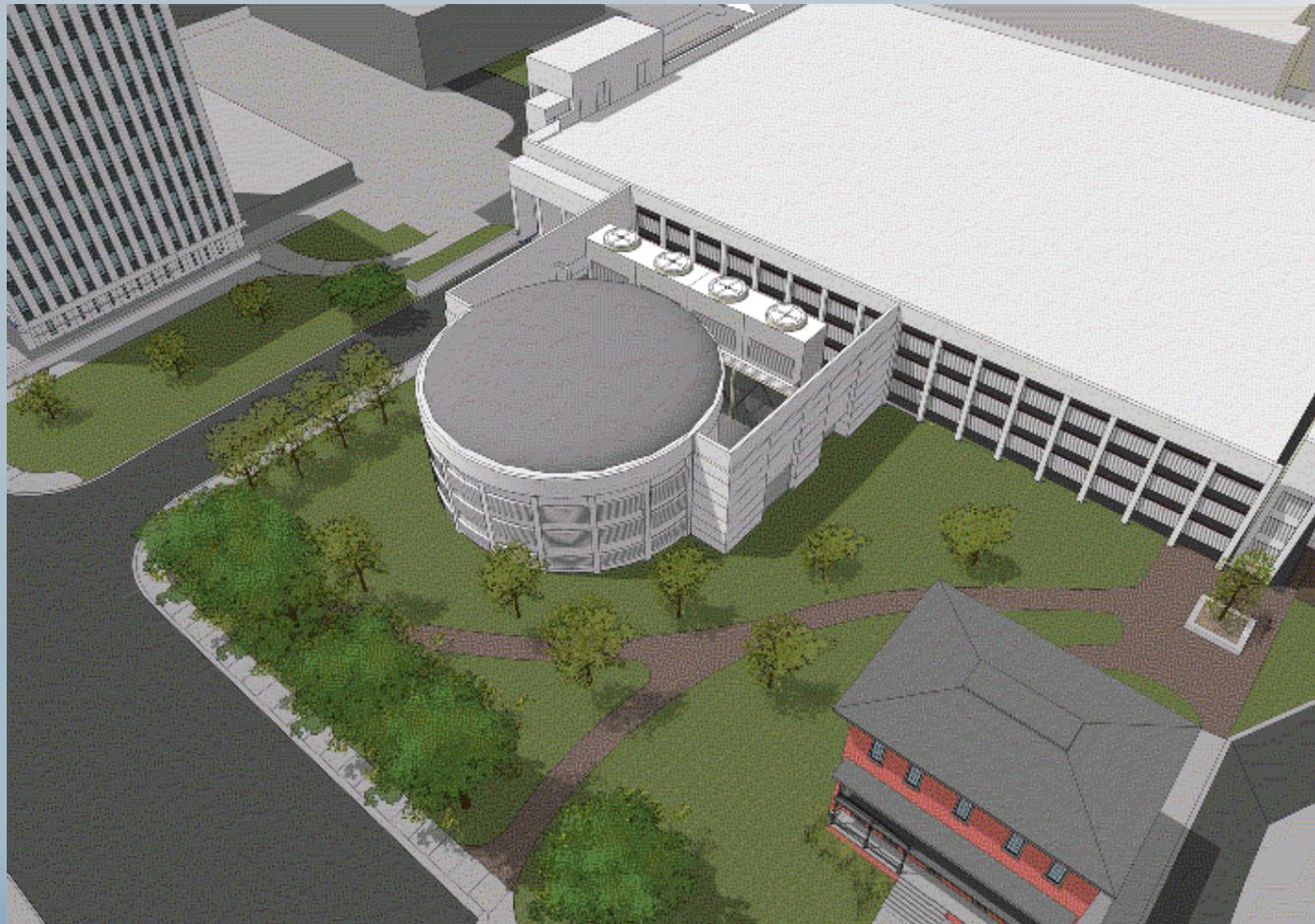
1200 Tons – Rincon, California

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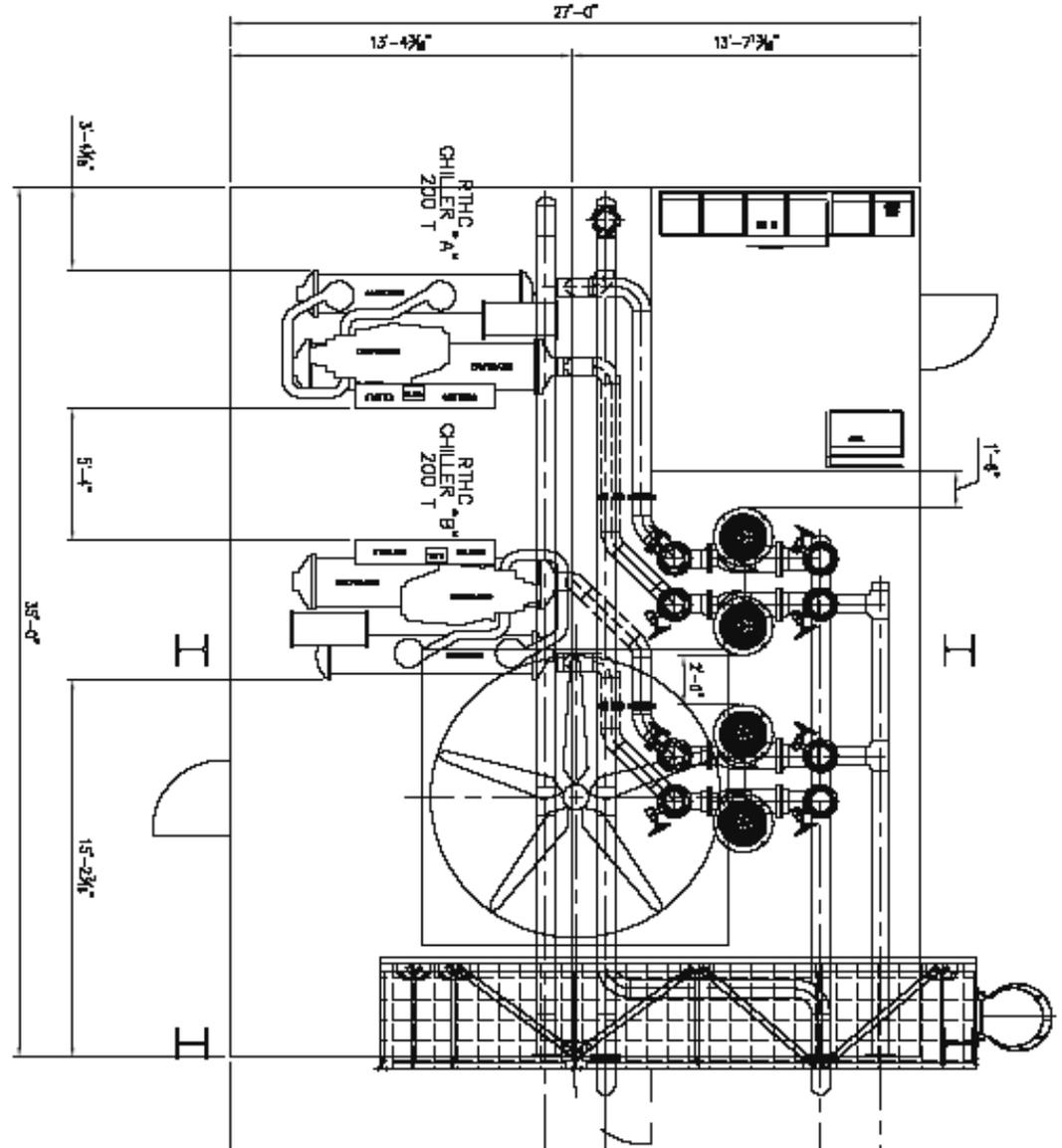
Screening Options

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400 Tons - Stafford, Texas

- Water-Cooled Screw Compressor Chillers
- Replaced Air-Cooled Chiller system
- Delivery to Startup: 9 Days



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400 Ton Packaged Plant

Innovation → Efficiency → Savings → *Guaranteed* Best Value



400 Ton Packaged Plant

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5000 Ton Packaged Plant – Pompano, Florida



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5000 Ton Packaged Plant – Pompano, Florida



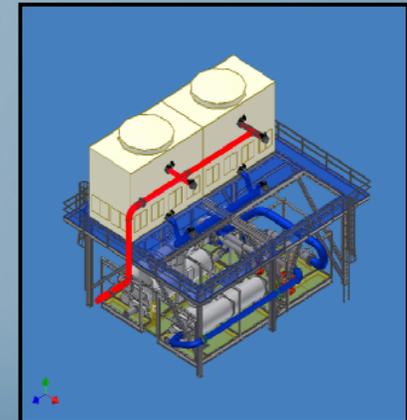
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Summary

- ✓ Reduced first cost
- ✓ High-efficiency plant
 - ✓ Lowest Life-cycle cost
- ✓ Reliability
- ✓ Quality
- ✓ Reduced footprint
- ✓ Minimal site interference = Maximum Safety
- ✓ Shortened construction cycle
- ✓ Guaranteed performance

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Additional Information

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