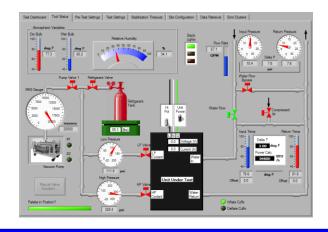


## Heat Pump Test System

- Robust, intuitive user interface
- Testing based on sophisticated statistical models and historical data
- All data sent to SQL server for easy querying and analysis
- Complete, recipe-driven test sequence for heating and cooling applications
- Reporting feature that allows engineers, managers, and customers to access test reports on any unit at any time

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## Overview

A top manufacturer of pool and spa equipment asked KDY to develop a test system for their heat pump products. The solution KDY delivered allowed the customer to decrease test time, eliminate false failures and escapes, and better collect and analyze crucial engineering information.

Tes Dashbard Tool Status Pre-Test Settings Test Settings Stablaston Theories State Configuration Data Relatives Data Settings				
Test Setup			Spec Model Inputs	Simulated Data Ta NII H20Temple Charge Arrps
Current Test Information Retrieve Unit from Labview.in Manually Enter Serial #	Previous Test Information Time 2/7/2008 10:00 AM Serial # 123456	Stack User/D Lights Inter Pump Test Stand 1-4 Set 2009	() 110 Mariyani 110, bol () 115 Mariyani 110, bol () 115 Mariyani 110, bol () 116 Mariyani 110,	100         100         56         8         90           115         30         66         7         45           106         80         86         40           106         80         86         60           100         77         86         60           80         70         86         90           80         80         86         90
Serial # 123456 Model # 000000 Test Type Rew Tost	Model # 000000 Result Possed	Constant States	Degree Control Famile         11/27/812-POC Impl-15         11/27/812-POC Impl-15           Dit Display         11/27/812-POC Impl-15         11/27/812-POC Impl-15           Dit Display         11/27/812-POC Impl-15         11/27/812-POC Impl-15           Dit Display         11/27/812-POC Impl-15         11/27/812-POC Impl-15           Display         11/27/812-POC Impl-1	With Bill         With Bill         A         ZO           Bill Bill         B         B         B           Bill Bill Bill         B         B         B           Bill Bill Bill         B         B         B           Bill Bill         B <t< th=""></t<>
Test Progress	advew.coc me awaring protop	Send labview.out to Database?	Vale? (ref. 104)	50 <sup>1</sup> 0 π. 0 <sup>1</sup> 0.
<ol> <li>Attach blue hose to low-pressure side and open manual valve.</li> <li>Attach red hose to high-pressure side and open manual valve.</li> <li>Attach relaw plus to orcut board.</li> </ol>	Status Checking Water Flow	USAS. UQAA.	UD Memory Served         CCC.71(m)-1111         ()1.1         ETUL/shear RDL           () Served         STURMARY         ()2.5         ETUL/shear RDL           () File         STURMARY         ()1.5         Reight Myn Research Dari RDL           () File         STURMARY         ()1.5         Reight Myn Research Dari RDL           () CO         Reight Myn Research Dari RDL         ()2.0         Reight Myn Research Dari RDL	Calculated Values Two Two S 55 60 45 55 55 50 15 70 15
<ul> <li>Attach near paig to oncut coard.</li> <li>Attach near paig to oncut coard.</li> <li>Safety Door in Correct Position<sup>2</sup> (check that the correct model # has been entered above)</li> <li>Vaid Test Specs Loaded?</li> </ul>	Setup Tests Water Flow Tests Water Flow Test	Pecent samples are with a cortrol links.     Single-3.2% specifier     sector-     sector-     sector-     sector-	Verify the function of site     Verify the function of si	3         5         10         15         20         23         30         30         40         40         50         60           Ratios High Processes Space         200         255         250 <td< th=""></td<>
MCR On? CK to Start Test?	<ul> <li>Water Pressure In Test</li> <li>Water Pressure Out Test</li> <li>Water Pressure Deita Test</li> </ul>	9000 - 9000 - 9000 - 9000 - 7000 -		ETU Mastra See 50 50 50 78 78 50 59 400 112 128 130 196 120 ETU Cooling See 56 50 78 51 51 50 50 112 128 130 116 120 Refrig High Process Dave Cooling
Stability Over	ride Time Remaining 00:00:12	7000 - 7000 - 6305 5 - 00.00 00.02 00.04 00.06 00.09 00.12 00.14 00.16 Tens	2	200 202 202 203 205 303 355 303 355 300 455 400 455 300 Bakes Lee Mennes Spec Cooling Color 100 1101 1101 100 100 100 1201 200 200 201 201 201 200 100 100 100 100 100 100

## The Test Dashboard

Because the system would be used by engineers as well as production operators, KDY developed a simple but highly functional user interface that allows product testing, software configuration, mathematical model entry, and model sensitivity analysis.

## Data Viewing and Analysis

The data from each unit testing is stored in a SQL database that can be queried for engineering information as well as manufacturing throughput information at any time. This data can be modeled and then fed back into the KDY software to further refine the product testing. KDY developed a customized query that lets engineers, product managers, and even customers quickly retrieve complete summary of test information for any unit.