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High Performance Clothes Washer In-Situ Demonstration in a Multi-Housing Multi-User Environment

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Study Objective

- Measure, analyze and report on the efficiency of 4 high performance brands of residential-style clothes washers in Army military barracks
- Calculate the energy and water savings of the high performance washers compared to existing “standard” washers
- Ascertain cost-effectiveness of the high performance clothes washers

Study Location

- Fort Hood, Texas
- Largest U.S. military base
- 73,000 population – 42,000 active military personnel
- 1,200 residential clothes washers provided by laundry service company

Study Characteristics

- 3 military barracks laundry rooms at Fort Hood, Texas
- 6 identical washers located in each laundry room
- ~140 troops/barracks
- Natural gas hot water @ ~60% delivery efficiency

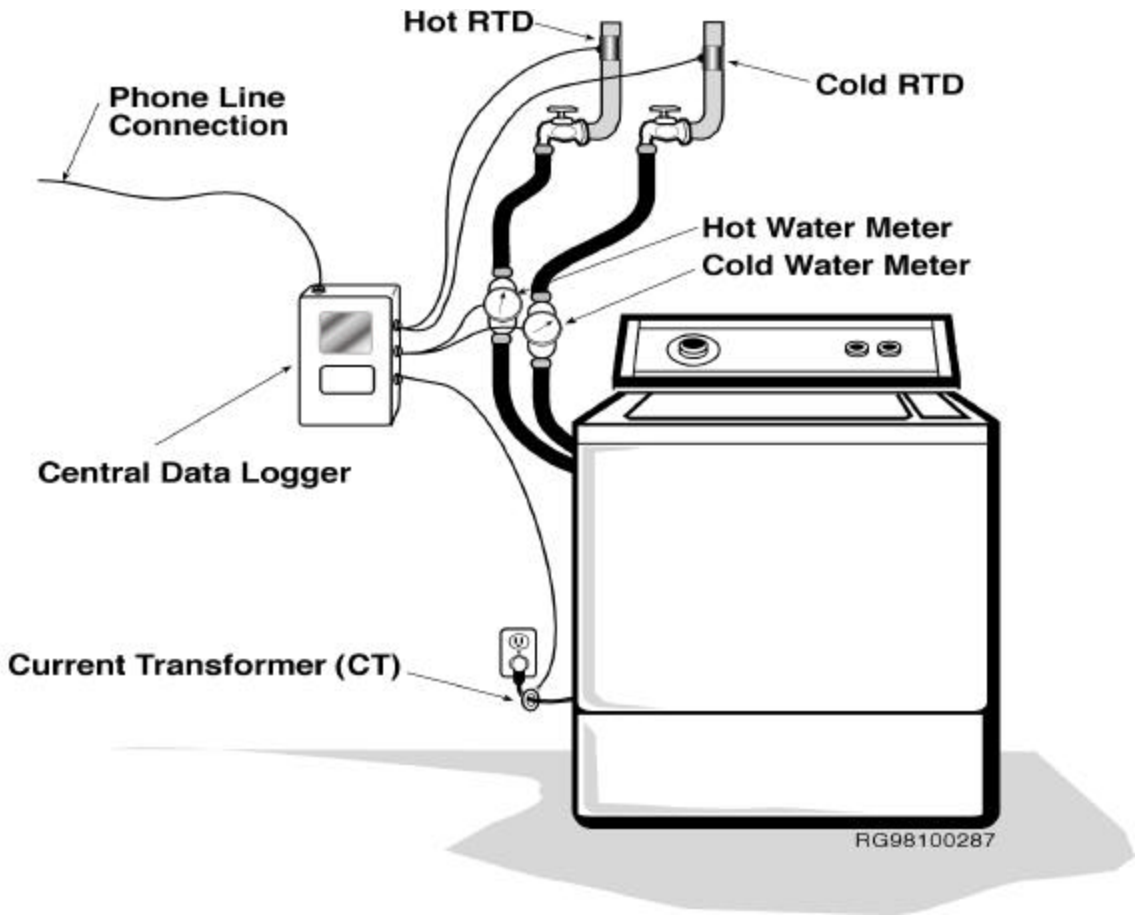
Clothes Washers Description

- Baseline (existing) washers
  - 6 Roper (Whirlpool brand) vertical axis top-loading
  - 2.50 cu ft; soft-mount; 6 years old
- High performance washers
  - 6 each new soft-mount:
    - Maytag front-loading; 2.86 cu ft
    - Speed Queen front-loading; 2.80 cu ft
    - Staber Industries top-loading; 1.93 cu ft
    - Whirlpool top-loading; 3.0 cu ft
- “Family-style” -- no coin-boxes

Metering

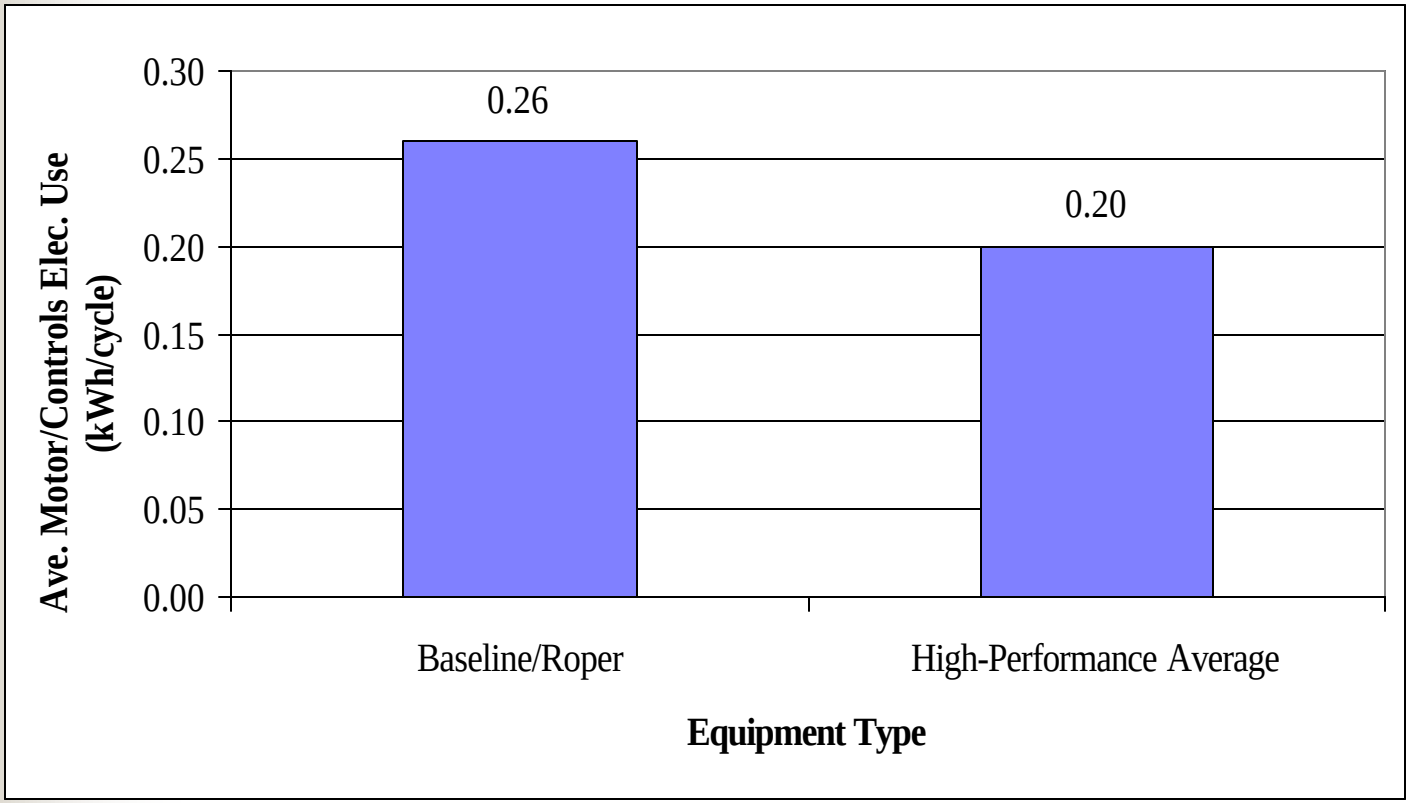
- Each washer was identically monitored for the following parameters:
  - Hot and cold water temperature
  - Hot and cold water use
  - Washer electricity use
- All data stored in a central data logger and retrieved remotely on weekly basis over phone lines.
- Metering Duration:
  - Baseline: 1,050 cycles
  - High performance: 1,198-5,078 cycles

Metering


Hot RTD
Cold RTD
Phone Line Connection
Hot Water Meter
Cold Water Meter
Central Data Logger
Current Transformer (CT)
RG98100287

Metering Results

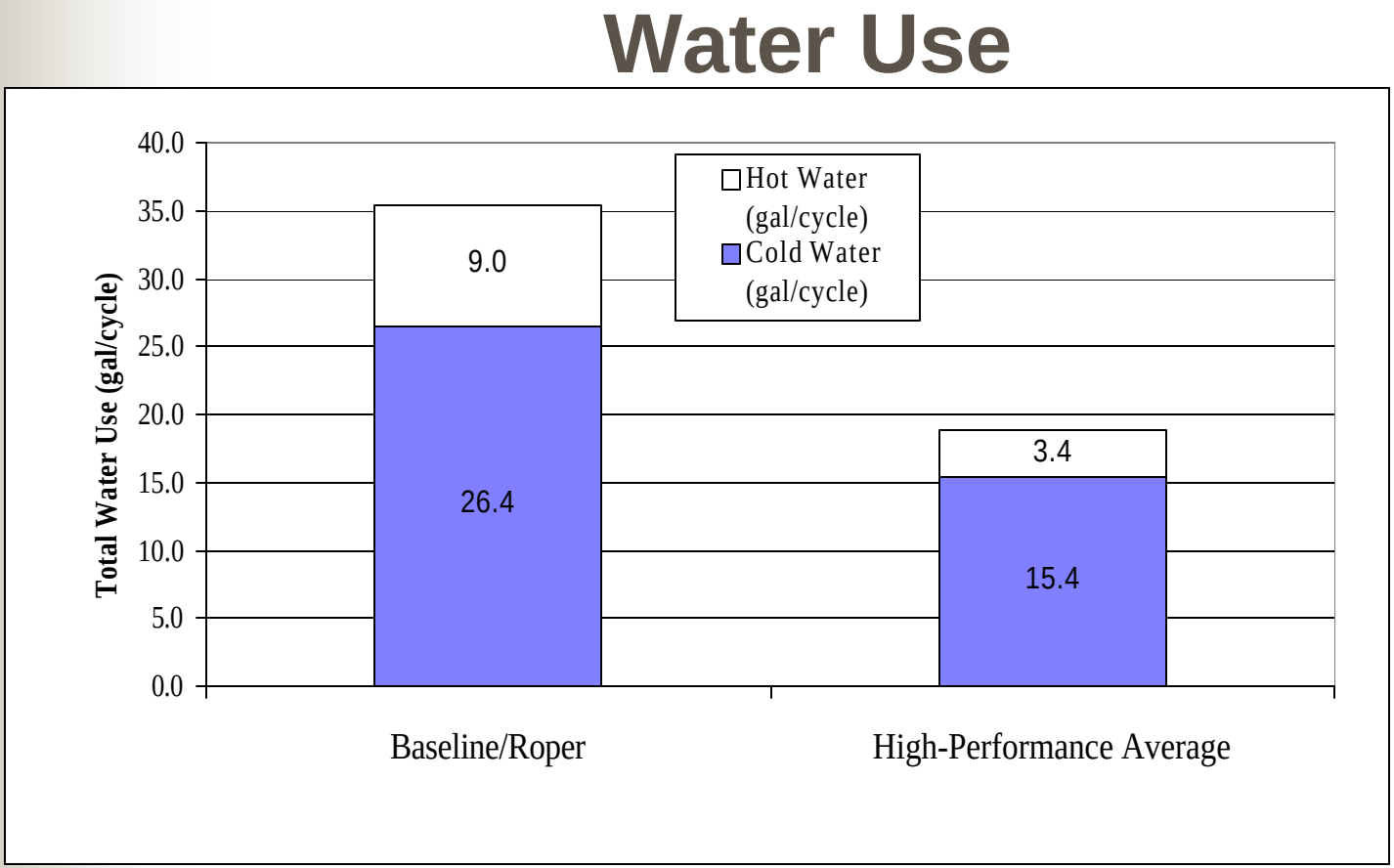
Motors and Controls



Average Savings:

0.06 kWh/cycle (or 23%)

Metering Results



Average Savings:

5.6 gal hot water (62%)
11.0 gal cold water (42%)
16.6 gal total water (47%)

Metering Results

- Hot water energy use
  - Baseline: 5,610 Btu/cycle
  - High Performance: 2,120 Btu/cycle
- Hot water energy use savings
  - 3,490 Btu/cycle
- Average cycles/day = 6.4 (all machines tested)

Economic Results

- Annual savings/machine – compared to standard baseline machine - based on Fort Hood utility rates*

Water:	$39/year
Electricity (motor)	$ 4/year
Hot water energy	$43/year
Total	$86/year

*32 cents/therm natural gas; 3.2 cents/kWh; $1.00/1,000 gallons water

Cost Effective?

YES!!

At Fort Hood (low) utility rates and 6.4 cycle/day for each machine, the present value of lifetime energy and water savings is:

~$450*

This is the maximum incremental cost above a standard machine that the Fort should be willing to pay.

*@ 3.1% discount rate