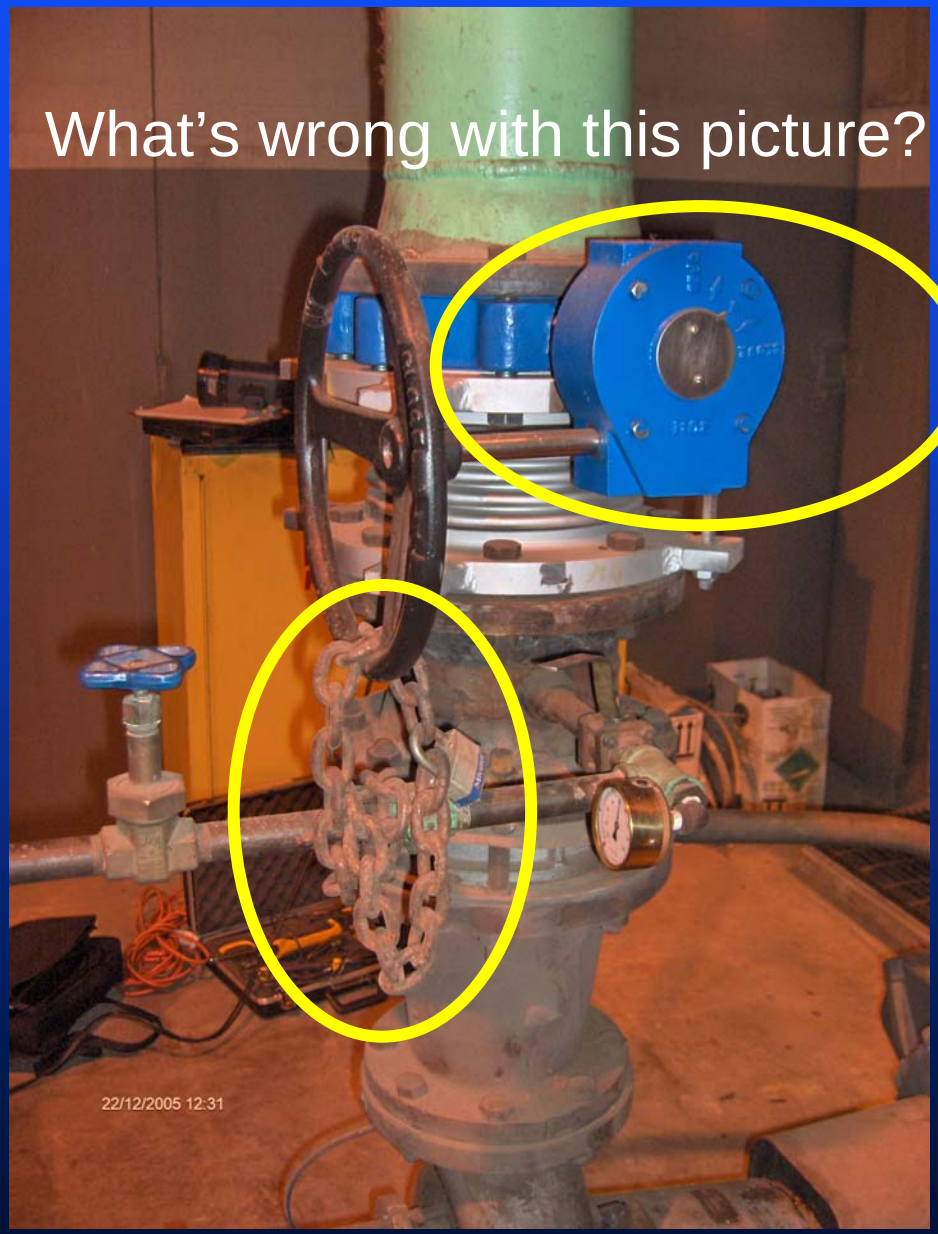
CSU IAC Case Study Example 2: Plant 582: A Beverage Container Manufacturer

CSU IAC PLANT 582

- Manufacturer of beverage containers
- Plant area: 336,000 ft^2
- 100,000,000 kW annual energy consumption
  - about 11 MW peak demand
- Annual electricity costs: $4.6 million/yr
- Estimated 10,000 hp of motors
- Two 1,000 hp, one 900 hp, and three 700 hp centrifugal air compressors
- 4 cooling water/tower pumps for air compressors
  - 60 hp each

CSU IAC PLANT 582: COOLING WTR PUMPS



CSU IAC PLANT 582: COOLING WTR PUMPS

Pump No. 1 (M30):

The cooling water pump is powered by a Baldor Super-E 60 hp motor (Cat. No. ECP4314T-4, rated at 460V, 71 A, 1,780 rpm, 94.5% efficiency).

The pump is an Allis-Chalmers Model 2000-391, 6 x 6 x 13 pump.

CSU IAC PLANT 582: COOLING WTR PUMPS

Pump No. 2 (M5):

The cooling water pump is powered by a Reliance E-Master 60 hp motor (rated at 460V, 73.4 A, 1,780 rpm, 93.6% efficiency).

The pump is an Allis-Chalmers Type 2000, 6 x 6 x 13 pump.

Note that the discharge valve is wide open – provided a good baseline

Power, Pressure, Pump Head Data

Power:

Motor was fully loaded (stroboscope), so full load power was about 60 hp × 0.746 kW/hp ÷ 94.5% motor efficiency = **47.4 kW**.

Flow:

Controlotron 1010WP portable flowmeter on 6” Schedule 40 steel pipe supply piping (25 psig 27” above floor) and 8” Schedule 40 steel discharge pipe (84 psig 29” above floor) showed a consistent **1,010 gpm**.

Note: 1,030 gpm on M5 pump

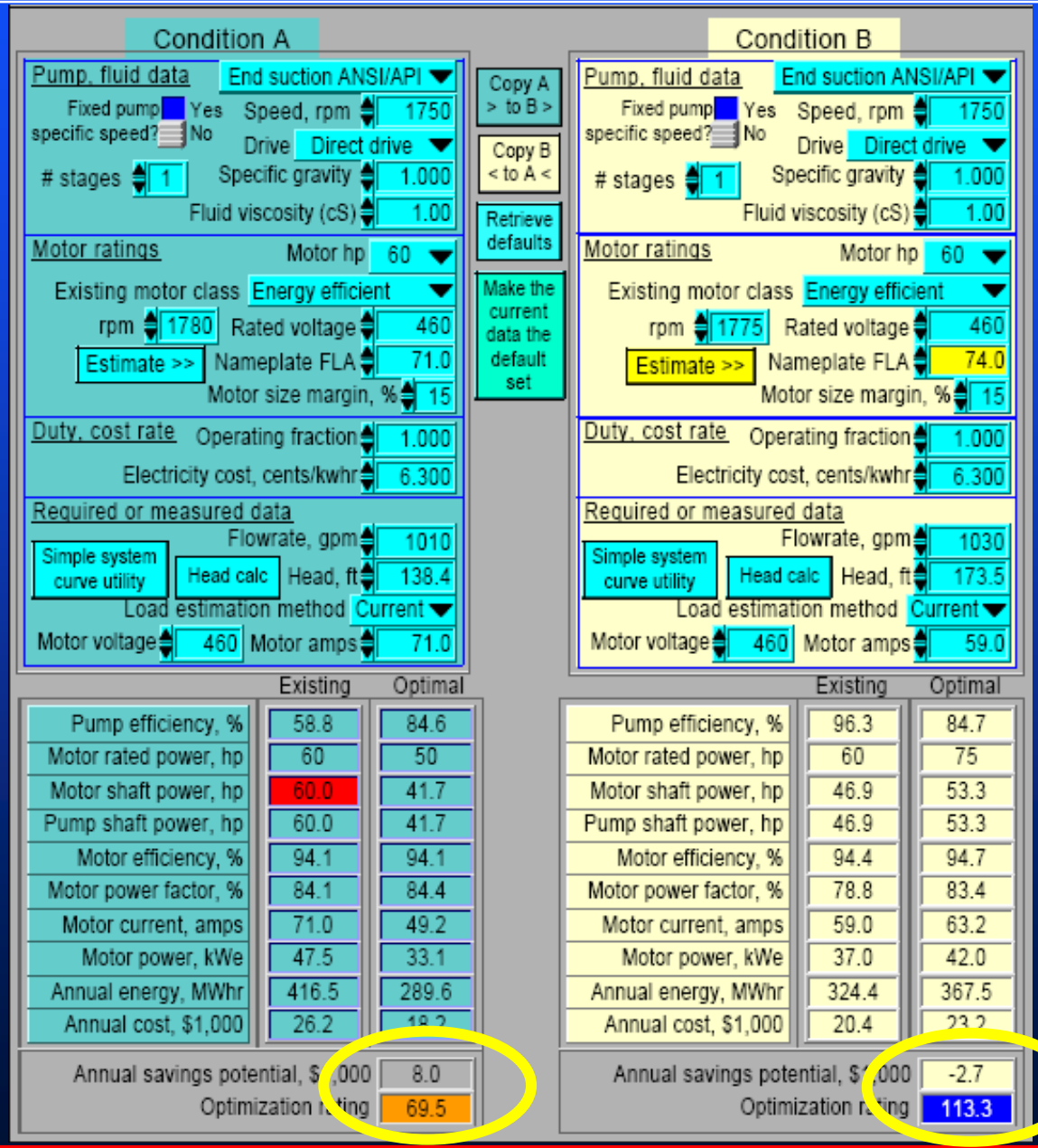
PSAT calculated 138.4 ft of pump head

So What's the Big Deal?

- One 60 hp pump out of 10,000 hp!!!
- Pump runs 100% of time (8,760 h/yr)
- Valve locked suggests the valve always operates this way

Let's see if this is a big deal

PSAT Results



Several Options Considered

- Trim the pump impeller
- Get a new, smaller pump
- Add a variable speed drive

Recommendation

Install variable speed drive – more conservative, easy to calculate

Control manually or by pressure control

Estimated installed cost: $11,500/drive (R. S. Means 2005)

Xcel Energy rebate: $30/hp x 60 hp = $1,800

Estimated Implementation Cost = $9,700 after rebates

Total energy and demand savings: $7,950/yr

Simple payback: 1.2 years