

Case 17

A Free Lunch?
by
William Truran
Stevens Institute of Technology

Zippy Quick, in his bright suit and straw hat, walked briskly into the large building complex to see the superintendent (Super) about her heating, ventilating, and air conditioning (HVAC) equipment. Zippy said “How’d you like to hear my scheme for you to make money from nothing and then end up with some new equipment that you can effectively use?”

Well, the Super was interested but suspicious. “What do you mean, I have to put up no money and end up with new equipment I can keep?”

“Correct, I’d have the specialists come in here and do the installation and startup of the equipment. You pay nothing, AND, you’d be *making* money in a year.”

“Where’s the catch?” exclaimed the Super.

“NONE, no catch” said Zippy. “Just sign a three-year contract to split 50/50 any savings the equipment generates on the use of your HVAC equipment plus pay for a service contract for the equipment’s maintenance. We will take out the loan for the equipment and installation and pay off the loan with our share of the savings. After three years the equipment is yours. You’ll only be giving us some of the money you are paying the power company for electricity. The service contract for the equipment is \$15,000 per year, but think of your peace of mind!”

The Super is suspicious of Zippy, but he seems to know HVAC equipment. The deal he is offering seems to be risk free if she gets a clause in the contract that gets the equipment removed at no cost after the first year if she is not seeing cash flow in excess of \$15,000 to cover the maintenance contract.

Based on her own research in response to Zippy's claims and some questions she asks him, she finds the following details to use in trying to evaluate Zippy's offer:

- The combined horsepower (HP) for the fans and blowers in the HVAC system total 400 HP. The system currently runs at capacity 100% of the time.
- Most systems are overdesigned. A 10% reduction from maximum speeds is possible without impacting performance if fixed speed motors and controls were originally used to drive the blowers. This system was designed that way.
- Zippy claims that with his equipment (variable speed drives and controls for the motors) the system will run at 20% of capacity at least 45% of the time. For example, on nights, weekends, and holidays, there is little need for heating and cooling.
- While not part of Zippy's pitch, running the fans and blowers at less than capacity will extend their life from about 7 years to 10 years, which is also the life for Zippy's system.
- Electricity is currently costing \$.12 per kilowatt hour.
- All the fans in the HVAC system are centrifugal—thus the effective HP is a cube of the speed (see Figure 17-1). This implies at 90% speed, the required HP is $.9^3$ times the required horsepower at 100% of capacity. Note that at 20% speed, the required HP is actually 10 HP rather than the 3.2 HP predicted by $.2^3$ times 400 HP.
- One horsepower requires 748 watts.

Questions to answer:

1. Is Zippy off of his rocker? (HINT: Yes, quite a strange way to dress and present himself; but beside his weirdness, he may have something to provide him money to buy a new suit.) Is this a good deal for Zippy? Zippy has a minimum attractive rate of return (MARR) of 12% and does not really take out a loan.
2. Considered over three years is this a good deal for the Super? Is this a free lunch? The Super has an MARR of 9%.
3. What should the Super do?

Options

1. What is the PW at the Super's MARR and the rate of return for the system considered over its 10-year life?
2. For Zippy's original proposal, what is the payback period for Zippy? For the Super?

Figure 17-1 Speed vs. Horsepower