

## Example 2, Use of the Motor Systems Tool – an energy advisory case

### **Situation A:**

You are an energy adviser. One day you encounter a fan installation. The installation is a three-phase motor driving a fan directly. The facility at where you are is well equipped and is able to provide the datasheet for the fan (see page 2). The motor nameplate can be read on site:

50 Hz, 5.5kW, 380V, 12A, cos phi 0.83, 1425 rpm.

Using your multi-meter, you find the power consumption of the installation to be 6.15 kW. From the fan curve, electrical measurement and your knowledge of motors we can take a qualified guess of the amount of air delivered by the fan:

\_\_\_\_\_ m<sup>3</sup>/s at a differential pressure of \_\_\_\_\_ pa

These numbers are verified on site. Having interviewed the operating personnel of the machine and by measuring actual duty points the following load profile is established:

1. Highest flow: P1 = 5.40 kW for 500 hours/year
2. Lower flow: P1 = 6.15 kW for 1800 hours/year
3. Lower flow: P1 = 5.82 kW for 1800 hours/year
4. Lowest flow: P1 = 5.34 kW for 2500 hours/year

What is the annual power consumption in the current situation?

What would the annual power consumption be, if the motor was replaced by an IE3 motor? (IE2, IE4?)  
(Not taking a potential speed variation into account)

Annual savings with IE3 (same load profile): \_\_\_\_\_ kWh (IE2, IE4?)

### **Situation B:**

Imagine the same situation but in this case the fan, for mechanical reasons, is driven by two belts (XPB narrow cogged, both pulleys Ø140). With unchanged hydraulic conditions (P4) the “new” load profile would look like this:

1. Highest flow: P1 = 5.87 kW for 500 hours/year
2. Lower flow: P1 = 6.65 kW for 1800 hours/year
3. Lower flow: P1 = 6.31 kW for 1800 hours/year
4. Lowest flow: P1 = 5.81 kW for 2500 hours/year

What would be an obvious action for saving energy – and why?

What would the savings potential be for this action?

What would the total savings of these actions be considering both replacement of belt and motor to IE3? (IE4?)

