Why do we use a 40hp Motor in our Evaporators?

Following is Slimline Manufacturing Ltd's answer to questions and an attempt to address any concerns about the fact we utilize a 40 horse power electric motor which is purposely oversized for many reasons, following is our presidents explanation of his reasoning regarding this issue.

Kim Blagborne, President & CEO of Slimline Manufacturing Ltd

"We had a chart recorder test ran on our evaporator and found the amperage draw during operation was 23.8 amperes on average with 446.8 volts. US Electric Motors publish the efficiency of their motor and these three factors were utilized in the following formula to determine the horsepower requirements to run our evaporator.
Using the formula for 3-phase power it provides us with the following info:
Using the efficiency factor published by US Electric Motors, at 50% load the motor has an efficiency rate of 94.2 % (Available direct from US Electrics)
Formula used: Horse power = (1.732 x Volts x Amps x Efficiency x Power Factor)/746
Horse power = (1.732 x 446.8 x 23.8 x .942 x .99)/746
The calculation results in an actual Horse power demand of 23 hp.

Regarding the development and choice of running a 40-horse power in comparison to a 25-horse power motor, I offer the EASA technical Manual information with the effects of unbalanced voltages. As you read the technical paper you will find out how the effect of unbalance voltage affects the durability, reliability and operational costs. Nema recommends that voltage unbalance should not exceed 1 percent. Technical Paper 3.8 pages 3 – 68 & 3 – 69 explains in more detail the effects and results of unbalance voltages on 3 phase motors (following page).
The second major consideration is operating temperature. By rule of thumb, a machine's life is cut in half for every 10 degree C rise, above its rated operating temperature.

Not only did I have to worry about unbalance voltage problems we have the issue of elevation change for different installations. The attached Technical Paper Section 3 pages 3 – 39 can calculate the effects of elevation change

Then, I look at the effect ambient temperature in relations to durability reliability and operation costs. On Technical paper dealing with the *Cause and Analysis of Stator and Rotor Failures in AC Induction Machines (Tech Note No.31) pages TN31-2 & TN31-3.*

If you look at Table 1 AMBIENT TEMPERATURE VS. INSULATION LIFE it illustrates the effects of ambient temperature at various temperatures

and the effects of Insulation life. This is why I installed the roof that provides shading on our evaporator, to minimize the effects from direct sunlight and provides protection from over spray gathering in the cooling vanes. In a condition where the Evaporator is blowing directly in the direction of the prevailing winds and the contaminated water is cycling through the blower. I also did not want to cover the motor totally, because I want to use the air movement cause by the intake of the Evaporator fan. This paper also discuss the effects thermal stress, overloading, Unbalance Phase Voltage, Obstructed Ventilation's.

Keeping all of this in mind I must shoot for the highest overall efficiency to minimize my operational costs. By choosing a motor that is only operating at 50% of available load it gives me a efficiency factor of 94.2 percent, but protects me for the aforementioned problems of improper motor installations. This also protects my customer for being billed high rates from power companies for poor efficiency motors.

If you remember I have stated that I customize the motor for our installation, the reason for doing this are explained in The Cause and Analysis of Stator Failure under the Sub Title B. Tracking. This is why we take the time to seal the motor up as much as possible before we install it on the Evaporator unit. I trust this answers the question of why I choose to install a motor that is substantial over sized with respect to horsepower demand. If not please ask as many question, as you like, I am happy to explain and justify my decisions.

Some Customers ask about the cost saving of purchasing a 25-horse power motor compared to our 40-horse power motor. The suggested retail price list for the motors in question, a 40 horse power motor 1800 rpm has a suggested retail of $3,388.00 and the similar motor but 25 horse power is $2,194.00 each. Therefore, resulting in a price differential of $1,194.00.

For a difference of a $1,100 dollars the benefit of the 40 horsepower with respect to temperature effect, voltage variance and the power efficiency far out way the cost differential. With regards to the benefits of durability, reliability, cost of operations and not to forget customer satisfaction and my company's reputation".

Kim Blagborne, adds " I would hope most of our customers compare fairly our product to other products and make an educated decision, we believe they are looking to us for a recommendation that will solve a problem, we recommend the best motor for this application is our 40 horsepower unit."

Having stated the above reasons for using the 40hp motor, If you the customer feel your situation is better served by utilizing a 30hp motor, we can supply, but this is not our recommendation for all the above reasons.

Call 1 800 495 6145 to speak with Mr Blagborne about any questions you have regarding our sizing on the motor.