Energy Efficiency & Energy Conservation measures for sewing machines

Tailoring is one of the most important livelihoods in India. Traditional tailors who generally serve local customers in small cities and villages uses manual sewing machines. To compete on the existing market and achieve higher productivity some of them have modified their machines by retrofitting the motor. However, In places with little or no grid availability, it is difficult to meet the increasing demands. SELCO Foundation has come up with a viable solar solution for them.

Solar is an ideal solution for micro generation. But the main challenge was to make it affordable for small scale businesses. SELCO Foundation made it possible by understanding the actual energy need and introducing energy efficiency measures. The key aspects of the intervention included the following:

Energy usage profiling:

Optimized solar system design largely depends on quantification of actual energy requirement. In case of intermittent types of load like this, it is very important to understand the usage pattern. A detailed study was conducted in a number of tailoring centers to find out the duty cycle. During the study it was observed that typically the straight stitch sewing machine motor is used for one fourth to maximum one third of the total operation time depending upon the volume of order to be supply.

Energy Efficiency Measures:

Mostly a universal motor of 1/10HP or 1/12HP is used along with a simple pedal control for this purpose. These motors are highly inefficient. It was noticed that while a 1/12HP universal motor consumed more than 100Watt to run a tailoring machine at nearly 1000spm (stitches per minute) speed, the same results could be achieved by a 60W PMDC motor consuming maximum 75Watts. By introducing a more efficient PMDC motor the energy consumption has been brought down by around 50% .This substantially reduced the cost of solar powering the equipment as well.

Energy Conservation Measures:

This type of machine has a clutch attached to the motor. When the pedal is pressed, the clutch gets engaged and the machine begins stitching. After the pedal is released, the clutch gets detached but the motor still rotates at no load, consuming at around 100W. This clutch motor was replaced by a Variable Frequency Drive (VFD) controlled 1/3HP induction motor. The VFD eliminates the idol running of the motor and saves more than 50% of the energy consumed. As a result the cost of the system get reduced more than 40%. An additional benefit is that it suppresses the high starting current of the motor and avoids the need for over sized inverter just to withstand the high starting current. At the same time the inversion efficiency gets increased due to improved percentage loading.

Through most of our observations we have found that the actual time the needle is engaged is only 30% of the total time. This would mean that if a garment unit shift is 9hours, the needle is get engaged for only 3hours.