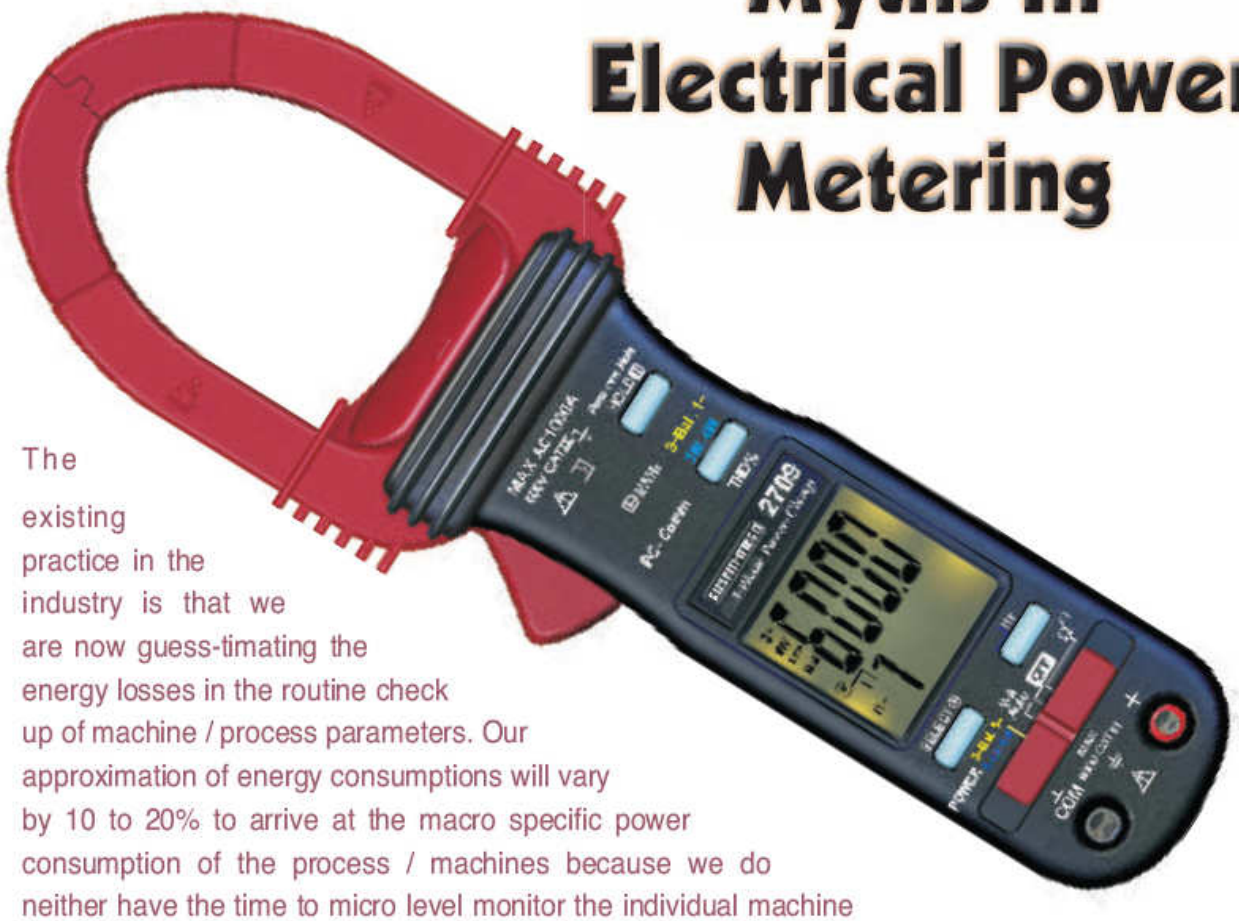
Myths In Electrical Power Metering



The existing practice in the industry is that we are now guess-timating the energy losses in the routine check up of machine / process parameters. Our approximation of energy consumptions will vary by 10 to 20% to arrive at the macro specific power consumption of the process / machines because we do neither have the time to micro level monitor the individual machine consumption, nor plan the time to analyze the macro power consumption.

- S Ashok

One of the reasons for this gap in assumption of power consumption is that either we do not have the power analyzer or even if have that, we do not have time to install & take measurements.

Having visited hundreds of industries who are energy guzzlers in this region in the recent years, I am surprised to find many industries in the segment have bought POWER ANALYZERS costing Rupees 2 to 3 Lakhs, few years back but the same is idling in the industry office shelf and sparingly put to use during routine maintenance.

The reason attributed to this poor usage of this power analyzer is that, it takes say 2 to 3 staff say Electrical Engineer, Supervisor & Electrician to hook up and it takes around half to one hour time to take out the first measurement of machine with this analyzer and then the trending starts.

After visiting the above industries few years back, I suggested them to buy a CLAMP-ON POWER METER costing less than Rs 10 K to at least be aware of the instantaneous power parameters of KW, KVA, KVAR, PF apart from the routine measurements of V, A, etc. With this meter, I explained to them both the Maintenance & the

Management, that they can take many instant power readings immediately in any machine, within 10 minutes. They can measure the motor input power in the 3 phases one by one phase with respect to neutral & individually each phase power parameters and sum the same for total power consumption.

We talk KW, KVA measurement accuracy of 0.5% in meter & spend later only, lakhs of Rs!

But today, we can walk the talk with 2% accuracy & spend Rs10 K to measure!

In my next visit to the above industries, to my pleasant surprise, I found that 90% of them, not only the small & medium scale industries

ACTIVE POWER (KW)		
Range	Resolution	Accuracy
0.00 to 600.0KW	0.01KW	± 2.0% rdg
APPARENT POWER (KVA)		
Range	Resolution	Accuracy
0.00 to 600.0KVA	0.01KVA	± 2.0% rdg
POWER FACTOR (PF)		
Range	Resolution	Accuracy
-1.000 to 0.000 0.000 to 1.000	0.001	± 10% rdg on ± (0.0+0.20) ± 5.0% rdg on ± (0.20 to 0.50) ± 3.0% rdg on ± (0.50 to 1.00)

bought one clamp-on power meter per industry immediately, but even large power consumers bought 2 to 3 of the above meters for their shift maintenance crew at least to know the instant power parameters at load ends and at the SSB.

Later, I was given to understand that the above type of meter was very much user friendly, even the Electrician uses it easily. And both the electrical & process managers talked to me about KW, KVA loading issues, optimum power consumption / machine during my next visits, there.

Inside the industry, this process of routine sharing of instant power parameters of machines between production and maintenance allowed the industry, to know that they were operating the machines safely & were to able to achieve the optimal energy conserving patterns on machines.

This metering practice, I wanted to share with you all in the industry that some basic power monitoring routinely & monthly can be added along with Sophisticated & Accurate monitoring every year over a long time gap with dedicated manpower & micro-studying for long man hours.

Reg the accuracy part of measurement, when no routine power readings were done, the industry manager talks only at 10% accuracy, but not acts. Now after buying this

clamp on meter measurements, today the same industry manager can pin point the losses now at 2% accuracy.

To circumvent the problem of low PF measured during motor no load parameters, I have suggested them that we can connect across the motor terminals, the sized capacitor and take the power readings so as to improve PF & maintain the accuracy in no-load KW measurements.

The sophisticated metering used with single CT mode or with 3 CT mode again depends on the dynamic load variations which normally happen in electronic driven non linear machine loads. Hence we have to plan to use the above meters to suit to the application and process variables.

For the given linear load of motor, though the theory says it is a balanced load, but still 3 phase 4 wire method of measurement gives an accurate individual and sum of power parameters in 3 phases. So a single CT probe measured as above, gives motor parameters in few minutes, is OK.

This article is addressing the power metering application to small & medium scale industries who find it difficult to meet both the ends that is how to maximize the usage of sanctioned quota of KWH, KVA so as to

get better production with the rationed quota. This exercise may sound trivial to large scale industries since they have already MODBUSSED the Integrated Power & Production parameters & are dynamic monitoring, trending by windows compatible mode.

What we are paying to EB is in KWH, KVA etc every month. Presently, the EB power is the cheap & best as it is subsidized < Rs 5. Compare this Kwh rate to the Kwh generated per liter of diesel in our captive DG sets. The Kwh from our own DG set has made all of us, think that electricity unit is costly > Rs 10/-. This forces us to conserve the subsidized EB units usage now.

Now the industry is getting only Rationed Electricity. This makes us to use the Electricity rationally and we want to maximize the use of sanctioned KVA & KW given to us, by reducing the losses. Priority to the industry now is to run our existing equipment efficiently and next comes the thinking of energy efficient equipment later.

By energy conservation in the industry, we try to recover the losses which go as waste. By Energy Measurement, we draw a line between Avoidable and Unavoidable Losses and plan to minimize same. So Measurement is the first step to Conserve Energy, first the instant power & then Trend.

Hence, we have to see that our motor is matched to load now. The industry can visualize the motor is not like 1000 W bulb which draw always only 1 KW during its usage, but 1 KW motor consumes power to match to its load demand say from 300 W to 1300 W. Lighting load is constant and visible to us where as motor loads are varying & the losses not visible to us.

Looking through an aerial eye view of the industry power consumption pattern, the invisible losses that is seen between the cup and the lip from the transformer up to motor terminals and beyond that at the inefficient loadings, it is my personal view that it is mandatory for the industry to have more instant power clamp-on meters than being content with one Hi Fi trend power analyzer. What the best operating practices call for and as per the BEE guidelines is that any motor 10 HP & above operating at two shifts a day or 6000 hours an year, needs mandatory KWH metering.

Many rules are framed by Electrical Inspection Authorities and followed by the industry. Though the rules are followed because of mandatory requirements, they intend to keep the Electrical House keeping safe.

'To use the above meter or in-situ power meter readings monthly or routinely' can also be made mandatory. This metering is a must not only for the HT consumers but also for the LT consumers as well. Ultimately this helps the consumer to know precisely what he consumes at each of his loads in KW, KVA, PF etc; sump up and then he can optimize the loads accordingly.

The power data displayed in this type of Low end clamp-on power meter can reach the bottom most ITI trained Electrician inside the industry and he is made aware of what is he measuring in each of the machines compared to the machine power ratings. In fact, the harmonic levels THD in volt & current up to 24 levels are displayed in these meters now.

Energy conservation can be achieved in an industry only by Energy Education to the bottom most employee. When the same employee measures the power parameters & compares this to ratings, then automatically he will come back to the Electrical Engineer with more avenues for saving.

The Good Things & Bad Things 'Happen to Us Because of Us Only' and others can only Catalyze. So Cultivate good House Keeping Habits to visualize & reduce Internal Invisible Losses than showing to others that we reduced the visible losses externally.■

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