



addressing the **CRGO** iSSUE in Transformer manufacturing

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With the Indian Prime Minister announcing that the country will provide affordable electricity to all households within the next five years, upgrading the existing power grid systems and increasing productivity has attained a greater significance. According to the figures released jointly by the Planning Commission and the Union Ministry of Power, the capacity target addition over the next five years will be 90,000 MW. This is significantly higher than the previous figures released by the Power Ministry (76,000 MW).

India presently has the fifth largest power generation capacity in the world. However, an alarming power deficit scenario is a reason for major concern. India's per capita power consumption of around 700 kilowatt hour (kwh) per annum is much lower than the global average of 2,600 kwh. Therefore, a lot of work is still left to be done for implementing the government's plans of reaching out to

the 1.2-billion Indian population with affordable electricity.

Current scenario

The Indian transformer industry, as we see it today, is standing at the threshold of a major overhaul. The increasing demand for better grid infrastructure is one of the key motivators of this change. The market for this particular equipment in India is on a buoyant upswing with more than 500 manufacturers continuously trying to outclass each other. The current industry size for transformer stands at a whopping INR 15,000 crore, which is significantly higher than any other such utility equipment market. But the concerning is the fact is that over 85 percent of these manufacturers belong to the small scale sector, requiring adequate government support.

With transformers being required for a wide range of applications, the

importance of customization becomes indispensable to encourage sales. The manufacturers are already equipped with requirements of up to 132 kV. But for 220 kV and above, there are only a few transformer manufacturers with limited manufacturing capacity. Experts feel that most Indian transformer manufacturers have the ability of meeting the demands of the industry. However, with the end users facing financial losses, the difficulties are bound to increase. The state distribution companies witnessed an aggregate loss of around INR 40,000 crore in March 2010, which is likely to shoot up to an alarming INR 1.16 lakh crore by 2014. States like Rajasthan, Madhya Pradesh, Tamil Nadu, Uttar Pradesh and Bihar presently account for almost 70 percent of the total losses. The situation has been worse for Tamil Nadu, which has increased the tariff for seven years. Evidently, the Indian government's populist move of providing free power is

affecting the transformer manufacturers and other equipment suppliers.

The CRGO factor

A key factor that has posed some serious problems for the transformer manufacturing sector is the non-availability of cold-rolled grain-oriented (CRGO) material which has to be entirely imported. The problems regarding CRGO acquisition includes import of defective CRGO by unscrupulous suppliers, as well as procurement of this material. As a result, there have been heavy losses in distribution. Industry insiders say that there is a huge amount of second grade material available in the market which is used by local manufacturers to be more competitive.

The CRGO steel grains are much larger than the size of regular steel, approximately 2mm to 5mm, while the regular steel is about 0.5mm. This remarkable size difference allows reducing Hysteresis losses (the power expended in a magnetic material due to the lack of

correspondence between the changes in induction resulting from increase or decrease of magnetizing force). Moreover, the chemical composition of CRGO steel consists of higher percentage of silicon. This, in turn, helps to increase the resistance compared to regular steel which helps to reduce eddy currents (the energy lost by circulating current included in the metal by the variation of magnetic fields in the metal).

While designing a distribution transformer, the main stress is put on the reduction of core losses. CRGO steel is one of the preferred options in such

cases, with an allowable limit of flux density of up to 1.55 Tesla for low core losses. Although the cost of transformer comes down once the distribution transformer

is designed above 1.55 Tesla, the performance deteriorates in terms of efficiency.

In the Indian context, CRGO steel is especially important because it can serve as

a balancing material in the costing of transformers. With the competitive pressure related to pricing increasing by the day, the only 'A' class item of significant value that can help reduce costs is CRGO. The country consumes 250,000 metric tonnes (MT) of CRGO sheets every year.



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However, out of this only 80,000 MT is prime material while the rest is of second grade quality.

One major problem with CRGO is that it is not manufactured in India and the local transformer industry is entirely dependant on the import of this material from about 15 foreign companies. The technology is guarded pretty closely and perhaps this is the only reason that technological collaborations with Indian companies have not been taking place.

CRGO usage by transformer manufacturers poses two major challenges:

There are some marginal distribution transformer manufacturers who intentionally use cheap and sub-standard CRGO, which helps them quote lower during the procurement process of power utilities

There are some manufacturers who end up using substandard CRGO out of ignorance due to the fact that there is absolutely no way of knowing the quality of imported CRGO.

Root of the problem

India has a notorious distinction of having the highest transformer failure rate, which is significantly higher than even some of the less developed countries. Studies reveal that while the global level for transformer failure is around 5 percent, India's transformer failure rate is around 20-25 percent. This is an indication that the country is using sub-standard transformers. The Indian government's poor Lowest Pricing (L1) procurement technique is one of the main reasons

behind this failure. The L1 policy, which encourages contracts being offered to those who quote the lowest price, kills the question of quality. As a result, transformer manufacturers are known for quoting ridiculously low prices while bidding for the government-backed contracts. They are able to quote such ridiculous price because of their intentional use of inferior scrap CRGO. This also makes manufacturing high quality transformer difficult because quality manufacturers are not rewarded with contracts. The Steel Quality Control has been trying to fight this issue for quite sometime now.

The Second Steel Quality Control Order

The Second Steel Quality Control Order which came into effect from September 12, 2012 made it mandatory to have the Bureau of Indian Standards (BIS) certification for CRGO steel which directly impacted the transformer manufacturers. Even though this measure might seem to be one of the key initiatives taken by the government to ensure credibility and better quality, this will directly impact the productivity of small manufacturers. In fact experts also feel that these regulations will bring the transformer industry to a standstill in the near future, if there is not adequate number of certified mills. At present out of the 14 global CRGO manufacturing companies, only three have got their product BIS certified. If more companies do not get their products approved by BIS, India is

bound to be confronted with multiple problems with lack of CRGO stock being only one of them.

This scenario is alarming because CRGO continues to be a critical factor for modern transformer manufacturing. It is expected to account for more than half of the total manufacturing cost of transformers in India. Although with the passage of time the country has managed to establish itself as the producer of the world's largest capacity transformer of 1200 KV, yet production of the most important ingredient still eludes the nation. India's demand for CRGO is expected to be around 2.5 lakh tonnes annually given the kind of planned capacity addition during the Twelfth Five-Year Plan (2012-17) period.

An interesting fact worth noticing is that the Steel Quality Control Order has no significant implication on finished import goods. This implies that while the Indian transformer manufacturers would struggle to get hold of BIS certified CRGO for the production of their transformers, imported transformers can get unthinkingly entry into the Indian market. The domestic transformer manufacturers have so far successfully managed to meet the country's power sector ambitions over the years and also significantly enhanced the production capacity. However, absence of CRGO, as a result of the inability to procure BIS certification would mean that this capacity will become unproductive and most of the demand will be met by imports. While the government's intention might be good as it tries to curb inferior CRGO, it has certain limitations.

The positives

However, not everyone feels that the Second Steel Quality Control Order is a move in the wrong direction. Some experts opine that there is no way back from here. Even though there are certain issues that need to be addressed, for example, whether BIS certification is needed only for transformers manufactured in India or do they apply for those imported from outside, the overall move is definitely a step in the right direction.



Many industry experts also feel that the quality control order has its own limitations. Something needs to be done urgently about the intentional and willful use of secondary CRGO by a rising group of marginal distribution transformers.

Experts from the Indian Electrical & Electronics Manufacturers Association (IEEMA) opine that the basic objective of this order, which is to improve the quality of Indian transformers, has to be acknowledged. However, there still remains scope for improvement. They also put special emphasis on the point of clarity, which they feel would be necessary for successful implementation of the programme. The first of the many steps would be to get CRGO suppliers to get BIS certification.

Even though some domestic companies like the Steel Authority of India (SAIL) had started producing CRGO internally, they have now stopped operation. According to Indian Transformer Manufacturers Association (ITMA) representatives, this is being done by those who control imports. Tata-owned Chorus is

yet another firm that has stopped production of CRGO steel. These companies have been looking for tie-up opportunities with foreign companies to manufacture CRGO steel.

Plans of CRGO production in India

One step that has been taken in the right direction is the plan of setting up a joint venture which will be engaged in manufacturing CRGO and CRNO (cold-rolled natural-oriented) steel. Rashtriya Ispat Nigam Ltd (RINL), commonly known as Vishakhapatnam Steel Plant, has signed an agreement with the Power Grid Corporation of India for the production of electric steel. The total investment in this venture is expected to be around INR 3,000 crore. The new facility will have the ability of producing 1.5 lakh tonnes of CRGO and 1 lakh tonnes of CRNO. It should here be mentioned that SAIL was supposed to partner Bharat Heavy Electricals Ltd (BHEL), Manganese Ore (India) Limited (MOIL) and Power Grid Corporation for a joint venture to produce electric steel. SAIL opted out of this

deal paving way for RINL to chip in.

Therefore, a lot still needs to be done before realizing the effects of BIS certification properly. With the fear of inferior CRGO usage looming large over the industry, making the BIS certification mandatory is a step in the right direction. But the government also needs to ensure proper implementation and adoption. The electrical industry's 7 percent revenue decline during the Q1 of 2013 indicates that the government's move is yet to make effective impact. Once a few suggested and planned steps are taken, the transformer manufacturing sector is bound to bear its fruits ■



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