A transformer is failing - remanufacture or replace it? These are the usual choices. Now, ABB offers other possibilities to redefine and expand use and extend asset value. For most repairs performance is matched to the original specification because of fixed core limitations. However, what if system conditions, risk elements or needs have changed since the original installation? Increasing performance, reducing maintenance or boosting reliability may be better value added solutions than just an ordinary transformer remanufacture and result in a higher return on past investment.

NOMEX® Thermal Protective Technology, rated 222 °C, is a family of synthetic paper and pressboard insulation materials which provide high levels of electrical, mechanical and chemical integrity. The strategy of using the technology in power transformers is to protect the insulation system in the hottest parts of the winding, by selectively replacing cellulose with NOMEX® and capitalize on its thermal strength to expand design choices.

Here are some of the options ABB can offer using hybrid insulation systems:

I) Retrofit with an increased rating:
- added capacity or higher overload
- reduced losses at original rating (depending on the type of the former design)
- The technology can provide an average increase in power (or overload capability) of 50%

II) Retrofit with the same capacity rating but reducing coil size:
- added reliability due to the high temperature insulation used
- possibility of cost reduction using (less copper and labor)
- fast execution
- The value of the transformer is optimised.

III) Retrofit with the same rating and coil dimension:
- allows increased overload capability of the transformer
- adds reliability and ensures higher oil quality over time
- The technology can be overloaded more often and is more durable.
Advantages of using NOMEX® technology in transformers
– permits increased power for a given unit size
– enables higher overload capability
– provides improved reliability and increased durability
– improves optimised value of the transformers

HOW ABB redefines transformer retrofit solutions using NOMEX®
Customer A: Growth has extended peak load beyond original specification limits of the failing transformer. Therefore an upgrade, using cellulose insulation, is inadequate. A new transformer exceeds the existing space allowance
Customer B: A failing transformer is replaced with a duplicate spare. Re-manufacturing the old unit with more capacity would enable wider use as a universal spare throughout the system.
Customer C. The Failed transformer was loaded light to moderate. A smaller capacity unit is technically justified but the number of system ratings was reduced. The next lower capacity unit is insufficient.

ABB’s Solution: Re-engineering using hybrid insulation system
– For customers A and B, hybrid upgrades could supply an average of 50% more peak or continuous load range is 30-100%
– Typically 20-30% first cost savings compared to a typical new unit with shorter lead time
– Lower installed cost - minimal site disruption, same space and pad, plug-in installation.
– For customer C, a hybrid upgrade could enable smaller sized replacement windings to provide 100% of the original name plate rating with higher average winding temperature rise and losses while improving reliability and decreasing maintenance
– Lower repair cost is possible with reduced active copper material.

Conclusion
Retrofit with NOMEX® Thermal Protective Technology offers the following benefits:
– Possibility to delay investment in the purchase of new equipment
– Added reliability for transformers operating in critical conditions
– More operational system flexibility from increased overload capacity
– Increased power for a given unit size or available space

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