TRANSFORMER ACADEMY

TRANSFORMER OIL COURSE

Course author: Dr. C. S. Narasimhan

TRANSFORMER ACADEMY

Dr. Narasimhan holds PhD in chemistry from a premier institute IIT Madras, Chennai (India), with a long experience of about 40 years. He has been working in corporate R&D centers of multinational companies ever since he completed his PhD in 1978.

He was heading R&D at Savita Oil Technologies in Mumbai for 20 years, until his recent retirement.

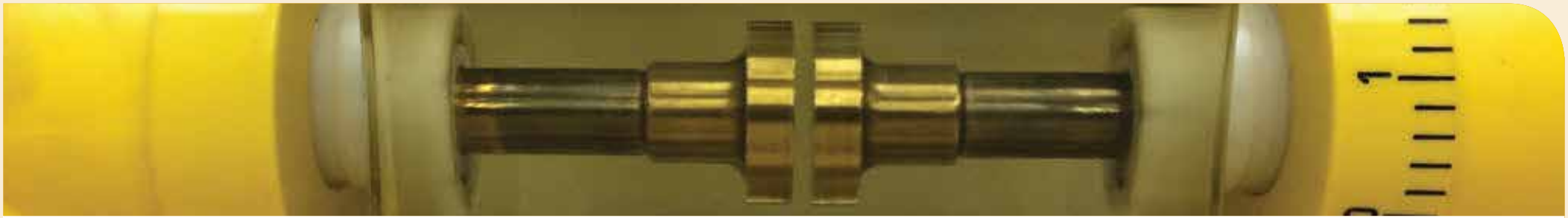
His R&D work includes:

- Developing a variety of grades of transformer oils based on paraffinic oils, naphthenic oils, natural esters and synthetic esters,
- application development in transformers,
- developing additives for transformer oils,
- studying oxidation behavior,
- moisture dynamics in oil-filled transformers,
- studies on dielectric properties of mineral oils and esters (impulse & power frequency),
- insulation paper ageing studies in mineral oils and ester oils
- published papers in the recent ICDL conference in Rome and 9 papers in IEEE conferences on dielectric properties of ester oils and mineral oils.

...and more.

He has published more than 30 papers, of which 15 are on transformer oils, and is proud of his six patents.

He has been an invited speaker at conferences in India and abroad, as well as delivered lectures at seminars conducted by Weidman in Europe. He is a member of two IEC committees on oil standards and a member of two CIGRE committees on oils.



WHAT MAKES THIS COURSE UNIQUE AND WHO IS ITS INTENDED AUDIENCE

This is perhaps the first course on transformer oils with absolutely no commercial axe to grind since it is delivered by an independent professional consultant. This course is also the first of its kind to highlight and discuss most of the critical areas of interest to the targeted audience.

The course is intended for:

SENIOR AND YOUNG UTILITY ENGINEERS/ CHEMISTS who are responsible for assessing the health of transformers in their respective shopfloors,

MANUFACTURERS of transformers, transformer components, monitoring systems, sensors etc. Oil being an integral part of a transformer and its components, this course should help in understanding the critical aspects of the design of components in interaction with the oil,

OIL MANUFACTURERS who need to get a holistic picture of their products in relation to its applications and see the future trends, challenge and opportunities,

STUDENTS AND FACULTY OF EDUCATIONAL INSTITUTES who are interested to have a good understanding of issues such as moisture dynamics, use and limitations of furanic compounds as markers of paper degradation and the key differences between stray gassing and DGA,

OIL TESTING LABORATORIES who need to appreciate the significance of their daily activities of oil testing in the context of their customers' needs,

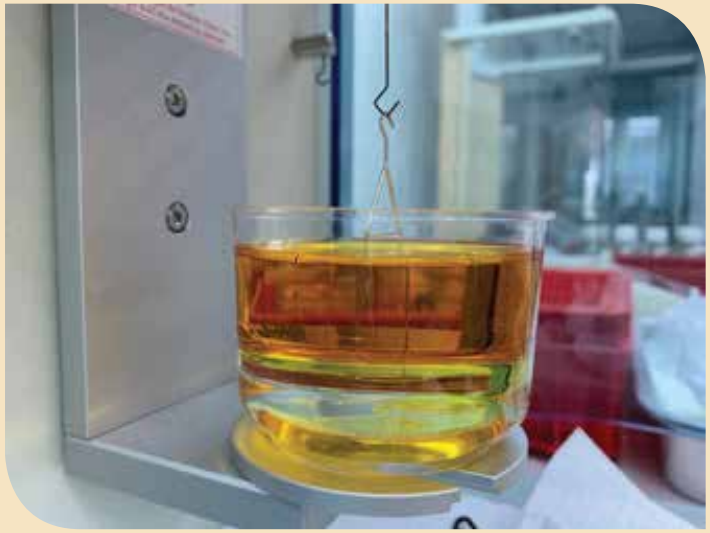
UTILITY STAFF responsible for outsourcing activities like reconditioning and reclaiming of aged oils or DGA.

INTRODUCTORY / BASIC LEVEL

1. An introduction to transformer oils – A brief review of transformer types based on insulation systems
2. Essential properties of oil in relation to performance
3. Oil standards – Basic concepts and key differences

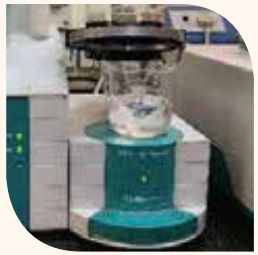
INTERMEDIATE LEVEL

1. Mineral oils in service – Storage, handling, filling into transformers, limits for parameters before energizing, testing oils for compatibility, sampling of oil
2. Condition monitoring of oils in service, their limits and recommended actions, interaction among oil parameters, sampling precaution for water
3. Reconditioning and reclaiming of mineral oils – Criteria for making decisions, and methods employed
4. Gassing tendency, stray gassing and DGA – Definitions, test methods and their importance for a transformer in operation
5. Additives in oil – Their chemistry, conferred benefits and pitfalls
6. Alternative fluids – R-temp, silicones, esters, GTL fluids – their origin and comparison with mineral oils and among themselves

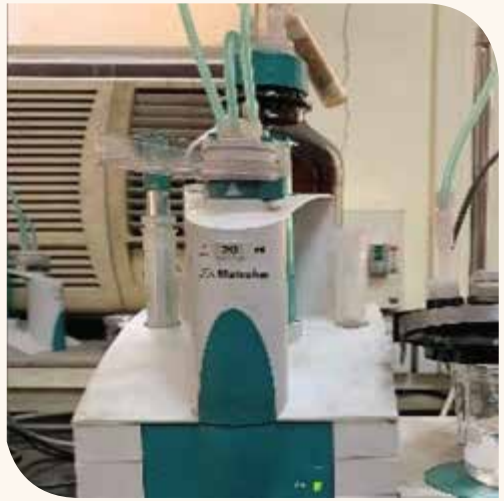


TRANSFORMER ACADEMY

MASTER'S LEVEL



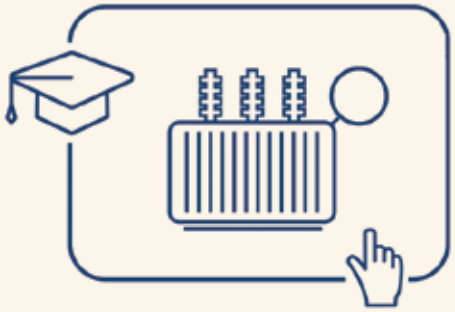
1. Moisture dynamics - Part I - Changing equilibrium in a transformer and its interpretation on the asset health
2. Moisture dynamics - Part II - Changing equilibrium in a transformer and its interpretation on the asset health
3. Oxidation of oil – Mechanisms in a transformer, consequences of ageing of oil and corrective actions
4. Copper corrosion – Major causes, mechanisms and mitigation techniques



5. Furanic compounds – Mechanism of formation in a transformer, analysis, interpretation on paper degradation
6. Emergence of methanol as a chemical marker for paper degradation
7. DGA of mineral oils – Chemistry of formation of different gases and principles of interpretation methods
8. Alternative fluids - Basic features influenced by chemical structures
9. A detailed comparison of Ester fluids and mineral oils with respect to Dielectric and heat transfer behaviour, design implications, performance benefits etc.
10. Maintanance Standards for Ester Fluids (Synthetic & Natural Esters)
11. Nanofluids

TRANSFORMER ACADEMY

TRANSFORMER ACADEMY



Visit our official Transformers Academy website transformers-academy.com to stay up to date about our courses.