



Transportation of Transformers, The Hot Buttons

-- Technical Presentation --
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1. Abstract

All the work we do in specifying, designing, building and testing transformers can be fruitless if there is little attention to transporting the equipment to the jobsite. An improper tie-down, or a mis-sized crane from a fly-by-night rigging contractor can result in equipment damage and project delays. Forgetting to properly permit the route, or being unaware of seasonal frost/thaw road limitations, can also cause unexpected delays.

In 2012, the Transformers Committee released a new document entitled, "IEEE C57.150, Guide for Transportation of Transformers and Reactors Rated 10,000 kVA or Larger". It provides useful information for minimizing the risk of damage and delays in the moving of transformers and reactors, regarding their design, shipment preparation, transportation, heavy-hauling, and arrival inspection. That guide is due to be revised by 2022, and we will start work on the revision soon. This presentation provides fodder for that work.

Although it is impossible to cover all aspects of moving transformers in a 75-minute presentation, we will briefly cover a few "Hot Buttons", which can cause you to lose sleep during that all-important project. To review those hot-button topics, we have gathered a team of presenters from various companies including: an insurance provider, a heavy-hauler/rigger, a manufacturer of impact recorders, and a marine architect from a shipping company. We also will hear briefly from a couple of end-user customers, about their own "oops experiences".

Some topics that will be covered are:

- Insurance issues
- Impact recorders
- Rigging and securing for over-road transportation
- Routing and permitting
- Ocean and barge shipments
- Arrival inspection & testing

2. Learning Objectives

This presentation will:

- Ensure that you are aware of the recently published "Transportation Guide", C57.150.
- Alert you to problems, which can cause equipment damage and/or project delays.
- Present "real-world experiences" from actual utility projects.
- Introduce the field of Risk Awareness/Management and how it impacts commercial issues.
- Gather momentum for the upcoming revision of C57.150.

3. Learning Outcomes

As a result of attending this session, participants will walk away knowing:

- Why not to say, "Deliver my transformer FOB pad."
- There is more to impact recorders than simply "X, Y and Z".
- Potential risks with cross-ocean shipments.
- How not to secure a transformer to a railcar or low-bed trailer.
- Why sometimes a 30-minute drive across town can become a 3-day moving fiasco.
- How to ensure your heavy-haul contractor is reputable and qualified.

4. Presenters' Biographies

Daniel J. Blaydon is a Sr. Engineer in Substation Engineering, Design and Standards at Baltimore Gas & Electric. In addition to responsibilities of power transformers, he has participated in various industry assignments including the NERC AC Substation Equip Task Force, and PJM Interconnection Transformer Working Group. Dan is a member of the IEEE Transformers Committee, and is a member of working groups: PC57.153 Transformer Paralleling Guide, and PC57.163 Guide for Establishing Transformer Capability during GMD. He has a Bachelor of Science Degree in Electrical Engineering from Penn State University and is a licensed Professional Engineer in Maryland.

Paul E. Boman is an IEEE member and Director of Hartford Steam Boiler Inspection and Insurance Company's program for fluid analysis. He consults with clients on fluids used in electrical transformers, steam turbines, gearboxes and engines, and gives recommendations based on fluid analysis results & equipment application. Paul has presented technical papers at technical groups, including CIGRÉ A2 Colloquium, and industry conferences. He is Chairman of IEEE working groups: C57.155 Natural & Synthetic Fluid Dissolved Gas Diagnostic Guidelines, C57.140 Evaluation and Reconditioning of Power Transformers, and C57.111 Silicon Fluid Maintenance Guidelines.

Andrew C. Burns has overseen multiple transportation projects over the last nine years at Edwards Moving & Rigging, Inc. His experience includes oversight & design of over-weight and over-dimensional transport of HRSGs, vessels, presses, and multiple transformer and GSU projects. In addition, he has overseen planning & execution of rigging projects at power plants, substations, refineries, etc. The majority of these projects have involved over the road transport, necessitating significant time investment in permit procurement, overhead obstruction issues, and bridge studies. Andy holds a BA degree in Secondary Education from Northern Kentucky University, and certifications in Hazardous Materials, Emergency Response (HAZWOPER), and Person-in-Charge.

Kraig J. Nunn has been at ShockWatch, a global provider of solutions to deter product mishandling and reduce costs in the supply chain since 2001. In his current role as Technical Sales Manager, Kraig provides technical expertise and consulting services to the ShockWatch sales team, distributor network and customer base. Prior to that, he was Sales Engineer, then Product Manager, heavily involved with product support in South America. Kraig holds a Bachelor of Science degree in Industrial Engineering from Kansas State University.

Peter van den Berg. After finishing studies of Naval Architecture in The Netherlands, Peter started with a Dutch engineering company within petrochemical industry and offshore technologies. Later he worked for a German engineering company within the field of gas purification for coke ovens and human waste incineration plants, and upscaling a copper production plant. In 2000, he returned to his naval roots, working in an engineering department of the German first-class heavy-lift carrier SAL, and dealing with cargos up to 1450 metric tons. Since 2003, he has worked in Hamburg with Rickmers-Linie, a world leading global ocean liner service, responsible for bedding and securing arrangements for heavy cargo units, developing necessary documentation for clients, and compiling in-house documentation for realization of loading operations and ocean transportation.