

N333. SG Replacement Problems Anticipated and Avoided with 3D CAD

Potential problems that could have arisen during the replacement of the steam generators at Electrabel's Doel-3 plant were anticipated and avoided by previewing the outage with a 3D CAD model combined with a scheduling package. An optimized working procedure was developed, saving time and money while reducing personnel radiation exposure.

The replacement requires thousands of activities and several hundreds of workers to be organized simultaneously in a limited space. A CAD system became especially useful at this point. Throughout the replacement project the CAD model has promoted safety, dose reduction and timing, leading to a number of advantages:

- Lower cost
- Shorter outage duration
- Less surprises during disassembly
- Increasing accessibility to plant data and saving dose

The computerized management of the outage resulted in a new world record for three-loop, 900 MWe steam generator replacements:

- Total outage duration, 96 days 7 hours
- Steam generator change-out, 44 days
- Total radiation exposure, 1.96 person-Sv
- Total cost, \$98 million

This accomplishment beats the previous world best marks for duration (North Anna-1,96 days 11 hours), total worker exposure (Dampierre-1, 2.2 person-Sv) and cost (Dampierre-1 \$103 million).

For more, "SG Replacement Problems Anticipated and Avoided with 3D CAD," by B. Danhier, A. Massonnet, F. Verminnen, *Nuclear Engineering International*, pp. 15-17, January 1994.