ACOUSTIC FATIGUE OF A STEAM DUMP PIPE SYSTEM EXCITED BY VALVE NOISE

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ABSTRACT:

The steam dump system in Gentilly 2 Nuclear Power Plant consists of four parallel steam pipes, each of which comprises a steam control valve. Two pipes of this system experienced high cycle fatigue damage. In-situ vibration and dynamic strain measurements were therefore conducted to identify the cause of the damage and formulate suitable counter-measures. The test results pointed to the high frequency noise of the valve as the primary source causing the fatigue failure.

By means of small-scale model tests, using a compressed air network, new valve stems were developed in two steps, in both cases producing a substantially lower noise level than that generated by the original valve stem. Implementing these new "low-noise" stems, without any other modifications in the valve body or the piping system, reduced the dynamic stress below the fatigue limit.