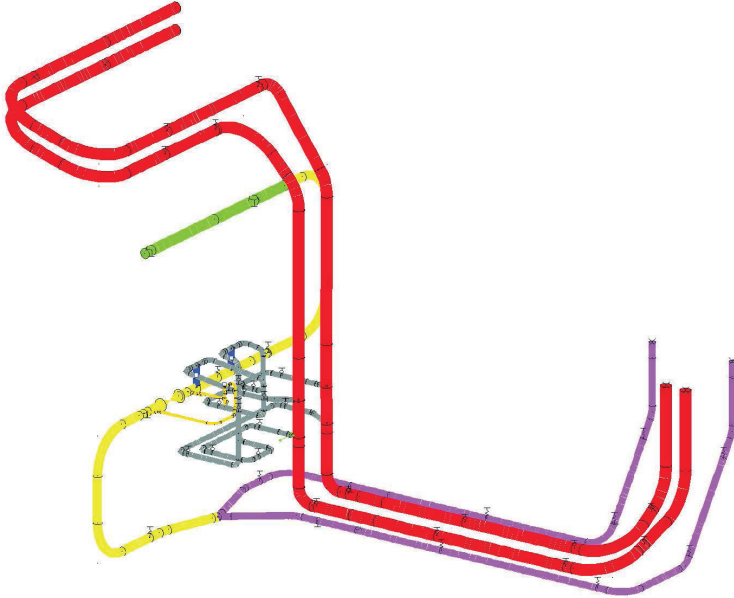


CASE - BWE BOILERS

UPPSALA ENERGI

RETROFIT OF MAIN STREAM PIPES



Boiler type:

The boiler was supplied by BWSC (then: BWE) in 1974 as an oil fired boiler with a steam capacity of 700t/h, 200 MWe. In 1984 it was converted into firing peat and coal.

Main steam data:	Operation	Design
Temperature	538°C	543°C
Pressure	186 bar	204 bar

Main steam pipes:	Original	New
Material	14MoV63	X10CrMoVNb9-1
Dimension	ID300x60 mm	ID300x36 mm

In 2000, BWSC (then: BWE) obtained a contract for the complete retrofit of the main steam pipes connecting boiler and turbine of the Swedish power plant Uppsala Energi, Unit 1.

Redesign

The original main steam pipes made of the material 14MoV63 were replaced with pipes made of X10CrMoVNb9-1 (European equivalent to ASTM P91). Due to the higher creep strength of X10CrMoVNb9-1 the wall thickness could be reduced significantly. The total weight of the new steam pipes is 24 tons. The lighter steam pipes also called for a complete replacement of the existing hangers that were all constant load hangers.

The pipe stress analysis performed by BWSC showed that many hangers could safely be replaced by spring hangers. Besides being cheaper than constant load hangers, the spring hangers also lead to a pipe system that is less sensitive to variations in the static loads.

Erection

The erection work was performed by BWSC personnel in the summer of 2000 within a period of six weeks. BWSC provided the necessary number of certified welders as well as approved welding procedures.