Outline of Operation using Pressure Plates

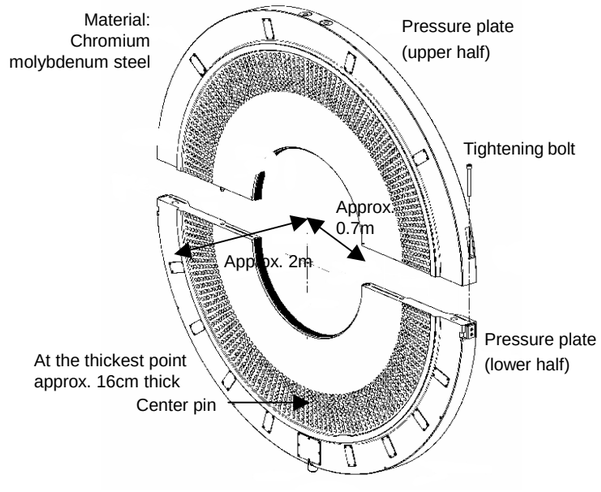
Attachment 2

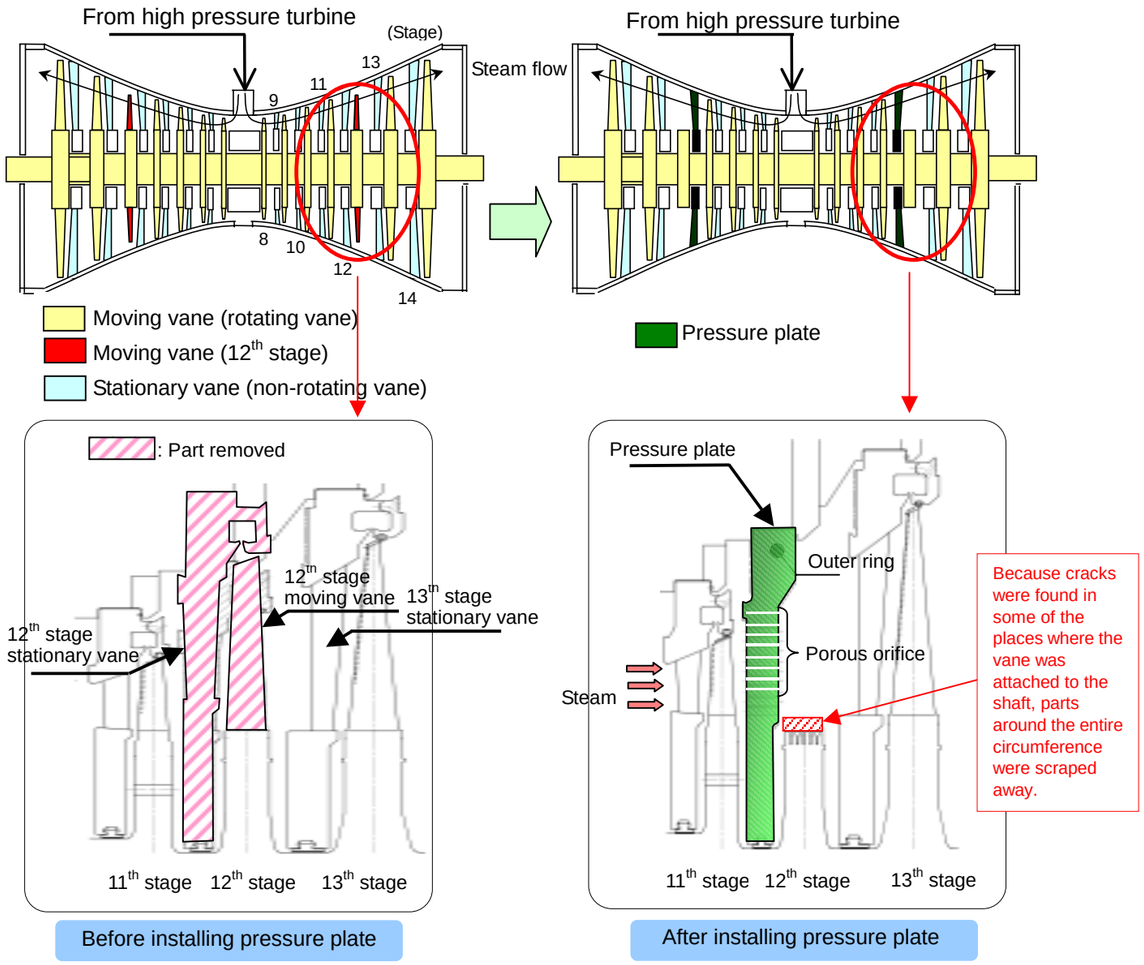
Chubu Electric has evaluated turbine operation using pressure plates to determine low-pressure turbine soundness and the effect on the reactor and other power generation facility, and ensured safe and stable operation. Hereafter, we will submit a construction plan to the national government and undergo inspection of the low-pressure turbine design using pressure plates, and will also undergo pre-use inspection before full installation and at the operations stage.

1. Installing 12th stage pressure plate

The 12th stage moving vane and stationary vane of low-pressure turbines (A) - (C) are removed and a pressure plate installed in the position occupied by the 12th stage stationary vane. The pressure plate reduces the steam pressure just as if the 12th stage stationary and moving vanes were present and adjusts the steam flow.

The pressure plate used for this countermeasure has a porous orifice design*1, which has a good track record.





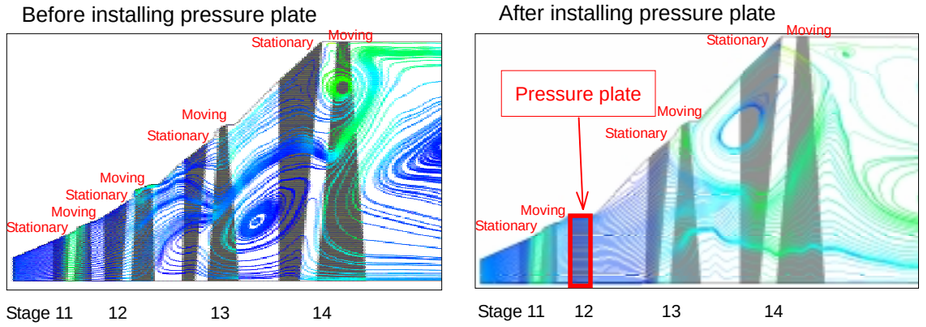
2. Soundness of low-pressure turbine during operation using pressure plates

The pressure plate has a history of use at several thermal and nuclear power stations and has been used safely thus far.

As the figure below indicates, having the pressure plate installed mitigates the impact of random vibration, because there is a narrower range of steam vortex than before it was installed, and at the subsequent stages (13 and 14) the flow of steam during low load is improved.

The pressure plate also adjusts steam against flashback vibration so flow to subsequent stages is not negatively affected. Thus it was confirmed that installing the pressure plate did not have any bad effect on other stages of low-pressure turbines.

◆ Low load (about 5%) flow analysis results



3. Assessment of effects on reactor and other power generation facility

The reactor runs at a constant rated thermal output, so reactor status is no different than before, and there is no effect on reactor safety and stability.

According to our assessment, installing the pressure plate reduces turbine efficiency, so rated output of electric power will decline 8%, from 1,380 MW to 1,270 MW. Because turbine efficiency is reduced, the amount of heat released from the condenser to the sea will increase slightly. However, we have evaluated the released heat this time and made sure that the environmental impact of the heated effluent would be no different than the results of evaluation performed prior to construction.

4. Confirmation and inspection by national government

The construction plan for the low-pressure turbine design using pressure plates will be delivered to the national government, which will inspect it. It will also undergo pre-use inspection by the national government before final installation and at the operations stage.

5. Measures after installing pressure plate

After installing the pressure plate, we will strengthen monitoring of turbine shaft vibration during operation, internal pressure*2 of water supply heater, temperature differences in released water, etc. to make sure there are no abnormalities. At the next regular inspection we will open up low-pressure turbines (A) - (C) and inspect them to make sure there are no abnormalities in the vanes, pressure plate, etc.

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*1: With a porous orifice design, the plate has many small pores, which reduces pressure and regulates flow.

*2: The water supply heater uses some of the steam from the turbine to heat the water that is supplied to the reactor. We will monitor the pressure of this heated steam to see if there is any impact on the adjacent vanes (11th and 13th stages).