

Mar. 12, 2012
T-E-008 / 766-90168

Application of diffusion treatment against solid particle erosion

REASON FOR SUGGESTION:

In case of long-term continuous operation, 1st stage nozzle may experience solid particle erosion due to scales from inlet steam piping.

On the other hand, diffusion treatment technology applied to get high resistance effect against solid particle erosion.

DETAILS OF SUGGESTION:

Diffusion treatment is done by chemical vapor such as nitrogen and boron. These materials bond with base material inside the metal structure. This method is called diffusion treatment.

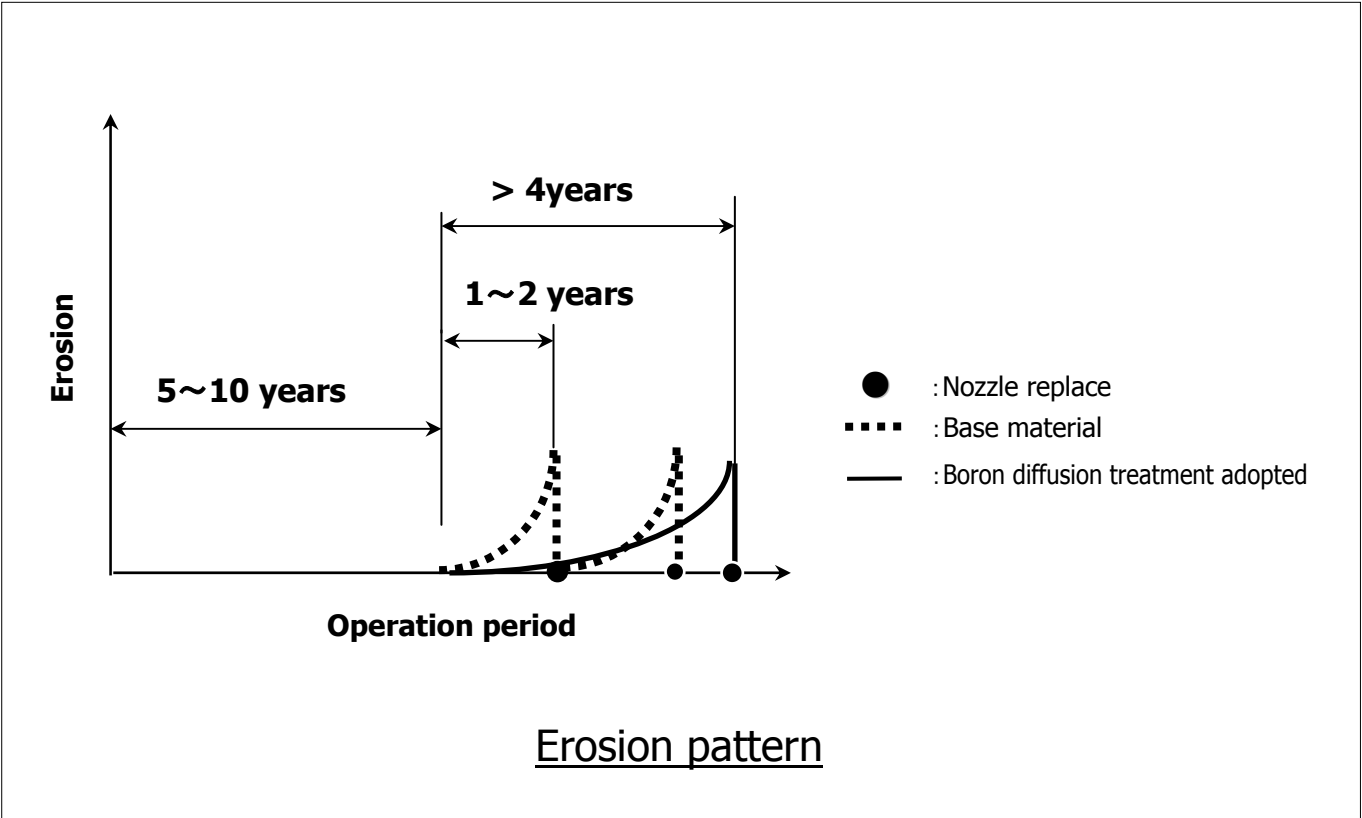
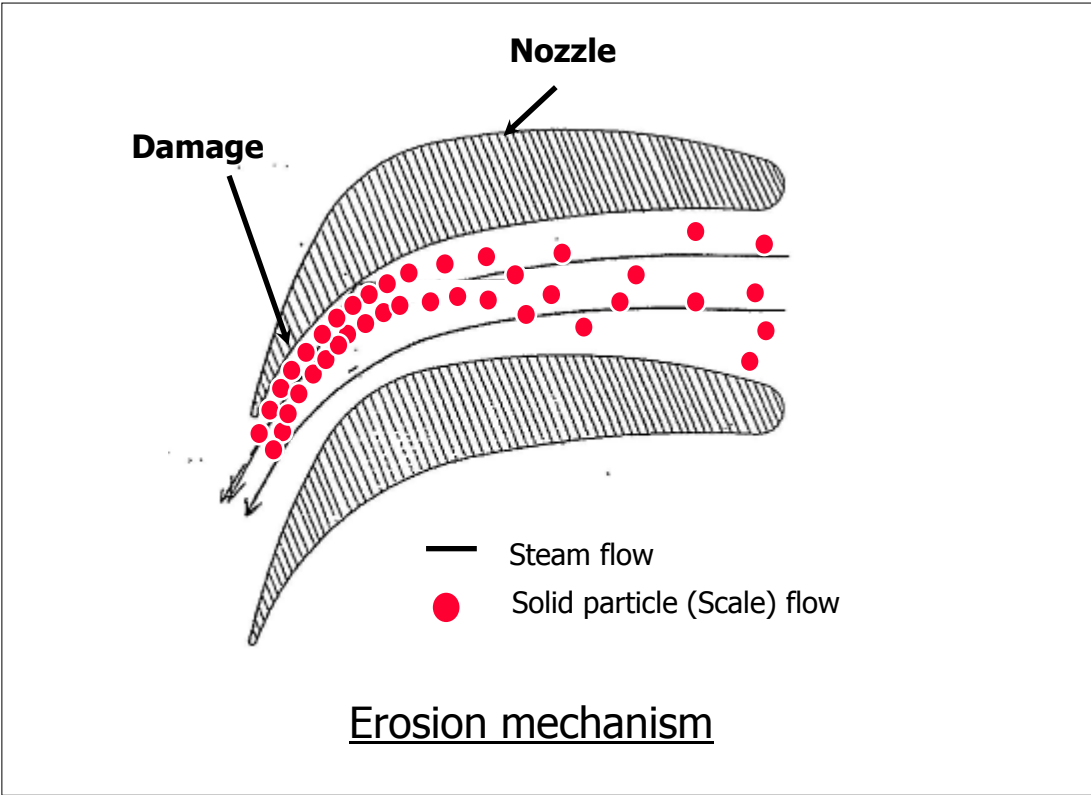
This feature is as follows:

- 1) Although the diffusion layer is as thin as 0.07mm, bonding power is very strong because of single layer structure.
- 2) The influence on the steam path can be kept little because outer dimension change is negligible small.
- 3) The steam path of the nozzle can be uniformly covered by diffusion layer.
- 4) Surface hardness is 5 times hard as base material and it has excellent resistance against erosion.

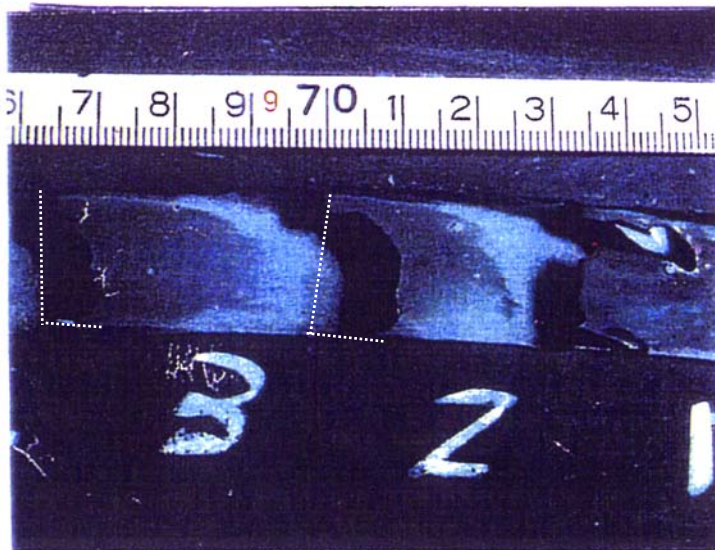
Two kinds of nozzle materials are used according to the system requirement temperature. Diffusion treatment can be applied to either material.

Applied temperature	Material	Base material hardness Hv	Diffusion layer thickness	Surface hardness after Diffusion treatment Hv
< 450°C	SUS410J1 (13CrMo)	202-252	0.07mm	950-1865
≥ 450°C	A422-1 (13CrMoWV)	284-320		

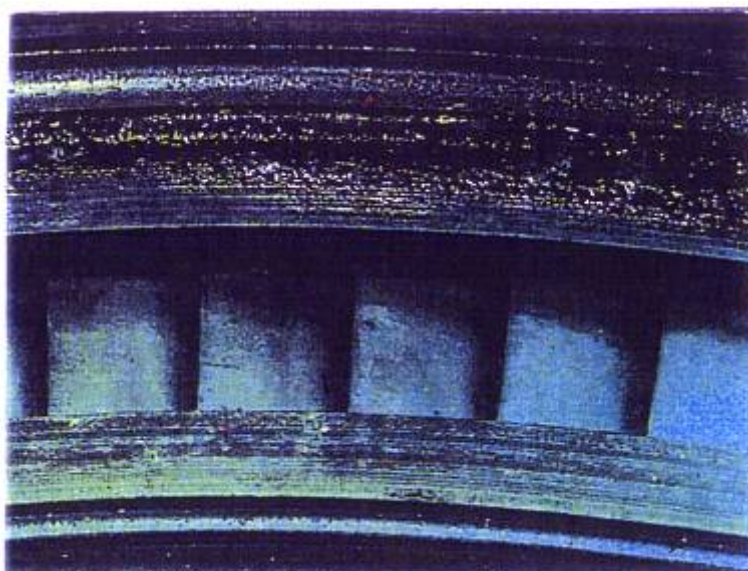
Effect of boron diffusion treatment



Boron diffusion treatment example



Before treatment



After 20 month operation with diffusion treatment