

# Development of a Heat Treatment Technology for Hot Rolled Coils

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**Abstract** - The interior of the hot-rolled coil edges and hot-rolled coils abutting with the atmosphere in the air-cooling process is becoming a material deviation occurs depending on the cooling rate difference, which is caused on the plate fracture of cold rolling. It is obtained to reduce the material deviation from 300 MPa to 150 Mpa by using a specially designed heat treatment furnace.

## 1. Introduction

The hot rolling process carried out in the steel manufacturing plant is the series of heating and cooling, such as after re-heating to a temperature suitable for rolling in a heating furnace the slab manufacturing, etc. Hence, the roughing mill and finishing mill is rolled into the form of a hot-rolled steel strip, and strip is cooled through the cooling equipment. Hot rolled coil is wound, placed in a yard and shipped by air cooling after the cold rolling mill products everywhere.

The hot-rolled coil edges meet with the atmosphere in the air-cooling process is becoming a material deviations depending on the cooling rate difference

It is expected to improve the productivity and reducing the cold rolling force for Advanced High Strength Steel in hot rolling mill.

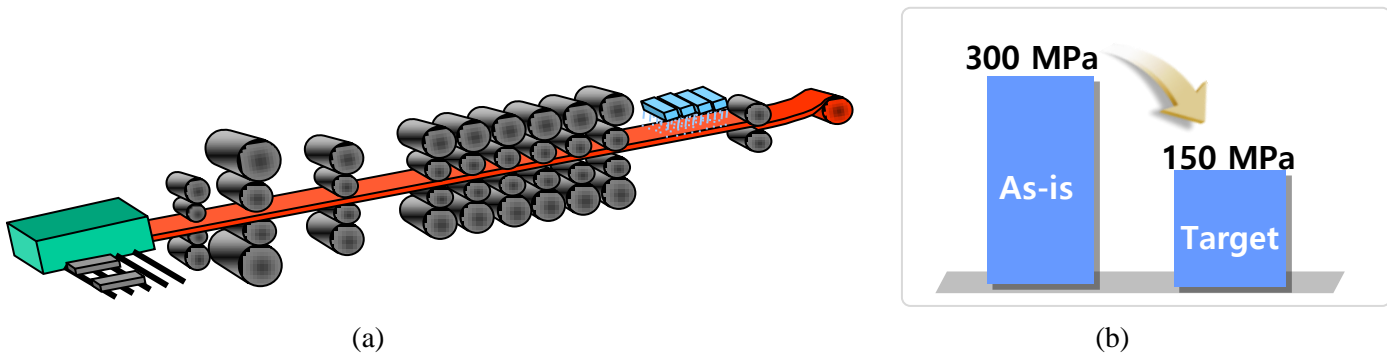


Fig. 1: (a) Steel Rolling Process, (b) Tensile Strength Deviation of AHSS.

## 2. Design and Computer Simulation

It is designed, installed and operated the new heat treatment furnace in order to homogenize the material properties of hot rolled coil by heating on the hard phase of the edge parts. And the numerical simulation of the heat transfer and fluid processes in a furnace is carried out using finite difference techniques.

In this furnace, it is applied the following new technology such as the flat flame burner to heat up the coil edge part, radiant tube to control the heating rate, circulation fan to circulate the air inside of the furnace and new type skid for piling of the coil etc.

Flowing downward from the recirculation fan reaches the bottom of the furnace to make a uniform temperature.

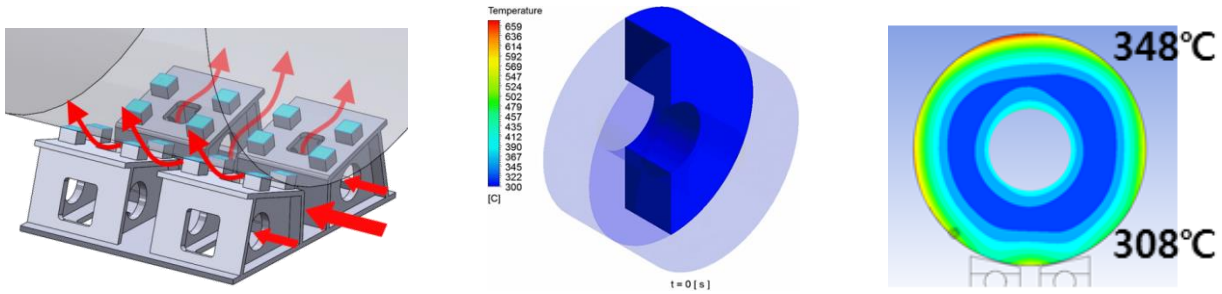


Fig. 2: Design and computer simulation to uniform the temperature.

### 3. Results

It is designed, installed and operated the new heat treatment furnace in order to homogenize the material properties of hot rolled. After all, it is obtained that the temperature deviation is decreased from 150 °C to 40 °C, tensile strength deviation is decreased from 300 MPa to 150 MPa. And the cold rolling force is decreased from 2100 ton to 1450 ton.

In the future, we can develop the new steel products by using this new heat treatment technology.

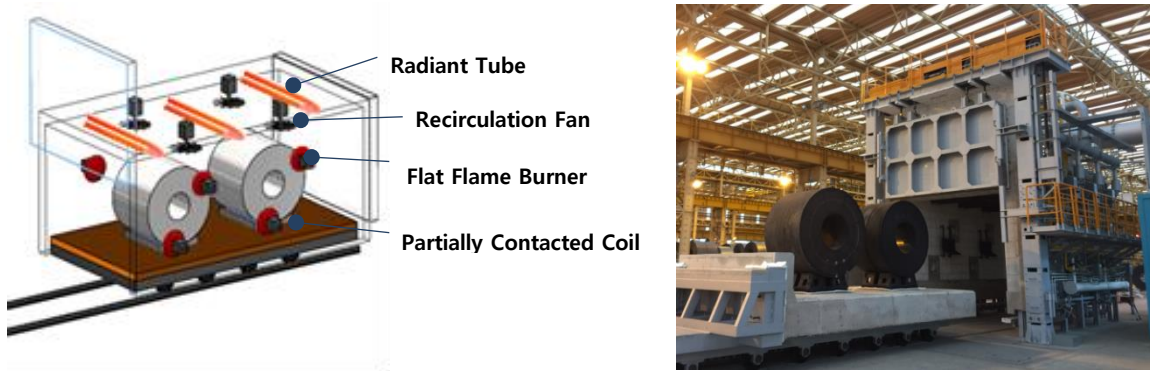


Fig. 3: Heat Treatment furnace of AHSS.

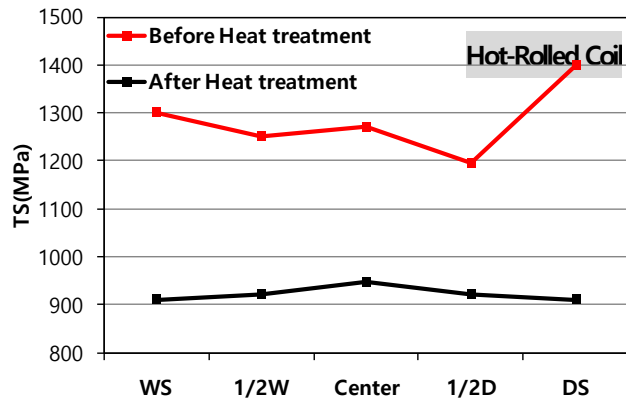


Fig. 4: Results of reducing the material deviation.

### Conclusion

Heat treatment furnaces was successfully designed, installed and operated to reduce the material deviation of AHSS from 300 MPa to 150 MPa.

## References

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