

Remanence Measuring System FWT 100 for on-line Annealing Control of Ferritic Stainless Steel Strip

Operating principle

Stainless strip grades can be classified according to their basic structure at ambient temperature into ferritic and austenitic material.

Ferritic stainless steel contains predominantly about 12 to 20 % Cr and varying contents of carbon, molybdenum and stabilizing elements as titanium and niob. The material X8Cr17 (AISI 430) is the most widely used in this group. It has a carbon content of roughly 0.05 % and about 16.5 % Cr as main alloying constituents.

After being hot-rolled into strip the material is usually hood annealed, pickled and then cold-rolled. This is followed by a final recrystallizing anneal during which enough heat must be supplied for a complete recrystallitation of the cold formed lattice. On the other hand the strip temperature must not become too high so that part of the ferritic structure begins to transform into austenite and to form martensite from austenite during cooling.

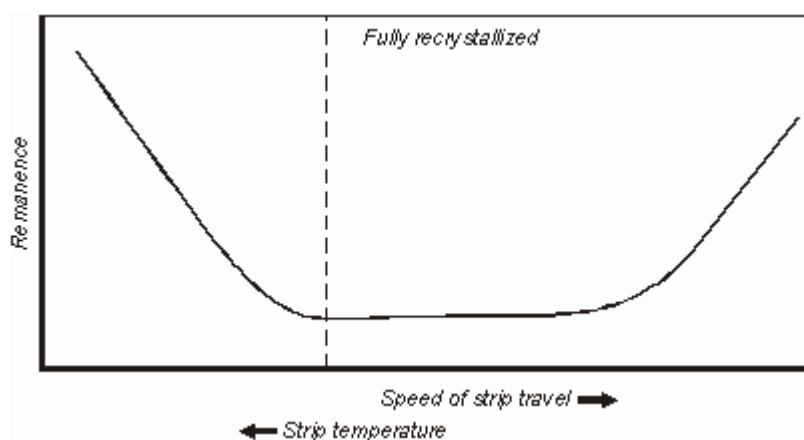


Figure A: Remanence as a function of strip speed and temperature

In case of ferritic material there is a clear correlation between grain structure, mechanical properties and magnetic behaviour (Figure A). During the annealing process the values of the apparent remanence drop significantly, reaching a minimum value in the case of full recrystallization. Overannealing can be observed by increasing values because of the formation of martensite. The remanence values are affected by the thickness as well as by the chemical composition of the material. Thus during running in of an instrument some calibration work is necessary.

System design

The measuring system consists of a magnetizing roller and a field detecting roller. Since the remaining remanent magnetization is very sensitive to strip bending and vibrations the equipment is always mounted on a guiding roll of the line.

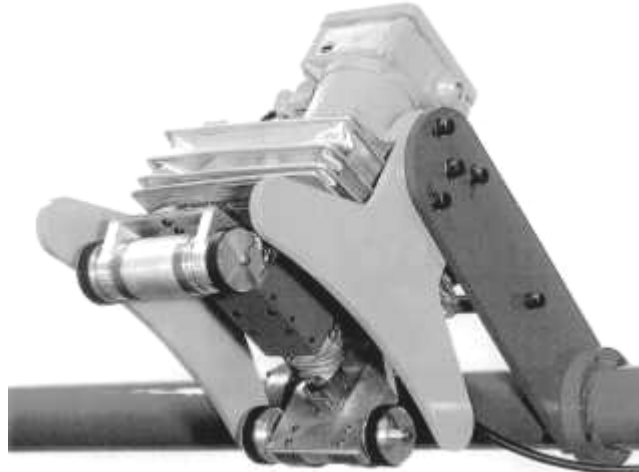


Figure B: Remanence measuring head

Robust design

- Low maintenance expense
- Complete assembling on customer's premises
- No modification to the annealing line necessary
- Measuring system fully protected against damages
- Rubber-tyred rollers to prevent damage to strip surface

Tested reliable electronics

- All functions controlled centrally
- Integrated Hallprobe calibration system
- Measurement recorded proportionally to strip length (option)

Benefits

The benefits of continuous annealing control can be pointed out as follows:

- Improved quality assurance
- Reduction of sampling costs
- Enhanced reliability in production
- Increased annealing line throughput.

Information contained herein is believed to be accurate and reliable. However, no responsibility is assumed by *Minteq International GmbH* for its use. Technical data are subject to change without notice.
File:M-FE-90-PDF-remanence.doc

Update: 12/2009