MAURER MAGNETIC®

From Demagnetizing to Curiezing

www.maurermagnetic.com

MAURER® Degaussing

Definition

Curiezing:

The ultimate Demagnetizing

- Heating material up to the Curie temperature accomplishes the total loss of magnetism
- This effect was reported by Pierre Curie (1859-1906)
- We call our demagnetizing method Curiezing in honour of Pierre Curie

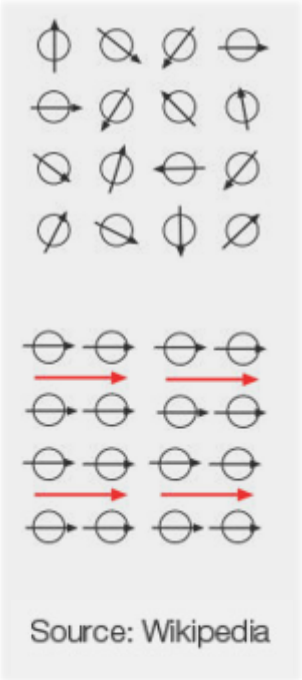
Definition

curiezing
curiezation
curiezed

- A method for complete demagnetization of ferromagnetic materials by means of a specific process (Maurer Degaussing)
- A high precision, closely controlled demagnetizing process
- Preferably in a magnetically shielded environment

Definition

The microscopic scale model of magnetism

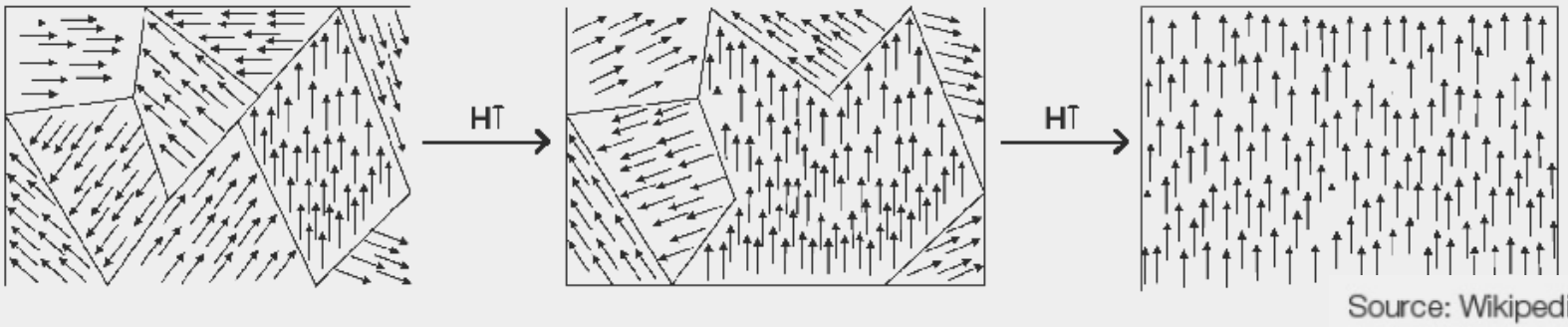


Source: Wikipedia

- The magnetic dipoles are directed randomly
- The workpiece is not magnetized
- The magnetic dipoles are all aligned in a specific direction
- The workpiece is magnetized

Ferromagnetic structure

The metallic model of magnetism

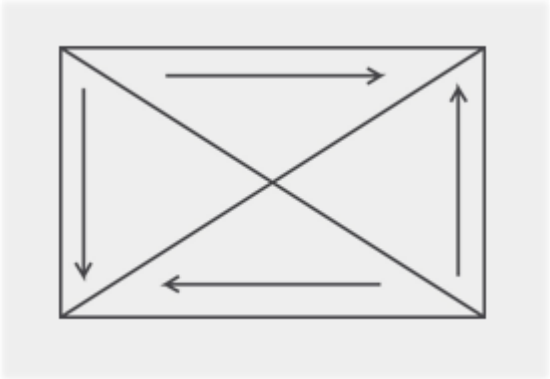


- 10…1000 domains/inch
- **curiezed**

- Orientation of domains rectified field vectors cause measurable magnetism on the surface

Ferromagnetic structure

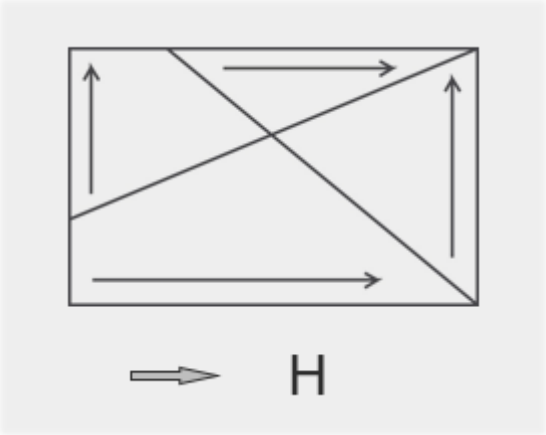
Magnetism by domain displacement



- Flux short circuit in balance, outside magnetically neutral

Ferromagnetic structure

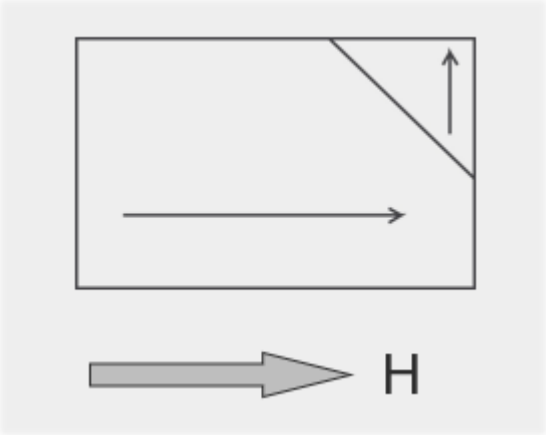
Magnetism by domain displacement



- At a small domain displacement, magnetism is reversible
- An external magnetic field, e.g. Earth's field, induces temporarily some weak magnetism

Ferromagnetic structure

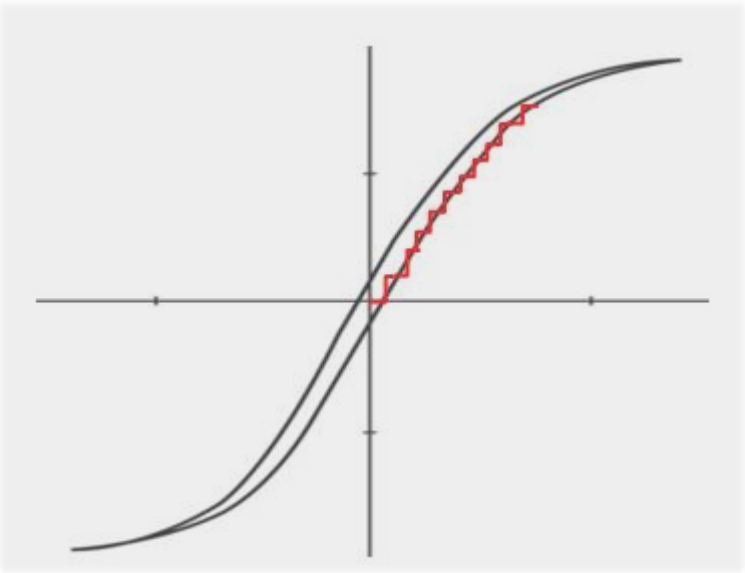
Magnetism by domain displacement



- At a large wall displacement, accomplished by a strong external magnetic field, magnetic domains merge throughout
- This kind of magnetism is irreversible

Ferromagnetic structure

Magnetism by domain displacement



- Jump wise magnetization by Barkhausen step

Ferromagnetic structure

Hard magnetic zone

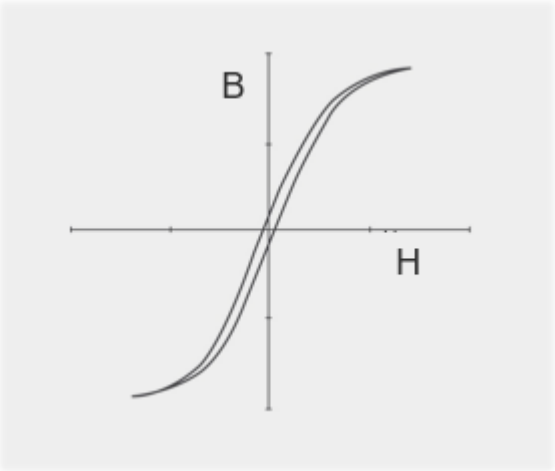
- In material embedded
  hard magnetic bodies

inclusions, foreign materials, cavities

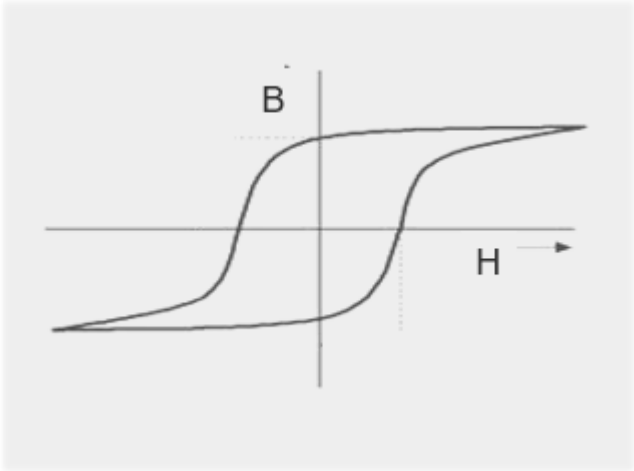
Ferromagnetic structure

Hysteresis

- Magnetically soft basic material



- Magnetically hard inclusions, cavities



Argumentation

Known methods such as:

- low-frequency generators
- counter magnetizing (knock-down)
- stepwise magnetizing DC field systems

will not **curieze** the magnetic structure

Argumentation

Curiezed magnetic structure eliminates phenomena of residual magnetism

- Avoid magnetic hydrogen embrittlement
- Eliminate electrical arching in turbines
- Mitigate strong wear of sliding seals
- Avoid early failures of ball bearings
- Assure reliable signal for Bently test, inductive encoders
- Accomplish low magnetic signature of Marine, Space structures

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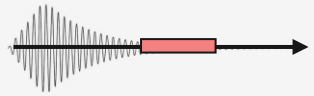
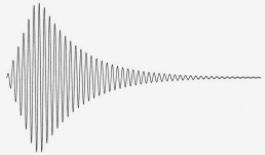
Comparison of technologies

method	type	Field strength	Effective range	Homogeneity of the field	Decrease precition	
field drop by increase in distance	coil					
	yoke / plate					
pulse, damped oscillation	coil					
	yoke / plate					
pulse, with energy feeding	coil					
	yoke / plate					

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Additional use

- Carbide tools and molds
- Crankshafts, camshafts, connecting rods, assemblies
- Machine tools, presses, turbines

MAURER® Degaussing

Summary

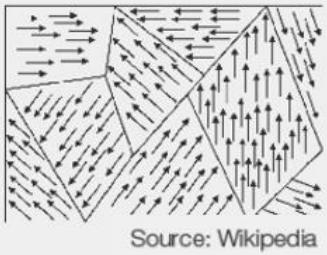
Advantage of MAURER® Degaussing demagnetizers

- Automatic degaussing process
- Bulk treatment
- Fast, productive and energy efficient
- Process reliability / reproducibility
- **Curiezed** magnetic structure, deeper than earth magnetic field <0.5 Gauss

Summary

Benefits of curiezed material by MAURER Degaussing demagnetizers

- No re-magnetizing without external magnetic field
- Various applications benefit from the very small magnetic domain structure
- **Curiezed** magnetic structure contains very low level of residual magnetism, deeper than earth magnetic field <0.5 Gauss



- 10…1000 domains/inch