Ferrite Production
Brief introduction of ferrite production process

Ferrites:

Chemical composition: A Fe$_2$O$_4$ with A = Mn, Ni, Zn etc.

Ferroxcube materials:

3. Mn,Zn-ferrites Mangan-Zink 3C90, ...
4. Ni,Zn-ferrites Nickel-Zink 4C65, ...

General properties:

* hard, but brittle
* chemically inert
flowchart production

- Powder preparation
- Pressing/extrusion
- Sintering
- Grinding/Finishing
- Final inspection and packing
Powder preparation:

- Weighing and mixing raw materials
- Prefiring (chemical conversion)
- Milling
- Spray-drying
Mixing and Weighting

Example of a control panel

Of raw materials
Prefiring; example of rotary pipe kiln

The powder will be heated to around 900 degrees to get a chemical reaction resulting into flakes (few cm$^3$)
Milling; example ball milling principle

The prefired material is milled with balls in water to slurry. After the addition of some binder, the slurry is ready for spray drying.
Spray drying principle

Through a high pressure nozzle, the slurry comes into the air heated area in the upper part and will dry fast to small balls of a few mm³.
Powder preparation

• Weighing and mixing raw materials
• Prefiring (chemical conversion)
• Milling
• Spray-drying

Powder storage in big bags ==>
flowchart production

- Powder preparation
- Pressing/extrusion
- Sintering
- Grinding/Finishing
- final inspection and packing
Pressing

container

boot

mould

upper punch

lower punch
Pressing

container

upper punch

boot

mould

lower punch
Pressing

container

upper punch

boot

mould

lower punch
Pressing

container

boot

upper punch

mould

lower punch
Pressing

container

boot

mould

upper punch

lower punch
Pressing

- container
- upper punch
- boot
- mould
- lower punch
Pressing
Pressing

container

upper punch

boot

mould

lower punch
Example of pressing punch (pot core)
Example of pressing machine

In this case a 50 tons press in our Polish factory
flowchart production

- Powder preparation
- Pressing/extrusion
- Sintering
- Grinding/Finishing
- final inspection and packing
Sintering curve ferrite products

- **temp**
- **O2**
- **time**

- **Sintering**
- **binder burnout**
- **200-400 C**
Sintering process

Racks with products for the Batch sintering kiln

Batch sintering kiln
Tunnel Kiln
flowchart production

1. Powder preparation
2. Pressing/extrusion
3. Sintering
4. Grinding/Finishing
5. final inspection and packing
Grinding process

- diamond tools
- upper and lower surface
- several grinding machines
- polishing process
- airgap
Batch Grinder
Through feed Grinder
Polishing
**Finishing**

**Toroids**
- Deburring
- Coating
  - Nylon
  - Epoxy
  - Parylene
- Caps
- 100% sorting out
- Gapping

**Rods**
- Cutting
- Centreless grinding
- Parylene coating
- Selection in L groups

**Wired products**
- Round wire
- Flat wire
- Tape & reel
flowchart production

1. Powder preparation
2. Pressing/extrusion
3. Sintering
4. Grinding/Finishing
5. final inspection and packing
Final inspection and packing

- In line process- and products inspections
- Final inspection
- Packing
  - Blister
  - Booklet
  - Tape on reel
Packing
Packing
Packing
Warehouse
Transport to Customer