Ductile Iron

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Discover the Truth of Material

Purpose:

Observe the microstructure of ductile iron. The morphology, size, and distribution of graphite are critical to the mechanical properties of cast iron, making their assessment essential for quality control during production. Samples undergo cutting (TableCut200), mounting (FLEXPRESS fully automatic modular hot mounting machine), grinding/polishing (Alpha610), and etching with 4% nitric acid alcohol solution to observe the microstructure (MN80 metallographic microscope).

Recommended parameters for different specimen size				
Sample size/ diameter (mm)	25	30	40	50
Individual force loading mode, individual sample pressure force (N)	−5	0	+(5~10)	+(5~10)

*Standard pressure: ϕ30mm (adjust according to sample size).

Recommended Equipment and Consumables (select grinding/polishing consumables based on sample conditions):



TableCUT−200 manual/automated precision cutting machine

Cutting

Equipment	TableCUT−200 manual/automated precision cutting machine	
Cut−off wheel	A30 alumina abrasive cut−off wheel	Order No：01.01.315
Cutting Coolant	TJ1410 Cutting Coolant	Order No：01.07.857
Fixture	Horizontal push fixture	
Cutting Method	Horizontal cutting (Y−axis)	
Cutting Parameters	Feed speed	0.1mm/s
	Pulse setting	No pulse cutting
	Cutting disc speed	3000rmp

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FlexPRESS Automated Modular Hot Mounting Machine

Hot Mounting

Equipment	FlexPRESS Automated Modular Hot Mounting Machine
Hot mounting resin	EP2237 Epoxy Edge-Retention Hot Mounting Resin Order No：02.01.710
Heating Power	100%
Holding time	5min
Temperature	180℃
Pressure	180bar
Cooling Conditions	Cool to 40℃
Cooling rate	High
Top heating	Enabled

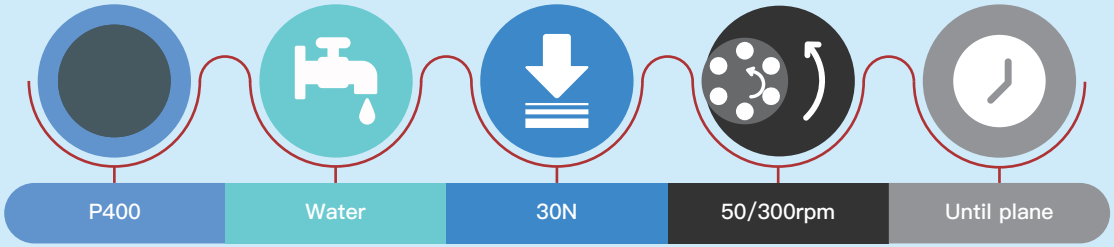
Basic Guide

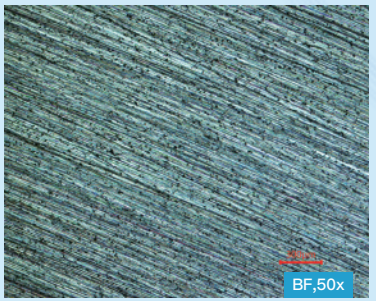
- **Cutting**
  1.Use an A30 resin-bonded alumina cutting wheel for ductile iron. Refer to the Trojan Cutting Guide for specific models.
  2.Select pulse mode for cutting, with a recommended maximum cutting speed ≤0.25 mm/s.
- **Mounting**
  Use high-edge-retention hot or cold mounting resin.
- **Grinding**
  1.Begin with P400 silicon carbide sandpaper/lapping films until the sample surface is flat and cutting damage is fully removed.
  2.Continue grinding with a POS disc + 9 μm diamond polishing suspension.
  3.Clean the sample, sample holder, and hands after each grinding step.
- **Polishing**
  1.Clean the polishing cloth, sample holder, and hands before polishing. Repeat cleaning after each step.
  2.Do not mix polishing disks with different abrasive particle sizes.
  3.Rinse the sample surface with alcohol and dry with a blower to remove residue and prevent corrosion.
  4.After each polishing step, inspect under a metallographic microscope to ensure: Scratch size matches the abrasive grit. Scratch direction is random.
  5.Clean polishing cloths with running water and a soft brush after use, then air-dry.
  6.Dedicate polishing cloths used for ductile iron exclusively to such samples.

Preparation Procedure——Ductile Iron

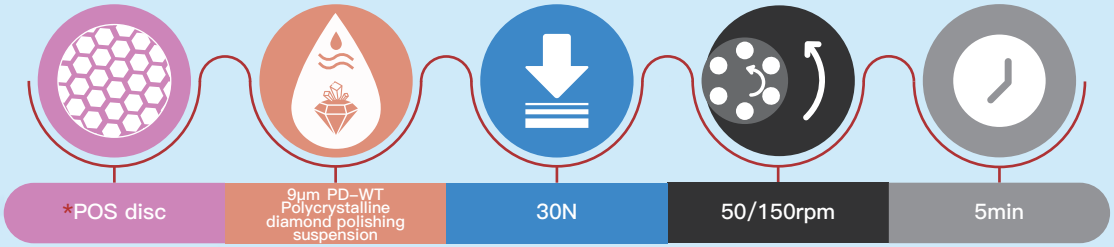
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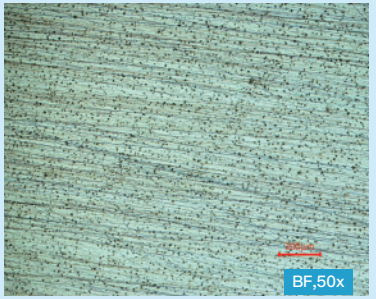
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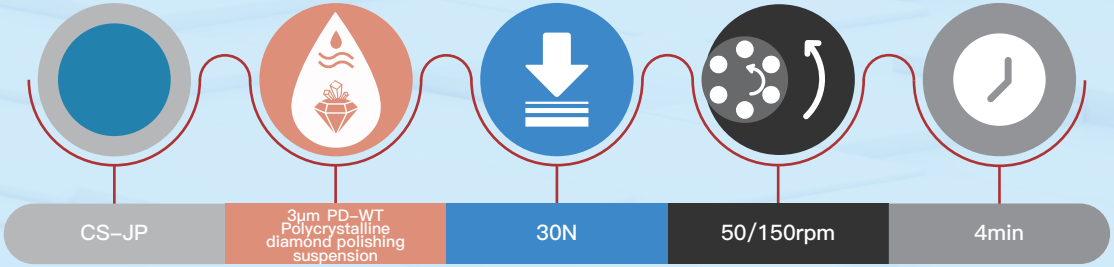
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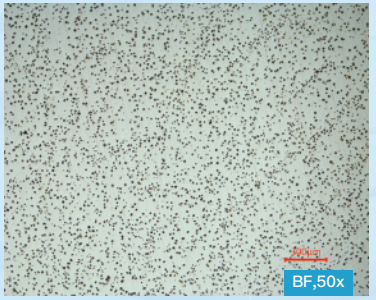




*POS discs can be replaced with P800 or P2000 sandpaper.

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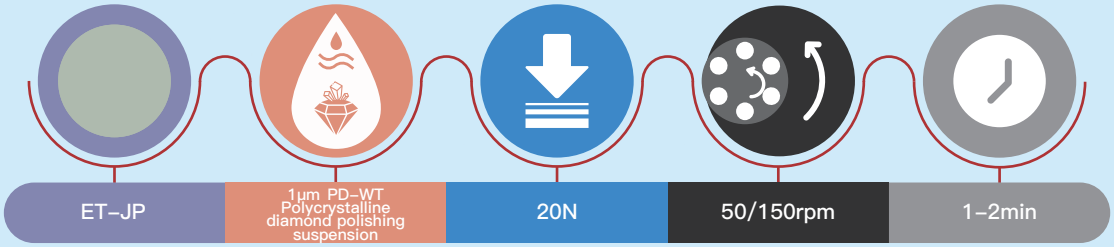


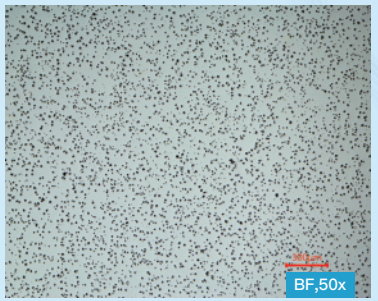


Preparation Procedure——Ductile Iron

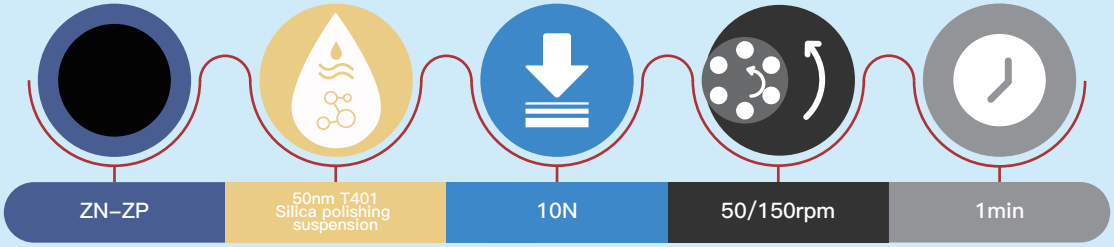
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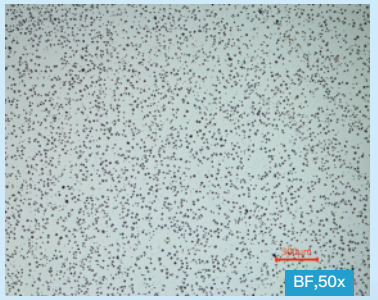
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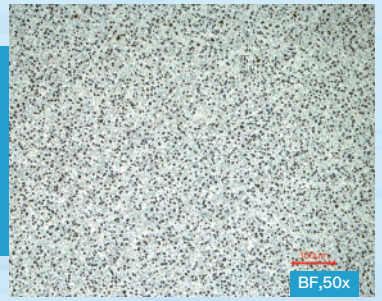


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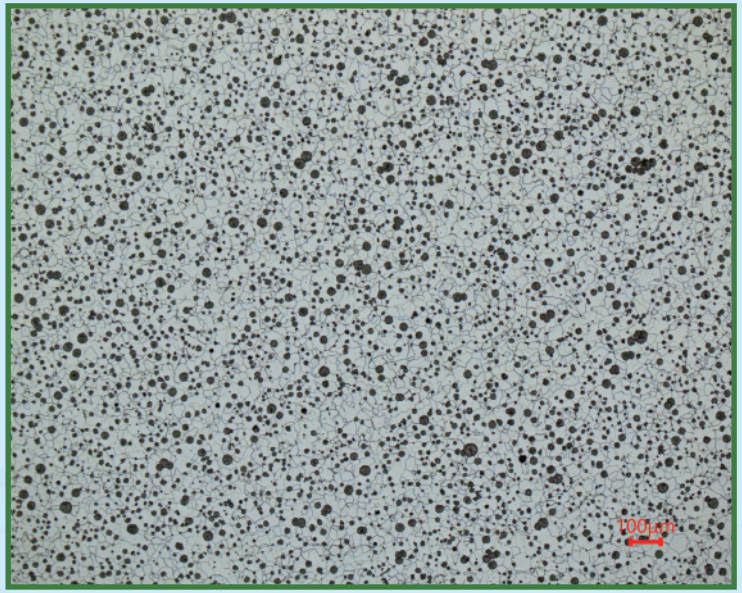
Immerse in 4% nitric acid alcohol solution for 10—60 seconds



Ductile Iron-Polishing Defect Sample

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Photos of qualified polished samples



Micrograph after etching (50X magnification)

- Clear structure with a clean, scratch–free surface.

Photos of unqualified polished samples



Micrograph after etching (50X magnification)

- Residual moisture due to delayed drying after cleaning;
- Repeat CS (coarse polishing), ET (intermediate polishing), and ZN (final polishing) steps. After cleaning, immediately dehydrate with anhydrous alcohol and dry thoroughly.