A  Clay-bonded sand

Examine lustrous carbon production

- yes
  - Defect remedied
  - no
  - Examine lustrous carbon production
    - yes
      - Defect remedied
      - no
        - Examine lustrous carbon production
          - yes
            - Defect remedied
            - no
              - Contact IKO

Measure active carbon in moulding sand, examine lustrous carbon producer, use material with greater lustrous carbon production; increase ignition loss in moulding sand

- yes
  - Defect remedied
  - no
    - Examine lustrous carbon production
      - yes
        - Defect remedied
        - no
          - Examine lustrous carbon production
            - yes
              - Defect remedied
              - no
                - Contact IKO

B  Moulding plant

Examine compaction

- yes
  - Defect remedied
  - no
    - Examine compaction
      - yes
        - Defect remedied
        - no
          - Contact IKO

Poorly compacted sections are at risk of overheating. Achieve more even compaction.

C  Gating and pouring practice

Examine gating

- yes
  - Defect remedied
  - no
    - Examine gating
      - yes
        - Defect remedied
        - no
          - Contact IKO

Excessive quantities of metal and over-rapid pouring rates cause local overheating. Achieve better distribution of metal.

Contact IKO
**A  Moulding plant**

1. **Examine stripping process**
   - Yes: Defect remedied
   - No: Examine prefilling

2. **Examine prefilling**
   - Yes: Defect remedied
   - No: Examine patterns

3. **Examine patterns**
   - Yes: Defect remedied
   - No: Examine compacting pressure

4. **Examine compacting pressure**
   - Yes: Defect remedied
   - No: Contact IKO

**B  Clay-bonded sand**

1. **Examine cluster content**
   - Yes: Defect remedied
   - No: Examine fines

2. **Examine fines**
   - Yes: Defect remedied
   - No: Examine sand temperature

3. **Examine sand temperature**
   - Yes: Defect remedied
   - No: Examine moisture of used sand

4. **Examine moisture of used sand**
   - Yes: Defect remedied
   - No: Contact IKO
A Clay-bonded sand

Examine binder content

Erosion can be expected below a critical amount of bentonite. Increase bentonite content if necessary.

yes

Defect remedied

no

Examine compactability

At a compactability of less than 30%, the bentonite is no longer totally developed. If necessary, increase compactability.

yes

Defect remedied

no

Examine inert, non-active fines content

Insufficient bonding of sand occurs with too high a proportion of inert fines.

yes

Defect remedied

no

Contact IKO

Examine sand temperature

Severe drying occurs at high sand temperatures. Reduce sand temperature to below 40 °C.

yes

Defect remedied

no

Gather and interpret data

Examine sand grain size

With coarse sand, individual grains can be torn from the mould, use finer sand

yes

Defect remedied

no

Gather and interpret data

Examine lustrous carbon producer

With low lustrous carbon production, the metal stream can tear away sand grains. Increase activity of lustrous carbon producer.

yes

Defect remedied

no

Gather and interpret data

Examine salt content of sand

High salt content in water or sand leads to deactivation of bentonite.

yes

Defect remedied

no

Gather and interpret data

Examine compactability

At a compactability of less than 30%, the bentonite is no longer totally developed. If necessary, increase compactability.

yes

Defect remedied

no

Gather and interpret data

Examine inert, non-active fines content

Insufficient bonding of sand occurs with too high a proportion of inert fines.

yes

Defect remedied

no

Contact IKO
B  Moulding plant

- Examine compaction
  - With low compaction there is insufficient bonding, sand must be more evenly distributed. Increase pressure of plant if necessary.
  - yes: Defect remedied
  - no: Gather and interpret data

- Examine pouring rate
  - With too high a pouring rate, erosion occurs at overheated points. Reduce pouring rate.
  - yes: Defect remedied
  - no: Gather and interpret data

- Examine quantity of inflowing metal
  - Excessive quantities of metal will cause overheating and erosion. Achieve better metal distribution.
  - yes: Defect remedied
  - no: Gather and interpret data

- Contact IKO

C  Gating and pouring practice

- Examine compaction
  - With low compaction there is insufficient bonding, sand must be more evenly distributed. Increase pressure of plant if necessary.
  - yes: Defect remedied
  - no: Gather and interpret data

- Examine pouring rate
  - With too high a pouring rate, erosion occurs at overheated points. Reduce pouring rate.
  - yes: Defect remedied
  - no: Gather and interpret data

- Examine quantity of inflowing metal
  - Excessive quantities of metal will cause overheating and erosion. Achieve better metal distribution.
  - yes: Defect remedied
  - no: Gather and interpret data

- Contact IKO

A  Clay-bonded sand

- Reduce moisture content
  - Low degree of mulling necessitates a higher water content. Water is released at an early stage when casting.
  - yes: Defect remedied
  - no: Gather and interpret data

- Examine degree of mulling
  - Low degree of mulling necessitates a higher water content. Water is released at an early stage when casting.
  - yes: Defect remedied
  - no: Gather and interpret data

- Examine proportion of inert fines
  - Inert fines requires a lot of water which is rapidly released on heating. Reduce inert fines content (dust, bentonite, lustrous carbon carrier).
  - yes: Defect remedied
  - no: Gather and interpret data

- Reduce bentonite content
  - Lower bentonite contents require less water. Use higher bentonite quality if necessary.
  - yes: Defect remedied
  - no: Gather and interpret data

- Contact IKO
### A  Resin-bonded sand

- **Examine sand grain size**
  - Higher AFS values reduce danger of explosive penetration. Use finer sand if necessary.

- **Examine lustrous carbon producer**
  - More active lustrous carbon producers require less water. Less material usage and coke formation.

### B  Moulding plant

- **Examine compacting pressure**
  - Reduce compacting pressure. If necessary, increase uniformity of compacting.

### C  Gating and pouring practice

- **Examine pouring rate**
  - Over-rapid pouring rate leads to explosive penetrations. Reduce pouring rate.
B  Clay-bonded sand

Examine lustrous carbon production in moulding sand

Measure active carbon. Reduce quantity of lustrous carbon producer.

Gather and interpret data

Examine lustrous carbon producer

Use less active lustrous carbon producer if necessary. Use slower-reacting materials.

Gather and interpret data

Examine gas permeability

Use coarser sand if possible. Reduce fines.

Gather and interpret data

yes  Defect remedied

no  Contact IKO

yes  Defect remedied

no  Contact IKO

C  Moulding plant

Examine compaction

Reduce compaction by increasing compactability or reducing compacting pressure.

Gather and interpret data

yes  Defect remedied

no  Contact IKO

D  Gating and pouring practice

Examine gating

Turbulence leads to lustrous carbon inclusions. Strive for laminar pouring.

Gather and interpret data

yes  Defect remedied

no  Contact IKO

Examine pouring data

Higher pouring temperatures reduce the risk of lustrous carbon inclusions.

Gather and interpret data

yes  Defect remedied

no  Contact IKO

Examine lustrous carbon production in moulding sand

Measure active carbon. Reduce quantity of lustrous carbon producer.

Gather and interpret data

yes  Defect remedied

no  Contact IKO

Examine lustrous carbon producer

Use less active lustrous carbon producer if necessary. Use slower-reacting materials.

Gather and interpret data

Examine gas permeability

Use coarser sand if possible. Reduce fines.

Gather and interpret data

yes  Defect remedied

no  Contact IKO

Examine gating

Turbulence leads to lustrous carbon inclusions. Strive for laminar pouring.

Gather and interpret data

yes  Defect remedied

no  Contact IKO

Examine pouring data

Higher pouring temperatures reduce the risk of lustrous carbon inclusions.

Gather and interpret data

yes  Defect remedied

no  Contact IKO
A Metallurgy

Examine residual magnesium content

- Adjust residual magnesium content to match gating, subversive elements, pouring temperature and casting systems.

- Examining sulphur content
  - Sulphur content sometimes high due to PTS or other binding systems. Reduce quantities.
  - Use other methods.

B Gating and pouring practice

Check pouring temperature

- Reduce pouring temperature. Cool melt more rapidly.

- Examine content of subversive elements
  - Proportions of subversive elements such as antimony, lead, cadmium, titanium and, to a lesser extent, aluminium, copper and zinc must be kept low.

C Resin-bonded sand

Examine sulphur content

- Defect remedied
  - Gather and interpret data

D Clay-bonded sand

Examine formation of oxidizing gases

- Oxygen, carbon dioxide, water vapour react with the residual magnesium content. Reduce formation of these substances.

- Contact IKO
Examine sulphur content in moulding sand

Use low-sulphur carbon carrier.
Examine inflowing core sand for sulphur.

Gather and interpret data

Examine formation of hydrocarbons

Use sufficient quantities of lustrous carbon producer.
Increase lustrous carbon production if necessary.

Gather and interpret data

Contact IKO

Examine nitrogen content

Nitrogen content of more than 100 ppm can lead to defects in grey and SG cast iron.
Examine charge materials; modify as appropriate.

Gather and interpret data

Check titanium content

Titanium bonds nitrogen, add pure titanium if necessary.
Increase titanium level to 0.03 %.

Gather and interpret data

Check CE value

Critical CE values between 3.4 and 3.8.
Increase to 3.8 if necessary.

Gather and interpret data

Contact IKO

Examine sulphur content in moulding sand

Defect remedied

no

Examine formation of hydrocarbons

Defect remedied

no

Contact IKO

Examine nitrogen content

Defect remedied

Gather and interpret data

Check titanium content

Defect remedied

no

Check CE value

Defect remedied

no

Contact IKO

A Metallurgy

Assistance for decisions: Fissure defects
B  Resin-bonded sand

Check nitrogen content of binder

- yes: Defect remedied
- no: Examine gas formation

- yes: Defect remedied
- no: Examine release of gas

- yes: Defect remedied
- no: Add iron oxide

- yes: Defect remedied
- no: Contact IKO

Reduce or avoid nitrogen-containing binders, hardeners, admixtures.

Gather and interpret data

Reduce moisture content

- yes: Defect remedied
- no: Examine nitrogen contents

- yes: Defect remedied
- no: Examine lustrous carbon producers

Gas absorption increases due to residual moisture. Reduce quantity of bentonite and inert dust.

Gather and interpret data

C  Clay-bonded sand

Reduce moisture content

- yes: Defect remedied
- no: Examine nitrogen contents

Reduce nitrogen contents by adding new sand. Use lustrous carbon producer with low nitrogen content.

Gather and interpret data

More active lustrous carbon producers with low nitrogen content preferable. Quantity and release of gas/unit of time should be kept low.

Gather and interpret data

Contact IKO
D  Gating and pouring practice

- Examine gating
  - Shortened flow channels prevent gas absorption. Avoid turbulence.
  - Gather and interpret data

  - yes
    - Defect remedied
  - no
    - Check pouring temperature
      - Faster and hotter pouring leads to improved liberation of gases.
      - Gather and interpret data

  - yes
    - Defect remedied
  - no
    - Contact IKO

A  Metallurgy

- Examine solidification range
  - Defect occurs only in metals with a wide solidification range. Reduce CE value. Remove low-melting-point components (in case of grey iron, phosphorus content).
  - Gather and interpret data

  - yes
    - Defect remedied
  - no
    - Examine gas contents
      - Combine gases or remove by degassing
      - Gather and interpret data

  - yes
    - Defect remedied
  - no
    - Contact IKO

B  Clay-bonded sand

- Examine gas formation
  - Check gasification rate and quantity of lustrous carbon producers. Reduce quantities if necessary. Check bentonite content and mould moisture, reduce if necessary.
  - Gather and interpret data

  - yes
    - Defect remedied
  - no
    - Contact IKO
C  Resin-bonded sand

Examine inert content in dust

yes

Defect remedied

no

Apply facing sand

Examine gas formation

yes

Defect remedied

no

Contact IKO

Excessive dust contents bind water and reduce gas permeability. Reduce inert dust contents if necessary.

Apply chrome ore sand or other materials with good heat conductivity at critical points.

D  Moulding plant

Apply facing sand materials

yes

Defect remedied

no

Contact IKO

Use materials with high heat conductivity at critical points.

Gather and interpret data

Examine mould stability

yes

Defect remedied

no

Gather and interpret data

Swelling and expansion of mould increase risk of defect. Compact mould evenly. Reduce compactability. Reduce bentonite content.

Examine radii of moulds

yes

Defect remedied

no

Gather and interpret data

Increase edge radii. Reduces the risk of gas transfer points.

Contact IKO
**A  Clay-bonded sand**

- **Check fluoride content in moulding sand** → **Use more new sand where content is too high**
  - yes: Defect remedied
  - no: Gather and interpret data
- **Check water content** → **Water content should be as low as possible. Reduce bentonite content, reduce dust content if necessary.**
  - yes: Defect remedied
  - no: Gather and interpret data
- **Examine feeder material in moulding sand** → **Remove all feeder materials. Fluoride-containing feeder residues cause surface reactions.**
  - yes: Defect remedied
  - no: Gather and interpret data
  - yes: Contact IKO

**B  Metallurgy**

- **Examine Mg content** → **Keep Mg content in melt as low as possible.**
  - yes: Defect remedied
  - no: Gather and interpret data
  - yes: Contact IKO

**C  Gating and pouring practice**

- **Examine need for feeder consumption** → **Use as few feeders as possible. Use insulation feeders if possible.**
  - yes: Defect remedied
  - no: Gather and interpret data
  - yes: Check pouring temperature
  - no: Reduce pouring temperature
  - yes: Contact IKO

**Assistance for decisions: Pitted surfaces**
A  Resin-bonded sand

1. Examine core venting
   - yes: Defect remedied
   - no: Examine binder

2. Examine binder
   - yes: Defect remedied
   - no: Examine moisture content

3. Examine moisture content
   - yes: Defect remedied
   - no: Check gas permeability of cores

4. Check gas permeability of cores
   - yes: Defect remedied
   - no: Contact IKO

B  Clay-bonded sand

1. Check sand moisture
   - yes: Defect remedied
   - no: Gather and interpret data

2. Check sand moisture
   - yes: Defect remedied
   - no: Gather and interpret data

3. Check sand temperature
   - yes: Defect remedied
   - no: Check gas permeability

4. Check gas permeability
   - yes: Defect remedied
   - no: Gather and interpret data

5. Check sand temperature
   - yes: Defect remedied
   - no: Examine bentonite

6. Examine bentonite
   - yes: Defect remedied
   - no: Contact IKO

Gather and interpret data
A Clay-bonded sand

Check sand grain size

Penetration occurs above a critical pore size. Use finer sand if necessary.

Gather and interpret data

Check proportion of fines

Low lustrous carbon production promotes penetration through greater wetting of sand; measure active carbon; increase addition of carbon carrier if necessary.

Gather and interpret data

Examine lustrous carbon production

A  Clay-bonded sand

D  Gating and pouring practice

Check pouring temperature

Liquids temperature should be noticeably exceeded.

Gather and interpret data

Check gating

Avoid turbulence, optimize pouring times. Separate slags; optimize pouring pressure.

Gather and interpret data

C  Moulding plant

Examine compaction

Determine mould hardness, reduce compacting pressure.

Gather and interpret data

Contact IKO
B  Resin-bonded sand

Check sand grain size

Penetration occurs above a critical pore size. Use finer sand if necessary.

yes  Defect remedied  no

Apply coatings

Seal pores by applying coatings. Use thicker applications if required.

yes  Defect remedied  no

Examine binding agent

Highly viscous binding agents result in uncompacted core sections; use binder with low viscosity. Examine lustrous carbon producers. Binders with high lustrous carbon production preferable.

yes  Defect remedied  no

Contact IKO

yes  Defect remedied  no

Gather and interpret data

C  Moulding plant

Check compaction

Make compaction more uniform. Examine deeper cores. Ensure even prefilling.

yes  Defect remedied  no

Gather and interpret data

yes  Defect remedied  no

Contact IKO

D  Gating and pouring practice

Check gating

Excessive quantities of inflowing metal cause overheating. Achieve more even and better metal distribution. Check pattern plate arrangement.

yes  Defect remedied  no

Gather and interpret data

yes  Defect remedied  no

Check pouring temperature

Reduce pouring temperature if necessary

yes  Defect remedied  no

Gather and interpret data

yes  Defect remedied  no

Contact IKO

yes  Defect remedied  no

Gather and interpret data
A  Metallurgy (ferrous metals)

- Check nitrogen content of melt
  - yes: Defect remedied
  - no: Check change materials for oxides and hydroxides
    - yes: Defect remedied
    - no: Check aluminium content
      - yes: Defect remedied
      - no: Check titanium content
        - yes: Defect remedied
        - no: Check manganese content
          - yes: Defect remedied
          - no: Gather and interpret data

B  Clay-bonded sand

- Check nitrogen content
  - yes: Defect remedied
  - no: Check moisture
    - yes: Defect remedied
    - no: Check lustrous carbon carriers
      - yes: Defect remedied
      - no: Check titanium content
        - yes: Defect remedied
        - no: Gather and interpret data

- Check aluminium content
  - yes: Defect remedied
  - no: The same applies as with aluminium. Titanium is used in melt beforehand to avoid pinholes. Hydrogen absorption increases in circulation.
  - yes: Defect remedied
  - no: Contact IKO
C  Resin-bonded sand

Examine nitrogen in core

- Yes: Defect remedied
- No: Add iron oxide

Examine lustrous carbon production

- Yes: Defect remedied
- No: Gather and interpret data

D  Gating and pouring practice

Examine gating

- Yes: Defect remedied
- No: Examine for presence of slag

Examine nitrogen in core

- Yes: Defect remedied
- No: Add iron oxide

Examine lustrous carbon production

- Yes: Defect remedied
- No: Gather and interpret data

A  Clay-bonded sand

Examine sand grain size

- Yes: Defect remedied
- No: Use finer sand grain if necessary.

Examine lustrous carbon production

- Yes: Defect remedied
- No: Increase additions of carbon carrier.

Examine lustrous carbon producer

- Yes: Defect remedied
- No: Use carbon carrier with higher lustrous carbon producing capacity.

Examine fines content

- Yes: Defect remedied
- No: Increase fines if necessary. Use lustrous carbon carrier with higher coke producing capacity.

Contact IKO
B  Moulding plant

Examine compaction

If possible, compact evenly and more effectively. Reduce compactability.

yes
Defect remedied
Gather and interpret data

no
Examine mould surface

Improve adherence of sand at the surface. Avoid drying out.

yes
Defect remedied
Gather and interpret data

no
Contact IKO

C  Gating and pouring practice

Check pouring temperature

Apply materials with good heat conductivity at critical points.

yes
Defect remedied
Gather and interpret data

no
Contact IKO

A  Moulding plant

Examine mould for pressure points

Separate flasks after assembling and perform visual inspection. Blow out mould flasks, fit pressure pads is necessary.

yes
Defect remedied
Gather and interpret data

no
Examine pattern plates

Inspect patterns for cracks and smoothness. Increase tapers and radii of patterns if necessary. Heat pattern plates; use release agent.

yes
Defect remedied
Gather and interpret data

no
Examine mould stripping process

Examine possibility of cracks and disintegration. Correct if necessary.

yes
Defect remedied
Gather and interpret data

no
Examine core setting

Check for edge crumbling when coring up and for core misalignment. Employ automatic core insertion.

yes
Defect remedied
Gather and interpret data

no
Contact IKO
Examine mould hardness

- yes
  - Defect remedied
  - no
    - Contact IKO

Examine cluster formation

- yes
  - Defect remedied
  - no
    - Gather and interpret data

Examine lustrous carbon producer

- yes
  - Defect remedied
  - no
    - Increase lustrous carbon production capacity if necessary.

Reduce quantity of lustrous carbon producer.

- yes
  - Defect remedied
  - no
    - Gather and interpret data

Examine core strength

- yes
  - Defect remedied
  - no
    - Increase binder content as appropriate. Improve compaction.

B Clay-bonded sand

Examine compactability

- yes
  - Defect remedied
  - no
    - Increase compactability. High compactability reduces the risk of over-compaction and increases plasticity.

Examine lustrous carbon producer

- yes
  - Defect remedied
  - no
    - Reduce quantity of lustrous carbon producer. Use material of higher lustrous carbon production capacity if necessary.

C Resin-bonded sand

Examine bentonite content

- yes
  - Defect remedied
  - no
    - Increase bentonite content, increase mixing times. Try to achieve better bentonite development. Improve pre-wetting.

Examine inert dust content

- yes
  - Defect remedied
  - no
    - Limit proportion of dead-burnt inert fines to 2 – 2.5 % with 10 % activated clay. Restrict by adding new sand or bentonite if necessary.

Limit proportion of dead-burnt inert fines to 2 – 2.5 % with 10 % activated clay. Restrict by adding new sand or bentonite if necessary.

- yes
  - Defect remedied
  - no
    - Gather and interpret data

Contact IKO

- yes
  - Defect remedied
  - no
    - Gather and interpret data
D  Gating and pouring practice

Examine gating

- yes: Defect remedied
- no: Examine pouring rate

Examine pouring rate

- yes: Defect remedied
- no: Reduce pouring rate if necessary.

yes: Defect remedied
- no: Gather and interpret data

Contact IKO

A  Metallurgy

Examine melt

- yes: Defect remedied
- no: Gather and interpret data

Examine melt for slag formation. Reduce oxygen-affinitive elements (Al, Mg, Mn). Reduce sulphur content if necessary.

yes: Defect remedied
- no: Gather and interpret data

Examine dissolution capacity of inoculant. Avoid mould inoculation if necessary. Re-specify type and grain of inoculant.

yes: Defect remedied
- no: Gather and interpret data

Examine ladle lining

- yes: Defect remedied
- no: Examine de-slagging of ladle

Examine reaction of lining with the melt, particularly at metal/atmosphere interface. Use refractory mixtures. If necessary, improve drying of ladle.

yes: Defect remedied
- no: Gather and interpret data

Avoid inflow of slag into ladle. Retain slag when pouring. Use teapot spout ladle; use slag-forming admixture if necessary. Clean ladle after pouring.

yes: Defect remedied
- no: Gather and interpret data

Contact IKO
B  Gating and pouring practice

Examine pouring conditions  
Raise temperature.  
Shorten pouring time.

- yes  
  Defect remedied  
- no  
  Examine gating  
  Keep pouring basin full, avoid turbulence.  
  Use a dross filter, use strainer core.

- yes  
  Defect remedied  
- no  
  Contact IKO

Examine bentonite content  
Increase bentonite content if necessary.  
Improve development of bentonite.

- yes  
  Defect remedied  
- no  
  Examine lustrous carbon producer  
  Use material that has a higher lustrous carbon production.  
  Increase quantity if necessary.

- yes  
  Defect remedied  
- no  
  Contact IKO

C  Clay-bonded sand

Examine inert dust content  
Do not allow inert fines content to rise above 2% with 10% activated clay.  
Add new sand.

- yes  
  Defect remedied  
- no  
  Contact IKO
A  Clay-bonded sand

Examine bentonite content

- Measure wet tensile strength. If necessary, increase bentonite content or change its quality.

  yes  Defect remedied

  no  Examine dust content

  yes  Defect remedied

  no  Examine sand grain size

  yes  Defect remedied

  no  Examine degree of mulling

  yes  Defect remedied

  no  Contact IKO

Examine degree of chamottization

- Higher compressive stress occurs with a low degree of chamottization. Reduce quantity of new sand if necessary.

  yes  Defect remedied

  no  Examine water quality

  yes  Defect remedied

  no  Contact IKO

B  Moulding plant

Examine compaction

- Excessive compaction results in compressive stress. Reduce compacting pressure, endeavour to achieve more uniform compaction. Increase compactability if necessary.

  yes  Defect remedied

  no  Contact IKO
C  Gating and pouring practice

Examine gating system

Local overheating due to over-rapid metal flow promotes scab formation. Improve inflow of metal.

yes  Defect remedied

no  no

Check pouring times

Strive for faster pouring and shorter radiation heat exposure times.

yes  Defect remedied

no  no

Gather and interpret data

Contact IKO

A  Moulding plant

Examine compaction

Measure mould hardness. Improve sand distribution when filling. Increase compacting pressure if necessary. Examine patterns.

yes  Defect remedied

no  no

Gather and interpret data

Contact IKO

B  Clay-bonded sand

Check compactability

Reduce compactability. Moulds become firmer, compaction more uniform.

yes  Defect remedied

no  no

Gather and interpret data

Contact IKO

Contact IKO

Contact IKO

Contact IKO
**Resin-bonded sand**

- Examine cores
- **Cores insufficiently compacted, improve compaction.**
  - Improve hardening of cores.
- **Defect remedied**
- **Gather and interpret data**

**D Metallurgy**

- Examine graphitization pressure
- **For grey cast iron, expansion pressure possible due to graphite formation in melt.**
  - Increase phosphorus content.
- **Defect remedied**
- **Gather and interpret data**

**Clay-bonded sand**

- Examine compactability
- **Reduce compactability.**
  - **Defect remedied**
  - **Gather and interpret data**

- Examine sand grain size
  - Coarse sands promote metal penetration.
  - Use finer new sand; use finer core sand if necessary.
- **Defect remedied**
- **Gather and interpret data**

- Examine heat resistance of moulding sand
  - Low-melting admixtures, impurities and a higher degree of oolitization all promote penetration due to chemical reaction.
  - Add greater quantities of new good silica sand.
- **Defect remedied**
- **Gather and interpret data**

- Examine lustrous carbon production
  - Lustrous carbon separates the melt from the moulding sand. Increase quantity of lustrous carbon producer.
  - Use lustrous carbon producer with greater coke formation.
- **Defect remedied**
- **Gather and interpret data**

- Contact IKO

---

**A Clay-bonded sand**
B  Moulding plant

Examine compaction

- Measure mould hardness. Improve sand distribution before compacting. Increase compacting pressure if necessary. Examine pattern design.

- yes: Defect remedied
  - no: Contact IKO

C  Resin-bonded sand

Examine cores

- Improve compaction of cores. Use finer core sand if necessary.

- yes: Defect remedied
  - no: Coat cores

  - Coat cores at critical points (overheated sections and under-compacted areas).

  - yes: Defect remedied
  - no: Contact IKO

D  Gating and pouring practice

Check pouring temperature

- Reduce pouring temperature if necessary

- yes: Defect remedied
  - no: Gather and interpret data

  - Examine gating system

  - Improve distribution of inflowing quantities of metal. Avoid overheated areas. Avoid excessive metallostatic pressure.

  - yes: Defect remedied
  - no: Contact IKO

  - Gather and interpret data
A. Clay-bonded sand

- Investigate gas formation
  - yes
    - Defect remedied
    - no
      - Gather and interpret data

- Examine gas permeability
  - yes
    - Defect remedied
    - no
      - Gather and interpret data

- Use coarser sand. Reduce fines, particularly inert fines.

- Explore patterns
  - yes
    - Defect remedied
    - no
      - Gather and interpret data

- Contact IKO

B. Moulding plant

- Examine patterns
  - yes
    - Defect remedied
    - no
      - Gather and interpret data

- Increase radii on edges of patterns.

- Contact IKO

C. Resin-bonded sand

- Examine core sand
  - yes
    - Defect remedied
    - no
      - Gather and interpret data

- Use coarser core sand and increase gas permeability.

- Examine core binder
  - yes
    - Defect remedied
    - no
      - Gather and interpret data

- Reduce quantity of binder. Use binders which release gas more slowly.

- Check pouring temperature
  - yes
    - Defect remedied
    - no
      - Gather and interpret data

- Reduce pouring temperature if necessary.

- Examine gating system
  - yes
    - Defect remedied
    - no
      - Gather and interpret data

- Improve secondary feeding of critical points.

- Contact IKO

D. Gating and pouring practice

- Investigate gas formation
  - yes
    - Defect remedied
    - no
      - Gather and interpret data

- Use coarser sand.

- Reduce moisture. Reduce quantity of bentonite if necessary. Examine lustrous carbon carrier, reduce quantity if necessary. Use more active materials.

- Gather and interpret data

- Improve secondary feeding of critical points.

- Contact IKO