SHELL PROCESS PROPER DEGREE OF CURE



TROUBLESHOOTING THE SHELL PROCESS

Casting Related Issues

METAL PENETRATION

- Low core density Increase blow pressure
- Surface of core or mold too brittle Decrease cure cycle or reduce mold or pattern temperature to prevent overcuring
- Sand too coarse Switch to a finer base sand; use refractory coating; add fines – iron oxide, clay

CASTING POROSITY

- Undercured mold or core surface Lengthen cure time
- Excessive gas generated at metal/sand interface Decrease resin and/or hexa level
- Permeability of base sand is too low –
 Use a coarser base sand
- Inadequate venting of cores or molds Add vents where needed
- Need for a gas scavenger Add iron oxide to the mix

VEINING & THERMAL SHOCK

- Pouring temperatures too high Monitor temperatures
- Stress areas in cores or molds Check ejection system; check uniformity of cooling
- Cores or molds are overcured –
 Shorten cure cycle
- Cores or molds are excessively brittle Use a plasticized resin; reduce hexa content
- Cores too strong Reduce resin content
- Base sand does not allow for enough expansion – Try alternate base sand
- Uneven mold bonding Check to see if locators are lining up properly
- Cores or molds are too cold Review storage conditions
- Core or mold weights are too low Increase weights by lengthening invest cycle; possibly sand is cold
- Cores or molds have thin walled spots –
 Check for peel back or lamination; maintain an even depth of cure

Core Making Related Issues

PEEL BACK

- Hot or cold spots in core box or on pattern – Hot spots–rearrange heaters; Cold spots–add beryllium copper inserts
- Entire core box is too hot or cold Adjust temperature
- Low melt point sand Contact HAI
- Core air pressure too high or low –
 Adjust air pressure settings; use pulsating blow; change blow angle
- Moisture in sand –
- Adjust blower air line moisture traps
- **Cold sand** Do not store in extremely
- cold area
 Dirty patterns or core boxes –
- Clean to improve heat transfer
- **Improper core density** Maintain full head of sand in magazine or dump box

WEAK CORES OR MOLDS

- Low resin content Check resin content and LOI of sand; increase resin level of sand
- Low hexa content Check hexa content, increase hexa level
- Cores or mold over or under cured –
 Check cure cycle and pattern temperatures

STICKING

- Core or mold is over cured Decrease cure cycle, decrease temperature
- Release build-up in the core box or on the pattern – Clean the core box or pattern; spray release less often
- Scored core box or pattern Repair damaged boxes or patterns; minimize damage
- Insufficient release agent in sand Add more release
- Dusty resin coated sand Monitor sand handling practices, minimize sand abrasion potential

POOR FLOWABILITY OR BLOWABILITY UNEVEN BUILD-UP

- Plugged vents Check vents regularly; change type of vents
- Not enough vents Change type or number of vents
- Pattern or core box too hot Lower temperature
- Low coated sand melt point Contact HAI
- Moisture in air line Check moisture traps on a periodic basis
- Insufficient amount of release agent in sand – Add more release
- Sand magazine partially filled Maintain a full magazine or dump box

EXCESSIVE BUILD-UP

- Too hot a pattern or core box Lower temperature
- Melt point of sand is too low Contact HAI
- Cores not draining properly Vibrate during drain
- Too long an invest cycle Decrease invest cycle



BILITY UNEVEN BUILD-UP Iv: • Poor heat distribution – Check

- arrangement of heaters
- Cores drain poorly Vibrate during drain
- Dirty patterns or core boxes Clean patterns and boxes regularly
- **Poor blow pattern** Check location of vents and blow inlets
- **Plugged vents** Check boxes periodically; try other types of vents

LACK OF BUILD-UP

- **Cool box or pattern** Raise box or pattern temperature
- Melt point of sand is too high Contact HAI
- **Cold sand** Increase invest cycle and review sand storage conditions
- **Too short an invest cycle** Increase invest cycle

ODOR

- Lack of deodorizer in the coated sand Use deodorized sand
- Eliminate vinsol Use non-vinsol plasticized sand if required

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