Troubleshooting for Lost Foam Casting

ZHEJIANG CASTCHEM NEW MATERIAL CO.,LTD.

Excessive moisture content in mold pattern

1. Defective sintering of foam-molding beads	It' s better to adjust the steam heating pressure and molding temperature.	It is important to preheat the mold (to or above 70°C) before filling the material.
2. Excessively high pressure of cooling water or too much time for cooling	Adjust cooling water pressure and cooling time.	There should be no pressure generated in cooling water during cooling (cooling at normal pressure).
3. Longer heating time for molding leads to rupture or fusion of cells.	Reduce the heating time for molding.	The heating time for each molding stage is generally controlled at 6 to 12 seconds.
4. Excessive low density of pre-foamed beads	Improve the density of pre-foamed beads.	It is to properly control pre-foaming density, which shall not be lower than 18g/L, according to different bead sizes.

Regular appearance of mold pattern with defective internal sintering

1. Short heating period for molding or low steam pressure, low molding temperature	Increase steam heating pressure and molding temperature, as well as foam molding time.	1. Molding pressure setup: 0.06-0.14MPa 2. Reference molding temp: 105-115°C 3. Loose internal sintering, more penetrating time required
2. Dry pre-foamed beads, high curing temperature or excessive time, insufficient content of foaming agent	Control drying of beads, curing temperature and time; adjust and control content of foaming agent.	1. Recommended bead curing time: STMMA≥24h EPS beads 4-48h 2. Percentage of bead foaming agent before molding: STMMA≥7%; EPS≥4.5%

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Mold pattern size increases and deforms due to expansion.

- Mold is not completely cooled down; early de-molding time
  - 1. Completely cool down the mold to temperature below 50°C → Reduce mold cooling speed and increase cooling time.
  - 2. Adjust de-molding time → Allow complete molding before de-molding.

Loose internal sintering with defective sintering in most parts

- 1. Nonuniform filling of beads → Improve filling method and condition
  - 1. Use pressurized filling instead of filling via suction.
  - 2. Select filling by lifting the mold when bead density is less than 18g/L.
- 2. Low temperature and short time for molding → Increase steam heating pressure and heating time → Loose internal sintering; longer steam penetration time required
- 3. Low bead density or low percentage of foaming agent → Control bead pre-foaming density and percentage of foaming agent
  - 1. Control pre-foaming density at 18-26g/L as required
  - 2. Control the percentage of bead foaming agent before molding: STMMA≥7%; EPS≥4.5%

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Local shrinkage in mold pattern	1. Nonuniform filling	Ensure uniform filling	Note: Mobility of beads during filling (whether the beads tend to cake or produce static electricity)
	2. Nonuniform heating or cooling	Adjust heating and cooling conditions to ensure uniform heating and cooling	1. Prevent steam inlet from directly bursting upon air plug of mold.
			2. Spray cooling method should be used for larger steam chamber or complicated mold structure.
	3. Improper mold structure, local air plug (vent) arrangement, quantity or bore	Improve mold structure; adjust air plug (vent) position, quantity and bore	Contact mold manufacturer for adjustment and modification.
	4. The mold is improperly placed in steam cylinder or box and it faces directly steam inlet in molding of steam cylinder or box.	Adjust the position of mold in steam cylinder or box; improve the position of steam inlet pipe of steam cylinder or the method of steam communication.	When steam penetrates, allow steam to disperse in steam cylinder or box instead of focusing on a fixed direction.
Mold pattern is damaged or deformed when removed from mold	1. Pattern sticks to the mold.	Regularly lubricate mold working surfaces	Heat the mold and apply release agent to mold cavity.
	2. Improper mold structure with rough inner wall surface of mold cavity	Modify mold structure, improve surface smoothness and increase mold release inclination.	Contact mold manufacturer; readjust and modify as required.

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Rough surface of mold pattern with dent at bead interface

1. Low bead density or incompletely cured beads	Increase bead pre-foaming density and select properly cured beads.	1. Control the pre-foaming density of beads at 18-26g/L according to molding requirement for subsequent patterns. 2. Curing of beads depends on environment. Make sure to provide ideal environment for bead curing.
2. Insufficient foam molding time	Increase molding time	Loose surface sintering, holding time to be increased (8-15s)
3. Low percentage of bead foaming agent	Increase percentage of bead foaming agent	Make sure to control the percentage of original bead foaming agent: STMMA≥9%; EPS≥6%
4. Larger bead size	Select suitable bead size	Relation of minimum mold wall thickness with bead diameter: 1/9

Rough surface of mold pattern with bulge at bead interface

1. Excessive molding time	Reduce molding time	Use low pressure and multiple pressure discharge when molding
2. Mold pattern cooled in a short period; not enough cooling time	Reduce mold cooling speed and increase molding cooling time to allow complete molding	Appropriately adjust cooling of mold pattern according to different season and water temperatures.

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Normal mold pattern after de-molding deforms later.	1.Low bead pre-foaming density	Reduce pre-foaming time and increase pre-foaming density	Control mold pattern density at 18-26g/L according molding requirement.
	2. Insufficient curing time for pre-foamed beads	Accordingly increase the curing time of pre-foamed beads.	Incompletely cured beads contain more moisture and feature with poor re-expansion ability in mold.
Pattern melted (over-sintered)	1. Excessively high steam pressure	Reduce steam heating pressure for molding	Molding pressure setup: 0.06-.014MPa
	2. Extra long period for foam molding	Reduce heating time for molding	Heating time controlled at: 6-12s
	3. Excessive mold air plugs (vents) or larger bores	Adjust the quantity and bore of air plugs (vents)	Heating time controlled at: 6-12s Select plum blossom shaped air plugs, bar shaped air plugs or needle bore shaped air plugs according to different mold structures.

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Shrinkage of pattern in large area	1. Molding time too much or temperature too high	Reduce the molding time or temperature.	1. Primary heating time controlled at (6-12s); holding time controlled at 8-15s
			2. Reference molding temperature: 105-115°
	2. Cooling speed too fast (low cooling temperature), extra cooling time, or low de-molding temperature	Readjust cooling speed and time	Appropriately control cooling speed and time (longer in summer and shorter in winter) according to seasonal changes and different cooling temperatures.
Incomplete mold pattern and obscure profile	1. Mold cavity is not completely filled with beads	Improve the filling method and adjust the pressure of compressed air.	1. Use pressurized filling instead of filling via suction; select filling by lifting the mold when bead density is less than 18g/L.
			2. Increase and control feed pot pressure at 0.14-0.2MPa.
	2.Mold air plug (vent) located in feed port position, improper mold structure	Improve mold structure; adjust the positions and quantity of air plugs (vents) as well as the feed port position.	1. Contact mold manufacturer and modify as required
			2. Use testing mold for trial production before determining the process and finalize the solution.
	3. Inappropriate bead size	Select smaller bead size for patterns with thin wall thickness	Relation of minimum mold wall thickness with bead diameter: 1/9