

Troubleshooting for Lost Foam Casting

Large fluctuation of bead pre-foaming density

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| 1. Amount of pre-foamed charge is different each time. | Suitable amount of pre-foamed charge is required each time. | Eg. A model 450 pre-foaming machine: 1000ml (0.5-0.6kg) for each charge |
| 2. Pre-foaming machine is incompletely preheated (temperature of upper cylinder is different from its lower part) | Preheat the cylinder completely in order to have uniform temperature across the cylinder body. | It is to be preheated in two steps: 1. Preheating by supplying steam; 2. Preheating by cycling steam. |
| 3. Unstable steam pressure | Stabilize steam pressure | <ol style="list-style-type: none"> 1. Use an additional pressure stabilizer 2. Use separate steam line (pipeline) 3. Improve pipeline design (with pressure reduction and regulation, stable pressure is achieved finally) |
| 4. Excessively high pre-foaming pressure and shorter time | <ol style="list-style-type: none"> 1. Reduce pre-foaming steam pressure 2. Extend pre-foaming time accordingly | <p>Reference steam pressure in pre-foaming cylinder: STMMA 0.03-0.06MP; EPS without pressure</p> <p>Reference pre-foaming time: STMMA 35-60s; EPS 12-30s</p> |
| 5. Temperature is unstable at different pre-foaming stages | Observe temperature changes at different pre-foaming stages | Properly adjust the pre-foaming parameters according to temperature changes (especially temperature changes at the beginning, in the middle and at the end of a pre-foaming stage) |
| 6. Foaming agent content varies in different batches of beads | Contact bead manufacturer to make sure the foaming agent content of current batch | Properly adjust pre-foaming parameters according to different foaming agent contents of beads |

Excessive bead coating (powder) during pre-foaming

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| 1. Excessive coating on original beads | Contact bead manufacturer to decide appropriate coating percentage | <ol style="list-style-type: none"> 1. More coating percentage for small-sized beads ($\geq 3\%$) 2. Less coating percentage for large-sized beads ($\leq 3\%$) |
| 2. Beads and coating are not well blended | | <ol style="list-style-type: none"> 1. Contact bead manufacturer about the issue 2. Blend manually until it is readily prepared |
| 3. Material charge sucked by air and powder blown away by air | <ol style="list-style-type: none"> 1. Improve feeding method 2. Install an additional powder filter | <p>Prevent compressed air from blowing away the powder coating</p> <p>Contact equipment manufacturer for installation</p> |

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High moisture content in pre-foamed beads

1. Excessively high moisture content in steam	1. Increase steam pressure in main pipeline	Main pipeline steam pressure $\geq 0.5\text{MPa}$
	2. Install an additional water separator	Steam delivered into the pipeline of pre-foaming machine should be saturated and slightly over-heated.
2. Poor thermal insulation of pre-foaming cylinder	Improve thermal insulation effect	The top and bottom temperatures for pre-foaming cycle is less than 8°C
3. Pre-foaming machine is incompletely preheated (temperature of upper cylinder is different from its lower part)	Preheat the cylinder completely in order to have uniform temperature across the cylinder body.	It is to be preheated in two steps: 1. Preheating by supplying steam; 2. Preheating by cycling steam.
4. lower hot air temperature or shorter drying time for fluidized bed	1. Increase hot air temperature of fluidized bed	Hot air temperature controlled at 30 to 40°C
	2. Extend drying time of fluidized bed	Recommended drying time 5 to 10 minutes
5. Excessively high pressure and temperature lead to damage of bead body	1. Reduce pre-foaming pressure	Reference steam pressure in pre-foaming cylinder: STMMA 0.03-0.06MP; EPS without pressure
	2. Reduce pre-foaming temperature	Reference temperature inside pre-foaming cylinder: STMMA $95-105^{\circ}\text{C}$; EPS $80-95^{\circ}\text{C}$
6. Pre-foamed bead density too low	Reduce pre-foaming time and increase pre-foaming density	1. Reference pre-foaming time: STMMA 35-60s; EPS 12-30s 2. Mold pattern density is to be controlled at 18-26g/L according to molding requirement

Rough surface of pre-foamed beads (damage of bead body)

1. Excessively high pre-foaming pressure and temperature, too much pre-foaming time	1.Reduce pre-foaming pressure	Reference steam pressure in pre-foaming cylinder: STMMA 0.03-0.06MP; EPS without pressure
	2.Reduce pre-foaming temperature	Reference temperature inside pre-foaming cylinder: STMMA $95-105^{\circ}\text{C}$; EPS $80-95^{\circ}\text{C}$
	3.Reduce pre-foaming time	Reference pre-foaming time: STMMA 35-60s; EPS 12-30s
2. Incomplete discharge for each pre-foaming (some beads are pre-foamed many a time)	1. Extend discharge time	It is recommended to discharge by 8 to 12s
	2. Check machine operation and depreciation	Equipment require regular service and repair
3. Low density of pre-foamed beads	Reduce pre-foaming time and increase pre-foaming density	1. Reference foaming time: STMMA 35-60s; EPS 12-30s 2. Control mold pattern density at 18-26g/L according to molding requirement
4. No aging treatment for original beads	Perform aging treatment to original beads	Spread original beads and leave them for 20 to 30 hours under an environment with temperature at $20-35^{\circ}\text{C}$ and moisture less than 30%.

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Foam beads not foamed

1. Low content of foaming agent in original beads	Scrap	Make sure the foaming agent content of original beads: ST MMA $\geq 9\%$; EPS $\geq 6\%$
2. Low steam pressure and high moisture content	1. Increase steam pressure in main pipeline	Main pipeline steam pressure $\geq 0.5\text{MPa}$
	2. Install an additional water separator	Steam delivered into the pipeline of pre-foaming machine should be saturated and slightly over-heated.
3. Pre-foaming machine fails to pressurize and foam	Contact equipment manufacturer to make adjustment	Reference steam pressure in pre-foaming cylinder: ST MMA 0.03-0.06MPa; EPS without pressure
4. Low foaming capacity of beads	Contact bead manufacturer to decide the foaming capacity of current batch of beads.	Make sure the foaming capacity of beads is not less than 40 times.
5. High moisture content in original beads	Contact bead manufacturer for drying treatment	Make sure the moisture content of bead before foaming is less than 1%.

Nonuniform pre-foamed beads

1. Excessive pre-foaming charge each time	Amount of charged pre-foamed material should be appropriate	Eg. A model 450 pre-foaming machine: 1000ml (0.5-0.6kg) for each charge
2. Pre-foaming machine is incompletely preheated (temperature of upper cylinder is different from its lower part)	Preheat the cylinder completely in order to have uniform temperature across the cylinder body.	It is to be preheated in two steps: 1. Preheating by supplying steam; 2. Preheating by cycling steam.
3. Damage of scraper inside pre-foaming cylinder	Replace damaged scraper	Equipment requires regular service and repair
4. Steam pressure unstable	Stabilize steam pressure	1. Use an additional pressure stabilizer
		2. Use separate steam line(pipeline)
		3. Improve pipeline design (with pressure reduction and regulation, stable pressure is achieved finally)
5. Incomplete discharge of each pre-foaming (some beads are pre-foamed many a time)	1. Extend discharge time	It is recommended to discharge by 8 to 12s
	2. Check machine operation and depreciation	Equipment requires regular service and repair
6. Larger range of original bead sizes	Reduce bead size to 0.15mm	1. Contact bead manufacturer for screening treatment
		2. Screen pre-foamed beads

Troubleshooting for Lost Foam Casting

Pre-foamed beads are caked

1. Less lubricating coating on original beads

Contact bead manufacturer to decide appropriate coating percentage

1. More coating percentage for small-sized beads

2. Less coating percentage for large-sized beads

2. Excessively high pre-foaming pressure and temperature, too much pre-foaming time

1.Reduce pre-foaming pressure

Reference steam pressure in pre-foaming cylinder: STMTA 0.03-0.06MP; EPS without pressure

2.Reduce pre-foaming temperature

Reference temperature inside pre-foaming cylinder: STMTA 95-105°C; EPS 80-95°C

3.Reduce pre-foaming time

Reference pre-foaming time: STMTA 35-60s; EPS 12-30s

3. Low density of pre-foamed beads

Reduce pre-foaming time and increase pre-foaming density

1. Reference foaming time: STMTA 35-60s; EPS 12-30s

2. Control mold pattern density at 18-26g/L according to molding requirement

4. High moisture content in steam

1. Increase steam pressure in main pipeline

Main pipeline steam pressure $\geq 0.5\text{MPa}$

2. Install an additional water separator

Steam delivered into the pipeline of pre-foaming machine should be saturated and slightly over-heated.

5. Incomplete discharge for each pre-foaming (some beads are pre-foamed many a time)

1. Extend discharge time

It is recommended to discharge by 8 to 12s

2. Check machine operation and depreciation

Equipment requires regular service and repair

Higher static electricity carried by pre-foamed beads

1. Less antistatic coating on original beads

Contact bead manufacturer to determine suitable coating percentage

Additional antistatic coating is required for original beads

2. Excessive air blowing time for fluidized bed

Reduce drying time for fluidized bed

It is recommended to dry the fluidized bed for 5 to 10 minutes.

3. Excessive foaming time

Reduce foaming time

Reference foaming time: STMTA 35-60s; EPS 12-30s

4. No antistatic device is provided for bead delivery pipeline

1. Install an additional antistatic device

Grounding via static electricity conductor (metal wire or object)

2. Replace foam bead delivery pipe

Replace plastic pipe with metallic pipe (stainless pipe)