



## PROBLEM SOLVING: Shrinkage Porosity

### Causes:

1. The piece has been incorrectly sprued
2. The piece has been sprued flat
3. Inadequate sprueing
4. The flask temperature is too high
5. The castings are too close to the bottom of the cylinder

Shrinkage porosity usually shows itself in the shape of small holes in the surface of the casting. On closer inspection the holes are seen not to be round but angular, generally with a dendritic structure inside. Shrinkage porosity is the most common type of porosity and is generally found on large surface area pieces, parts with shanks that increase in thickness and also in parts with many angles and change of section.



The shrinkage takes place due to non-uniform solidification of the part and the metal actually tries to tear itself to pieces as it solidifies.

### Incorrect Sprueing

**Solution** - Attach the sprue to the heaviest section of the pattern. This area will be the last part of the ring to freeze and therefore there will be plenty of feed material available for the metal as it contracts and solidifies. It is advisable where possible to use a round gate rather than a square or flat one.

### The Piece has been sprued flat

**Solution** - Attach the piece to the centre sprue at a 45 degree angle  
Inadequate Sprueing

**Solution** - Use large or multiple sprues. The sprue is designed to supply the molten metal into the pattern cavity. If this sprue is too small it will solidify before the actual piece being cast, therefore the piece cannot draw any feed metal from the centre sprue and shrinkage porosity will occur as previously described.



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### Flask temperature too high

**Solution** - Use a lower flask temperature. If the flask temperature is too high porosity levels due to shrinkage problems are increased. The flask temperature should be as low as possible as long as a complete fill of the cast part can be achieved. In order to maintain a complete fill it is recommended to keep similar size and weight pieces on the same tree thus avoiding different solidification rates. If it is necessary to put different weight pieces on the same tree the heavier pieces should go near the bottom and the lighter ones at the top. The castings are too close to the bottom of the cylinder

**Solution** - Leave at least 1" between the bottom and the first row of castings. The button itself is obviously open to air and will cool quickly. This cooling effect could be passed along to the gates of the first row of rings if they are nearer the 1" therefore the gates will freeze and shrinkage porosity could occur.

