Venting Rotational Molds

Association of Rotational Molders

Annual Meeting
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Rosemont, IL

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A. Schulman Inc

Venting

All aspect of vents - vent placement, types of vents, length of vents, diameters of vents, number of vents, vent material etc. have to do with one thing –

Controlling Pressure

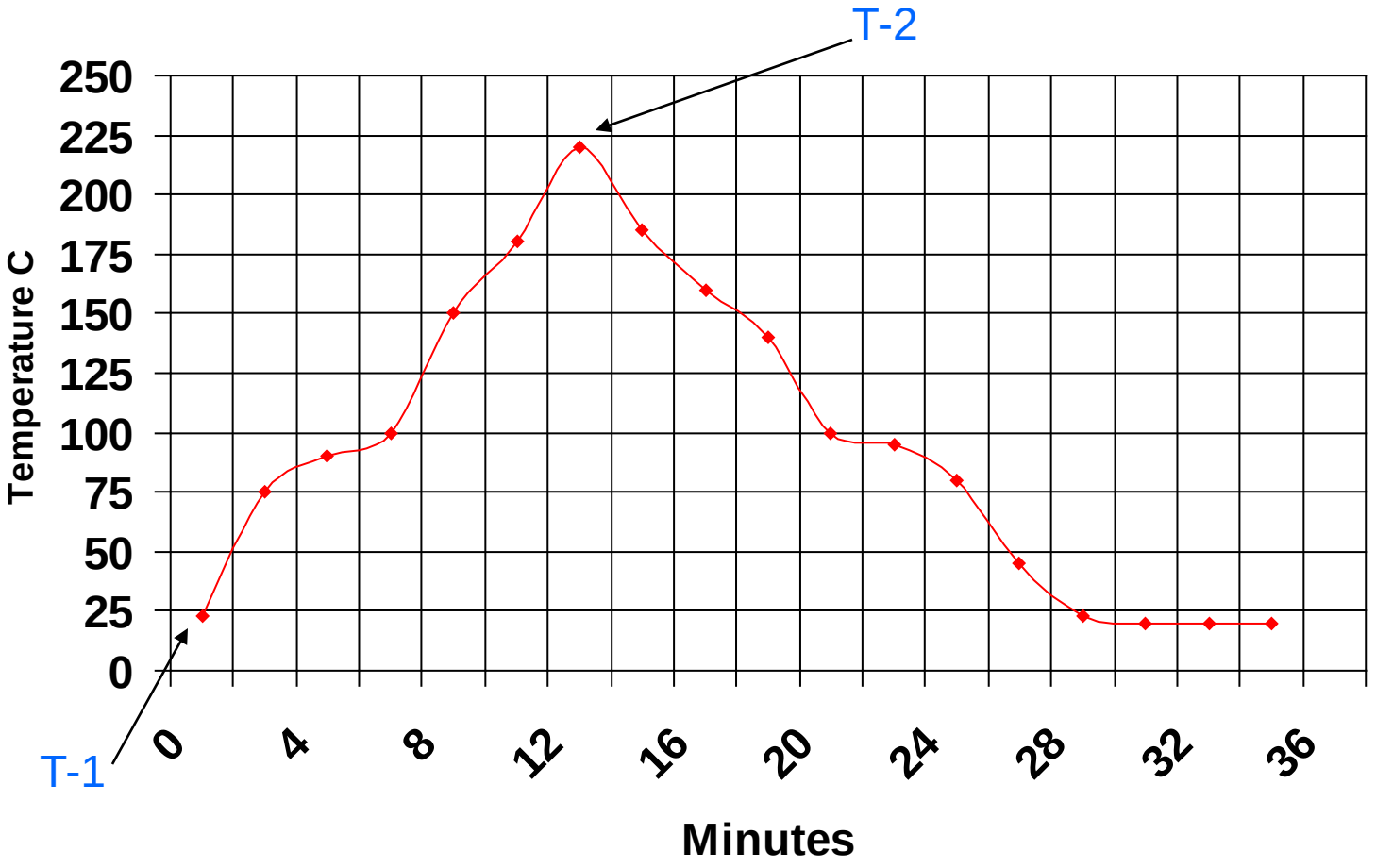
Why We Vent

- Gases expand and contract according to temperature.
- We vent to compensate for the pressure difference between mold cavity and surrounding atmosphere.
- Pressure increases during the heating stage.
- Pressure is reduced during cooling as air flows back into the mold.
- Any part heated and cooled experiences air expansion and contraction.

Please keep in mind this information only relates to those of you heating and cooling molds.

Joseph Louis Gay-Lussac

Typical Internal Air Trace



Gay-Lussac's Law

It states that the pressure exerted on a container's sides by an ideal gas is proportional to the absolute temperature.

$$\frac{P_1}{T_1} = \frac{P_2}{T_2}$$

$$\frac{14.7 \quad \text{psi}}{288.15 \text{ K}} \qquad \frac{X}{488.15\text{K}}$$

$$288.15X = 14.7 \text{ X } 488.15$$

$$288.15 \text{ X} = 7175.805$$

X = 24.9psi

P= pressure

T = Temperature (Kelvin)

$K = ([F^{O}]+459.7) \times 5/9$

Three Very Important Laws in Rotational Molding

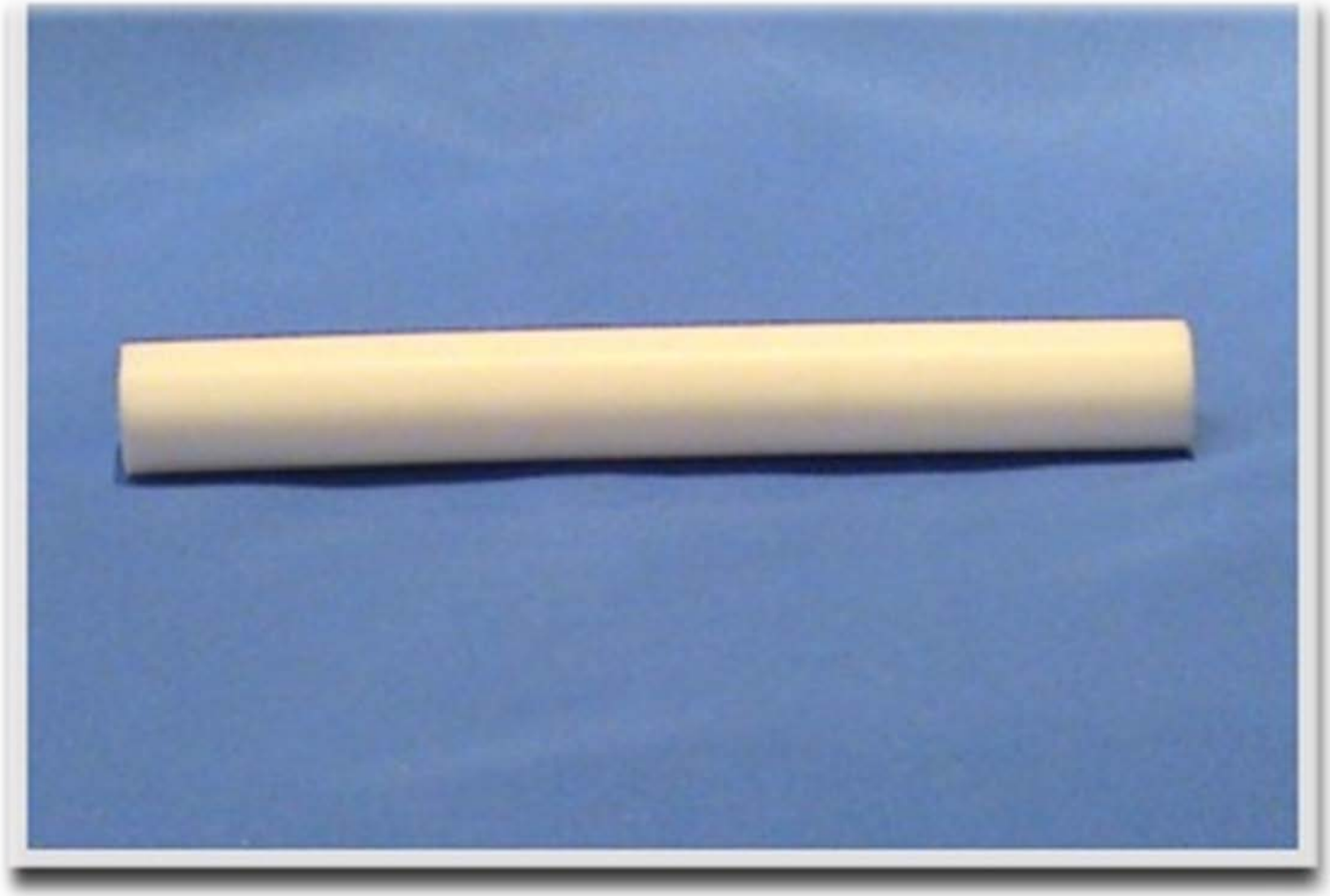
Gay-Lussacs Law

Charles's Law

Dru Laws

How Do We Vent

Vent Tube



Fixed Vent

Vent Packing

CELLOPHANE TAPE

Is that vent able to pass air?

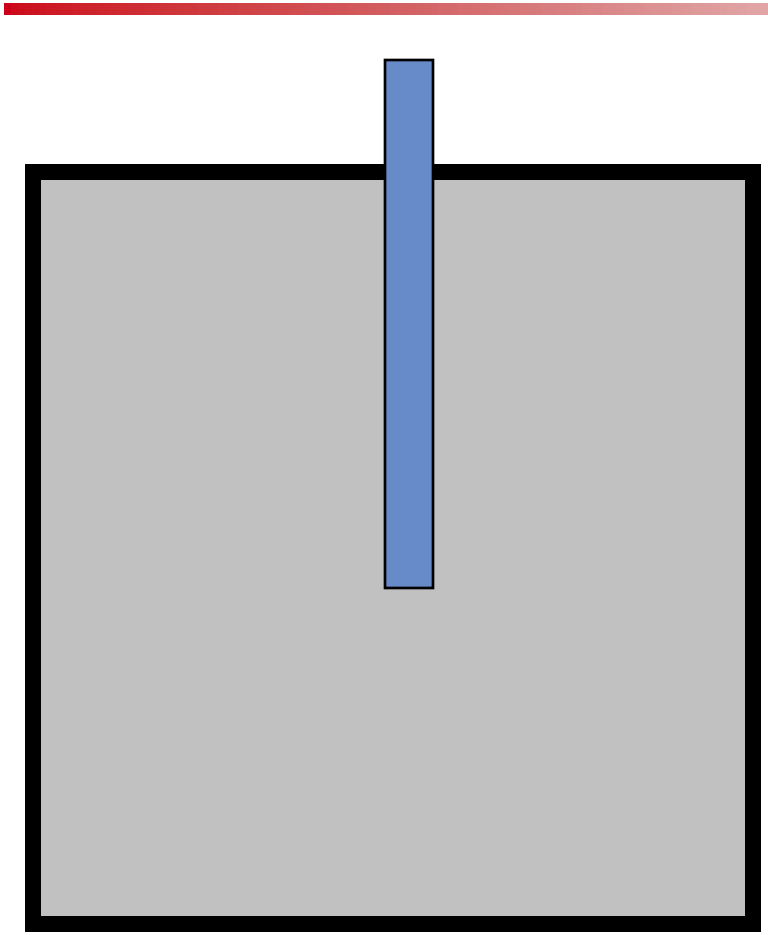
Filter Vents

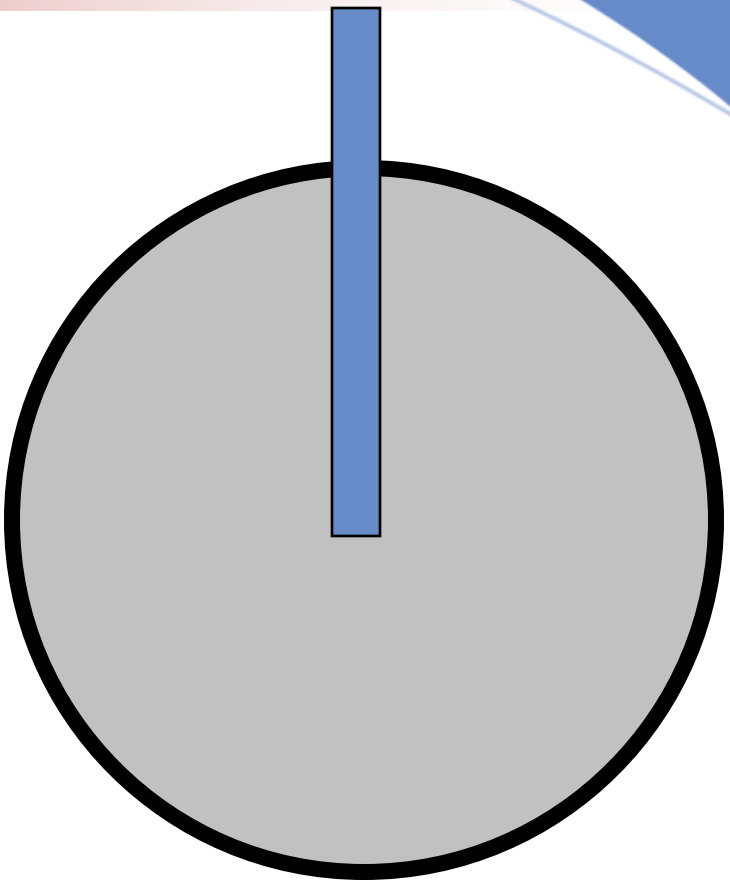
SupaVents & Smart Vents

NORSTAR Molds

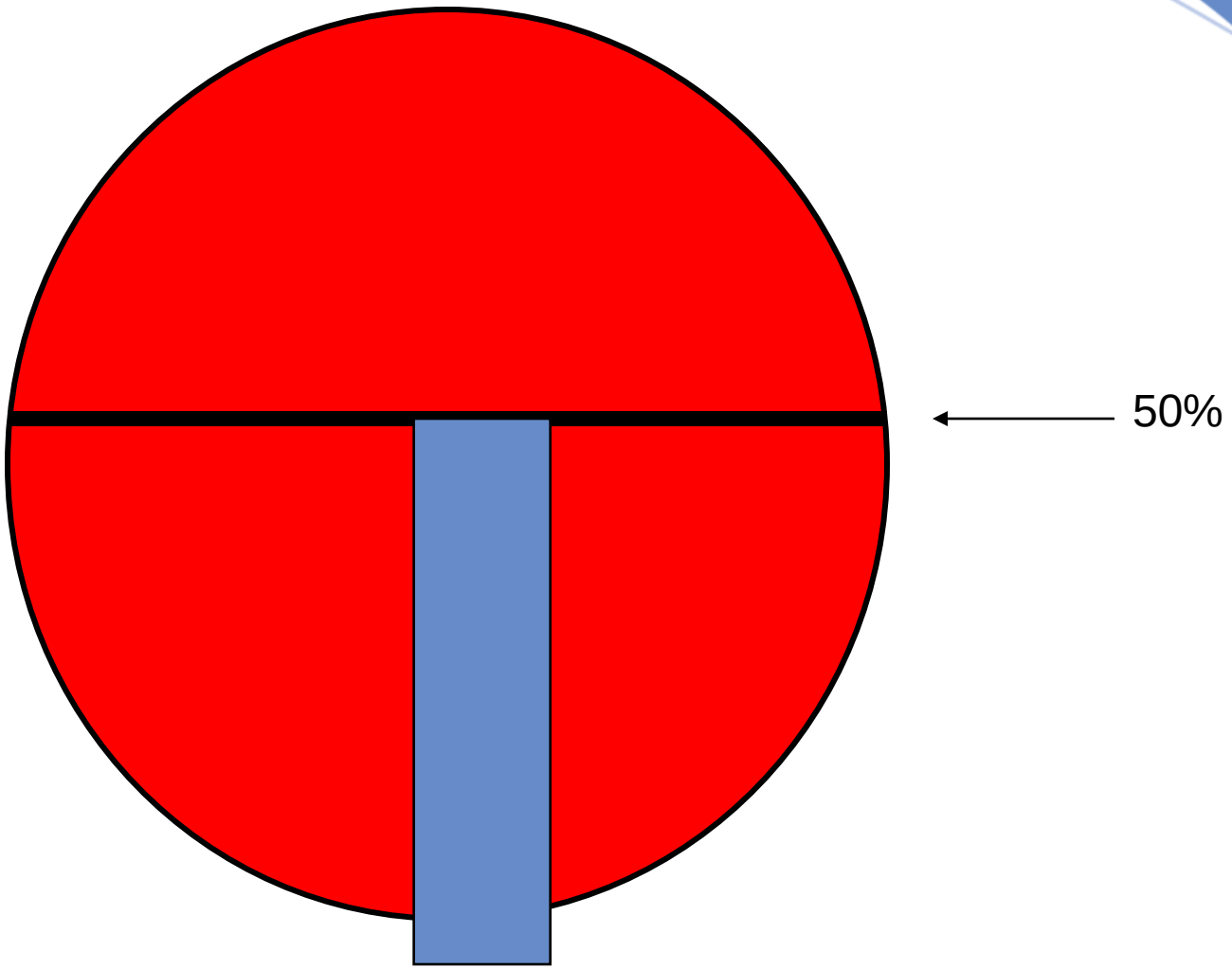
Vent Placement

Vent Placement





Vent Placement



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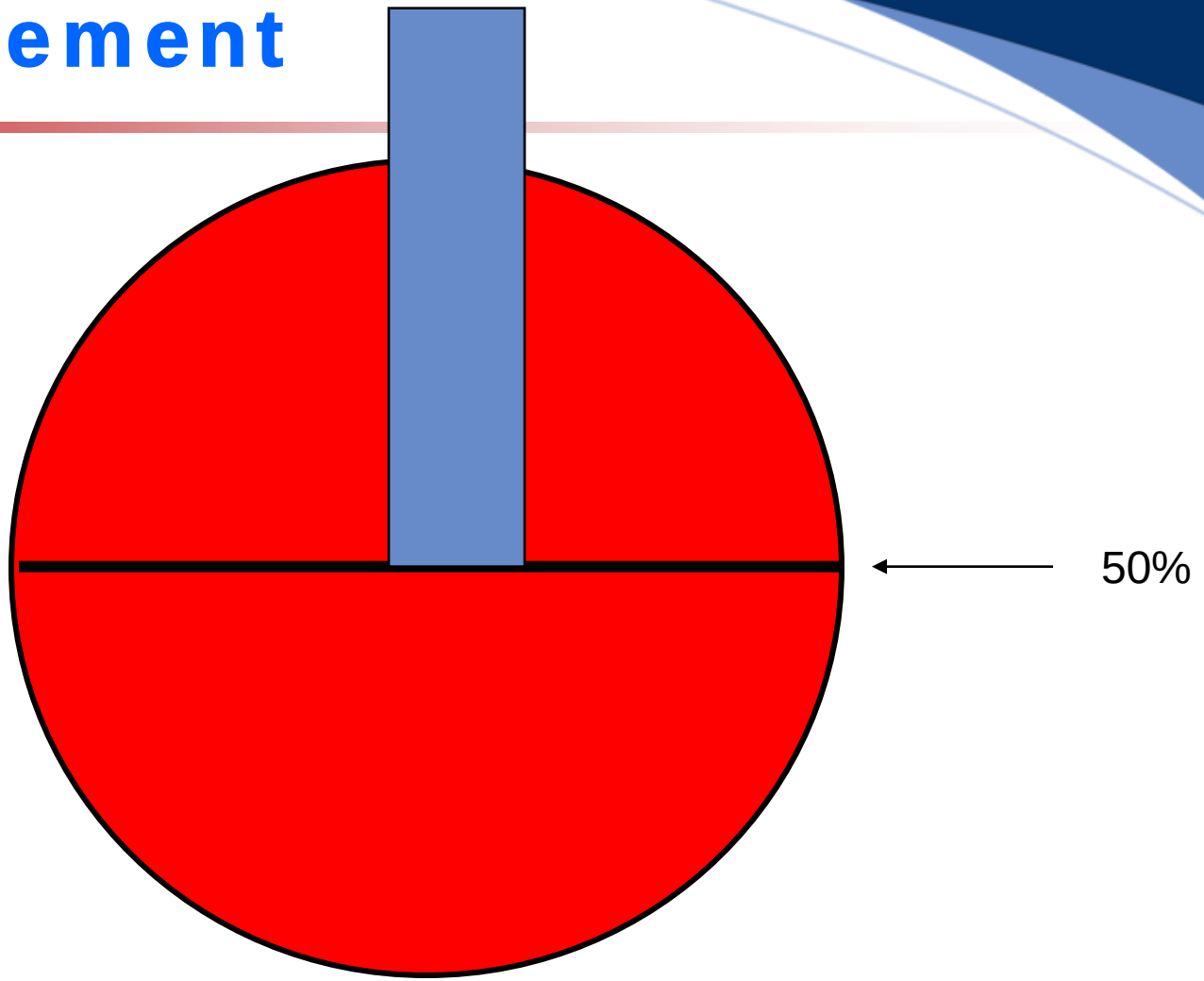
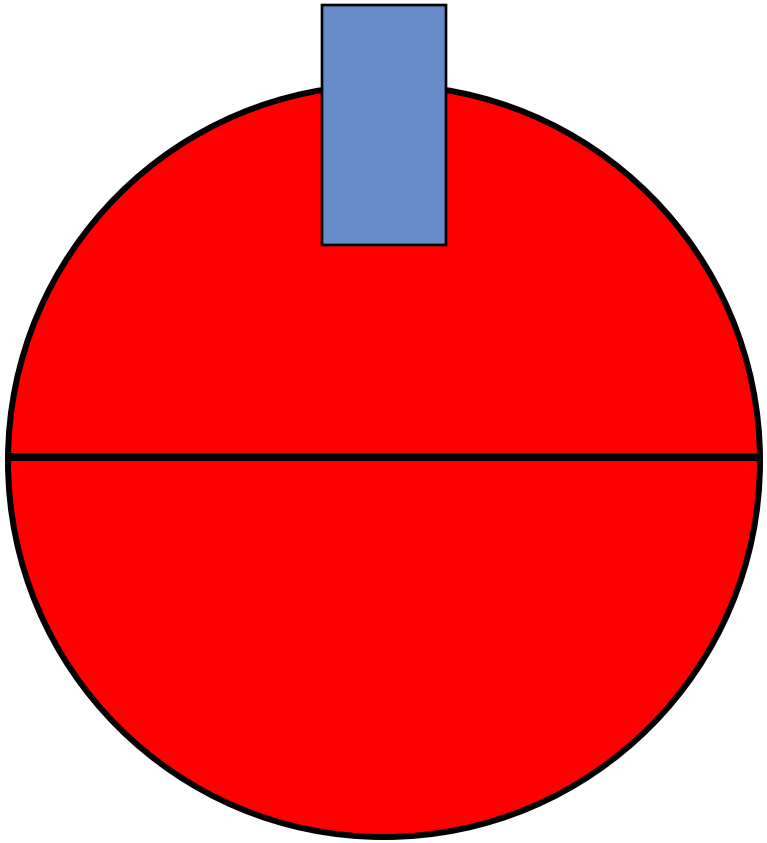
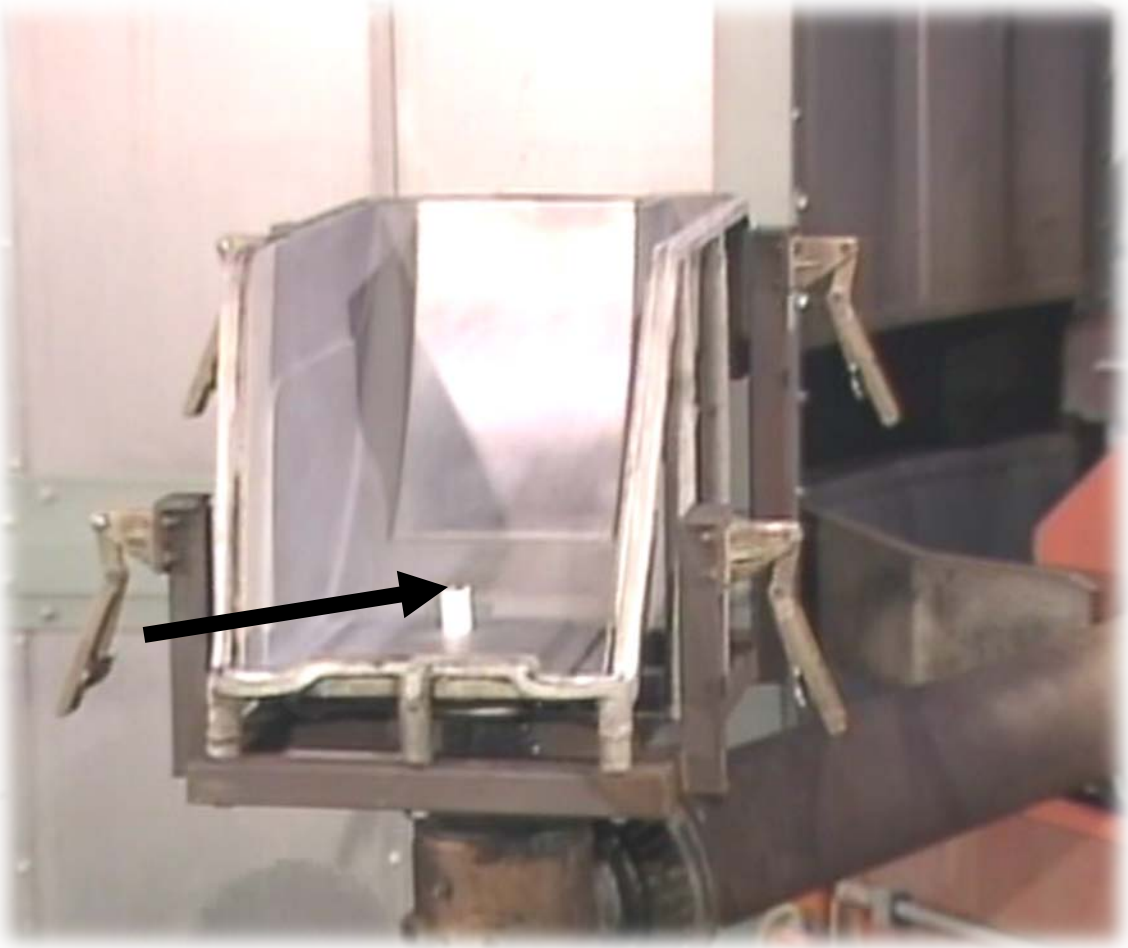


Vent Placement

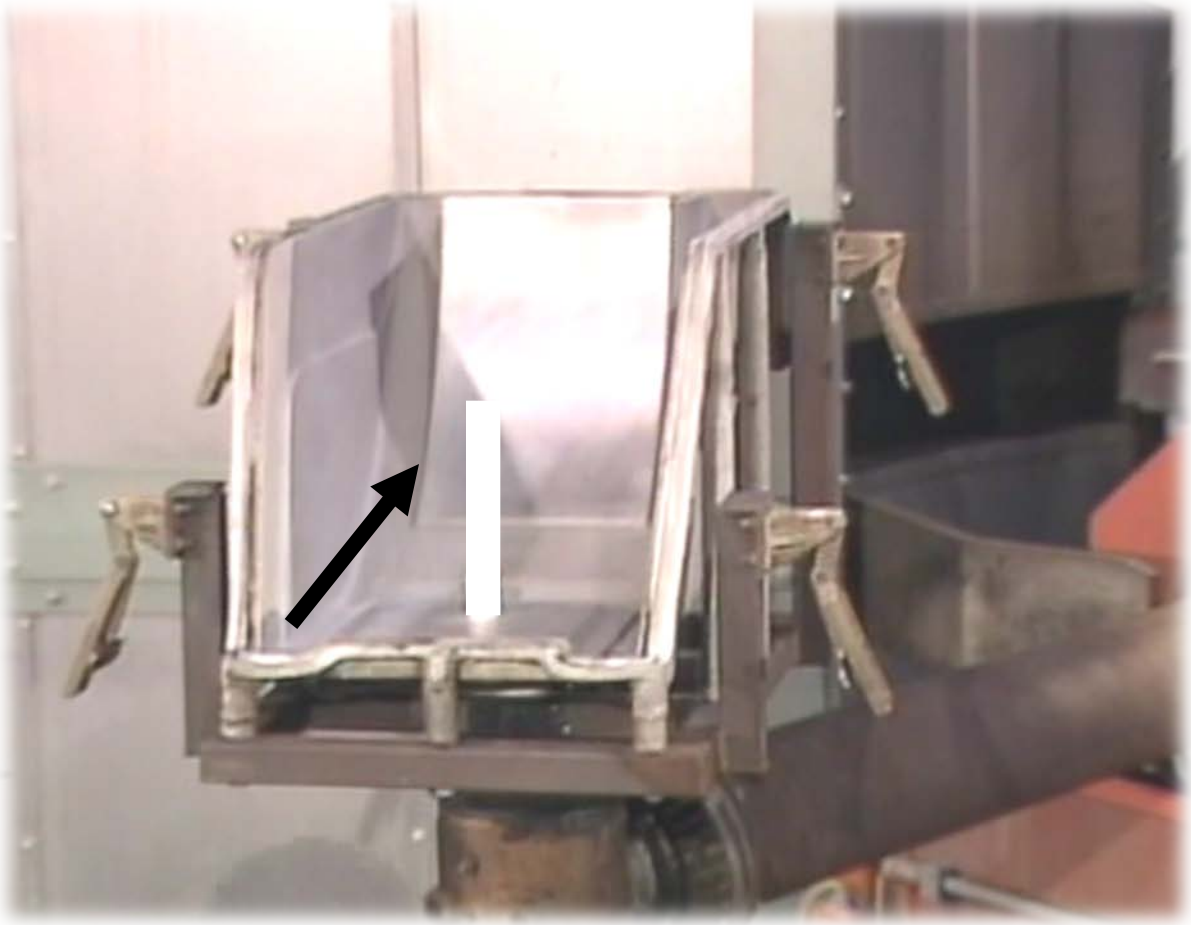


Short Vent



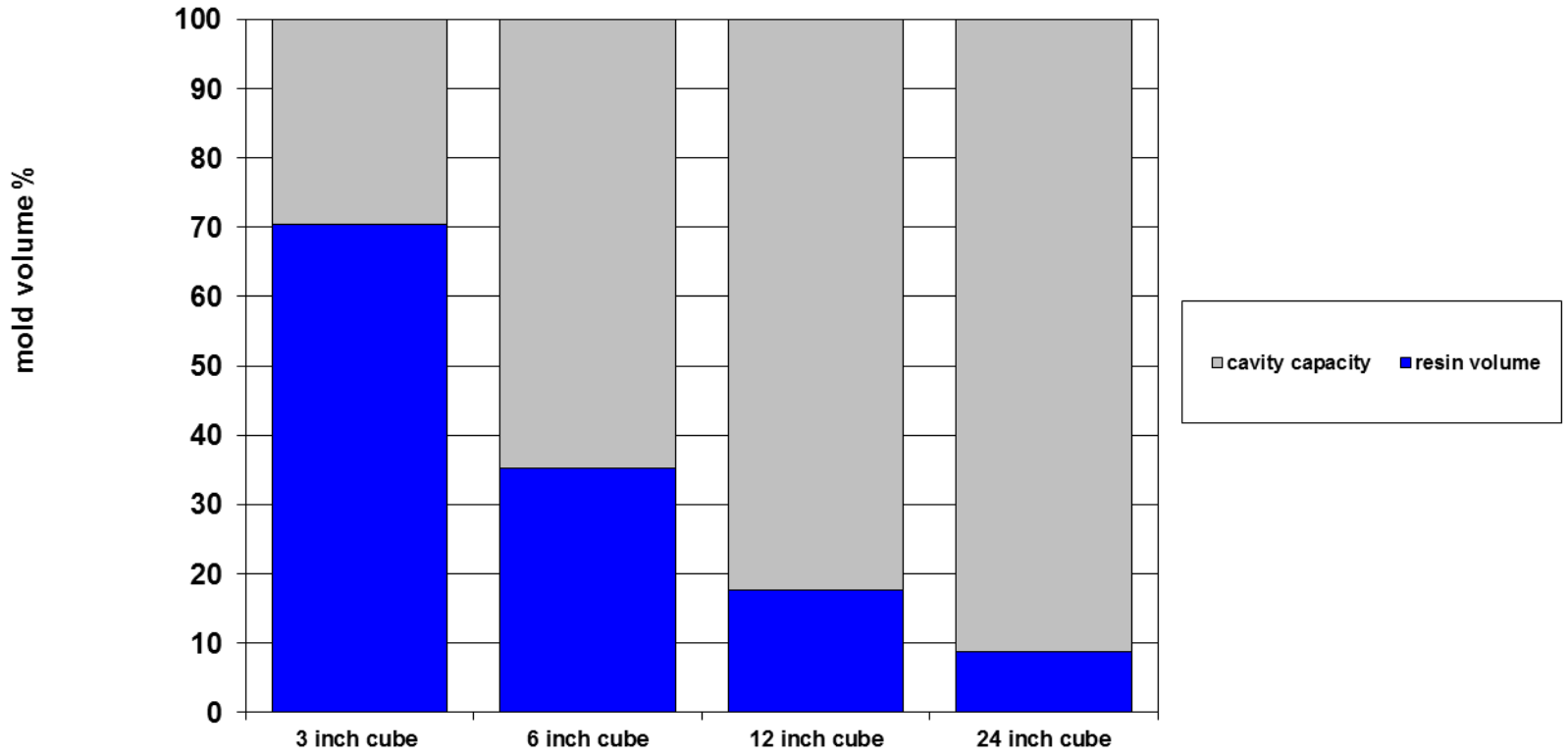
ARM Video

Better Vent



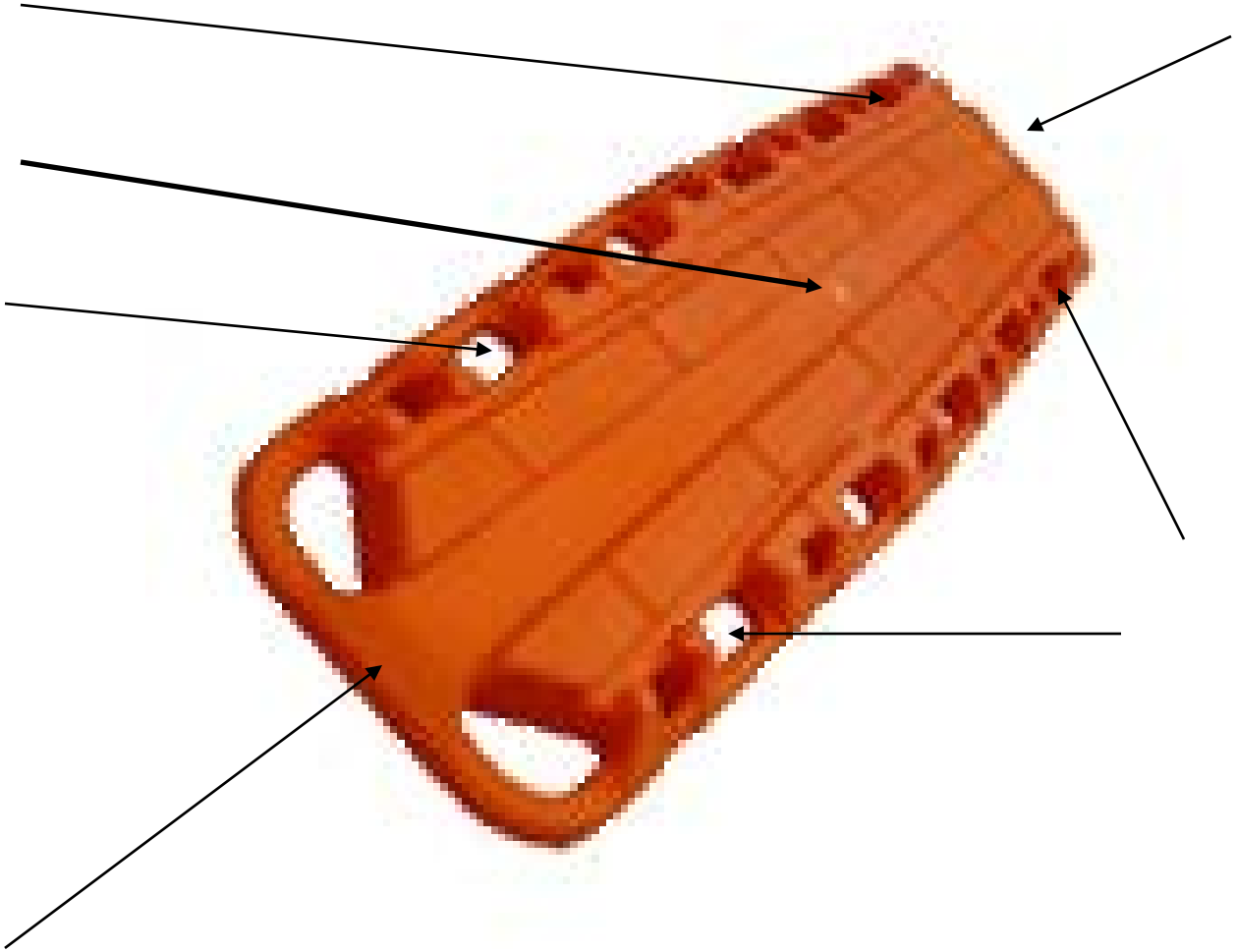
ARM Video

.125 Inch Wall Thickness



Tough to Vent

Tough to Vent



Vent Related Issues

Improper venting can lead to multiple issues. Not only undersized vent or vents that blind off but vents simply packed too tightly will prevent air movement.

Over-packing is most likely a leading cause of venting problems

Suck Holes

ARM Video

Inserts Leaking

Flash

Some materials may tend to or suffer suck holes or PL issues more than others

High Melt Strength

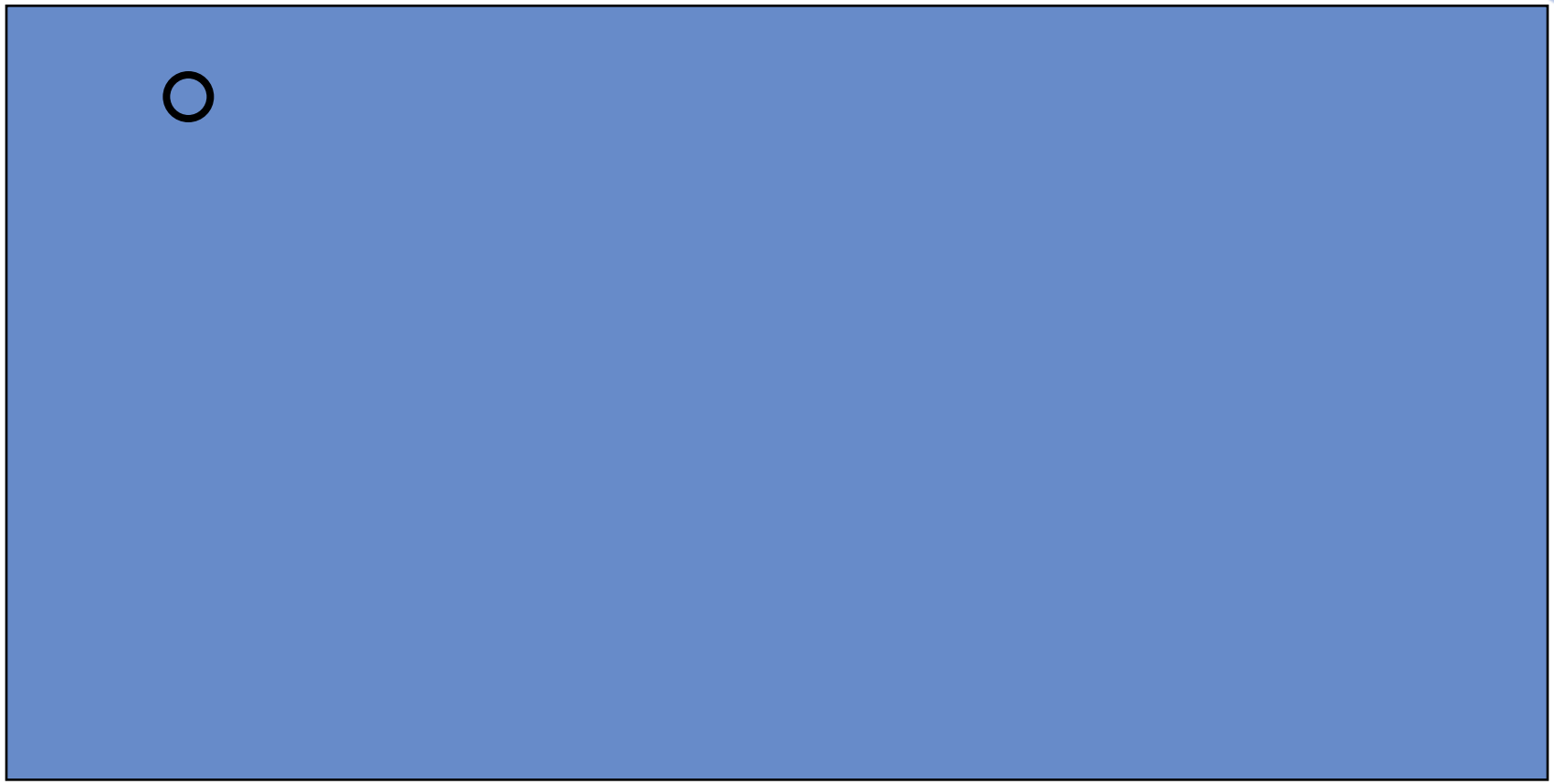
Low Melt Strength

Resin Spills

Mild Part Distortion

Packing in the Part

Distortion / Restricted shrink



In Conclusion……

Vent Size

- A vent must be of adequate size to permit air passage with minimal restriction.
- Vent ID of 0.5 to 0.75 inches ID per cubic yard of mold volume has been a general guideline but there are exceptions. Packing reduces a vents volume.
- Multiple vents can be very useful – use them if possible. There are no formal rules forbidding the use of multiple vents.
- A mold can not be over vented

Vent Packing

- Not all vents need packing!
- No vents need dense compact packing that inhibits air flow.
- Use the correct packing in the appropriate manner – while we are trying to prevent powder spilling out we are also more importantly allowing air movement in and out.
- No need for steel wool even in conventional… PE Dust is combustible.
- Clean vents each cycle

Vent Location

- Place vents in an area that will be concealable in the finished part.
- Take into consideration what area will permit the vent to penetrate closest to the center of the part and minimize or eliminate time under the power pool.
- The vent should be easy for the operators to service.
- Vents should be placed as not to interfere with shrink if possible.

A Good Vent

- Allow pressure to equalize between the mold and atmosphere. This would be done by allowing air volume to freely move in and out of the mold.
- It would also prevent any powder from spilling from the mold.
- This vent would be as inconspicuous as possible - located in an area that is to be trimmed away if possible.
- The vent would need very little attention and may not need to be removed or serviced every cycle.
- The vent would in no way affect the shape (warp) of a part.

Remember

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Thank You