BRANSON Plastics Assembly News

#25
Technical Bulletin

Ultrasonic Welding Troubleshooting Guide

PROBLEMS	PROBABLE CAUSES	SOLUTIONS
Overweld	Too much energy into the part	Reduce pressure, gauge, and/or trigger. Reduce weld time/energy. Change to lower ratio booster to reduce amplitude. Slow down stroke. Use power control (last resort). Change to lower gain horn if lowest booster is already in use.
	Excessive joint size.	Reduce joint area, energy director or shear.
Underweld	Insufficient energy into the part.	Increase pressure, gauge and/or trigger. Increase weld time/energy. Use higher ratio booster to increase amplitude, if horn allows. Change to higher gain horn if highest booster is already in use.
	Energy loss into fixture. (If fixture is urethane.)	Change fixture to rigid material.
	Presence of mold release.	Eliminate use or clean parts after molding.
Non-uniform weld around the joint	Warped part(s).	Check part dimensions. Check molding conditions. Use higher trigger pressure.
	Energy director varies in height.	Redesign energy director to ensure uniform height. Check molding conditions.
	Lack of parallelism between horn, fixture and part.	Shim fixture where necessary. Check part dimensions. Check part fit with horn using carbon paper.
	Wall flexure.	Add internal ribs to part. Modify fixture to prevent outward flexure.
	Knock-out pin location in joint area.	Move knock-out pin location from joint area. Make sure knock-out pin marks are flush with surface.
	Insufficient support in the fixture.	Improve support in critical areas. Change to a rigid fixture. If large sections of urethane are deflecting, add rigid backup or use higher durometer urethane
	Part tolerance.	Tighten part tolerances. Check molding conditions.
	Improper alignment.	Check for part shifting during welding. Check provisions for alignment in mating parts. Check for parallelism of horn, part, and/or fixture.

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PROBLEMS	PROBABLE CAUSES	SOLUTIONS
Non-uniform weld around the joint (continued)	Lack of intimate contact around joint area.	Check part dimensions. Check tolerances. Check for knock-out pin marks in the joint area. Check for misalignment of mating halves. Check for sinks. Check part fit with horn using carbon paper.
	Non-uniform horn contact.	Check fit of part to horn. Check for proper support in fixture.
	Mold release.	Clean mating surfaces. If mold release is required, use a paintable/printable grade.
	Fillers.	Check molding conditions. Reduce the amount of filler.
	Moisture in joint area.	Dry parts as required.
Inconsistent weld results part-to-part	Mold release.	Clean mating surfaces. If mold release is required, use a paintable/printable grade.
	Part tolerances.	Tighten part tolerances. Check part dimensions. Check molding conditions.
	Cavity-to-cavity variations.	Run statistical study to see if a pattern develops with certain cavity combinations. Check part tolerances/dimensions. Check for cavity wear. Check molding conditions. Centralize gate location.
	Regrind/degraded plastic.	Check with molder for percentage of regrind. Check molding conditions. Reduce percentage of regrind. Improve quality of regrind.
	Changes in line voltage.	Use an in-line voltage regulator.
	Drop in air line pressure.	Raise compressor output pressure. Add surge tank with a check valve.
	Filler content too high.	Reduce percentage of filler. Check molding conditions. Change type of filler, i.e., short- to long-glass fibers.
	Non-uniform distribution of filler.	Check molding conditions. Check mold design.
	Wrong joint design.	Redesign joint, check with Branson personnel.
	Degraded material.	Check molding conditions.
	Poor part fit.	Check part dimensions. Check part tolerances. Check molding conditions.
	Incompatible materials or resin grades.	Check Branson Technical Information Sheet PW-1. Check with resin supplier. Check with Branson Applications Lab.
	Moisture in molded part. (Usually nylon parts.)	Receive parts dry-as-molded, bagged and sealed. Dry parts, then weld.

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Marking	Horn heats up.	Check for loose stud. Check for loose tip. Reduce weld time. Cool horn with ambient or refrigerated air. Check coupling between horn and booster. Visually check for cracked horn. If horn is titanium, change to chrome-plated aluminum. If horn is steel, reduce amplitude.
	Localized high spots in part.	Check part dimensions. Check fit of horn to part in fixture. Use polyethylene film between horn and part.
	Raised lettering.	Relieve horn. Use recessed lettering where possible.
	Improper fit of part to fixture.	Check for proper support. Redesign fixture. Check for cavity-to-cavity variations.
	Aluminum oxide (from horn).	Chrome-plate horn and/or fixture. Use polyethylene film between horn and part.
	Horn doesn't fit part correctly.	Check part dimensions. Obtain a new horn. Check for cavity-to-cavity variations.
	Improper horn contour.	Check part size. Check for cavity-to-cavity variations.
	Weld cycle is too long.	Reduce weld time by adjusting amplitude and/or pressure. Adjust dynamic triggering pressure.
	Lack of parallelism.	Check for parallelism between horn, part, and fixture. Check horn/part fit. Check part/fixture fit. Shim fixture where necessary.
Flash (see also non-uniform welding)	Energy director too large.	Reduce size of energy director. Reduce weld time. Reduce pressure. Use textured surface.
	Shear interference too great.	Reduce amount of interference.
	Weld time too long.	Reduce weld time.
	Non-uniform joint dimensions.	Redimension joint. Check molding conditions.
	No joint design (butt surfaces).	Incorporate proper joint design, check with Branson personnel.
Misalignment of welded assembly	Lack of proper alignment feature between mating parts.	Add alignment feature to the mating part halves (i.e., pins and sockets). If possible, design means of alignment into the tooling.
	Improper support in fixture.	Redesign fixture for proper support. Shim fixture where necessary. If large sections of urethane are deflecting, add rigid backup.
	Wall flexure.	Add ribs or gussets to part. If large sections of urethane are deflecting, add rigid backup.
	Joint design improper dimension.	Redimension parts.
	Part tolerance/poor molding.	Tighten part tolerances. Check molding conditions.
	Overwelding.	Reduce weld time/energy/pressure.

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Internal components damaged during welding	Excessive amplitude.	Reduce amplitude by changing to a lower gain booster. Investigate the use of 40 kHz equipment.
	Long weld time.	Reduce weld time by adjusting amplitude and/or pressure. Adjust dynamic triggering pressure.
	Too much energy into the part.	Reduce amplitude. Reduce pressure. Reduce weld time/energy. Use power control. Investigate the use of 40 kHz equipment.
	Components improperly mounted, i.e., mounted too close to joint area, etc.	Make sure internals are properly mounted. Isolate internal components from housing. Move components away from areas of high energy concentration. Use nodally-mounted device to dampen energy locally.
	Location of components.	Components should be in fixture part.
Melting/fracture of part sections outside of joint.	Sharp internal corners.	Radius all sharp corners.
	Excessive amplitude.	Reduce amplitude by changing to a lower gain booster. Reduce horn amplitude if lowest booster is already in use.
	Long weld time.	Reduce weld time. Increase amplitude (if horn/booster restrictions allow). Increase pressure. Adjust dynamic triggering pressure.
	Internal stress.	Check molding conditions. Check part design.
	Knit/flow lines.	Check molding process parameters.
	Improper molding conditions.	Check molding conditions.
	Gate located near joint.	Move gate area away from joint.
Diaphragmming	Excessive amplitude.	Reduce amplitude.
	Long weld time.	Reduce weld time by increasing amplitude and/or pressure.
	Gate location.	Check gate placement. Check molding conditions. Change shape of gate. Add stiffening ribs to the part. Increase thickness of material on the underside of the gate area.
	Horn type and/or placement.	Change horns. Check for horn/part fit. Use a horn with a nodal plunger. Add vent hole in horn.
	Thin wall section.	Increase wall thickness.
Internal parts welding	Internal parts same material as housing.	Change material of internal parts. Lubricate internals.