BRANSON

Ultrasonic Welding Trouble Shooting Guide

PROBLEM	PROBABLE CAUSES	SOLUTIONS
Overweld	Too much energy into the part.	Reduce pressure, trigger force and/or down speed
	Weld time too long.	Reduce weld time/energy/ collapse.
	Too much collapse.	Change to lower ratio booster to reduce amplitude. Digitally reduce the amplitude %. Use Amplitude Profiling. Reduce down speed. Change to lower gain horn if lowest booster is already in use.
	Absolute distance too high.	Recalibrate absolute distance and adjust.
Underweld	Insufficient energy into the part.	Increase pressure, trigger, and/or down speed.
	Insufficient weld time.	Increase weld time/energy/ collapse.
	Insufficient amplitude.	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 such as aluminum, stainless steel. Evaluate part fit in fixture.
	Presence of mold release.	Eliminate use or clean parts after molding.
	Absolute distance too low.	Increase absolute distance.
	Moisture absorption by hygroscopic material.	Dry parts as required.
Non-uniform weld around the joint	Warped part(s).	Check part dimensions and flatness Check molding conditions. Use higher trigger pressure.
	Non-uniform horn face amplitude.	Have horn tested (and modified if needed) to establish uniformity.
	Lack of parallelism between horn, fixture and part. Insufficient support in the fixture.	Shim fixture where necessary, or level adjustable plate. Check part dimensions/flatness. Check part fit with horn using carbon paper. Improve support in critical areas. Change to a rigid fixture. If large sections of urethane are deflecting, add rigid backup

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Non-uniform weld around the joint *(continued)*	Inconsistent energy director height.	Correct mold to ensure uniform energy director height. Check molding conditions.
	Wall flexure.	Add internal ribs to part. Increase wall thickness. 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.
	Improper alignment.	Check for part shifting during welding. Check alignment features in mating parts. Check for parallelism of horn, part, and/or fixture.
	Non-uniform horn contact.	Check fit of part to horn. Check part fit with horn using carbon paper. Check for sinks. Check for proper support in fixture.
	Part tolerance.	Tighten part tolerances. Check molding conditions.
	Mold release.	Clean mating surfaces. If mold release is required, use a paintable/printable grade.
	Accumulation of fillers in one area.	Check molding conditions. Reduce the amount of filler. Use only short fiber fillers
	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 (maintain below 10%). Improve quality of regrind.

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Inconsistent weld results part-to-part *(continued)*	Drop in air line pressure.	Raise compressor output pressure. Add surge tank with a check valve. Check air supply line capacity vs. number of welders supplied.
	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.
	Incorrect joint design.	Redesign joint, check with Branson applications engineering.
	Poor part fit.	Improve part dimensions. Improve part tolerances. Check molding conditions and improve.
	Incompatible materials or resin grades or lots.	Check Branson Technical Information Sheet PW-1. Check with resin supplier specifications. Check with Branson Applications Lab.
	Moisture in molded part. (Usually nylon parts.)	Receive parts dry-as-molded, bagged and sealed. Dry parts, then weld.
Marking	Lack of parallelism.	Readjust for parallelism between horn, part, and fixture. Check horn/part fit. Check part/fixture fit. Level fixture where necessary.
	Shear interference too great.	Reduce interference.
	Energy director too large.	Reduce energy director size.
	No joint design (butt surfaces).	Check for proper support. Redesign fixture. Check for cavity-to-cavity variations.
	Improper fit of part to fixture.	Check part dimensions. Check for cavity-to-cavity variations. Obtain a new horn.
	Weld cycle is too long.	Reduce weld time by adjusting amplitude and/or pressure. Adjust Dynamic Triggering pressure.

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Marking *(continued)*	Horn heats up.	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.
	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.
	Aluminum oxide (from horn).	Chrome-plate or clear anodized horn and/or fixture. Use polyethylene film between horn and part.
	Overwelding: control mode (time, energy, collapse or absolute distance, peak power, force) too high.	Readjust control parameters.
Flash (see also non- uniform welding)	Weld time too long.	Reduce weld time.
	Non-uniform joint dimensions.	Redimension joint. Check molding conditions.
	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.
	No joint design (butt surfaces).	Redesign joint to direct flash as required by application.
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).
	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. Increase wall thickness. If large sections of urethane are deflecting, add rigid backup.

PROBLEM	PROBABLE CAUSES	SOLUTIONS
Misalignment of welded assembly *(continued)*	Joint design improper dimension.	Redimension parts.
	Part tolerance/poor molding.	Tighten part tolerances. Check molding conditions.
	Overwelding.	Reduce weld time/energy/pressure.
Internal components damaged during welding	Too much energy into the part.	Reduce amplitude by changing to a lower gain booster, or utilize Amplitude Profiling. Reduce pressure and/or down speed. Reduce weld time/energy. Adjust Dynamic Trigger pressure. Investigate the use of alternate frequencies.
	Long weld time.	Reduce weld time by adjusting amplitude and/or pressure. Adjust Dynamic Triggering pressure.
	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.	Too much energy into the part.	Reduce weld time. Decrease amplitude. Decrease pressure. Adjust Dynamic Triggering pressure.
	Sharp internal corners.	Radius all sharp corners.
	Excessive amplitude.	Reduce amplitude by changing to a lower gain booster, or step amplitude. Reduce horn amplitude if lowest booster is already in use.
	Internal stress.	Monitor/improve 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.

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Diaphragmming	Excessive amplitude.	Reduce amplitude. Utilize Amplitude Profiling.
	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.	Eliminate horn contact over diaphragm area. Check for horn/part fit. Use a horn with a nodal plunger. Add vent hole in horn.
	Thin wall section.	Increase wall thickness or add ribs.
Internal parts welding	Internal parts same material as housing.	Change material of internal part to incompatible material. Lubricate internals. Reposition internal parts to prevent contact during weld cycle.

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