APPLICATION BENEFITS TO 15 KHZ WELDING

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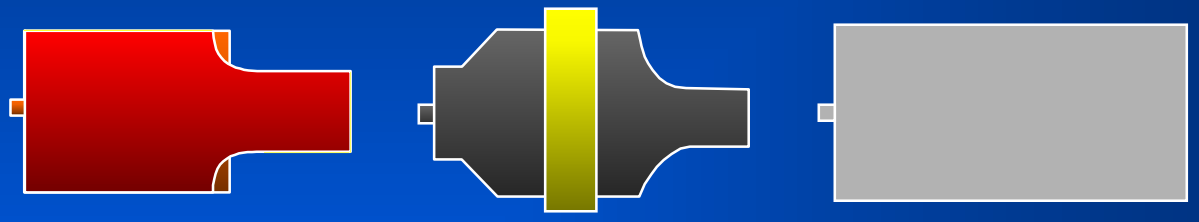
APPLICATION BENEFITS TO 15 KHZ WELDING

- Higher Amplitude
  -30 microns
- Larger Part Sizes
- Deeper Contours
- Quicker Welds
- Less Part Marking
- Easier coupling of horn and part help with far field welds

15 kHz Amplitude Output

Ratio of output amplitude to input amplitude.



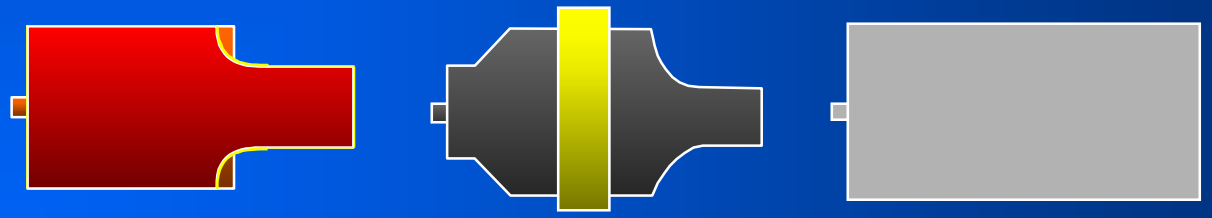
20 kHz Converter
20 Microns

X

Black Booster
1 : 2.5

X

Horn
1 = 50 Microns



15 kHz Converter
30 Microns

X

Black Booster
1 : 2.5

X

Horn
1 = 75 Microns

15 kHz Horn Size

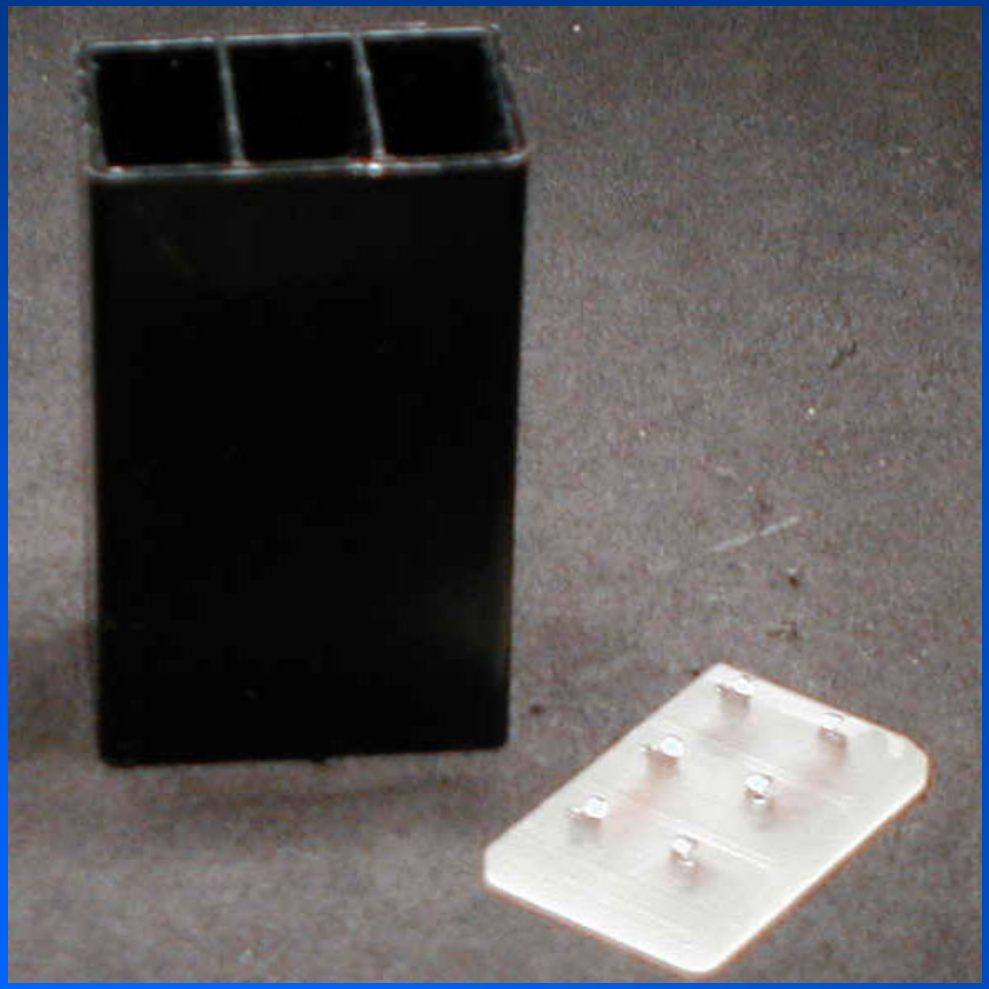
Due to longer wave length of 15 kHz, horns can be designed up to 33% larger than similar horns in 20 kHz

Less Part Marking

- F=ma
- At 20 kHz a=473,700 m/s^{2*}
- At 15 kHz a=266,500 m/s^{2*}
- Thus to make the part couple with the horn, the force (stress) is higher with 20 kHz

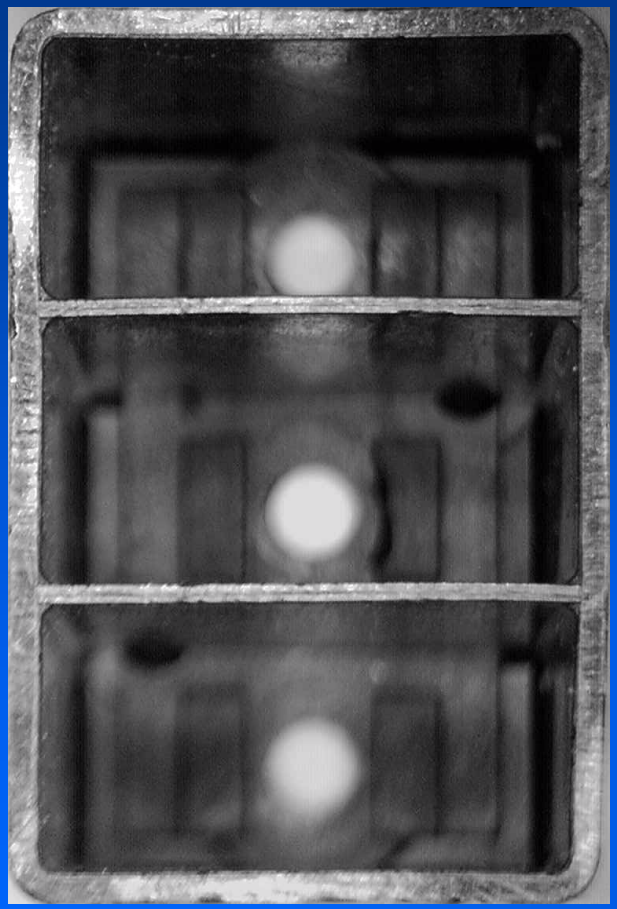
Battery Application

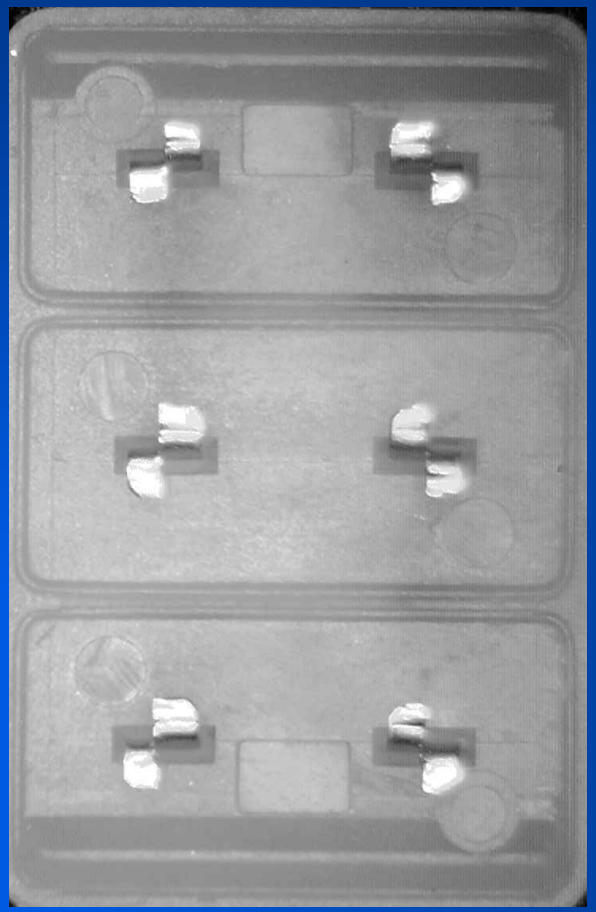
Battery Application



Weld PP cover with over-molded metal contacts to 30% glass filled Battery Housing to achieve a hermetic seal.

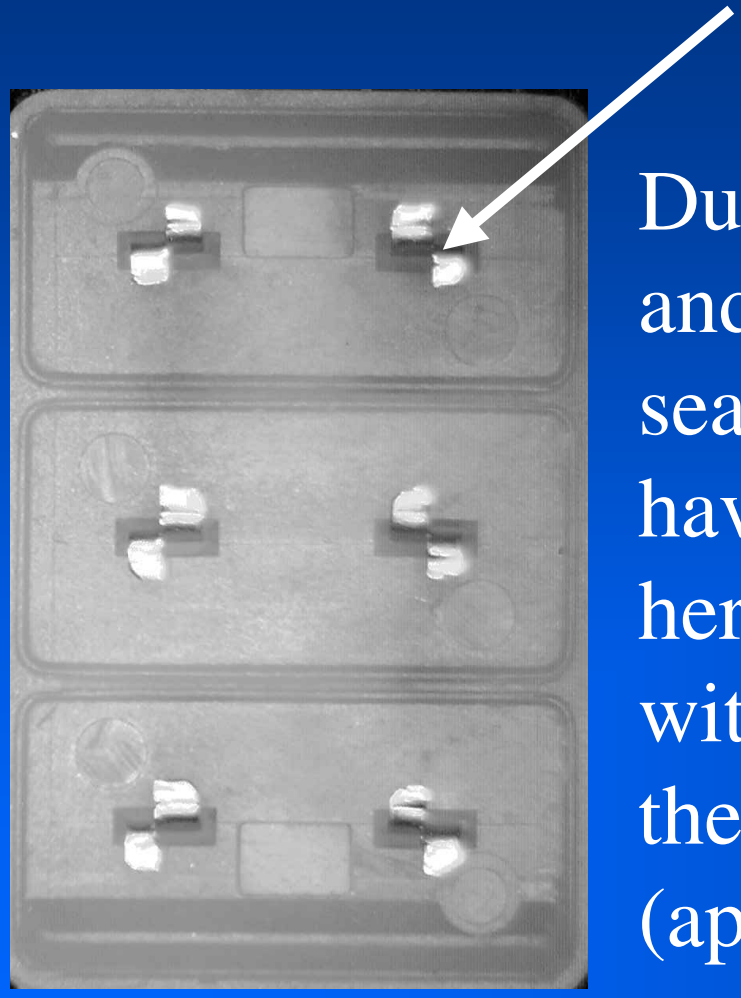
Battery Application





0.015” H x 90° energy director on Cover to flat surface on Battery Housing

Battery Application



Due to a 15 lb preload on contacts and high energy levels required to seal chambers, the customer was having difficulties achieving a hermetic seal around the perimeter without disturbing the seal around the contacts using 20 kHz tooling. (approximately 35% rejects)

Battery Application

- Higher energy levels associated with 15 kHz allowed us to get PP material to it's melt temperature quicker than 20 kHz. This reduced the energy being absorbed into the contacts causing them to heat up and break the seal.
- Longer wave length of lower frequency allows energy to penetrate through part with less loses to concentrate energy at weld joint.

Packaging Application

Packaging Application

Weld three sides of PVC blister pack together in one hit to achieve a strong tamper evident seal.

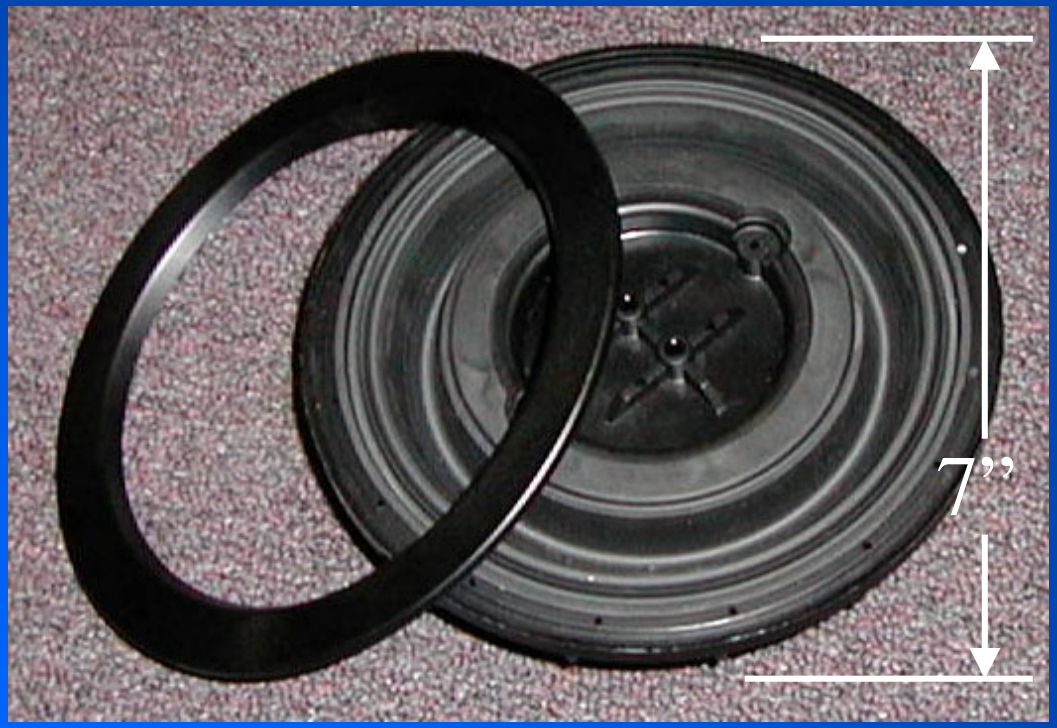
Packaging Application

- Application was run on 13.5” x 8.5” titanium block horn with anvil having interrupted stitch pattern
- Larger horn size capability enabled application to weld with one hit

Road Reflector Application

Road Reflector Application

•Weld ring to reflector housing to achieve a strong, hermetic seal capable of withstanding extreme temperature changes and severe road conditions.



•Nylon 6/6 w/30% glass

•7” dia, shear joint was used to achieve max strength

Road Reflector Application

- Due to the material selection and size of the shear joint, 20 kHz did not have enough amplitude to weld parts together and achieve a strong homogeneous weld.
- Application was run on 10” x 10” titanium block horn and 1:2.5 booster to achieve 75 microns amplitude

Impeller Application

Impeller Application

- Weld 7” unfilled PP cover to unfilled PP Impeller
- Fins have approximately 0.025” high x 60° energy directors with Branson 600 textured surface on impeller cover
- Impeller cover is ~0.25” thick (far field) and horn contact surface is on an angle

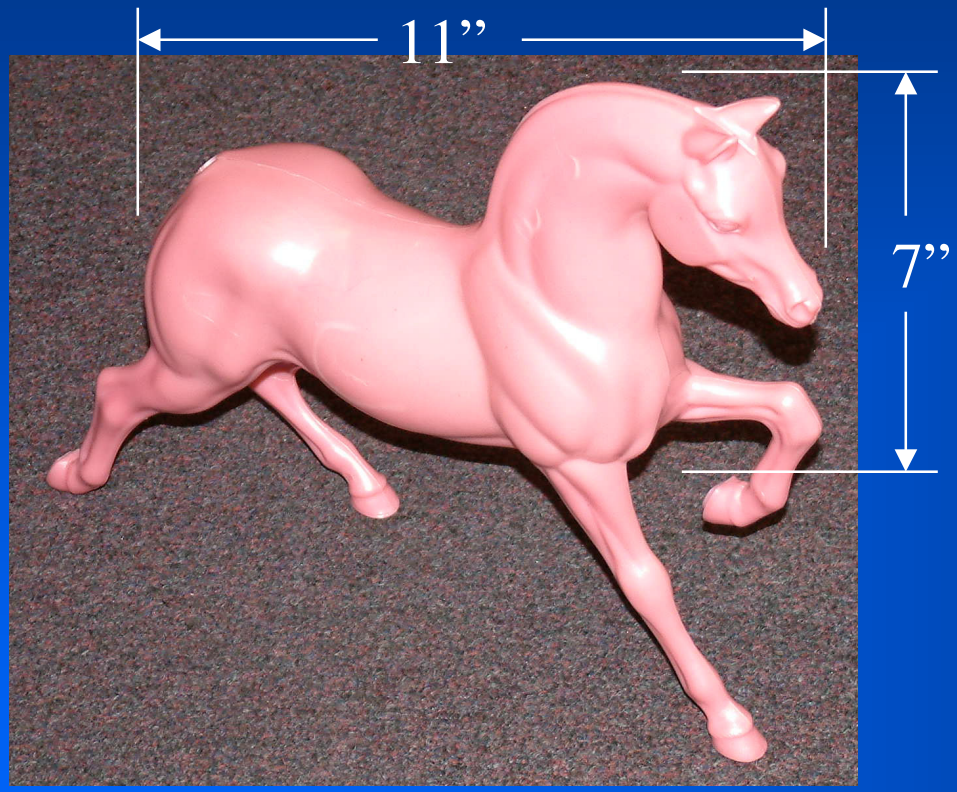
Impeller Application

•Due to size of the part and material selection, it was difficult to get the cover to couple with the horn at 20 kHz causing the horn contact surface to melt. Once melting starts (part marking), it is nearly impossible to stop it.

•At a lower frequency, it was easier to get the Cover to couple with the horn reducing the part marking and allowing the energy to concentrate at the weld joint.

Horse Application

Horse Application

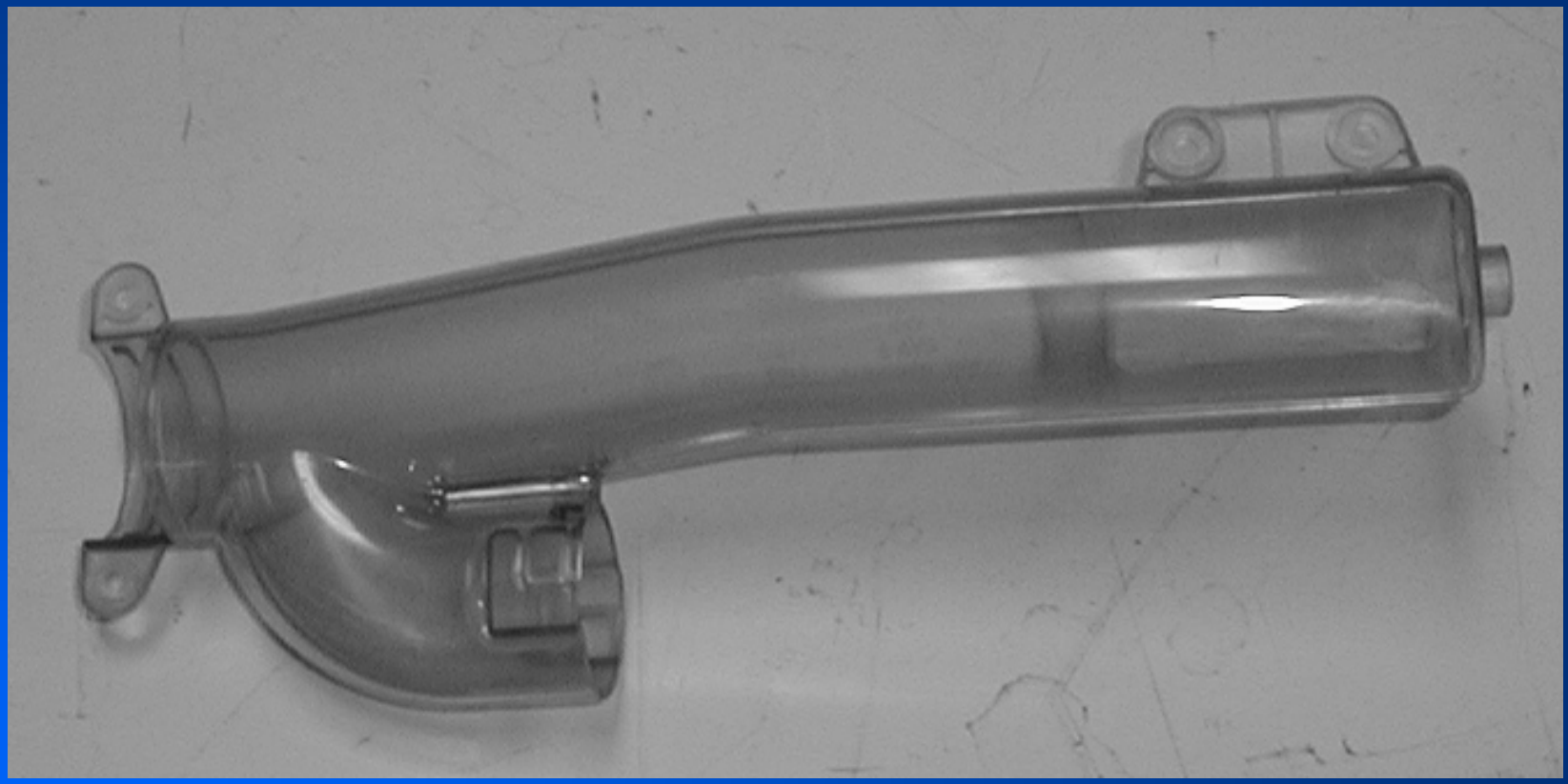


- Weld two halves of styrene horse together to achieve a strong bond with no marking
- Joint design is an interference stud weld

Horse Application

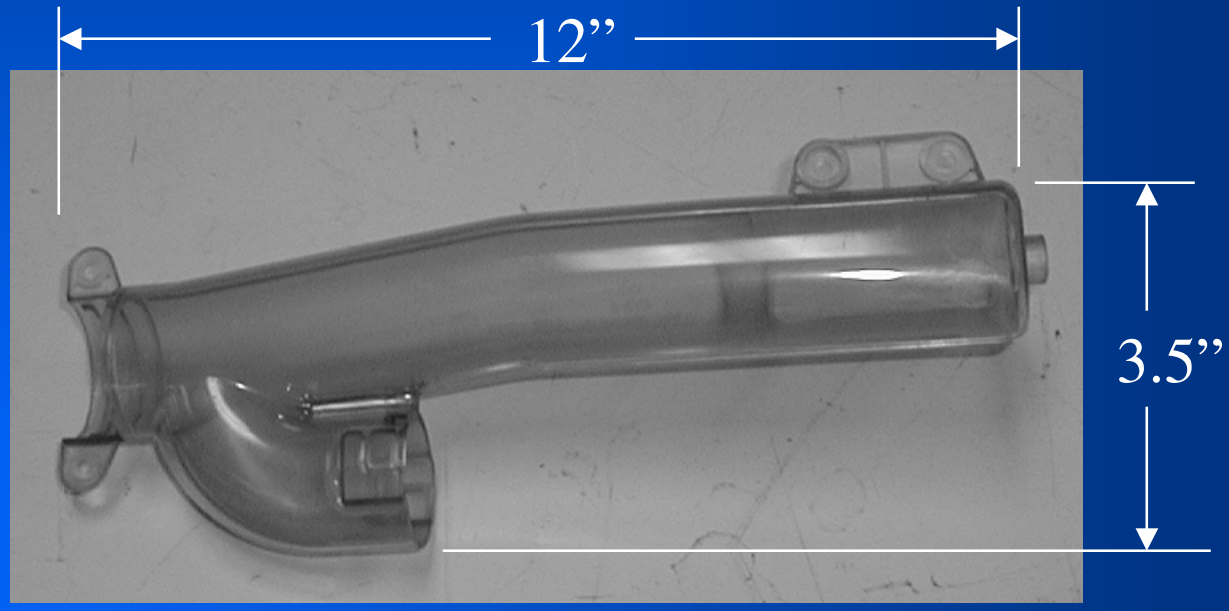
- Due to depth of contour and size of horse, a 20 kHz horn could not be designed
- With 15 kHz, we were able to build a horn large enough and sink the contour deep enough into face to weld from the nose to the rump

15 kHz Application



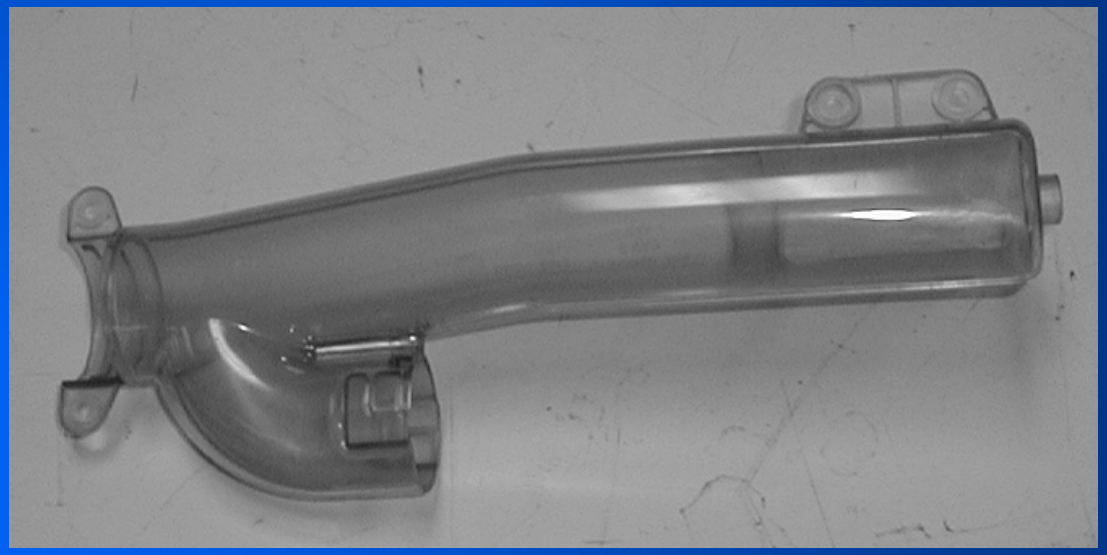
15 kHz Application

- Weld two halves of ABS Air Duct together to achieve a strong hermetic seal with no marking.
- Tongue and groove joint design with energy director and textured surface

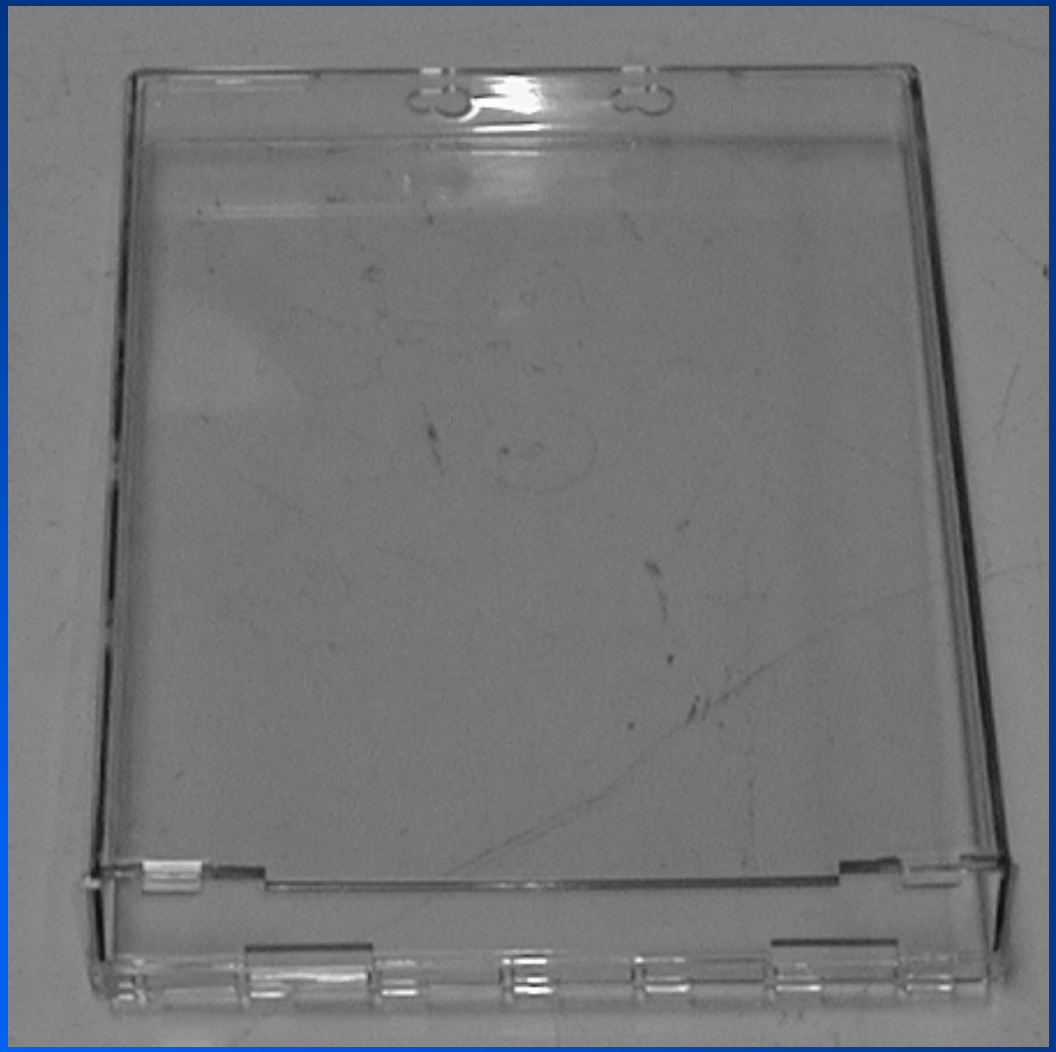


15 kHz Application

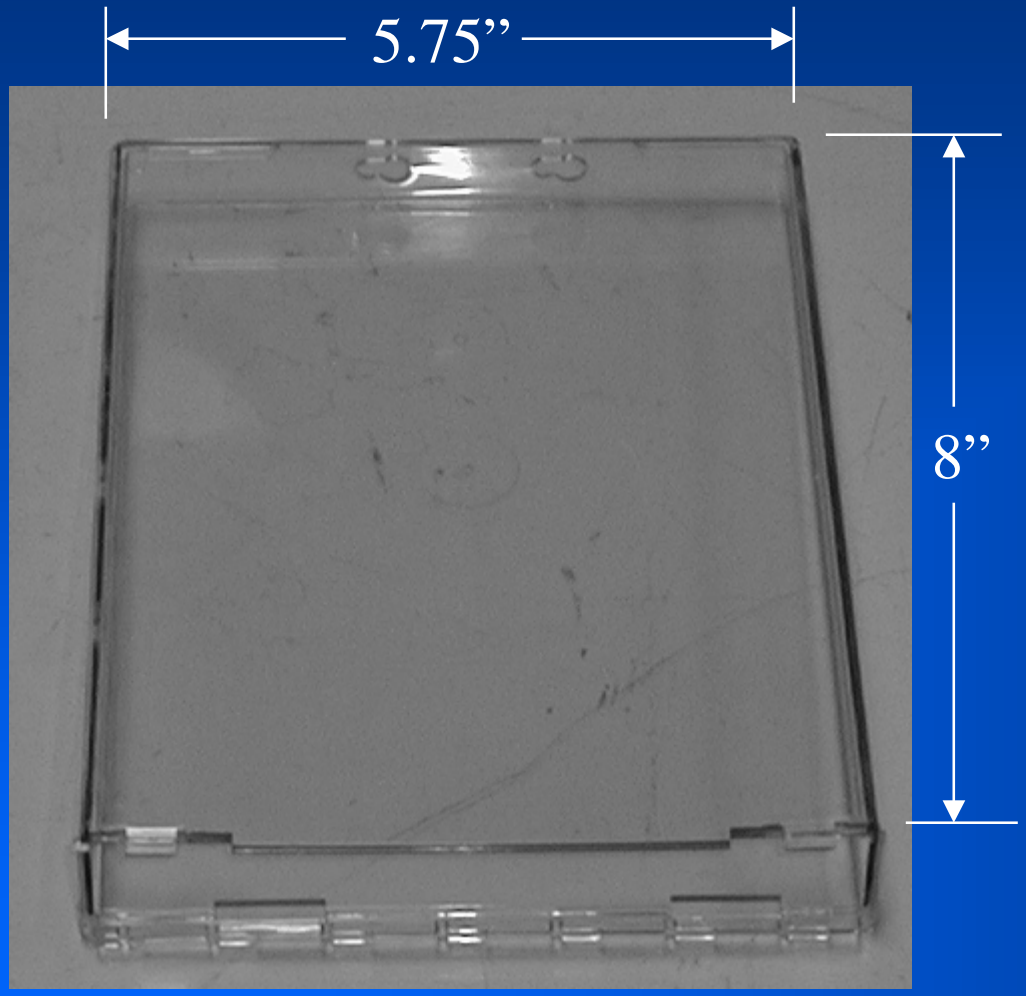
- Due to size of part and depth of contour required to get horn contact surface close enough to weld parts, 20 kHz tooling was not reliable
- Longer wave length of 15 kHz enabled us to build a reliable horn with a deep enough contour to meet the requirements



DVD Case

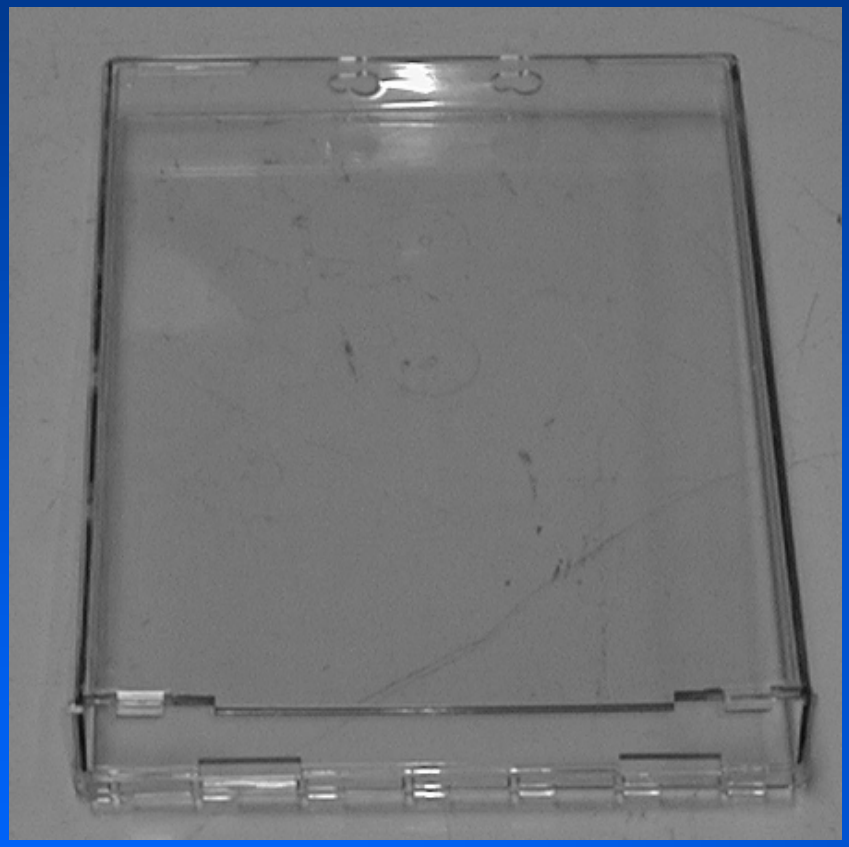


DVD Case



- Weld top of PC DVD Security Case together to achieve a strong, clear weld with no marking
- Tongue and groove joint design with criss-cross energy directors

DVD Case



- 20 kHz tooling was unable to melt the energy directors without marking and frothing in the weld joint
- Higher amplitude output of 15 kHz enabled us to fully melt the energy directors quick enough to eliminate marking and frothing in the weld joint

Questions