

Optimize ultrasonic welding of plastics

'Alternatives to welding with ultrasonic technology of PP, ABS, POM parts, plastic resins in general'

Background

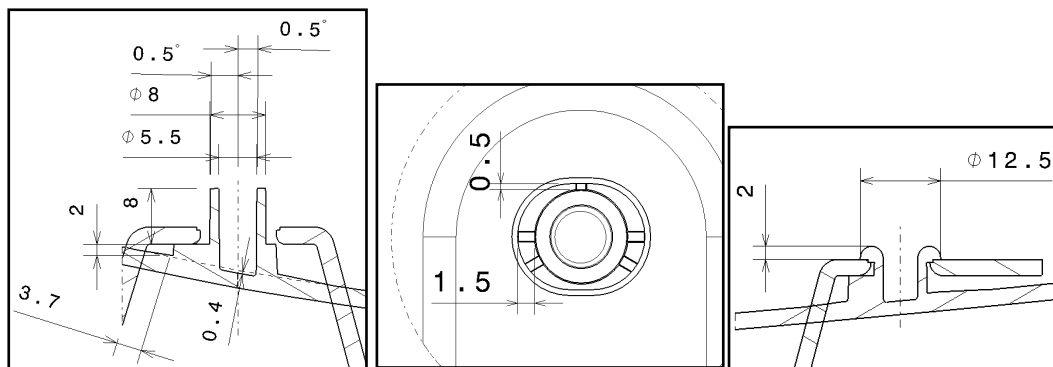
Our client is a leading multinational supplier of solutions in a high competitive industry. Innovation is for this company a key differentiator to continuously bring to their customers high quality products and outstanding processes.

The company manufactures **plastic products (PP, ABS, other common plastic materials used for automotive interiors components).**

The challenge

These products are assembled through a multiple step welding process using **ultrasonic technology** (see pictures of different welding points and edges in attachment):

Welding pin 8 mm diameter example.





- Pictures of right and wrong welded parts



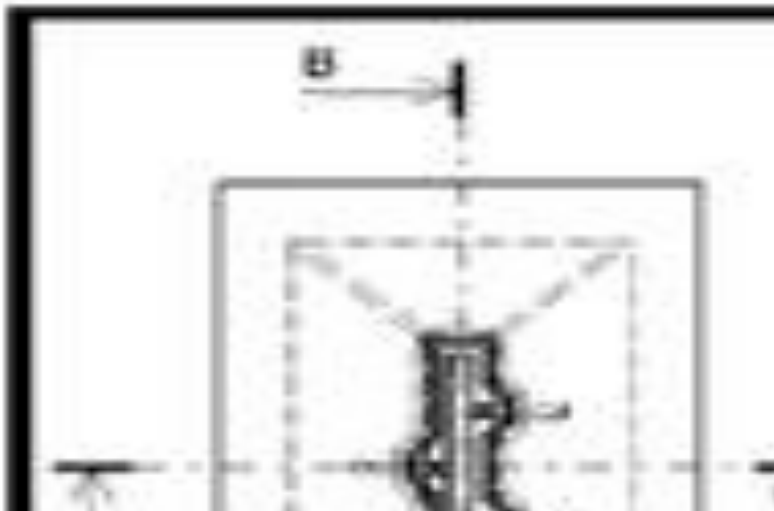
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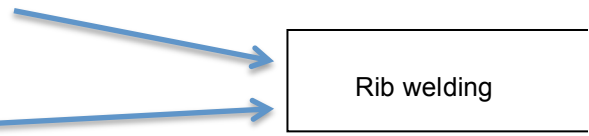
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Welding rib example.





- Initially the welding equipment is set up with a specific tool (one sonotrode for each welding point).



- Two or more plastic parts are loaded into the equipment (complete door panel).



- The equipment performs the welding process in one or more steps depending of product flexibility (vibration directions can be perpendicular or with different angles).

This welding technology works well but has some **disadvantages**:

- Requires a high investment since each product requires a specific welding equipment.
- Is not flexible enough, since a different product needs a specific sonotrode for each point.
- ***Parts welding is quite fast but requires waiting time for cooling thermoplastic material (more than 10 seconds).***

In the challenge attachment you can find the following documents:

- Thermoplastics materials specifications sheet for most common used polypropilene and ABS resins.

What the client is looking for

Our client is **looking for a faster technology (ultrasonic or alternative) to weld the different parts while reducing cycle time between <2,5 * seconds/ welding point.**

Is necessary to keep actual architecture (welding pin & rib).

If possible, the new technology should be as more flexible (e.g. using standard robots rather than dedicated equipment).

(*) The target of 2,5 seconds refers from the first contact between the part and the welding device until removal (including cooling time) keeping welding consistency with any mechanical deformation.



Quality test (welding pin 8 mm)

- 150N @ 10mm/min (tensile strength)
- 150N @ 10mm/min (shear strength)

This solution must be capable for welding pins between 4 and 8 mm exterior diameter.

This is a **3-rounds tournament** with the following submissions:

First round

- Proposed technology with a high-level process description.
- Feasibility evidences.

Second round

- Detailed process specification.
- Equipment specifications and available suppliers.
- Estimated investments (per welding point) and operational costs.

If required, additional information will be provided during the course of this round.

Third round

- Required clarifications

Evaluation criteria

- Complies with product specification and quality
- Complies with required cycle time requirements (< 2,5 seconds)
- Feasibility evidence
- Optional: More flexible process compared to current ultrasonic welding with sonotrodes.

Timeline

This is a 3 rounds tournament with the following timings

- 1st round – 6 weeks+ 2 week for evaluation
- 2nd round – 3 weeks + 2 week for evaluation
- 3rd round – 2 weeks + 1 week for evaluation

The Prize

The winner will be awarded with a **12.000 € cash prize**