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Hugg As
Mekanisk Design
og Produktutvikling

hu!

Ingen lekkasje!

Tetningsløsninger i produktdesign

Av Lars Rimmereid

Dedicated to help Norwegian companies make better products

- Est. 2015, originate from Nemo engineering and Kongsberg Oil & Gas Technology
- 27 Employees
- 35 MNOK yearly revenue
- Over 200 completed development projects

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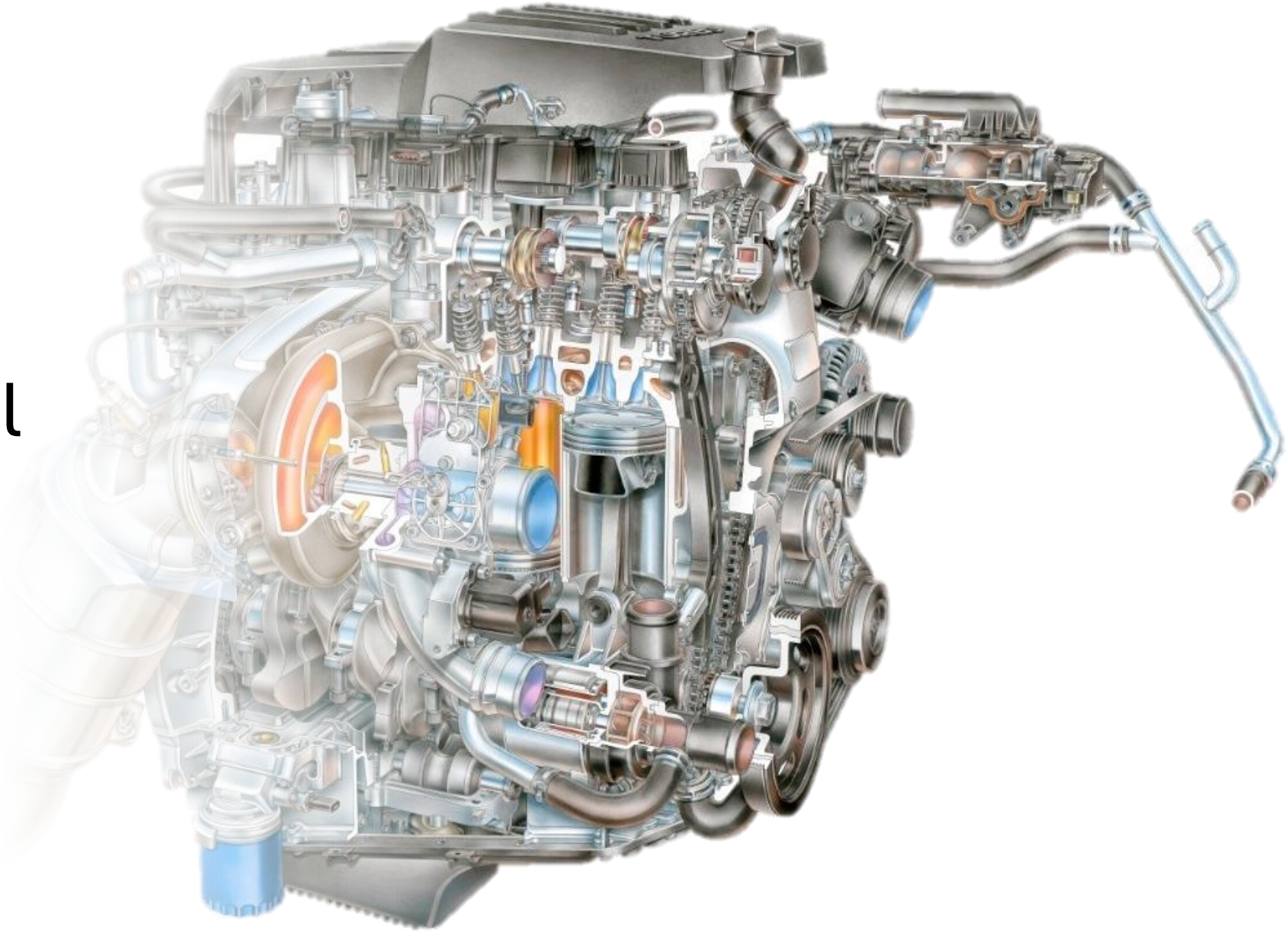
1. What is sealing?
2. Selections of seal solutions
3. Chemical compatability
4. Different types of sealing solutions

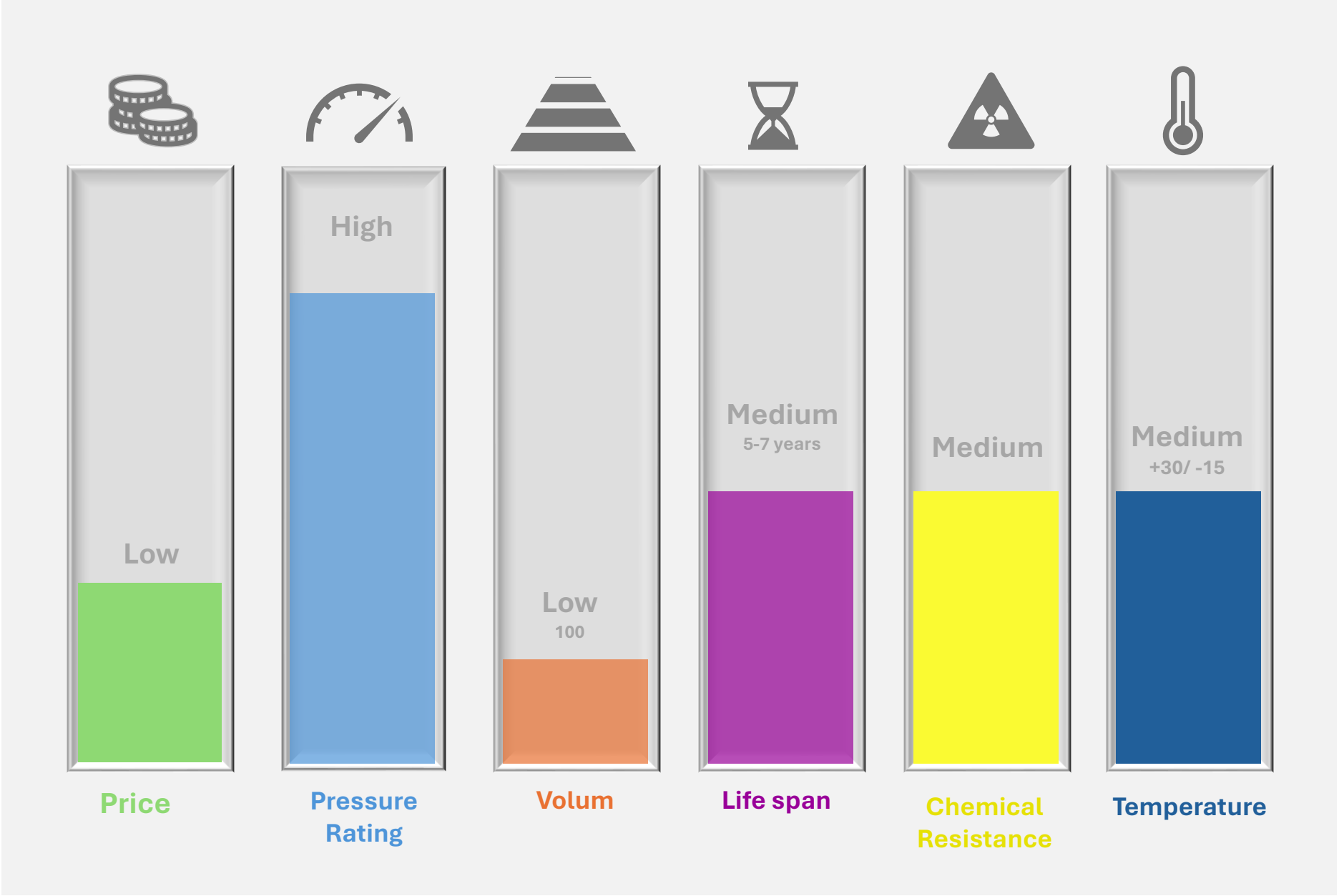
What is sealing?


A barrier
against the
environment

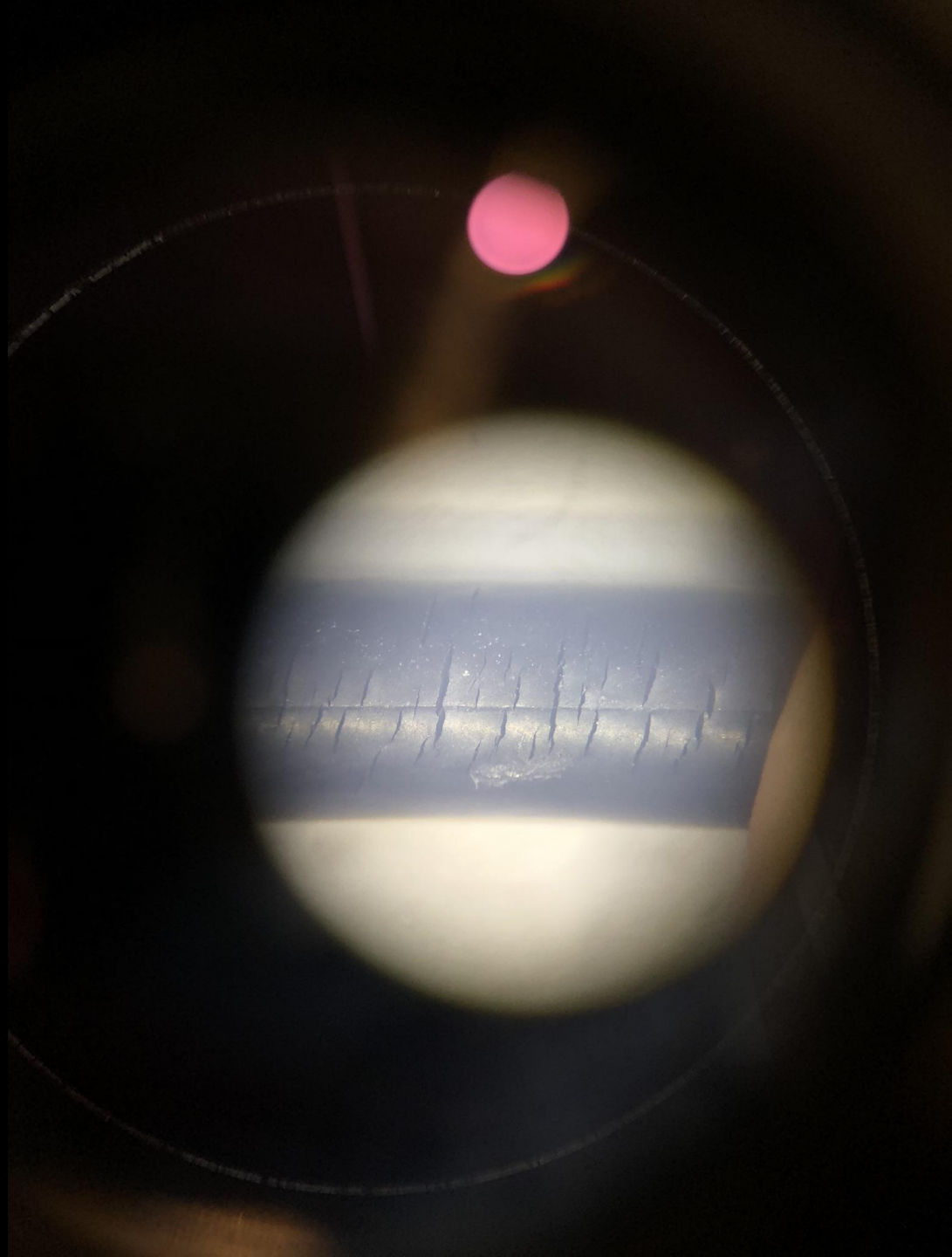
Selection of seal solution



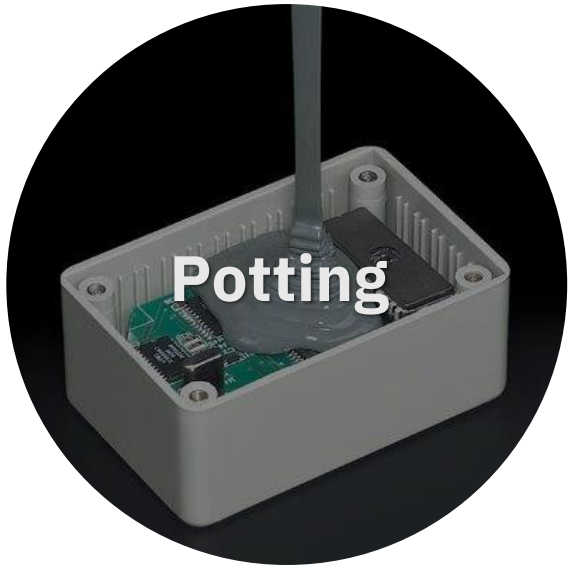
Balancing Trade-offs in Product Development

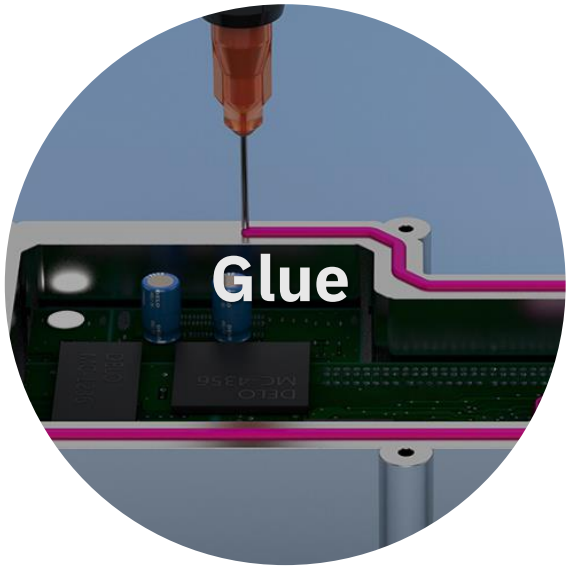


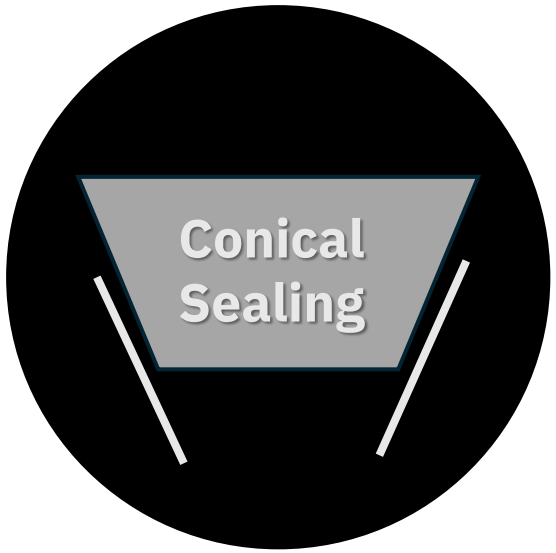
Chemical compability




Welding

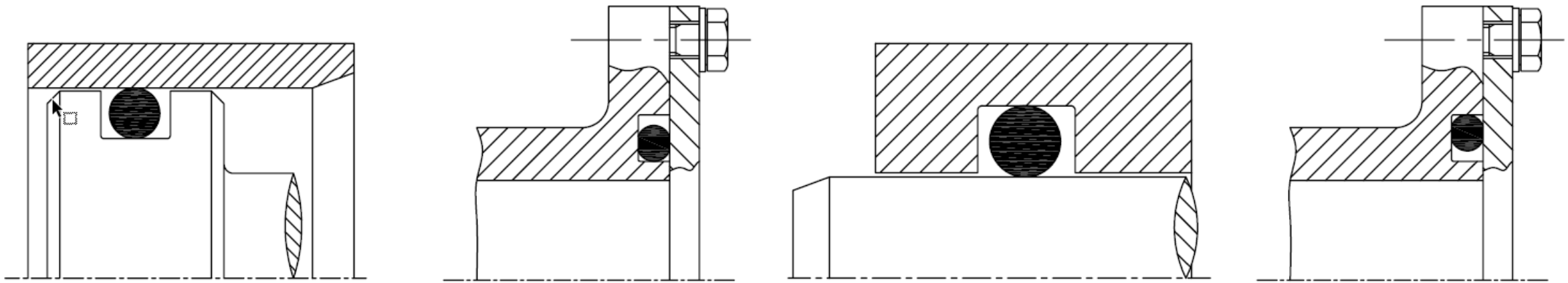

Potting


Glue


Conical
Sealing


Gasket
Sealing

Sealings & gaskets



High level seal calculations

Fill prosentage: 60-75% is recommended

$$\%Fill = \frac{O-ring\ cross\ section\ Area}{O-ring\ groove\ Area} * 100$$

Stretch: Should be kept under 5%

$$Stretch = \frac{Groove\ OD - O-ring\ nominal\ ID}{O-ring\ nominal\ ID} * 100$$

Poisson's ratio (typically 0.5 for most elastomers)

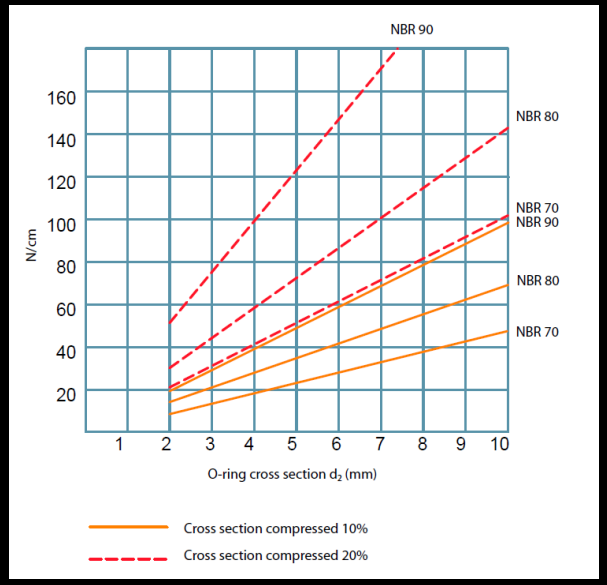
$$Percent\ cross\ sectional\ diamter\ reduction = Stretch * poision\ ratio$$

Squeeze (compression) 15% to 30 % for static applications and 7-25% for dynamic applications

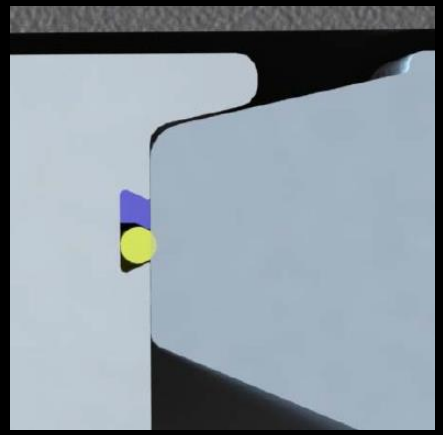
$$MIN\ Squeeze = \frac{Reduced\ o-ring\ cross\ sectional\ dia\ - Max.O-ring\ groove\ height}{Reduced\ o-ring\ cross\ sectional\ dia} * 100$$

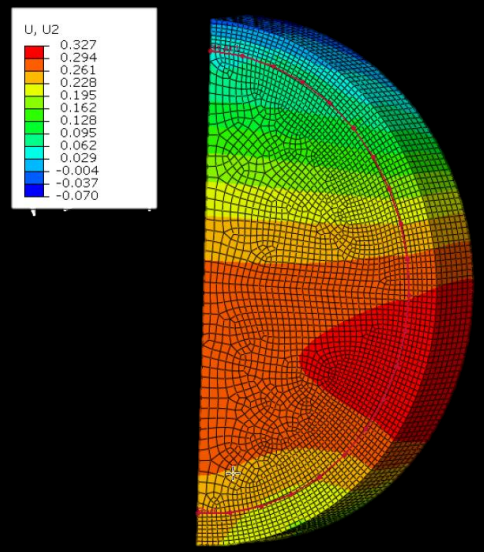
$$MAX\ Squeeze = \frac{Reduced\ o-ring\ cross\ sectional\ dia\ - Min.O-ring\ groove\ height}{Reduced\ o-ring\ cross\ sectional\ dia} * 100$$

High level seal calculations

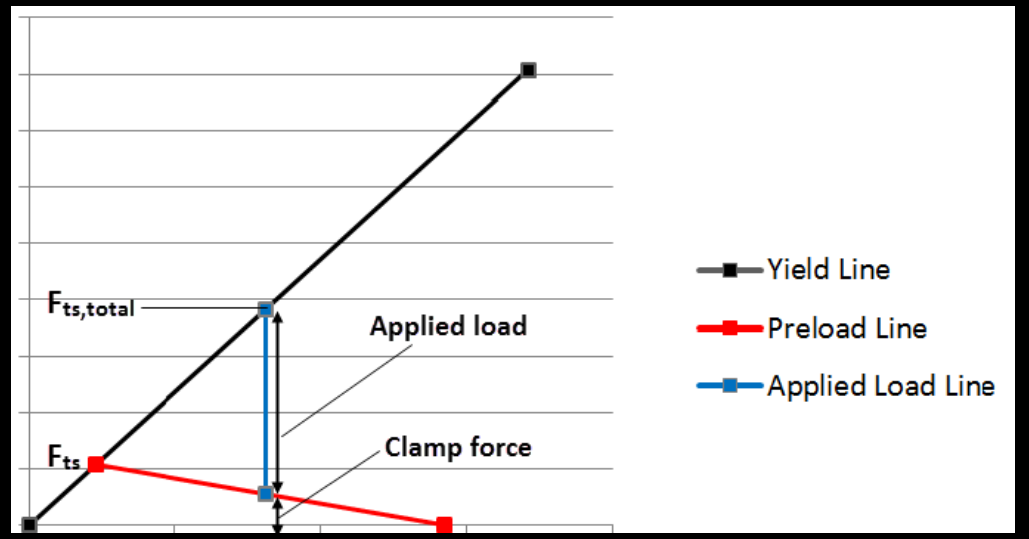


Seperation –Too much gap results in leak



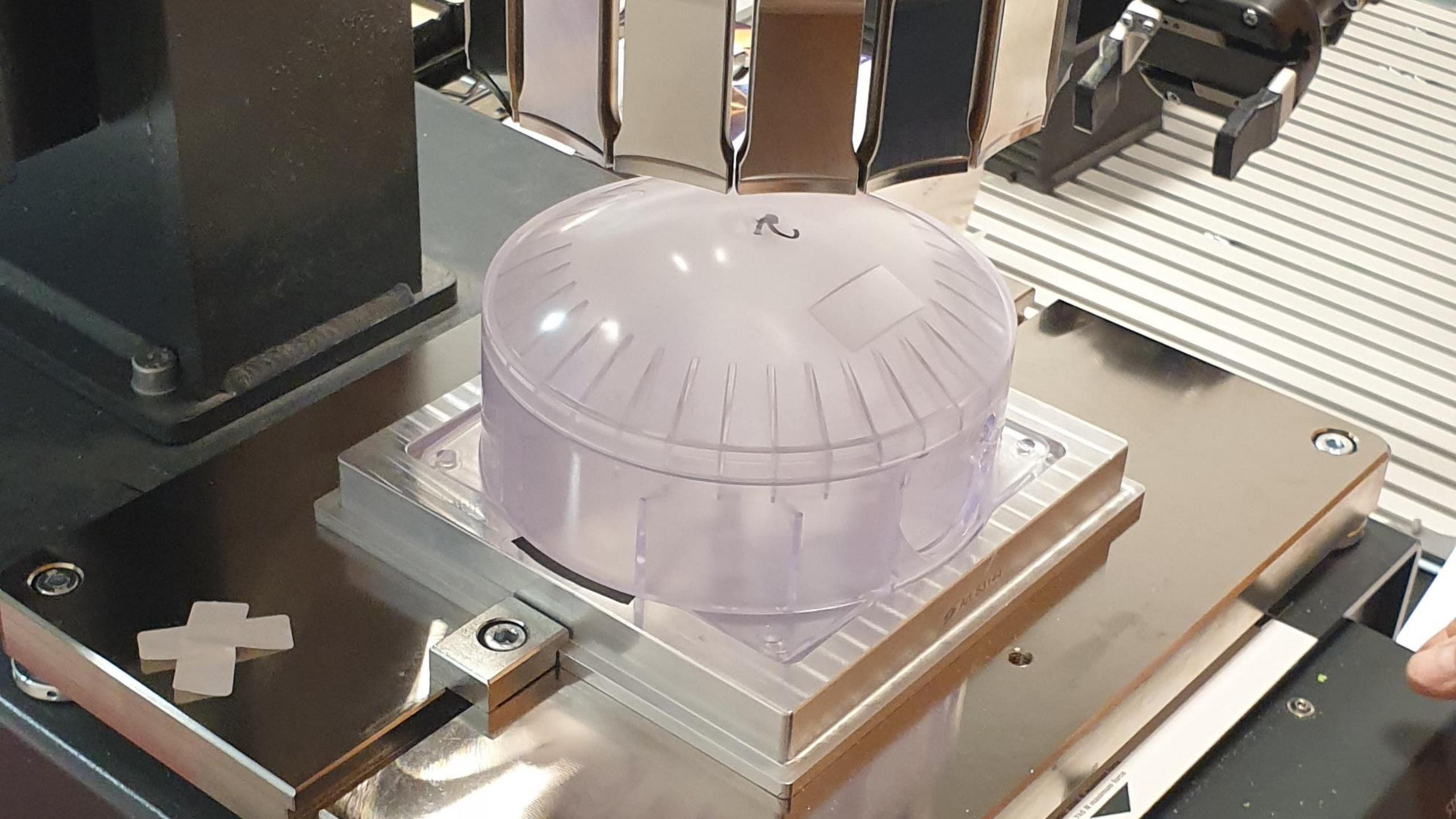


Separation simulated by FEA

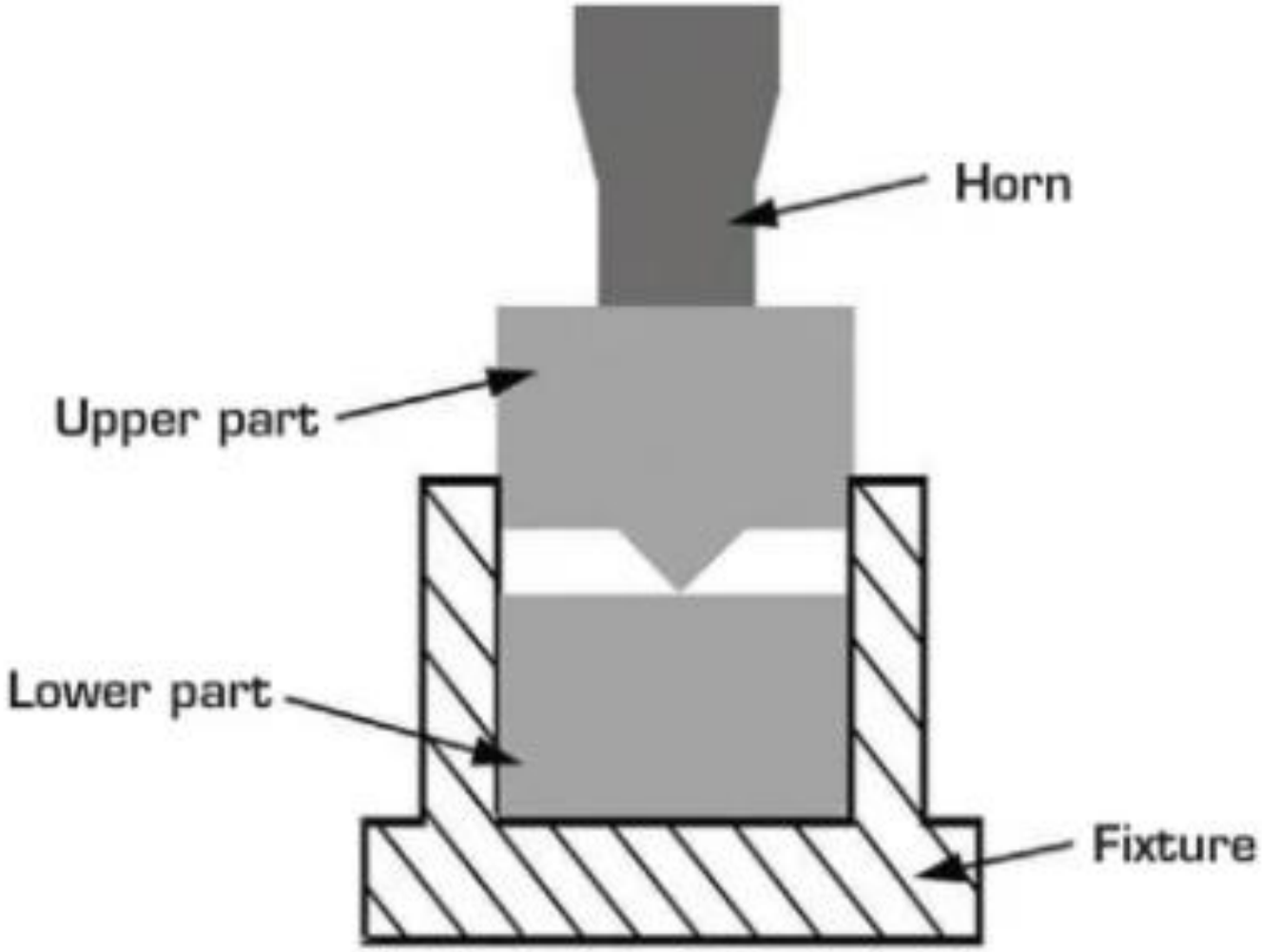


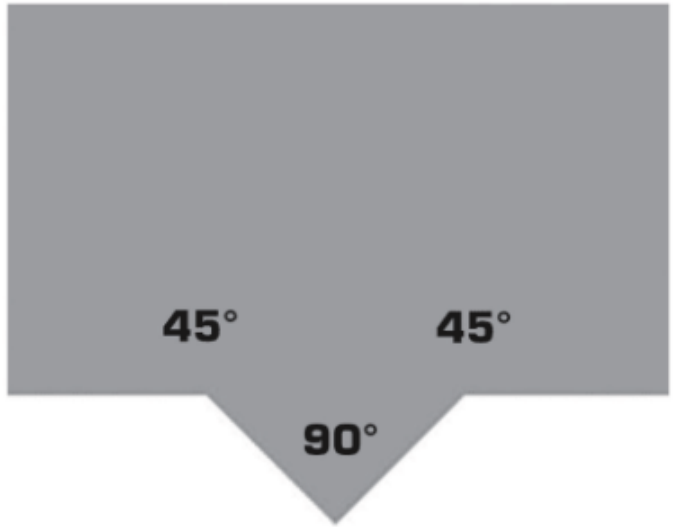
Separation calculated by a bolt load diagram


welding

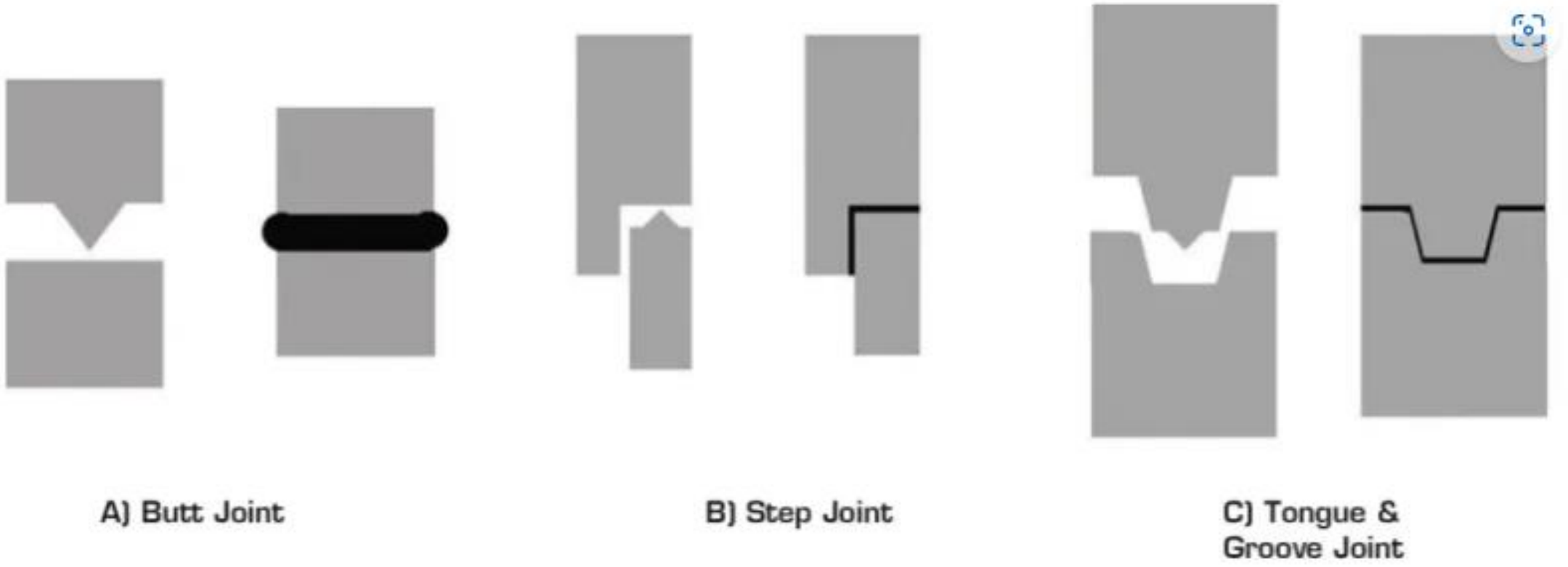


Ultrasonic welding

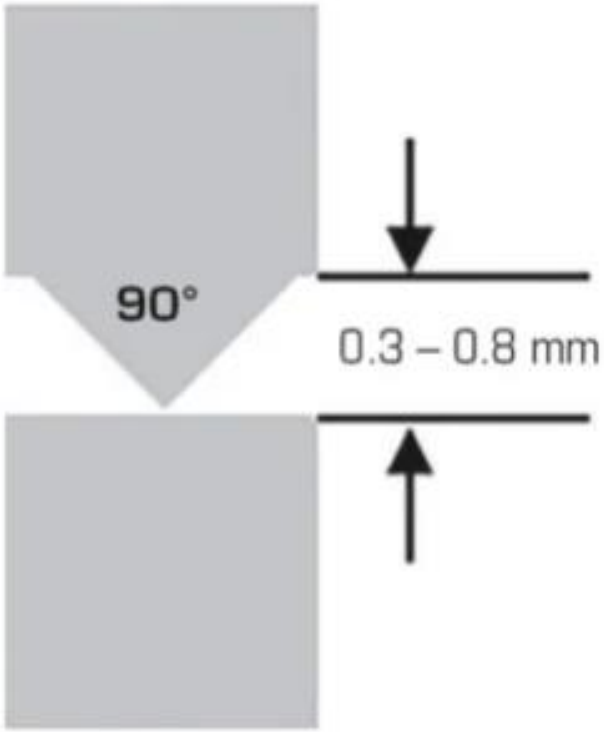




Ultrasonic welding

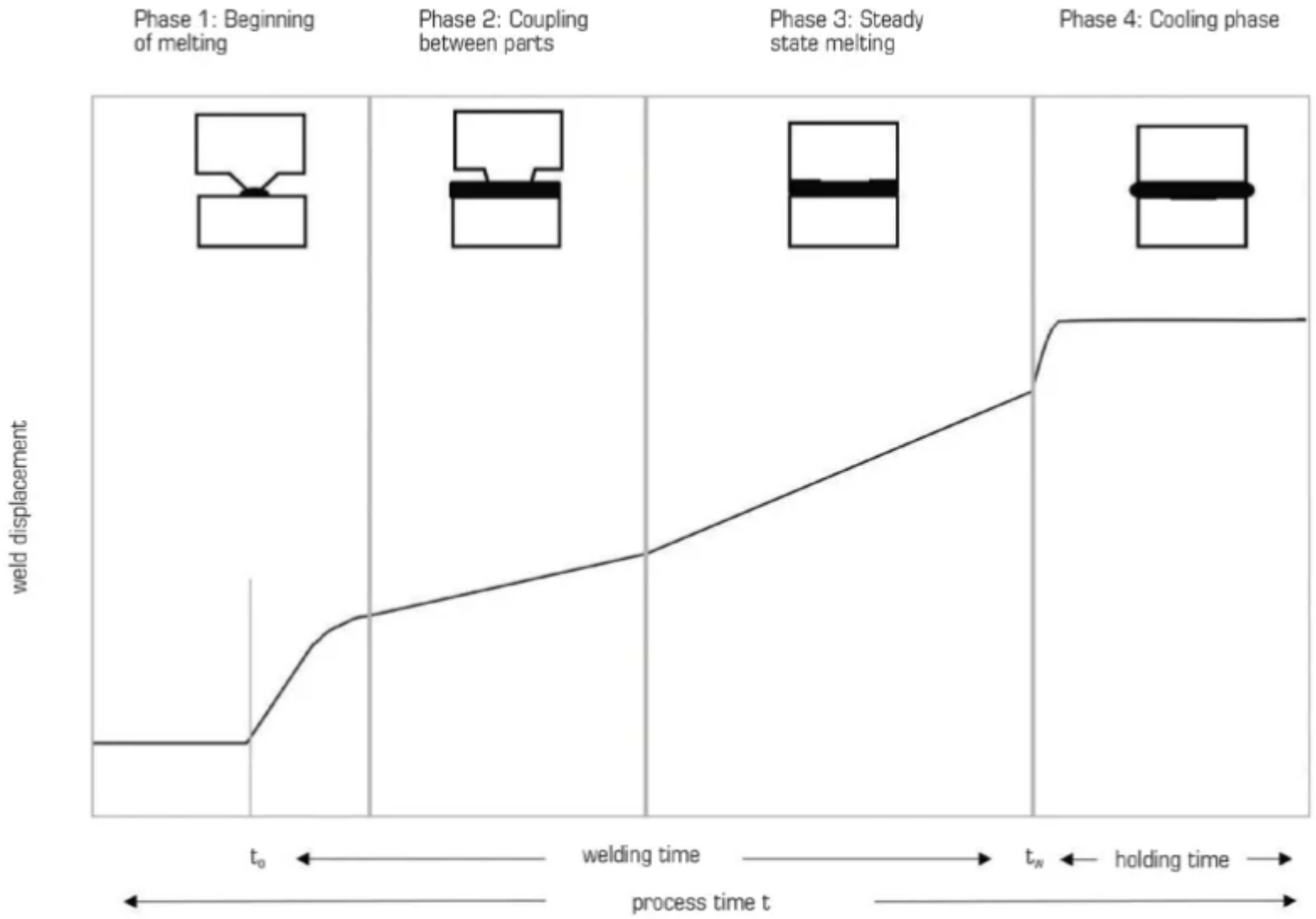


Ultrasonic welding

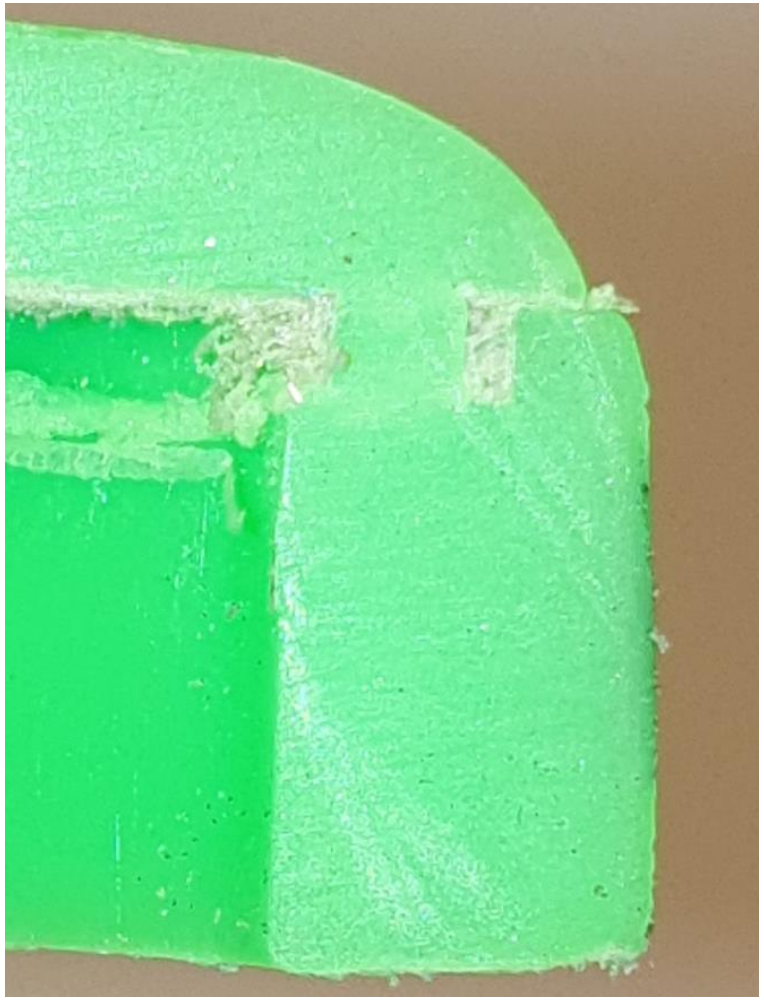


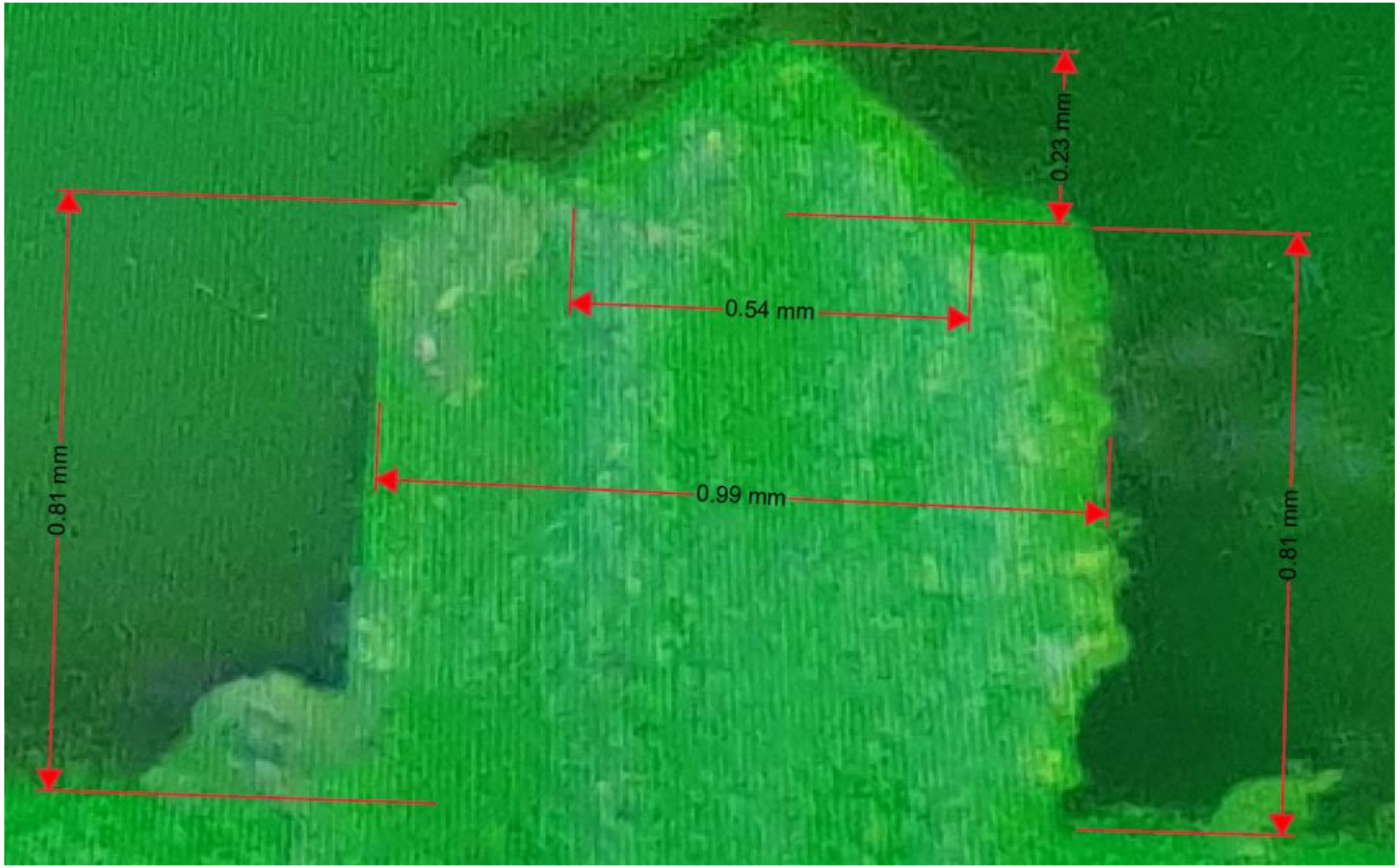
Energy director height [mm]	Energy director width [mm]
0.30	0.006
0.50	1.000
0.60	1.200
0.80	1.600

Ultrasonic welding

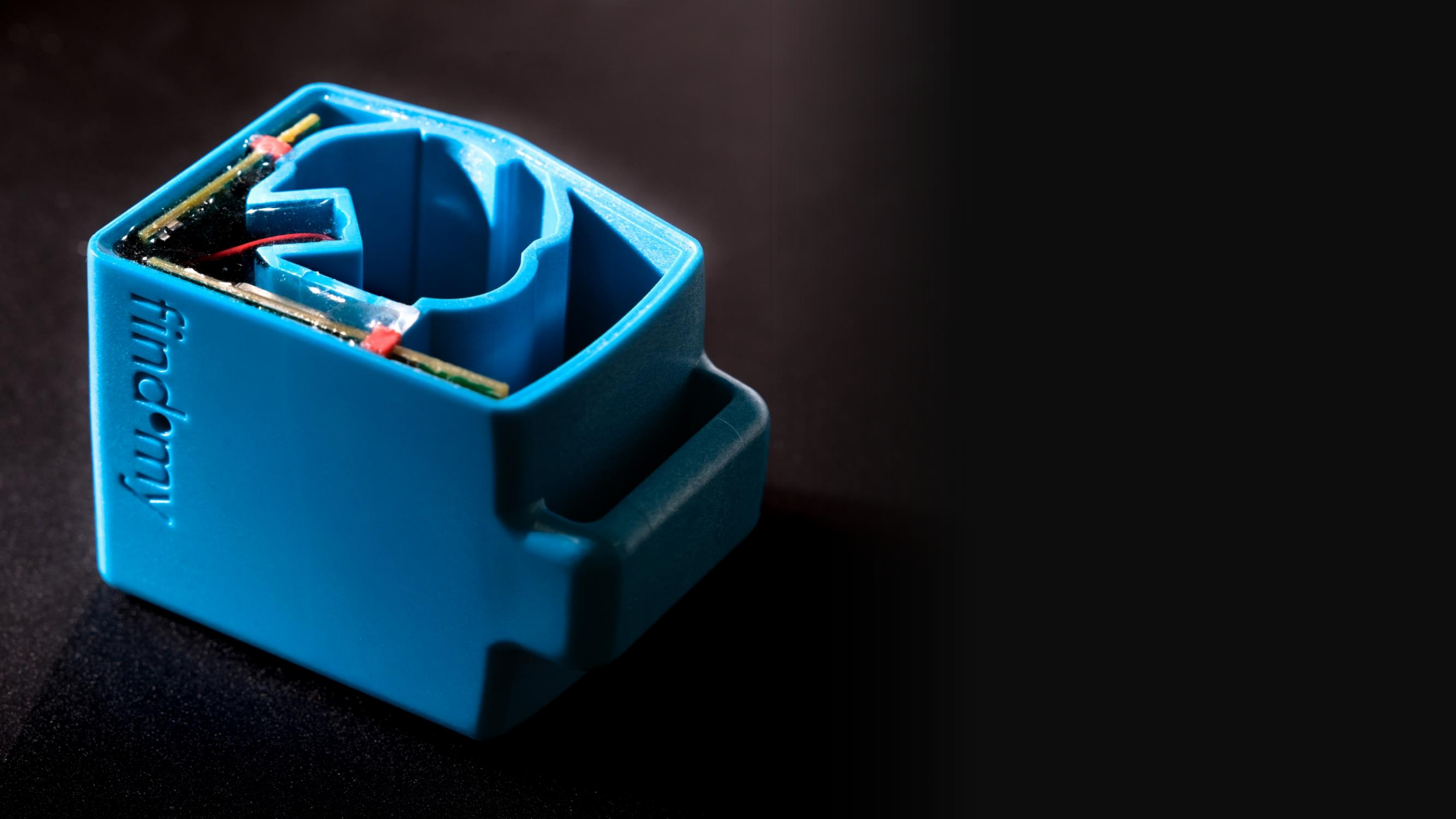


Ultrasonic welding





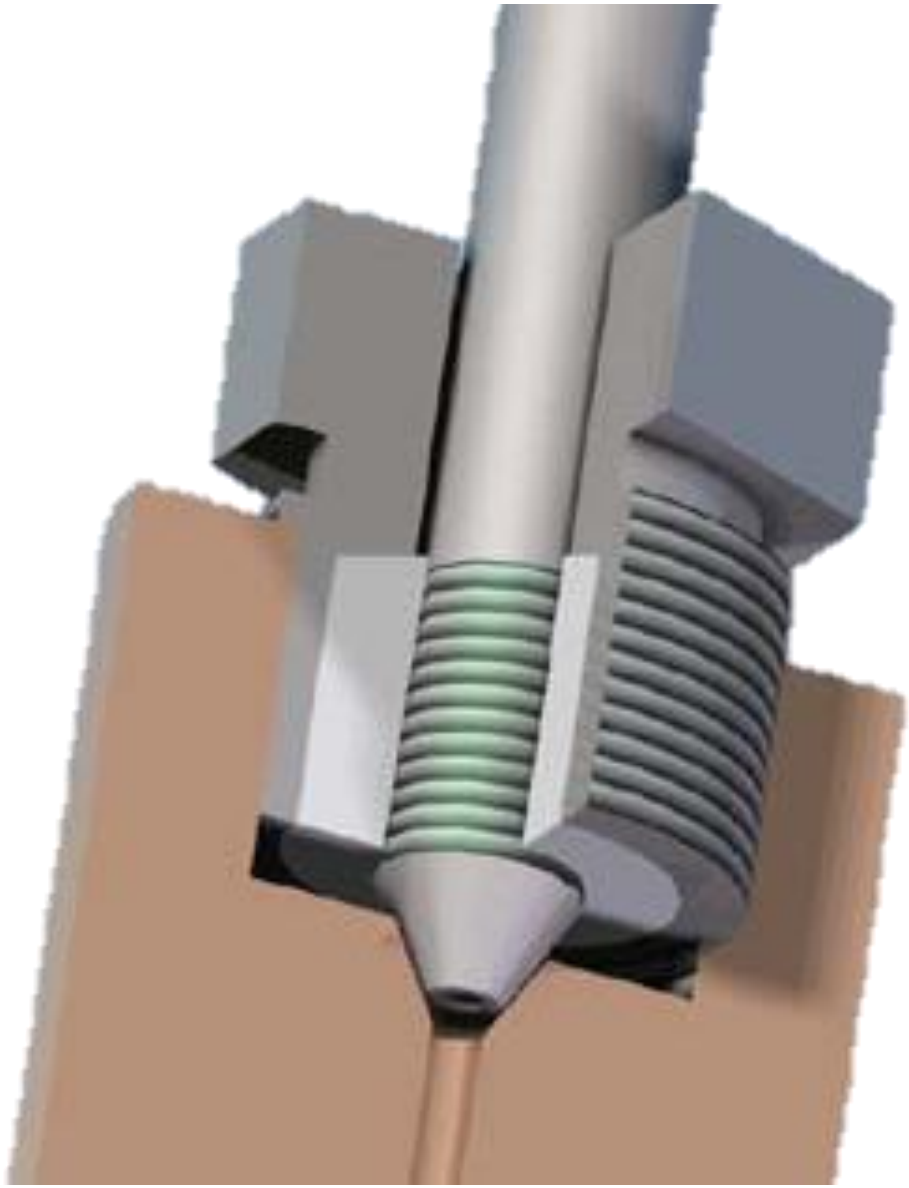
Potting


fluidonly

Potting mass -Failure & test


Glue


Conical seal

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