KOOPS

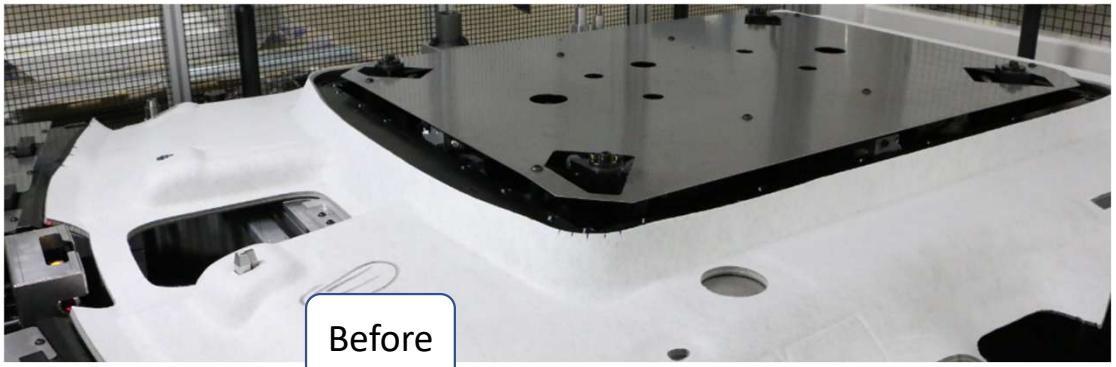
factory automation systems

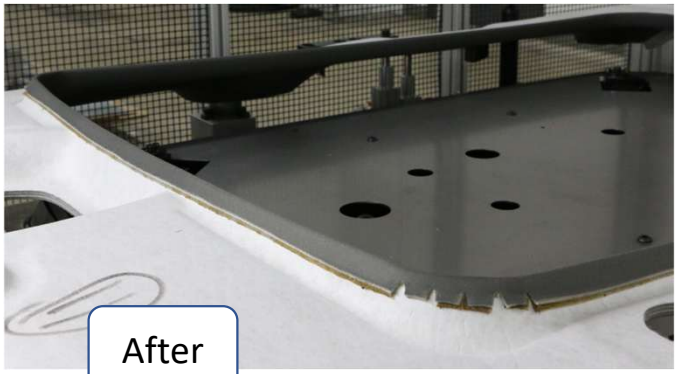
Edge Finishing Workshop

Michael Kalsbeek – 2020.06.19

Edge finishing: Overview

- Definition
  - Typically refers to edge treatment on automotive headliner parts.
  - Is a process applied to a part to create a quality appearance.
  - The process involves bringing the cover stock to the back of the part.
- Core Technology
  - Long history of these machines at Koops.
  - Koops is a market leader in edge finishing.

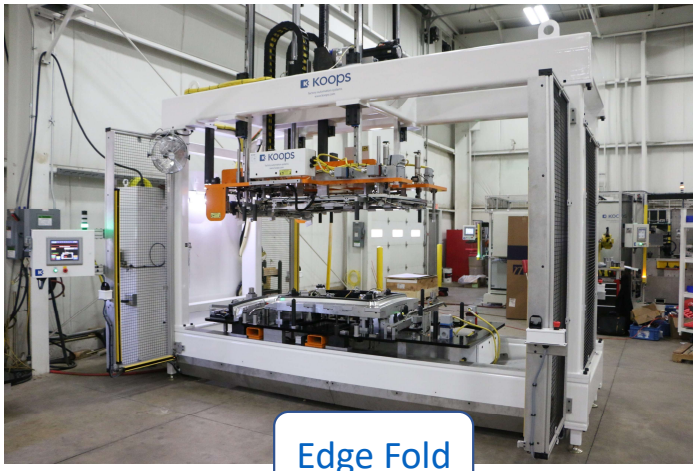




Edge finishing: Types

- 2 main types
  - Edge Wrap is (often) glue based.
    - Overall higher cost and quality.
  - Edge Fold is heat based.
    - Overall lower cost and quality.

Edge Wrap



Edge Fold

Edge finishing: Types

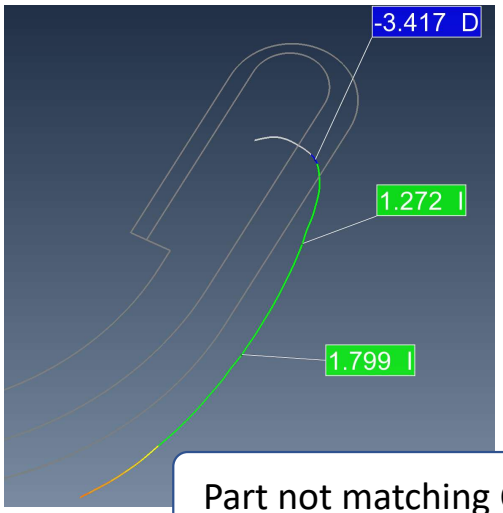
- Edge Wrap
  - Historically European or luxury programs.
  - Typically requires a 2-step headliner forming process.
    - 1st step forms the B-C layer including the foam and fiberglass, sometimes a metal trim ring is attached.
    - An initial trimming occurs to cut holes through the substrate.
    - 2nd step forms the A-B layer including the cover stock and soft touch foam.
    - A second trimming occurs to cut holes through the cover stock and leave a length of the cover stock for wrapping.
  - Usually easier to tune as we don't need to adjust to a gage, as the trim ring sets the height.
  - Quality and consistency is typically higher than edge fold as the trim ring is a defined wrap line.
  - Glue is typically used to adhere the fabric to the trim ring, either dispensed by robot or previous step.
  - Trim ring is generally required for openings, tension in the cover stock due to corners can crush and break substrate.

Edge finishing: Types

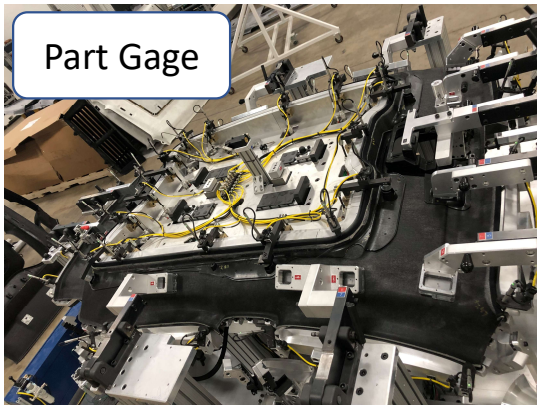
- Edge Fold
  - Historically North American or lower cost programs.
  - Typically requires a 1 step headliner forming process.
  - Edge folding folds the covers stock and substrate together, as opposed to edge wrap which is only the fabric layer.
  - The heater ring and tooling create your fold line, which isn't as consistent.
  - Corners are the biggest challenge and often cause issues with being out of spec or visually unacceptable with bumps.
  - General industry impression is edge fold cannot hold as tight of tolerance as edge wrap, which is particularly true with multiple and larger openings.
  - Customers keep driving to tighter tolerances and more complex geometries which increase risk and tuning time.
  - 2 main sub-types: Low-temp and High-temp.
    - Glass/PP and Dry PU substrates are low-temp at ~400-500 deg F.
    - Wet PU substrates are high temp at ~600-750 deg F.
      - These are much more difficult to achieve consistency with dimensional and quality standards.

Edge finishing: Challenges

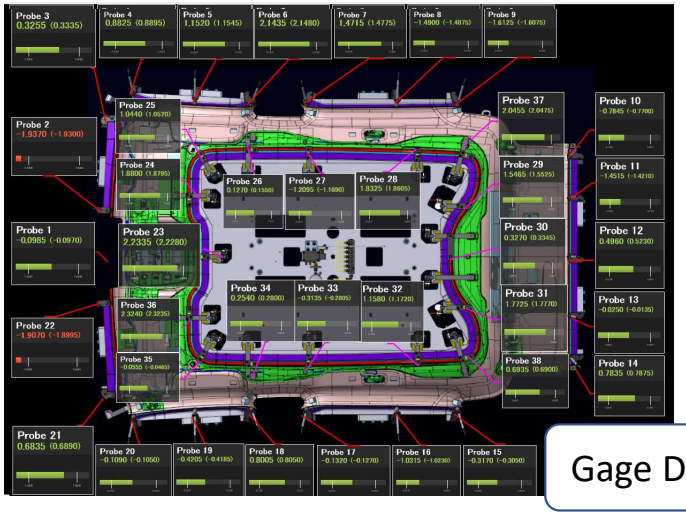
- Typical Challenges
  - Visual quality requirements.
  - Dimensional requirements.
  - Customer part issues.
  - Suede.



Part not matching CAD



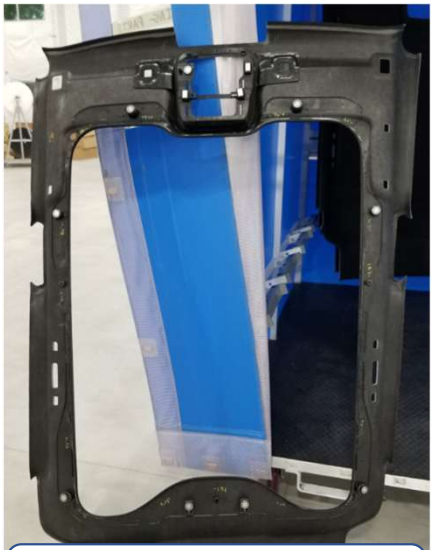
Part Gage



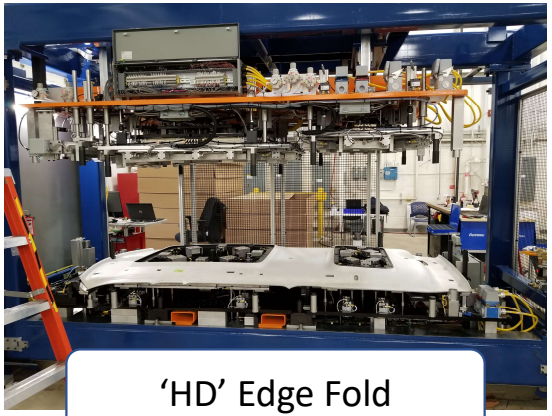
Gage Data

Edge finishing: Innovation

- Core Tech Team Initiatives
  - Edge finish Core Tech Team members:
    - Matt Boers, Jon Marshall, Ryan Havey, Brian Brinks, Michael Kalsbeek, Jeff Beagle, Matt Lee, Luke Getz
  - Standardization.
  - Sales and market analysis.
  - Website page updates.
  - Lessons Learned feedback loop.
  - New and challenging designs/geometry.
  - Cost reduction.



Challenging Edge Fold



'HD' Edge Fold

'C-frame' Edge Fold