

1.0 Purpose/Scope

- 1.1 This specification establishes the MachineTek inspection criteria of metallic and non-metallic honeycomb core.
- 1.2 The types of honeycomb core referenced in this document are shown below (Figure 1, Figure 2).
- 1.3 All MachineTek inspection criteria will be used for determination of product conformity when an alternate customer specification for honeycomb core is not provided through the customer purchase order.

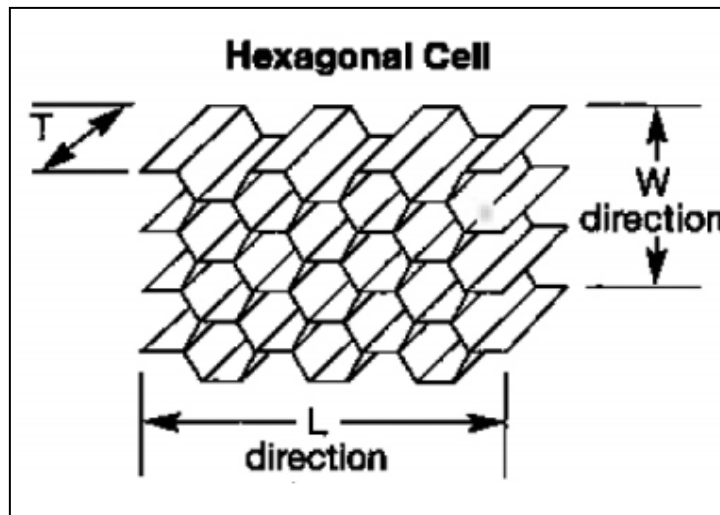


Figure 1 – Hexagonal Core

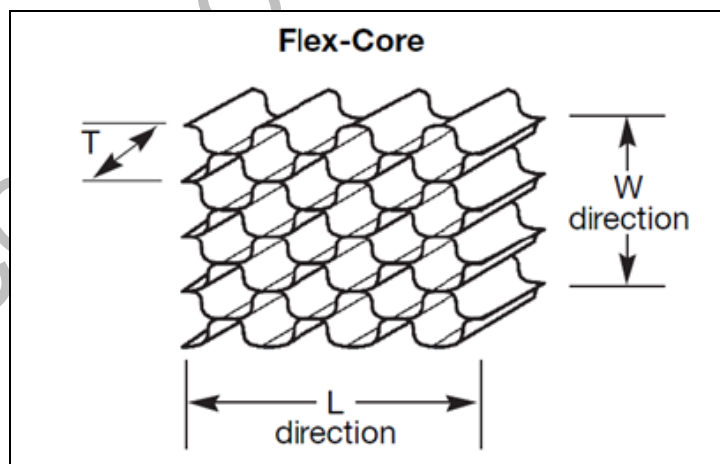


Figure 2 – Flex Core

2.0 Inspection Criteria

2.1 Dimensional Requirements

- 2.1.1 Core thickness and tolerance shall be as specified on the applicable Engineering drawing. If no core thickness tolerance is specified, core shall be procured or machined to a thickness tolerance of ± 0.010 ".
- 2.1.2 All other core dimensions shall have been formed or machined to a tolerance sufficient to assure that the core assembly meets the fit-up requirements of the Engineering drawing.
- 2.1.3 All other dimensions shall be to a tolerance sufficient to assure that the details meet Engineering drawing requirements, and the core assembly meets the fit-up requirements.

2.2 Ribbon Direction

- 2.2.1 Ribbon direction shall be no more than +/- 10 degrees from the nominal ribbon direction as specified in the model or drawing.

2.3 Profile

- 2.3.1 Unless otherwise specified in the engineering drawing and/or model, the surface profile and edge-of-part profile tolerance shall be .120" (+/- .060").

2.4 Disbonds & Cell Wall Failure

- 2.4.1 Disbonds or Node Bond Separations are identified as instances of peeling of nodes of cells where greater than 50% of the node is unattached (Figure 3).

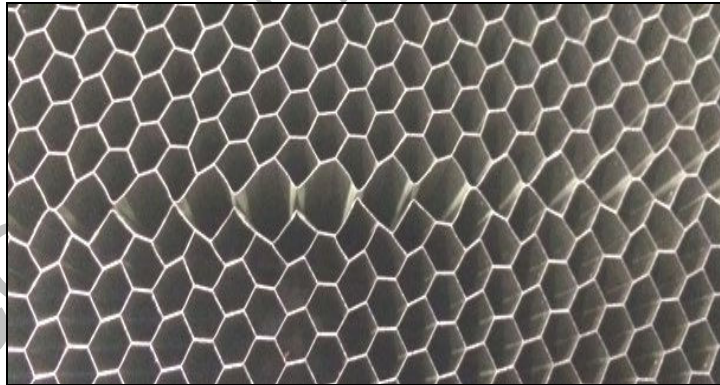


Figure 3 – Node Bond Separation Example

- 2.4.2 Bonds where the toolpath has left less than 50% of the length of original node length remaining will not be identified for instances of node bonds.
- 2.4.3 For Aluminum Hex-Core density less than or equal to 8.1 pcf:
There shall be no more than (85) unattached or separated nodes or cell wall failure separations in any 12" diameter circle encompassing the most node separations.
- 2.4.4 For Aluminum Hex-Core density greater than 8.1 pcf:

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There shall be no more than (15) unattached or separated nodes or cell wall failure separations in any 12" diameter circle encompassing the most node separations.

- 2.4.5 For all Aluminum and Non-Metallic Core densities, unless otherwise specified:
 - a) There shall be no more than (3) separations or cell wall failures in connecting or adjacent cells in any direction
 - b) No more than (5) defective node bonds per 12" of exposed cell ends is acceptable.
 - c) No more than (3) broken cell wall shall be allowed in any area 6 inches in diameter.

2.5 Cell Tear Out

2.5.1 A maximum EOP length of 1 inch, and maximum width of 0.25-inch perpendicular to the core edge.

2.5.2 No more than three cell tear out every 18 inches.

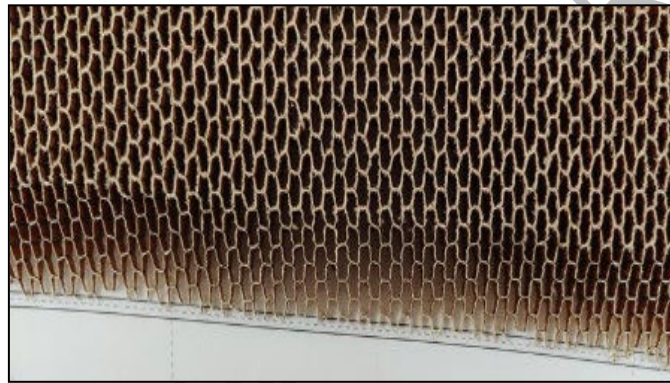


Figure 4 – Cell Tear Out Reference

2.6 Foreign Object Debris (FOD)

2.6.1 FOD inspection must be performed under consistent lighting with unaided eye from a view distance of 18".

2.6.2 Visible foreign matter remaining on the surface after all clean-up operations is not acceptable.

2.6.3 Discoloration or dulling not related to foreign object debris will be reviewed and deemed acceptable only by disposition of Quality Engineer or Manufacturing Engineer.

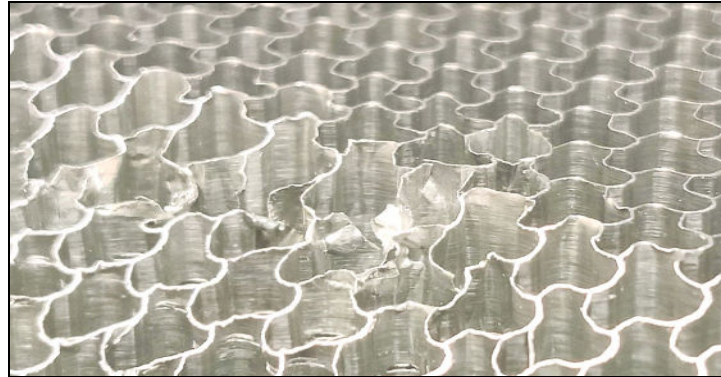
2.7 Scratches & Surface Depressions

2.7.1 Identified as a localized area compacted more than surrounding area, generally caused by a point pressure (for example, foreign matter on the tool surface), width is less than 0.125 inches.

Scratches	Depth (Inches)	Length (Inches)
&	< 0.001 or Visual Only	Any Length Acceptable

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Surface Depressions	0.001 – 0.005	< 6
	0.005 – 0.020	< 2


Figure 5 – Surface Depression Reference
2.8 Holes & Punctures

2.8.1 Identified as visible through hole greater than the size of the core cell.

2.8.2 Adjacent cells with a shared torn wall are not considered instances of holes/punctures.

2.8.3 There shall be (0) unauthorized holes or punctures in the face sheet material.

2.9 Double Cell Walls

2.9.1 Identified as unexpanded adjacent ribbons of honeycomb core.

2.9.2 Double walls are acceptable.

2.10 Over Expanded Cells

2.10.1 Local areas that have become over-expanded will be reviewed by Engineering and be passed/failed per if the core is still structurally acceptable.

2.11 Cell Wall Buckling

2.11.1 Cell wall buckling is acceptable so long as the buckled cell walls remain damage free. If damage is present in buckled cell walls, refer to 2.4 *Disbonds & Cell Wall Failure* for inspection criteria.

2.12 Fit-Up Test

2.12.1 Identified as a measurement of profile conformity to a fit-up tool.

2.12.2 All gaps larger than 0.015 in. height shall conform to the tool (i.e., gap will close and be less than or equal to 0.015 in. height directly under the location the pressure was applied) when light hand pressure (5 lbf) is applied.

2.13 Rolled Metal

2.13.1 Identified as core that is rolled over in the T direction, resulting in a non-conforming thickness.

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2.13.2 Rolled metal may be picked back by a Production Technician the so that the cells walls are no longer bent over one another.

2.14 Unexpanded Cells

2.14.1 Identified as an individual cell that has not been expanded.

2.14.2 Unexpanded cells are acceptable so long as it does not affect part profile conformity or ribbon direction conformity.

2.15 Splicing

2.15.1 The bond line shall be visibly dry, and free of dirt, residues from hand protection, cleaning materials, oil, grease, fingerprints, and foreign materials, such as release layers and airborne contamination. The bonded core splice shall be securely joined as shown below in Figure 3.

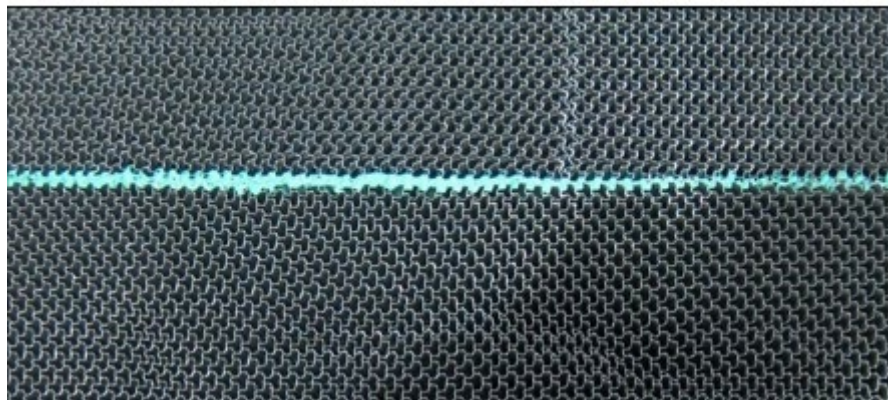


Figure 6 - Securely bonded core splice joint

2.15.2 One layer of 0.05" thick foaming core splice shall be used for all core splicing unless otherwise specified by Engineering:

- a) No overlaps allowed
- b) Adhesive shall be placed full depth of the core
- c) Gap between the two pieces of core splice shall not be greater than 0.03" (Figure 7)

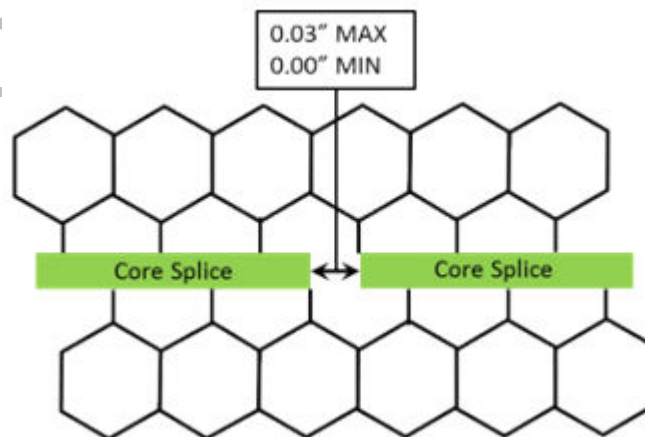


Figure 7 - Core splice butt joint gap

2.15.3 Core splice voids (due to expansion) are acceptable, so long as core

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splice butt joint that is filled with adhesive shall have no gap greater than 0.15" as measured from the outermost core wall edges (Figure 8).

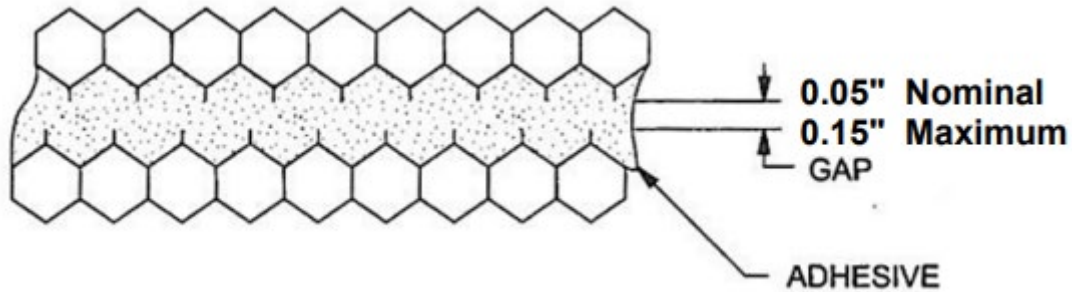


Figure 8 - Core edge gap tolerance

- 2.15.4 All core wall cut edges and adjoining surfaces of any internal detail in a core splice or attachment area shall be contacted a minimum of 95% (0.95" for 1.0" thick core) of their full height.
- 2.15.5 Core splice that contacts less than 95% of the core thickness may be filled with an appropriately sized core splice strip (prior to cure) to meet the specification.

2.16 Potting

- 2.16.1 The potting shall match the location specified within the part engineering definition or may extend up to three cell widths larger than defined.
- 2.16.2 Flushness: The height change from one piece of core to the next, including any splice or potting, shall meet profile tolerances as specified by part drawing. Sanding profile to conformity is allowable if profile exceeds tolerance.

3.0 Revision History

Revision	Date	Section	Summary of change, evaluation of Impact to other processes	Authorized by
A	01/14/22	-	Initial release - Document name "Honeycomb Core Details Inspection Criteria" DCO 22-001	Z. Vangrin
B	07/04/22	2.15, 2.16	Revised Splicing/Potting sections for relevance.	Z. Vangrin