INDIUM10.1 SOLDER PASTE

Looking for an SMT solder paste that has superior printing and voiding performance?

Prefer to use one that is in volume production today?

Want it to be stable at room temperature and on the stencil?

Find the solution inside.

AVOID THE VOID® + STABILITY

INDIUM® CORPORATION®

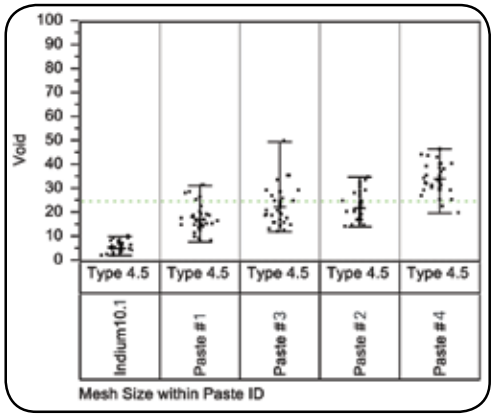
AVOID THE VOID® INDIUM10.1 SOLDER PASTE

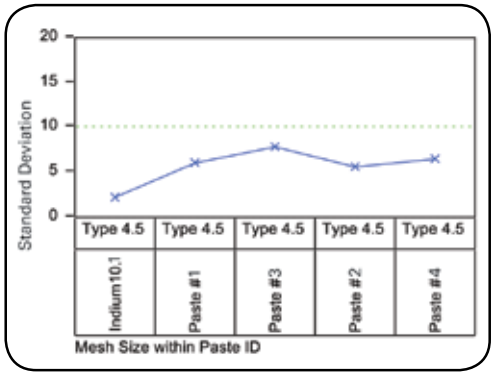
+ STABILITY

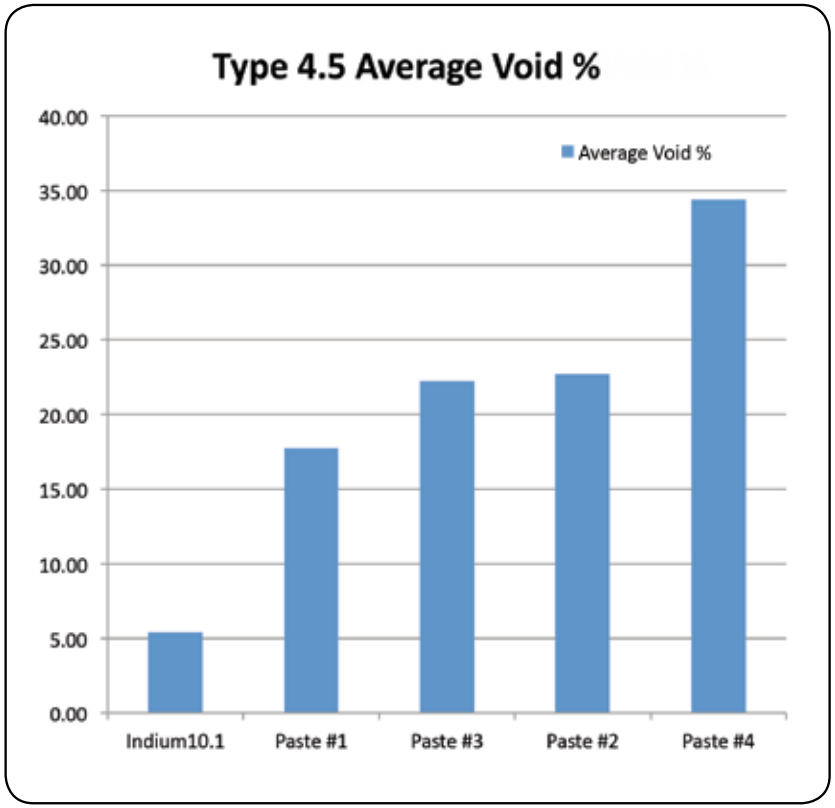
Paste	Indium10.1	Paste #1	Paste #3	Paste #2	Paste #4
Average Void %	5.41	17.74	22.23	22.70	34.42

<15%
15% - 20%
20% - 25%
>25%

Type 4.5 Variability Chart for Void %







	Traditional Solder Pastes	Indium10.1
Refrigerated Shelf Life (<10°C)	6 months	1 year
Usage Life at 25°C	<24 hours	30 days
Stencil Life (22-28°C & 30-60RH)	>8 hours	18 hours

- **Longer shelf life**
- **Stable at room temperature**
- **Longer stencil life**

FEATURES

- Indium10.1 enables the lowest cost of ownership for PCB assembly customers
- Indium10.1 provides a versatile, well-balanced set of properties with best-in-class printing AND soldering performance
  - Print definition and transfer efficiency
  - Low-voiding performance
  - Head-in-pillow resistance
  - Graping resistance
  - Solderability to difficult-to-solder components and RF shield metallizations

SUGGESTED ACTION: If halogen-free is not required, evaluate Indium10.1 to experience the benefits for your process.

AVOID THE VOID® STABILITY SOLDER PASTE STORAGE AND HANDLING GUIDELINES

SOLDER PASTE STORAGE

- Indium Corporation solder paste is refrigerated or frozen after manufacturing and shipped cold, often with a cold pack. This helps keep the solder paste from getting hot during shipping.
- Refrigerated storage prolongs the shelf life of solder paste; -20°C to 10°C is common, although some solder pastes should not be frozen. Consult the product data sheet for specific information.
- Solder paste packaged in syringes and cartridges must be stored with the tip pointed down for best dispensing performance.
- For product-specific storage requirements and shelf life information, please refer to the product data sheet.
- When stored properly in refrigeration, solder pastes are often viable after the "use by" date. It is up to the user to validate use of paste after this recommendation.

STORAGE BEST PRACTICES

- Solder paste is a shelf-life dependent item and should be stored as such (in a First In-First Out manner).
- Upon delivery, solder paste packages should be directly put into a storage refrigerator (<10°C).
- Solder paste should be removed from coolers and refrigerated for long-term storage.
- The manufacturing date is included on each label along with a "use by" date for best performance.
- Solder paste should be stored by lot, ensuring use of the older lots first for optimal material management.

PROCESS IMPACTS OF EXCESSIVE HEAT EXPOSURE

- Generally, solder paste is stable at temperatures less than 25°C.
- Solder paste exposed to temperatures >30°C for extended periods of time may no longer perform as expected.
- Key reasons for concern:
  - Significant flux separation
  - Potential for chemical decomposition, reducing the tack and activity of flux
  - Elevated viscosity, resulting in poor print transfer
- Working life of solder paste is dependent on:
  - Temperature and relative humidity in the manufacturing environment (<30°C)
  - Sealed container, closed container, or open container
  - Air flow inside the stencil printer
  - Time of exposure on the stencil
- Contact Indium Corporation to discuss disposition of heat-damaged solder paste.

BEFORE USING SOLDER PASTE

- Prior to use, solder paste must equilibrate to the environmental conditions in which it will be used.
- It is important to remove sealed containers from refrigeration and equilibrate to room temperature before opening (typically at least two hours, up to four for large or frozen containers).
- Note: Opening cold solder paste in a warmer environment can result in condensation and can also potentially impact performance.
- Recommendation: Remove a jar or cartridge of solder paste from refrigeration one day before use to allow plenty of time for equilibration in the environment (not recommended for syringes).
- Do not expose solder paste to heat (>25°C) to bring it up to temperature.
- For quickest equilibration, a temperature-controlled water bath ≤25°C is recommended.
- Label containers with date of removal from refrigeration to monitor exposure.

PASTE HANDLING BEST PRACTICES DURING STENCIL PRINTING

- It is not typically necessary to re-homogenize paste prior to use. However, if needed, hand stirring with a plastic spatula is the best method for solder paste in jars.
- Use of mechanical mixing equipment is not recommended for homogenizing solder paste.
- When solder paste is removed from the stencil, always store in a separate jar; re-introduction into fresh paste can result in process inconsistency.
- It is not necessary to return solder paste to the refrigerator after opening. It is possible that refrigeration can cause condensation and compromise performance (unless use environment is uncontrolled or >30°C).

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AVOID THE VOID® STENCIL PRINTING STABILITY TESTS

STABILITY

STENCIL PRINTING BEST PRACTICES

- Board support, typically provided by vacuum tooling, is of paramount importance for consistent stencil printing.
- Use enough paste so that a generous bead is able to roll freely when the squeegee moves (typically 10-20mm in diameter).
- Set squeegee pressure just high enough to ensure a clean swipe of the squeegee with no paste left on the stencil after the pass (for Indium Corporation pastes, typically 5kg is sufficient for a 250mm blade).
- Solder paste is a thixotropic material, meaning it thins under pressure, so it only reaches optimal performance after a couple prints (number varies depending on paste).
- Proper gasketing is very important, meaning alignment of apertures with pads, levelness of board surface, and solder mask definition should not detract from contact between the surface of the board and the stencil.
- To check for proper gasketing, check the alignment of stencil and board. While in contact, tap the stencil to ensure there is no space for deflection.
- Wiping the underside of the stencil intermittently to remove any excess paste is often necessary. Typically, a dry wipe with advancing paper and a vac cycle is sufficient.
- Refer to the product data sheet for specific wipe frequency recommendations. Frequency is also highly dependent on proper gasketing and process optimization.
- Powder size choice can also impact stencil printing (refer to Powder Choice application note for more information).
- Typically, higher transfer efficiencies correlate to higher area ratios.

STENCIL PRINTING STABILITY TESTS

Stencil printing tests are conducted with a 100µm "ideal" stencil (laser-cut stainless steel with nano-coating) to eliminate stencil type as a variable. Stencil design includes many sizes and shapes of apertures. The data presented will focus on square aperture designs.

"Phase" category is used to designate which part of the procedure data was collected during:

	1 = 50mm/s	13 = After DV Wipe
	2 = 100mm/s	14 = After Wipe and One-Hour Pause
	3 = 150mm/s	15 = First Recovery
	4 = 200mm/s	16 = After One-Hour Pause, No Wipe
30-Minute Pauses	5 = Set 1	17 = Second Recovery
	6 = Set 2	18 = After Wipe and Two-Hour Pause
	7 = Set 3	19 = Third Recovery
	8 = Set 4	20 = First Boards After Overnight Pause
	9 = Set 5	21 = Overnight Recovery
	10 = Set 6	22 = DV Wipe 30-Minute Pause
	11 = Set 7	23 = No Wipe 30-Minute Pause
	12 = Print 6	24 = Final Recovery

Area Ratio Chart (mils)											
Aperture Size (mils)	6	7	8	9	10	11	12	13	14	15	16
Aperture Size (µm)	152.40	177.80	203.20	228.60	254.00	279.40	304.80	330.20	355.60	381.00	406.40
Stencil Thickness 100µm	0.38	0.44	0.50	0.56	0.63	0.69	0.75	0.81	0.88	0.94	1.00

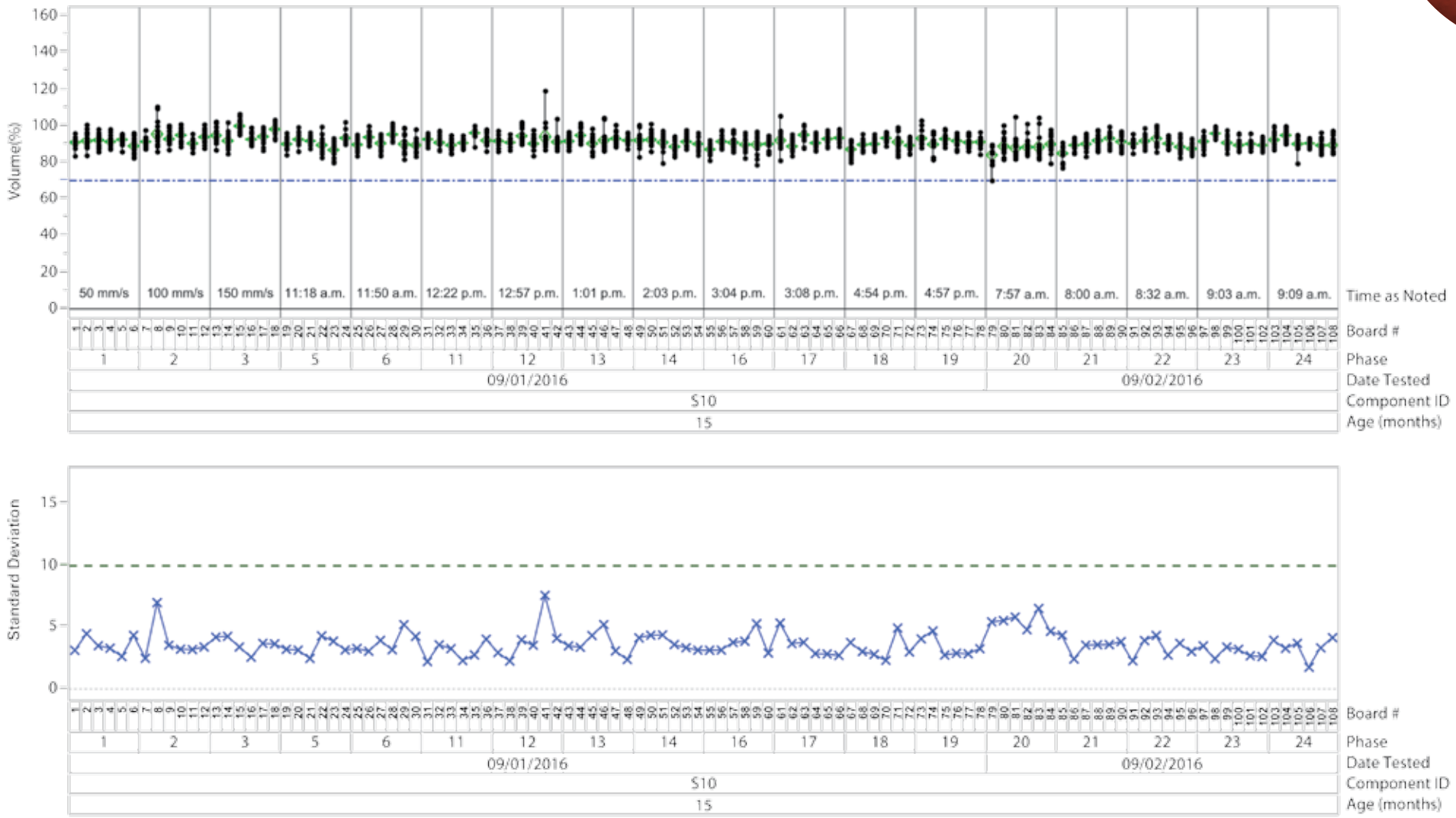
AVOID THE VOID® LONG STENCIL LIFE

STABILITY

Once a bead of paste has been added to the stencil, regardless of pause times, how long will this bead of paste perform?

Test procedure:
A five-hour procedure was performed the first day. A bead of Indium10.1 Solder Paste was left on the stencil overnight. The procedure was resumed the next day to assess response to an extremely long pause, as well as stencil life.

108 Boards Total

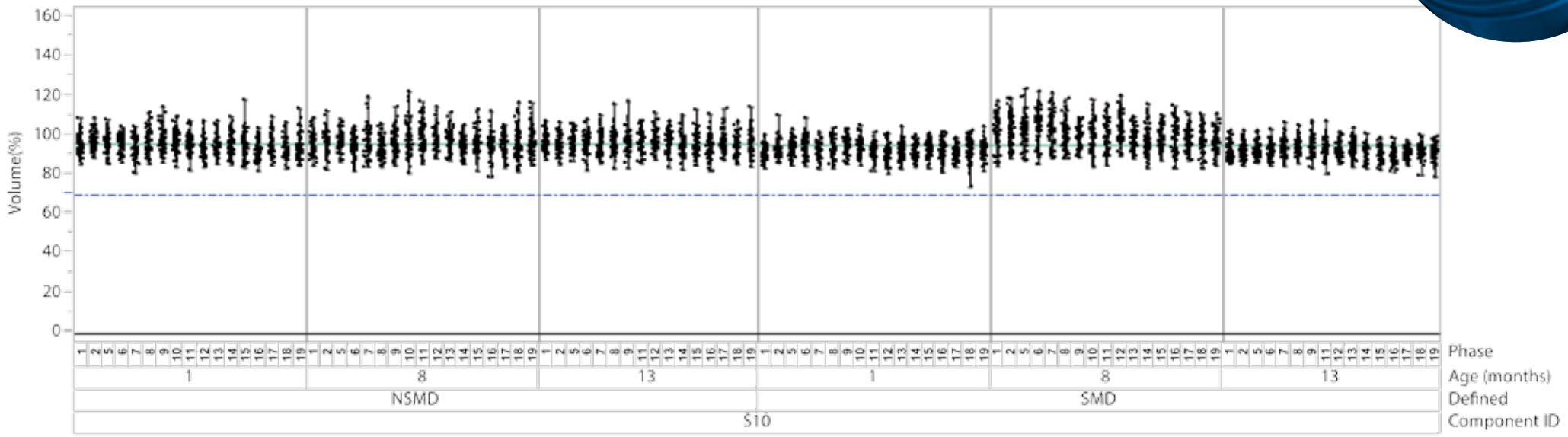


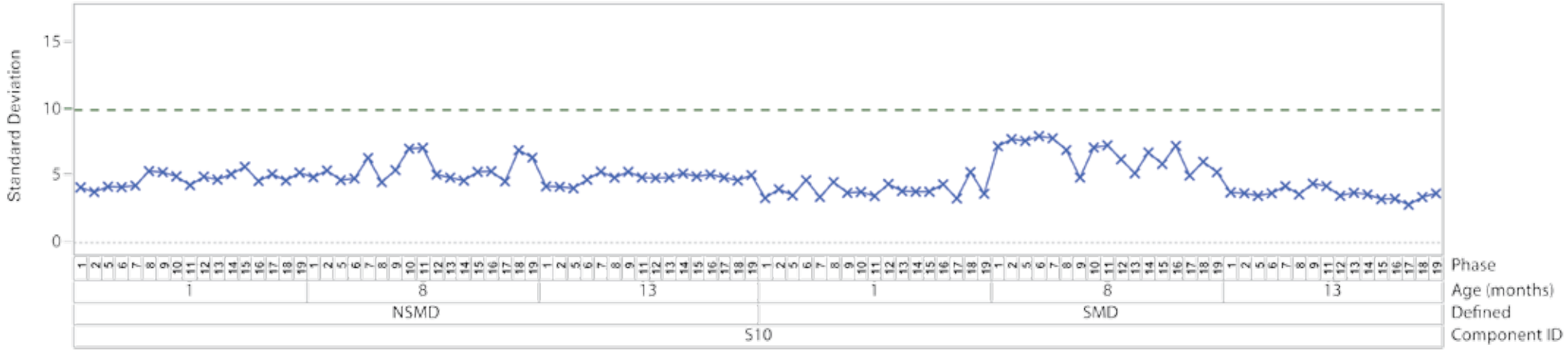
AVOID THE VOID® 12 MONTHS STORAGE REFRIGERATED

STABILITY

Solder paste is stored in a refrigerator or freezer. How does performance change as it nears the end of its shelf life?

Test procedure:
Eight-hour print tests were conducted at each storage interval (one bead of paste, 100+ boards printed). These results show impressive repeatability, showing excellent printing performance after one year in refrigerated storage.

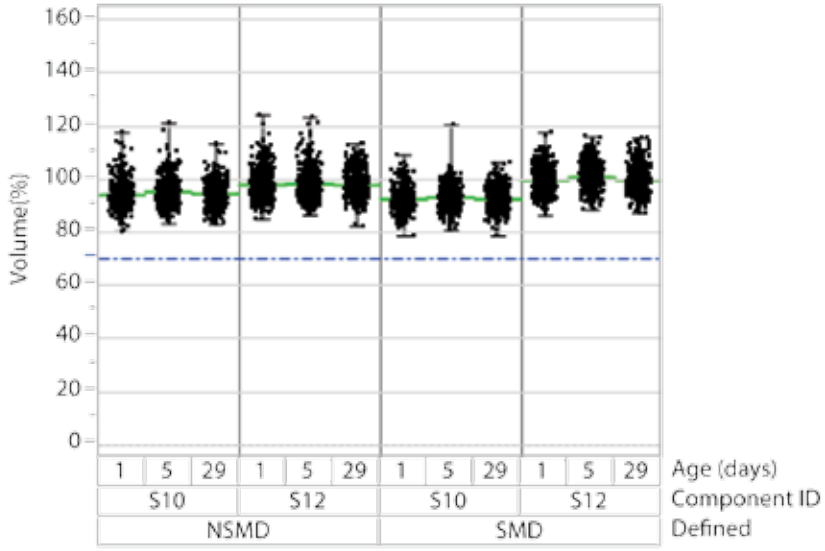


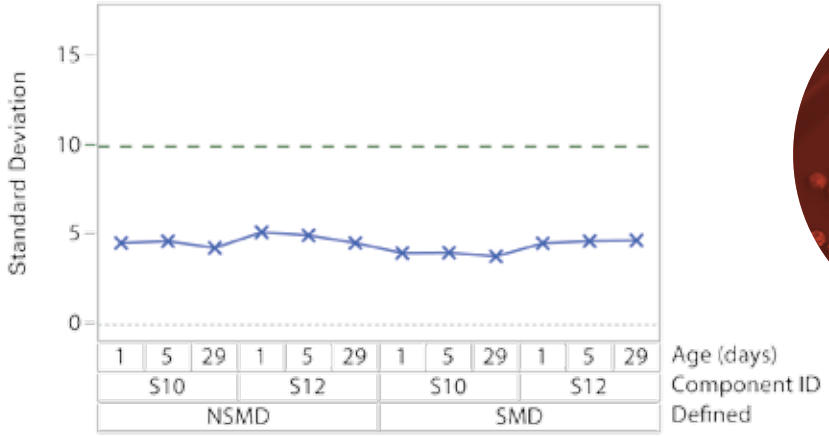


AVOID THE VOID® ROOM TEMPERATURE STABILITY

A closed jar is taken out of the refrigerator and allowed to reach room temperature. How long can it stay on the counter and still be usable?

Test procedure:
Testing was conducted periodically to monitor changes in appearance, viscosity, stencil printing, and reflow performance. The data shown here summarizes the print data, whether the jar has been out from Monday to Friday, or even up to four weeks.





864 Points Per Grouping

INDIUM CORPORATION

Our Goal

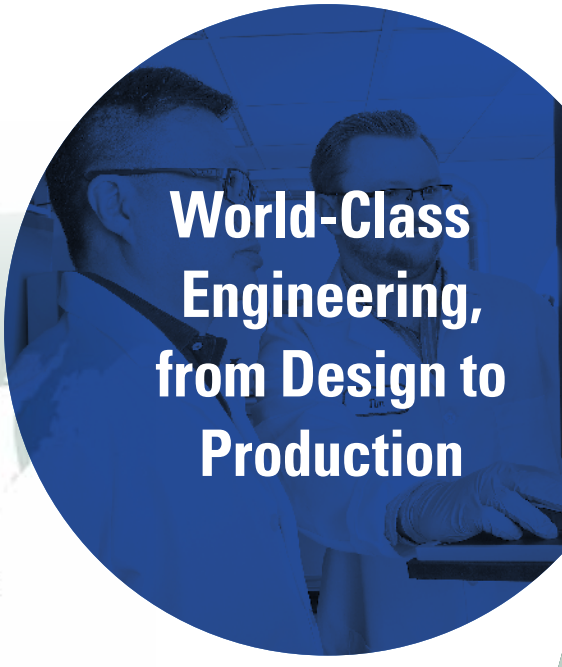
Increase our customers' productivity and profitability through premium design, application, and service using advanced materials.

Our Basis For Success:

- Excellent product quality and performance
- Superior technical and customer service
- Cutting-edge material research and development
- Extensive product range
- Lowest cost of ownership

Business Segments

- Electronics Assembly Materials
- Engineered Solders & Alloys
- Metals & Compounds
- Thermal Interface Materials
- Nanotechnology
- Semiconductor Assembly Materials



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Contact our engineers today: **askus@indium.com**

Learn more: **www.indium.com/avoidthevoid**

From One Engineer To Another®