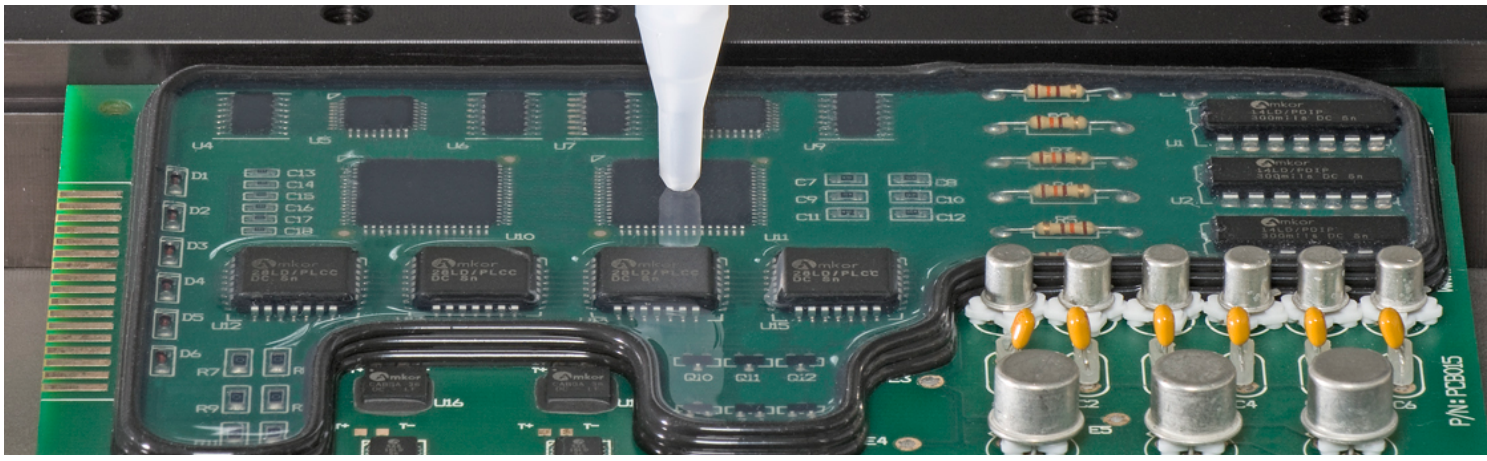
INNOVATION. PRECISION. EXCELLENCE.

PRECISION PACKAGE: DAM & FILL



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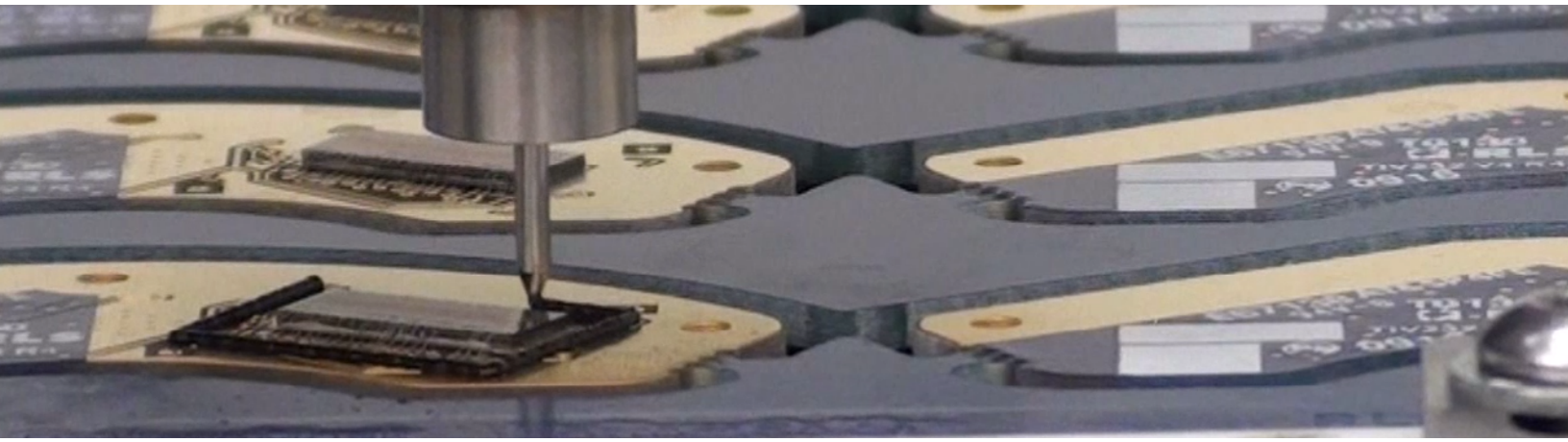
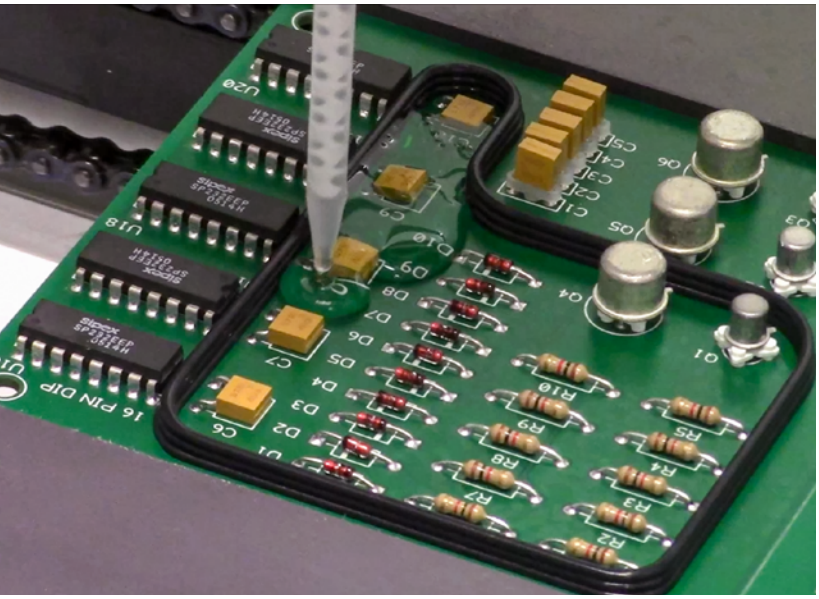


DAM & FILL APPLICATIONS



Dam and fill applications are used where a section of a printed circuit board (PCB), electrical assembly, or wire bonded die needs to be potted or encapsulated in material but there is no package or means to confine the liquid potting material. This application can also be useful when there are small gaps or spaces between components that need to be filled with epoxy or another encapsulant material for mechanical support and improved thermal performance.

To create a dam and fill, a dam is developed as a physical barrier around a component before applying the encapsulant or potting material. In most cases, the fill material can be applied immediately after the dam material, followed by heat curing both materials at the same time. Depending on material requirements, room temperature curing may also be an option.

KEY MARKETS

- Aerospace and New Space
- Automotive, E-Mobility, and Transportation
- Military and Defense
- Renewable Energy
- Telecommunications and Connectivity

DEFINING YOUR SOLUTION

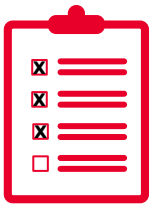
STEP 1: Understanding Material Properties and Chemistry

Dam and fill requires two very different types of materials to form and then fill the dam. A one or two part thixotropic paste is typically used to form the dam. Whereas the fill material is typically a low viscosity one or two part material. One of the most common configurations used that aids in the application process is a one part heat cure dam, and a two part heat or room temp cure fill material. Work with your material manufacturer along with equipment supplier to select a material that is right for your application and that provides a robust process to apply the material. Clearly define the requirements of the material:

- Base chemistry
- Single or two component formulation
- Viscosity
- Required cure schedule
- Pot or work life
- How the material is packaged/container size (cartridge, canpail, bladder bag, etc.)

STEP 2: Defining the Dam and Fill Requirements

This requires two specifications - one for the dam and one for the fill. Key requirements include:



Dam

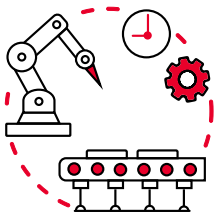
- Bead dimensions and allowable tolerance
- Bead location and tolerance
- Clearly defined keep out areas

Fill

- Minimum and maximum fill volume
- Acceptability of voids or bubbles

STEP 3: Define the Automation Required

Will the process be manual, semi-automated, or fully automated? In addition to requirements identified in steps 1 and 2, the following questions need to be answered in order to define the required equipment:



- What is the production rate required (e.g. number of parts annually)?
- What is the duty cycle for the process (e.g., hours per day, days per week, weeks per year)?
- Takt time (determined by production rate and duty cycle)?
- Part dimensions?
- Part handling - will the process be manual load/unload or conveyorized?

ADDITIONAL CONSIDERATIONS

1. Carefully review material requirements and choose materials that meet the application requirements and provide a robust process that can be realistically employed.
2. Components covered with the fill material can trap air. Determine if trapped air under components is acceptable. If the trapped air releases from components and forms bubbles in the fill material, specify if this is not acceptable. If some bubbles are acceptable, quantify what is and is not acceptable in your application.
3. Most manufacturing challenges can be eliminated by utilizing DFM (design for manufacturing) by working with your material supplier and equipment manufacturer early on in the process.

CHOOSING YOUR APPLICATION METHOD

Some of our most common valves for gasketing and sealing are shown below with optional features and additions where applicable. To learn more about each valve, scan the corresponding QR code.

BP50

Controlled dispensing for 50 ml bi-pack cartridges for low to high viscosity fluids.

Viscosity
1 cps - paste

FC100-MC

Needle dispense valve that uses standard Luer Lock needles for detail or hard to reach areas. Capable to use with high pressure for dispensing gels and encapsulants.

Viscosity
1 cps - paste

SB300

High flow rate dispense valve with snuff back operation used with high viscosity adhesives for large dot or bead applications. Available with luer lock outlet or 1/4" NPT connection.

Viscosity
50,000 cps - paste

PC100

Plural component mixing valve with a divorced valve design to prevent material contamination of the air body.

Viscosity
1 - 100,000 cps

PC150

Compact two part dispense valve for a wide viscosity of unfilled fluids with short pot life chemistries.

Viscosity
1 - 500,000 cps (unfilled)

PC200

Ideal for most two component bead or dot project and compatible with standard bell inlet disposable mixers.

Viscosity
1 - 500,000 cps

PCP

Featuring a machined rotor coupled with a rubberized seal to assure drip-free operation with a wide range of viscous chemistries.

Viscosity
1 - 500,000+ cps

PDP

Superior volumetric accuracy for your most demanding two-component dispensing applications.

Viscosity
1 - 500,000+ cps

SD100

Provides clean on/off control for dispensing directly from syringes.

Viscosity
1 cps - paste

SP100

Syringe pump dispenser that is optimal for encapsulant applications.

Viscosity
1 cps - paste

SVX

Auger valve for processing micro volumes of medium to high viscosity epoxies in precise, repeatable patterns.

Viscosity
25,000 cps - paste

Compatible Pump & Metering Options

Endurance

Bundles multiple dispensing and pumping technologies into one solution as a standalone or integrated option.

Ratio
1:1 to 15:1

SMR

Servo metering rod system for two component systems with abrasive fillers.

Ratio
Variable, 1:1 to 10:1

SGP

Servo precision gear pump for single or two component chemistries.

Ratio
1:1 to 15:1

CP Series Pump

Ideal for dispensing medium to high viscosity materials in pre-packaged cartridges.

5GPP Series

Five gallon pail pumps ideal for transferring high viscosity fluids under high pressures to a dispense applicator or metering system.

DEFINING YOUR AUTOMATION

With an application method chosen, a benchtop or inline/batch automation method can be selected to complete your process. Scan the corresponding QR code to learn more about each system.

Benchtop Solutions

PVA350

A compact 3 axis robot ideal for entry level automation of a variety of coating and dispensing applications.

Work Area (1 Valve/Tool)
365 mm x 378 mm x 101 mm

Footprint
944.3 mm x 831.8 mm x 793.7 mm

Inline/Batch Solutions

Delta 8

Conceptualized for maximum flexibility, the Delta 8 features a robust overhead three-axis motion platform suitable for inline or batch operations.

Work Area (1 Valve/Tool)
621 mm x 595 mm x 100 mm

Footprint
1270 mm x 973 mm x 2222.6 mm

Delta 6

Designed with improved structural and gantry rigidity for higher acceleration, robustness, and easier access.

Work Area (1 Valve/Tool)
521 mm x 485 mm x 100 mm

Footprint
854 mm x 1170 mm x 2105 mm

Flex Cell

Designed to meet your specific application requirements. Available in standard to very large work areas and can be highly customized.

Work Area
Various, from 500 mm^2 - 1200 mm^2

Footprint
Varies upon workcell

Inline/Batch Configuration Options

Number of Axes

3, 4, or 5

Head Tooling

Single or dual tool

Fluid Delivery

Syringe
Cartridge
Pail
Drum
Bladder bag

Substrate Handling

Edge chain conveyor
Pin chain conveyor
Flex fixture
Tooling plate
Single drawer
Dual drawer

Vision

Fiducial camera
Programming camera

Software

Barcode
MES
Hermes
CFX

Additional Options

Agitation
Auto refill
Black light
Blower
Flow monitor
Needle calibration block
Recirculation
Temperature control
Vacuum degas

CURING AND HANDLING

Curing and handling options can easily be added to streamline your process. Scan the corresponding QR code to learn more about each system.

Curing Solutions

Spectra

With Fusion® UV lamps by Heraeus, the Spectra can initiate fast ultraviolet light polymerization of adhesives and coatings in an efficient inline process. Various beam widths are available to accommodate a wide range of substrate dimensions.

Working Width
50 mm to 500 mm

Footprint
1651 mm x 1066.8 mm x 1661.2 mm

DeltaTherm

Utilizing infrared panels, the DeltaTherm can efficiently cure adhesives and coatings in a controlled, heated environment. With its double-sided configuration, the DeltaTherm offers custom top and bottom heat profiling in each two-foot section. Optional humidity control feature is available for further control of moisture cure applications.

Working Width
50 mm to 500 mm

Footprint
Varies upon oven
4ft, 8ft, 12ft, and 16ft options available

Handling Solutions

Queue-S Transfer & Inspection Conveyor

Ideal for a wide range of part handling applications, the Queue-S transfer and inspection conveyor can optimize material flow between processes for either bare board assemblies or pallet fixtures.

Working Width
50 mm to 500 mm

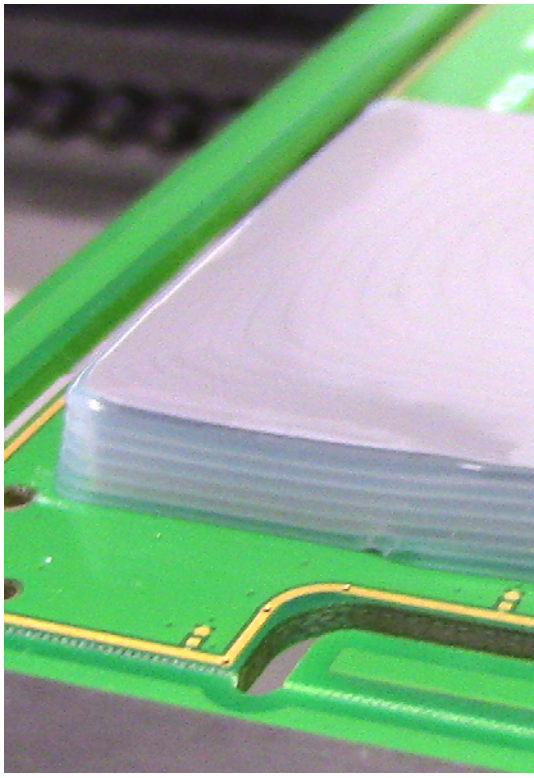
Footprint
1046 mm x 1003 mm x 2022.9 mm

Curing and Handling Configuration Options

Conveyor Height	Component Clearance
890 mm to 965 mm from floor (SMEMA)	100 mm (4 in) maximum top and bottom 4.75 mm (0.187 in) in edge carrying (SMEMA)*

**Applicable for Queue Series*

FREQUENTLY ASKED QUESTIONS



When should dam and fill be used?

A dam and fill application can be best utilized when your process is looking to encapsulate only select areas of the substrate. Ideally, the application will have clear requirements for keep outs and wetted areas.

How can I avoid air/bubbles in my fill material?

If the fill rate is too fast and air cannot escape prior to the material curing, the potted assembly can be placed in a vacuum chamber to allow trapped air/bubbles to expand and rise to the surface and burst. If you have an array of parts being filled at same time, another potential solution is to fill each part in multiple steps. For example, if you have an array of 10 parts, dispense half the amount in each of the 10 parts. As you are filling subsequent parts, air is escaping the previously potted parts. By the time you get back to the first one, the air has escaped and you can complete the fill.

How does dam and fill compare to conformal coating and full encapsulation?

Compared to conformal coatings and full encapsulations, dam and fill offers more balance with targeted protection for sensitive components against moisture, chemicals, and mechanical influences. This allows other areas to still be accessible for any potential reworks. Additionally, thickness control of both the dam and fill components can allow for less weight addition than full encapsulation methods.

Leader in World Class Dispensing, Coating, and Custom Automation

PVA is a world class innovator of high quality, repeatable dispensing and conformal coating systems. We manufacture turnkey solutions that help our customers improve their competitiveness. We do that through engineering robust processes that introduce repeatable results that reduce waste, increase throughput, and lower manufacturing costs. Our flexibility is unmatched as each solution is customized to optimize your manufacturing goals.

Headquartered in Upstate New York, with regional sites stationed throughout North America, Europe, and Asia, all PVA Systems are backed by a 24-hour global service network.

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