

pentagon EMS
ELECTRONIC MANUFACTURING SOLUTIONS

A StenTech Company |

Backed by North America's leading SMT and
Precision Manufacturing Platform.

StenTech 
Innovative Problem Solvers

**Advanced PCBA
Process Tooling &
Precision Manufacturing**

Engineered solutions that improve yield,
repeatability, and production efficiency.

THE PENTAGON DIFFERENCE

ENGINEERED AROUND YOUR PROCESS.

For more than two decades, Pentagon EMS has helped manufacturers solve complex production challenges through engineered tooling, precision manufacturing, and advanced component fabrication solutions. Our approach starts with the process.

We work to understand your PCB, production environment, equipment, and production objectives before engineering a solution designed to improve process control, repeatability, product quality, and throughput.

From high-performance PCBA tooling and fixtures to precision-machined components and advanced precision parts, Pentagon combines specialized engineering expertise with the technology and production resources required to move projects from concept to production with confidence.

Today, as part of the StenTech Manufacturing Platform, these capabilities have been further strengthened through substantial investments in new CNC machining centers, facility modernization, and advanced production equipment. Customers now benefit from an even broader North American platform, bringing together expanded engineering resources, specialized technical expertise, and industry leading technologies to deliver complete precision solutions from prototype through production.



**WE DON'T JUST MANUFACTURE.
WE SOLVE COMPLEX PRODUCTION
CHALLENGES »**



PCBA PROCESS TOOLING

Custom-engineered tooling and fixtures that improve control, repeatability, and efficiency throughout PCB assembly, from SMT and wave soldering to press-fit, conformal coating, inspection, and test. Each solution is engineered around your process to support consistent, reliable production performance.



ADVANCED MACHINING

High-precision CNC machining and fabrication for complex, high-tolerance components and assemblies, from rapid prototypes through full production. Advanced milling and turning capabilities deliver the accuracy, consistency, and manufacturing flexibility required for demanding applications.



PRECISION PARTS

Advanced precision manufacturing for complex metal and plastic components from prototype through production. Combining laser cutting, chemical etching, and electroforming with the expanded capabilities of the StenTech manufacturing platform, we deliver accurate, repeatable parts for demanding applications.

YOUR BOARD. YOUR PROCESS. OUR TOOLING.

PCB assembly is a sequence of highly controlled manufacturing processes. At every stage, board stability, positioning, protection, alignment, and repeatability matter.

Pentagon EMS develops specialized tooling solutions around the real-world demands of the production floor, helping manufacturers increase process speeds, improve reliability, and maximize throughput.

Whether supporting a flexible circuit through stencil printing and reflow, protecting sensitive components during wave soldering, controlling alignment during press-fit assembly, or improving repeatability during coating, inspection, and test, our tooling helps solve complex process challenges, improve production performance, and increase overall manufacturing efficiency.

BETTER PROCESS PERFORMANCE. GREATER PRODUCTIVITY. IMPROVED PROFITABILITY.

Tooling solutions for every process. Every challenge.

We offer a comprehensive range of custom tooling solutions designed to support, optimize, and improve performance across every stage of PCB assembly.

SMT Process Tooling

- SMT Process Carriers
- Universal Process Carriers
- Printer Support Plates
- Matrix Trays
- AOI / 5DX Fixtures
- Flying Probe Fixtures
- Hand Soldering Fixtures

Wave Solder Tooling

- Wave Solder Tooling
- Selective Solder Fixtures
- Universal Solder Fixtures
- Rotary Wave Solder Fixtures
- Routing Fixtures (Depanelization)
- Overarm Bars

Press Fit Tooling

- Press Fit Support Fixtures
- Press Fit Top Tools
- Component Presses

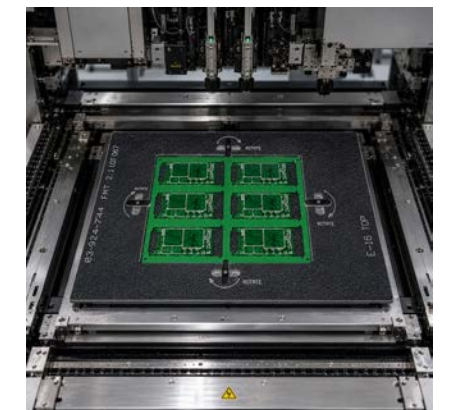
Holdown Solutions

- Alignment Hold-Down Canopies
- PCB & Component Holddowns

Coating & Assembly Tooling

- Conformal Coating Fixtures
- PCB Wash Baskets
- Final Assembly Fixtures
- Component Masking Boots
- Lead Trimming and Forming Tools
- Label Alignment Fixtures
- Custom Applications
- Manufacturing Solutions

SMT PROCESS CARRIERS



Increase accuracy, repeatability, and process stability throughout the SMT assembly process with custom SMT Process Carriers. Designed to support PCBs through printing, pick-and-place, and reflow, these precision fixtures provide stable board support while minimizing thermal mass and eliminating interference with production equipment.

Flush-mounted hardware securely supports and positions the PCB without interfering with stencil printing or automated pick-and-place operations. Ideal for rigid-flex and flex circuits, irregularly shaped PCBs, and assemblies with edge-mounted components, each carrier is custom engineered to maximize process consistency, protect assemblies, and improve yields from prototype through high-volume production.





SMT PROCESS TOOLING

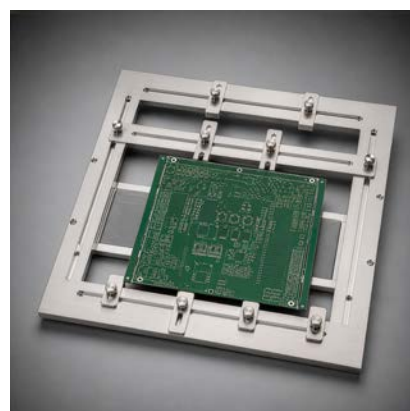
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UNIVERSAL PROCESS CARRIERS



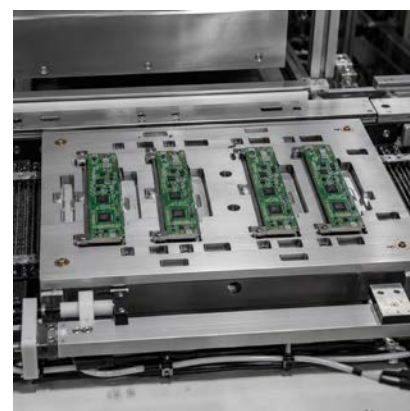
Process a wide variety of PCB sizes, shapes, and configurations with a single flexible tooling solution. Universal Process Carriers feature adjustable width and accommodate a range of specified PCB thicknesses, providing exceptional flexibility for changing production requirements. Compatible with printing, pick-and-place, reflow, conformal coating, inspection, washing, and other PCB assembly processes, these carriers utilize low-profile, sub-surface hardware to securely support assemblies without interfering with production. Ideal for prototype, mixed-product, and high-mix environments, they improve process stability, repeatability, and manufacturing efficiency while reducing the need for dedicated tooling.



PRINTER SUPPORT PLATES



Achieve accurate, repeatable solder paste deposition with Pentagon EMS Printer Support Plates. Custom designed to provide rigid, stable PCB support throughout the screen printing process, these plates minimize board flex and maintain consistent stencil contact across the assembly. Each plate is tailored to your PCB and printing equipment to improve print accuracy, reduce process variation, and support higher first-pass yields. Manufactured from durable ESD-safe composite materials or precision machined aluminum, Printer Support Plates deliver reliable performance in demanding SMT production environments. Vacuum-compatible designs are also available for applications requiring enhanced board stability, support, and process control.



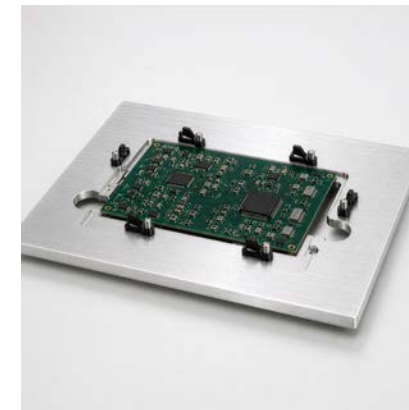
MATRIX TRAYS



Our Matrix Trays provide a custom ESD-safe handling solution for SMT components not available in standard JEDEC packaging. Precision machined to securely hold and accurately present components to automated pick-and-place equipment, these trays enable reliable processing when tape-and-reel presentation is not an option. Each tray is designed around the specific component to protect delicate devices and ensure consistent positioning throughout production. Durable ESD-safe materials support storage, shipping, and bake-out applications while maintaining reliable handling performance. From prototypes through high-volume manufacturing, Pentagon EMS Matrix Trays improve automation, component protection, and overall process efficiency.



AOI / 5DX FIXTURES

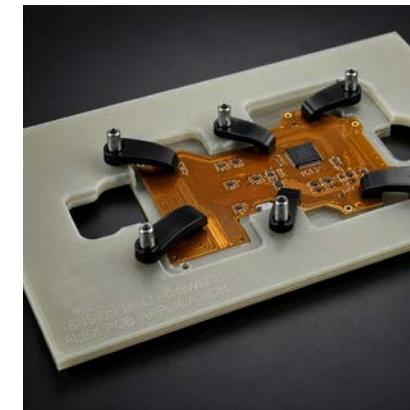


Improve inspection accuracy and repeatability with precision fixtures designed to securely position PCBs during automated optical inspection (AOI) and X-ray (5DX) processes. By controlling board movement, skewing, and flex, these fixtures maintain consistent alignment throughout inspection and help reduce false failures.

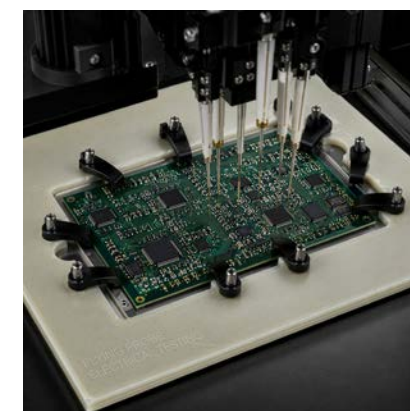
Custom engineered for specific PCB and equipment requirements, AOI / 5DX Fixtures support faster, more reliable inspection while improving process consistency across prototype, NPI, mixed-product, and high-volume production environments.



FLYING PROBE FIXTURES



Improve test accuracy and repeatability with Flying Probe Fixtures engineered to securely locate and support PCBs throughout the testing process. Precision positioning permits simultaneous probe contact on the top and bottom of the board, while tension holdowns control flex and warpage to help eliminate false failures. Ideal for dense circuitry, odd-shaped boards, flex circuits, and edge-mounted components, custom single or multi-up fixtures improve probe accuracy, increase throughput, and deliver consistent, reliable test results across demanding PCB assembly environments.



HAND SOLDERING FIXTURES



Improve manual soldering accuracy, consistency, and efficiency with custom Hand Soldering Fixtures engineered to securely locate and support PCB assemblies. Purpose-built for each application, these fixtures prevent board and component movement while protecting delicate assemblies and providing stable, repeatable positioning throughout the soldering process. Ergonomic, production-ready designs simplify operations, reduce handling errors, improve workmanship, and increase throughput. Ideal for prototype, rework, low-volume, and full production environments, each fixture is tailored to specific assembly requirements, helping operators achieve reliable, consistent, high-quality soldering results across every production cycle.





WAVE SOLDER TOOLING

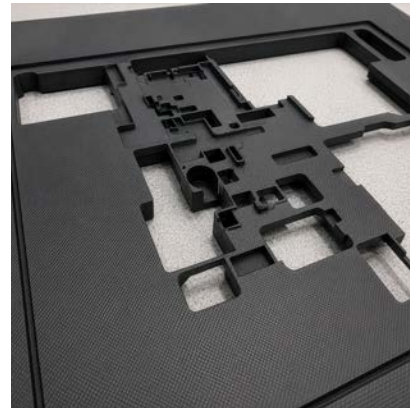
WAVE SOLDER TOOLING



Optimize through-hole assembly with custom Wave Solder Pallets engineered to improve solder quality, reduce cycle times, and increase production throughput. Each pallet securely supports the PCB while masking gold fingers, open routings, plated tooling holes, solder-side SMT components, and other critical board features from the solder wave. Precision-machined openings expose through-hole leads for controlled, repeatable solder flow, eliminating time-consuming hand masking. Compatible with both leaded and lead-free processes, and designed to accommodate overarm bars where required, our tooling reduces defects, improves yields, and delivers consistent, reliable wave solder performance.



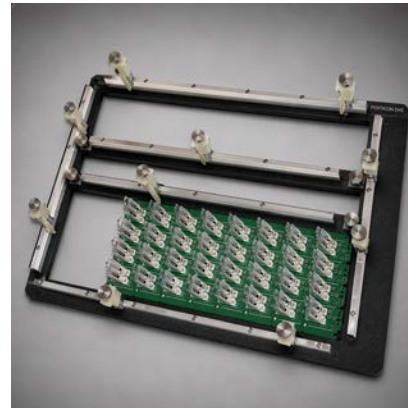
SELECTIVE SOLDER FIXTURES



Improve solder quality and process repeatability with custom-engineered Selective Wave Solder Fixtures. Designed for each PCB application, these fixtures securely support the assembly while exposing only areas requiring solder and protecting sensitive components and critical board features from the molten wave. Precision support helps maintain component alignment, control board movement, and reduce bridging, skips, and other common solder defects. Designed to accommodate odd-shaped and non-standard PCBs, these fixtures also eliminate many manual masking and gluing operations. The result is improved first-pass yield, faster processing, reliable thermal protection, and safer, more ergonomic handling.



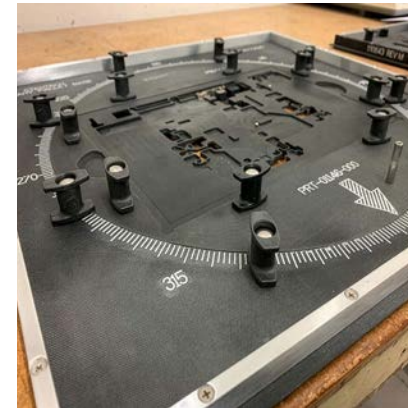
UNIVERSAL SOLDER FIXTURES



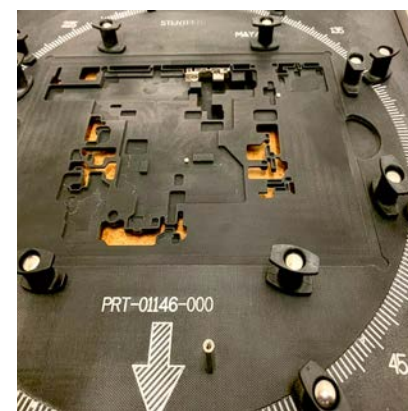
Process a wider range of PCB sizes and configurations with our Universal Wave Solder Pallets. Designed to make odd-shaped boards and assemblies with edge-mounted components conveyor friendly, these adjustable fixtures provide secure support throughout wave and selective soldering processes. Fully adjustable perimeter holddowns can be positioned exactly where needed, while center bars quickly accommodate varying PCB widths. Ideal for prototype, NPI, and low-to-medium volume production, Universal Wave Solder Pallets improve process consistency, simplify changeovers, and reduce dedicated tooling requirements. Optional Overarm Bars, titanium edge steps, and process identification features provide added support, durability, and flexibility.



ROTARY WAVE SOLDER FIXTURES



Improve wave solder quality and process reliability with our Rotary Wave Solder Pallets. Designed to determine and maintain the optimal PCB presentation angle, adjustable rotation in 5-degree increments helps reduce bridging, skipping, and rework. Wave pockets and solder channels promote controlled solder flow, while durable materials provide reliable support through repeated production cycles. A common pallet base accommodates multiple board designs using interchangeable rotating plates, reducing tooling costs and increasing flexibility. Optional titanium edge steps, thin-wall inserts, process identification features, and custom configurations provide added durability and control for demanding through-hole and mixed-technology assemblies.



ROUTING FIXTURES (DEPANELIZATION)



Separate PCBs with precision using custom Routing Fixtures engineered to securely support assemblies throughout the depanelization process. Precision-machined to match the exact PCB profile, each fixture minimizes board movement, flex, and vibration in the X, Y, and Z axes as required, protecting components during routing.

Compatible with manual and automated routing systems, these durable, wear-resistant fixtures improve cut quality, reduce scrap, maintain dimensional accuracy, simplify setup, increase throughput, and deliver consistent, repeatable depanelization performance for prototype, NPI, and high-volume production environments.



OVERARM BARS



Improve wave solder process control and reduce setup time with custom Overarm Bars from Pentagon EMS. Designed to hold and orient topside components, secure PCBs within the fixture, and control warpage on larger boards, each solution is tailored to the specific assembly. Available in hinged or detachable configurations, Overarm Bars attach quickly using spring-loaded latching mechanisms for secure, repeatable positioning. Detachable designs are keyed to ensure correct orientation to the fixture and PCB, while custom contact pads can accommodate irregular component shapes. From simple board retention to complex component control, Overarm Bars improve stability, repeatability, and overall process efficiency.





PRESS FIT TOOLING

HOLDDOWNS

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PRESS FIT SUPPORT FIXTURES



Improve press fit assembly accuracy and throughput with precision engineered Support Plates designed to provide rigid PCB support during component insertion. By evenly supporting the board and accurately aligning components with the top tool, these fixtures reduce setup time, minimize handling, and protect PCBs and connectors from damage. Complete bottom-side support eliminates the need for multiple individual support tools, reducing tooling costs and simplifying production. Universal configurations with adjustable guide rails and interchangeable connector support plates accommodate multiple PCB sizes. The result is faster setup, improved repeatability, and reliable press fit assembly performance.



PRESS FIT TOP TOOLS



Achieve accurate, repeatable connector insertion with precision-crafted Press Fit Top Tools designed to match your specific component geometry. Engineered to transfer insertion force evenly, each tool protects delicate connectors and PCBs while improving assembly consistency. Custom designs can press multiple closely positioned components simultaneously and standardize press stroke length, reducing setup time and increasing throughput. Manufactured from hardened steel, stainless steel, or aluminum, Top Tools are compatible with manual, pneumatic, and automated press systems. With shorter lead times and lower costs than typical component manufacturer tooling, they provide a fast, reliable, and cost-effective solution for press fit assembly.



COMPONENT PRESSES



Custom Component Presses accurately install connectors, pins, and other components with consistent force and precise alignment. Engineered for each application, these purpose-built fixtures improve repeatability, protect sensitive assemblies, and reduce assembly errors while ensuring proper component seating. Designed for manual, pneumatic, or automated production environments, they streamline assembly operations, increase throughput, and deliver reliable, high-quality results across prototype, NPI, and high-volume manufacturing applications.



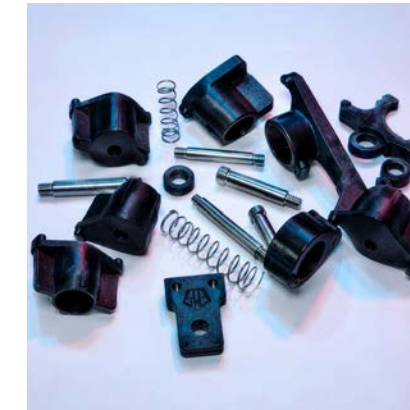
ALIGNMENT HOLD-DOWN CANOPIES



Maintain precise component positioning throughout the soldering process with custom Alignment Hold-Down Canopies. Designed for assemblies requiring critical alignment with mating parts or downstream processes, these fixtures ensure components remain positioned to exact design specifications, reducing misalignment, rework, and assembly variation. Engineered for durability and ease of use, Alignment Hold-Down Canopies mechanically secure light, unstable, or tall components during soldering to prevent lifting or movement. Available in a wide range of standard and custom configurations, they combine accurate positioning with reliable mechanical support to deliver consistent, repeatable, high-quality assembly results.



PCB & COMPONENT HOLDDOWNS



Secure PCBs and components throughout demanding assembly processes with durable, easy-to-use holddowns designed for wave solder, SMT, and custom tooling applications. Injection molded from glass-reinforced, high-performance resin, standard holddowns maintain strength and stiffness across a broad temperature range while providing excellent chemical resistance and electrical properties. Designed for lead-free solder environments, multiple configurations provide reliable retention, comfortable operation, and fast loading and unloading, helping improve board stability, process repeatability, operator efficiency, and overall production throughput.



BALD PCB Holddown
Rotating, spring-loaded PCB holddown. The standard for general purpose use.



BSALD PCB Holddown
Rotating, spring loaded PCB holddown. For use when space is at a premium.



Rudder PCB Holddown
Rotating, spring-loaded PCB holddown. For use when a lower profile is desired.



XBALD PCB Holddown
Rotating, spring-loaded PCB holddown. Ergonomic, pulling grip design.



XBALD PCB Holddown
Rotating, spring-loaded PCB holddown. Single sided version of the XBALD.



Ball Pincher Holddown
Spring-loaded, deft style PCB holddown. Useful for quick change of PCB.



TENSIONER
Spring-loaded, flush mount design. Applies pulling force to PCB when tooling pin holes are available.



SNUGGER
Spring-loaded, flush mount design. Applies pushing force to PCB when tooling pin holes are not available.

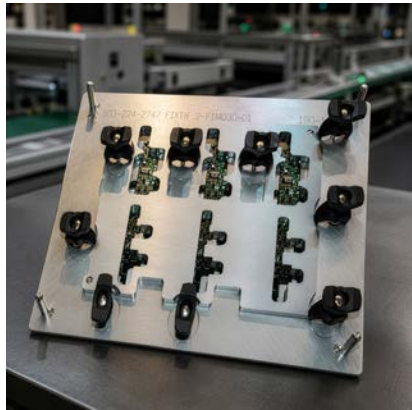


FENDER
Spring-loaded, applies downward retaining force to component to hold it securely in place through wave solder. Configurable to accommodate different component heights.

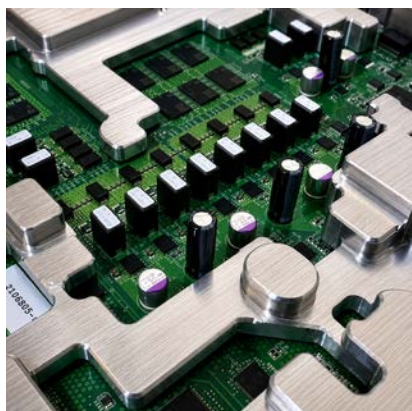


COATING & ASSEMBLY SOLUTIONS

CONFORMAL COATING FIXTURES



Streamline conformal coating with custom fixtures designed to deliver fast, accurate, repeatable PCB masking for both hand spray and automated coating processes. Each fixture securely supports the assembly while exposing only areas requiring coating and protecting connectors, test points, contacts, and other critical features from overspray. Simply load the PCB, close the covers, and begin processing eliminating manual masking and improving process consistency. A specialized tabbed design minimizes fixture contact, reducing coating buildup and maintenance. Multi-board configurations increase throughput, while ergonomic, application-specific designs improve reliability, repeatability, and production efficiency.



PCB WASH BASKETS



Protect assemblies and improve cleaning consistency with custom stainless steel Wash Baskets engineered for your specific PCB or component. Designed to securely support products throughout automated washing and rinsing processes, each basket provides excellent solution flow while limiting movement, reducing handling damage, and improving process consistency. Optional stainless steel mesh lids or inserts provide additional board retention when required. Precision built to match your application, Wash Baskets support prototype through high-volume production while improving throughput, reducing handling time, and delivering consistent, repeatable cleaning performance in demanding manufacturing environments.



FINAL ASSEMBLY FIXTURES



Custom Final Assembly Fixtures accurately locate and secure components, improving positioning, reducing assembly time, minimizing variability, and delivering consistent, repeatable quality across production environments.

COMPONENT MASKING BOOTS



Custom Component Masking Boots protect selected components during conformal coating with precise, repeatable masking. Manufactured in G10, aluminum, or ESD composite (Durostone), they improve coating consistency, reduce labor, simplify setup and removal, and support prototype through high-volume production.

LEAD TRIMMING AND FORMING TOOLS



Custom precision tooling designed to trim, form, and prepare component leads with exceptional accuracy, delivering clean, consistent results while reducing setup time and improving production efficiency.

LABEL ALIGNMENT FIXTURES



Custom Label Alignment Fixtures precisely position and secure labels for accurate, repeatable application. Designed for manual or automated processes, they improve placement consistency, reduce errors, streamline assembly, and ensure a professional finished product.

ENGINEERED MANUFACTURING SOLUTIONS



Not every manufacturing challenge fits a standard solution. Pentagon engineers design and manufacture custom tooling for PCB assembly, inspection, handling, automation, testing, and other specialized production requirements. From label alignment, final assembly, lead trimming and forming, heatsink positioning, and soldering fixtures to fully integrated automation solutions, every tool is engineered for your specific process and manufacturing environment. Purpose-built solutions improve repeatability, reduce operator variability, streamline production, and increase throughput. Tooling can incorporate ESD-safe materials, vacuum compatibility, quick-change features, barcode or serialization identification, and seamless integration with automated equipment, robotics, and machine vision systems.



SCAN. EXPLORE. GET A QUOTE

Scan the QR code to explore the full Pentagon EMS tooling portfolio, access detailed product information, and easily request a quote.

[PENTAGON-EMS.COM/TOOLING](https://pentagon-ems.com/tooling)



ADVANCED MACHINING. NOW AT A WHOLE NEW SCALE.

MORE CAPABILITY. MORE EXPERTISE. MORE RESOURCES

For decades, Pentagon EMS has earned its reputation by solving complex manufacturing challenges through precision machining, custom tooling, and application-specific engineering.

Today, those capabilities are backed by the manufacturing strength of the StenTech Manufacturing Platform, providing customers with expanded machining capacity, specialized engineering resources, and advanced manufacturing technologies across North America.

Complemented by StenTech's tooling and machining operations and strengthened by the addition of BlueRing Stencils & Machining, our team brings together experienced CAD/CAM engineers, CNC programmers, machinists, and tooling specialists to support projects from prototype through full-scale production.

Whether producing precision fixtures, machined components, or custom production tooling, customers benefit from responsive lead times, greater production flexibility, and the engineering expertise to solve demanding manufacturing challenges.



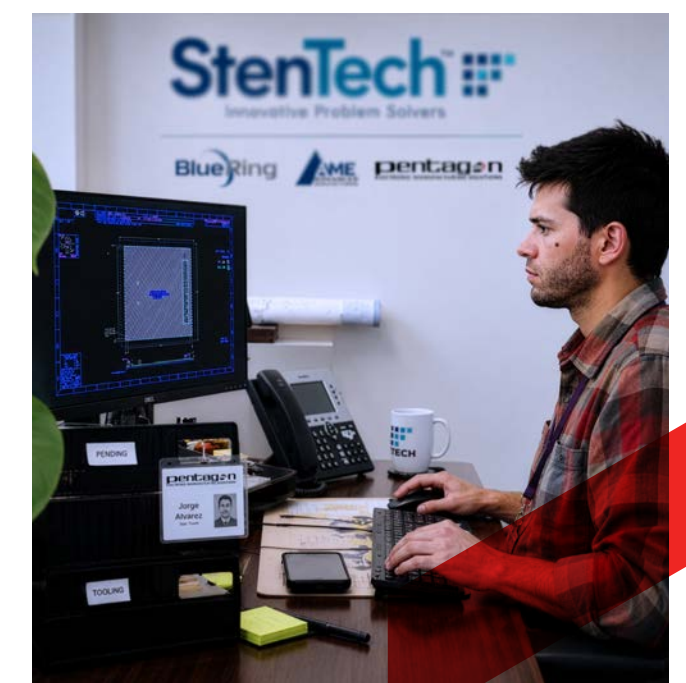
ENGINEERING THE RIGHT SOLUTION »

Precision machining is about more than equipment.

It requires the engineering expertise, manufacturing knowledge, and production experience to transform complex designs into reliable, repeatable solutions. Every project begins with a thorough evaluation of the application, enabling our engineers to recommend the most effective manufacturing strategy based on part geometry, material selection, tolerance requirements, production volumes, and cost efficiency.

From design review and material selection to CAD/CAM programming, CNC machining, inspection, and final production, our teams collaborate throughout every stage of the process. By identifying potential challenges early, we improve manufacturability, reduce lead times, optimize production efficiency, and consistently achieve demanding tolerance requirements.

Whether you need a precision-machined component, a complex production fixture, custom assembly tooling, or a fully engineered manufacturing solution, bring us the print, the application, or simply the manufacturing challenge, and our team will develop the right solution to move your project from concept to production with confidence.





ENGINEERING PRECISION WITHOUT COMPROMISE »

From one-off prototypes to demanding production programs, our expanded machining capabilities combine advanced CNC technology, precision equipment, and decades of hands-on manufacturing experience.

Across our connected manufacturing network, advanced multi-axis CNC machining supports complex geometries, intricate features, tight tolerances, and demanding surface finish requirements. Capabilities span precision CNC milling, CNC turning and lathe operations, complex multi-process machining, prototype development, custom tooling, and production machining.

Our broad machining resources support a wide range of metals, plastics, composites, and engineered materials, providing the flexibility to manufacture everything from individual precision components and complex fixtures to repeat production parts and specialized tooling.

With expanded capacity, advanced equipment, and machining resources across North America, we deliver the accuracy, repeatability, speed, and production flexibility required for today's most demanding manufacturing applications.

SCAN. EXPLORE. GET A QUOTE

Scan the QR code to explore our full machining capabilities, access detailed product information, and easily request a quote.



[PENTAGON-EMS.COM/MACHINING](https://pentagon-ems.com/machining)

CNC MILLING



Pentagon EMS brings extensive machining experience and advanced CNC equipment to the production of complex components, custom tooling, fixtures, and precision-engineered parts. Advanced multi-axis CNC milling supports intricate pockets, contoured surfaces, precision holes, channels, complex profiles, and detailed features requiring exceptional dimensional accuracy and surface quality. Modern machining technology produces complex geometries in fewer setups, improving efficiency, consistency, and repeatability. From one-off prototypes and specialized tooling to ongoing production programs, Pentagon's machining teams deliver accurate, reliable, production-ready results across a broad range of materials and demanding applications.

CNC TURNING / LATHE



Pentagon EMS combines extensive machining experience with advanced CNC turning and lathe capabilities to produce precision shafts, pins, bushings, threaded components, and complex cylindrical parts. Modern CNC equipment supports grooves, tapers, threads, contours, and detailed features requiring tight tolerances, concentricity, and repeatability. Supported by the broader StenTech and BlueRing machining network, customers gain access to expanded equipment, expertise, capacity, and manufacturing resources across North America. From one-off prototypes and low-volume precision parts to complex multi-process components and ongoing production programs, our teams deliver consistent quality, production flexibility, and scalable machining solutions.

MATERIALS



Exceptional machined components begin with the right material. At Pentagon EMS, material selection is an integral part of our engineering process, ensuring every component delivers the strength, precision, durability, and long-term performance your application demands.

Our team machines a broad range of materials, including aluminum, stainless steel, carbon steel, titanium, copper alloys, engineering plastics, and specialty materials. By understanding the unique machining characteristics of each, we optimize manufacturing methods to achieve tighter tolerances, superior surface finishes, and consistent production quality.

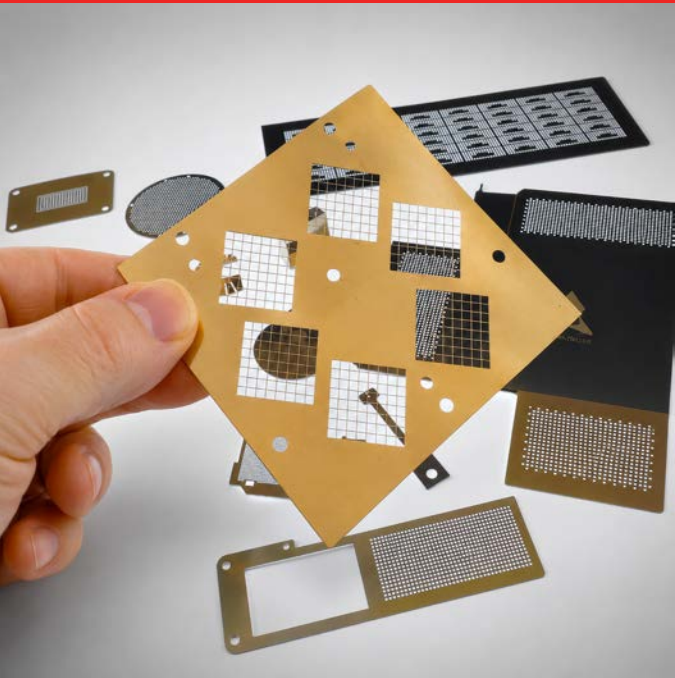
Have a project?



Let's Talk.
(503) 924-2744



PRECISION PARTS. NOW WITH A WHOLE LOT MORE POSSIBILITIES.



THE RIGHT PROCESS FOR EVERY PART »

The success of every project depends on receiving high-quality parts at the right cost, delivered on time, and manufactured using the most effective process. Selecting the right production method for a complex component can be challenging.

Our role is to simplify that decision by combining engineering expertise with a broad portfolio of precision manufacturing technologies.

Pentagon EMS is now supported by StenTech's Precision Parts Division, giving customers access to expanded manufacturing capabilities and specialized process expertise across North America.

From photo and chemical etching to precision laser cutting, CNC machining, electroforming, and hybrid manufacturing solutions, our engineers evaluate every design to determine the process that delivers the best balance of precision, performance, manufacturability, and cost.

By identifying production challenges early, we improve manufacturability, reduce lead times, and create a seamless path from prototype through scalable production. The result is greater manufacturing flexibility, expert engineering guidance, responsive communication, and reliable delivery for even the most demanding precision components.

- » Simple or Complex, Thin or Thick
- » Small or Large
- » Quick Turnaround Quotes
- » Honest, sensible pricing
- » Rapid Lead Times
- » Production Quality Prototypes
- » Schedule Flexibility
- » Full engineering support
- » Reliable Expedited Delivery
- » #1 in Service & Satisfaction



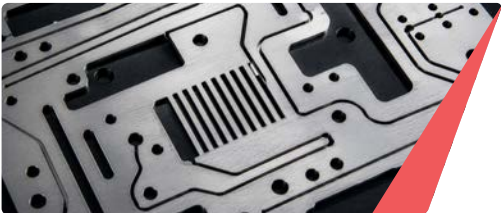
We don't just make parts.

We optimize quality, accelerate timelines, reduce costs, and provide custom solutions that simplify design and procurement, protect your brand, and support scalable growth across every stage of production.



CHEMICAL PHOTO ETCHING

Photo etching is a precision subtractive process that uses photo-resist and chemical etchants to produce thin metal parts with simple or complex geometries.



HYBRID ETCH-LASER PROCESS

Hybrid manufacturing combines photo etching and laser cutting to create complex, cost-efficient parts faster, maximizing design flexibility, precision, and production efficiency.



CHEMICAL COPPER ETCHING

Etched copper parts offer superb electrical and thermal conductivity for high-performance electronics, with copper alloys adding strength, corrosion resistance, and cost-effective precision.



CHEMICAL STAINLESS STEEL ETCHING

Stainless steel offers clean, accurate etching and natural corrosion resistance through its chromium content, delivering strong, smooth components for many industrial applications.



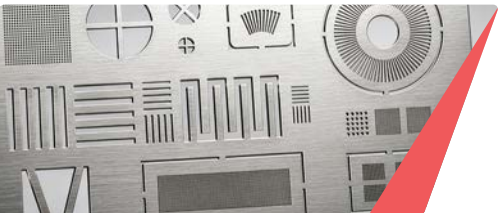
ALUMINUM ETCHING

Aluminum etching is increasing thanks to its light weight, strength, conductivity, corrosion resistance, and non-magnetic properties.



LASER CUTTING

High-speed fiber lasers produce clean, burr-free cuts with minimal heat, delivering precise, versatile results from thin metal foils to heavy sheet applications.



ELECTROFORMING

Electroforming builds ultra-precise metal parts atom by atom, delivering smooth walls, complex geometry, and exceptional durability across demanding applications.



CNC MACHINED PARTS

Our CNC Machining Department manufactures precision metal parts, including heavier components, built for strength, stability, and control.



PRECISION PARTS

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ELECTRONIC MANUFACTURING SOLUTIONS

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AME
ADVANCED
METAL ETCHING

MATERIALS & COATINGS



From ultra-thin precision components to heavy-duty engineered parts, our extensive range of materials, thicknesses, tempers, and specialty metals supports diverse manufacturing requirements.

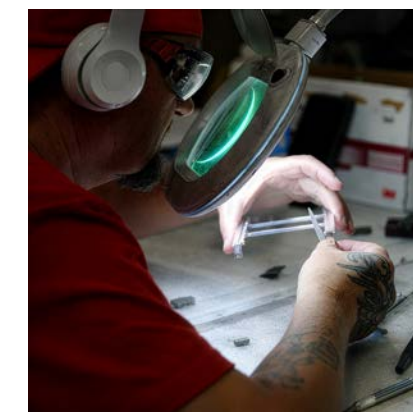
Capabilities span stainless steel, nickel, Kovar, Inconel, titanium, copper, brass, aluminum, specialty alloys, silicon, plastics, and more. When exact stock thicknesses are unavailable, material can be precisely reduced to meet specific dimensional requirements. An extensive selection of advanced coatings, plating, and polishing processes, including PVD, electropolishing, anodization, passivation, gold, silver, tin, zinc, and nickel finishes, can further enhance durability, corrosion resistance, conductivity, appearance, and overall component performance.

FORMING & FINISHING SERVICES



Precision manufacturing doesn't stop once a part is cut. Through StenTech's expanded Precision Parts Division, Pentagon customers now have access to integrated forming and finishing services that transform flat metal into production-ready components. Parts can be deburred, polished, bent, and precisely formed to meet specific dimensional and functional requirements. From folded edges and formed tabs to complex bends and engineered geometries, these capabilities support seamless integration into larger assemblies. Ideal for rapid prototypes and scalable production programs, our processes deliver the accuracy, consistency, surface quality, and repeatability required from first article through full production.

QUALITY INSPECTION & CERTIFICATIONS



Quality is built into every stage of our precision parts manufacturing process. Our commitment to continuous improvement drives higher quality, customer satisfaction, efficiency, and reliable on-time delivery. With 100% material traceability from raw stock through finished product, multiple in-process inspections, and cross-trained manufacturing teams, every component is produced to exacting specifications.

Supported by ISO 9001:2015 quality systems and ITAR-registered manufacturing resources, we work closely with customers to deliver consistent, repeatable precision and manufacturing excellence across every production program.

DIVERSE INDUSTRIES. DEMANDING APPLICATIONS »

Our precision parts capabilities extend well beyond the traditional SMT and EMS markets. Today, precision engineered components manufactured across the StenTech Manufacturing Platform support demanding applications in aerospace, defense, medical, automotive, electronics, telecommunications, semiconductor, energy, and advanced industrial sectors.

Whether producing intricate prototypes, mission-critical components, or long-term production programs, our teams understand the quality, consistency, traceability, and precision these industries require. Supported by ITAR registered manufacturing, certified quality systems, and specialized engineering expertise, we deliver reliable North American manufacturing solutions for highly regulated and performance-critical applications.

By matching the right process, technology, and facility to every project, we help customers optimize performance, control costs, reduce risk, and confidently scale production from concept through full manufacturing.

SCAN. EXPLORE. GET A QUOTE

Scan the QR code to explore our full precision parts capabilities, access detailed product information, and easily request a quote.

PENTAGON-EMS.COM/PARTS



AUTOMOTIVE



**AEROSPACE
& DEFENSE**



MEDICAL



ELECTRONICS



INDUSTRIAL



COMMUNICATIONS

DID YOU KNOW? WE MAKE SMT STENCILS »

Pentagon customers now have direct access to one of North America's most advanced SMT stencil manufacturing operations, delivering industry-leading stencil technology, engineering expertise, and rapid regional production support..

At StenTech, precision is the foundation of SMT excellence. From high-speed laser-cut stencils and advanced step technologies to ultra-precise electroform designs, our solutions are engineered for today's fine-pitch, high-density, micro-BGA, and complex mixed-technology assemblies. Advanced stencil design and proprietary coating technologies improve solder paste release, reduce print-to-print variation, increase deposit consistency, and support higher first-pass yields. From standard production stencils to complex multi-level and 3D relief designs, StenTech provides solutions for virtually every SMT printing challenge.

For time-critical builds, our regional manufacturing network delivers exceptional responsiveness, scalable production capacity, and same-day turnaround when approved production files are received within facility deadlines.

Trusted by Tier 1 manufacturers for more than 25 years, StenTech is regarded as a global leader in SMT stencil technology, delivering the precision, innovation, responsiveness, and supply-chain confidence required to maximize SMT line performance.



STENTECH SMT STENCILS

Helping electronic
manufacturers
run sharper,
print cleaner
perform better.

HIGH-PERFORMANCE STENCILS. BUILT FOR BETTER PRINTING.

Many PCB assembly defects originate in the solder paste printing process. StenTech addresses these challenges through advanced stencil engineering, precision manufacturing, and innovative surface technologies designed to improve print performance and process reliability.

Backed by decades of SMT expertise and one of North America's most advanced stencil manufacturing operations, we help customers optimize solder paste printing for today's increasingly complex electronic assemblies. The result is improved process control, higher first-pass yields, reduced downtime, and more productive SMT operations.

ADVANCED STENCIL COATINGS

Exclusive to StenTech, our industry-leading stencil coating innovations are engineered to improve solder paste release, enhance print consistency, and reduce cleaning requirements, helping manufacturers achieve cleaner prints, greater process stability, fewer interruptions, and higher overall SMT production performance.

BP

StenTech BluPrint™

Advanced vapor deposition coating engineered to improve transfer efficiency, reduce cleaning and defects, and deliver consistent performance across extended high-volume production runs.



AN

Advanced Nano™

An award-winning hydrophobic coating engineered to enhance paste release, improve print definition, and increase stability in fine-pitch and low-area-ratio applications.



NS

NanoSlic® Gold

A proven, durable polymer coating engineered to improve paste transfer, reduce underside cleaning, and deliver more consistent solder paste deposition across demanding production runs.



SCAN. EXPLORE.





YOUR TRUSTED PARTNER IN PRECISION MANUFACTURING.



OUR COMMITMENT.

For more than 25 years, Pentagon EMS has helped customers solve complex manufacturing challenges through precision engineering, responsive service, and trusted expertise. Today, backed by the StenTech Manufacturing Platform, we remain committed to delivering the quality, innovation, and partnership our customers depend on.

A relentless commitment to your success. That's the Pentagon difference.



intertek

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