



Turnpack, LLC
 22425 S Scotland Ct, Suite 104
 Queen Creek AZ 85142
 United States

Invoicing Address:

POWER DEVICE CORPORATION, Invoicing
 105 WILBUR PL.
 Bohemia NY 11716
 United States

POWER DEVICE CORPORATION, Shubham
 Mahadevan
 105 WILBUR PL.
 Bohemia NY 11716
 United States

Shipping Address:

POWER DEVICE CORPORATION, HYBRID PDC - Delivery
 Address
 105 WILBUR PL.
 Bohemia NY 11716
 United States

Order # SO2543968

Your Reference:

CEP-00186

Order Date:

03/24/2026

Salesperson:

Lorena Carrillo

DESCRIPTION	COMMITMENT DATE	QUANTITY	UNIT PRICE	TAXES	AMOUNT
DeLidder					
[H5] HGRS-V Hot Gas Workstation 30% Down Payment Required on all US orders, Intl orders may vary.	06/30/2026	1.000 Unit(s)	44,000.0000		\$ 44,000.00
Subtotal					\$ 44,000.00
Tooling					
Nozzles, Angled, with Thermocouple (min buy 10, mix-n-match)	06/30/2026	10.000 Unit(s)	435.0000		\$ 4,350.00
Nozzles, Straight with Thermocouple (min buy 10, mix-n-match)	06/30/2026	10.000 Unit(s)	435.0000		\$ 4,350.00
Subtotal					\$ 8,700.00
Custom Tooling					

Heated Static Shear, Custom mechanism attaches to front of workholder, providing an adjustable fixed mounting for a wide steel blade, and side rails to hold package at proper height with substrate facing down. Side rails will include access and outlet holes for ambient temperature N2 floods (see item 6) and vacuum exhaust assist as application cooling requires. Provision will be made as necessary to heat blade using HGRS-V preheat circuit and control system with custom fixture and harness.	06/30/2026	1.000 Unit(s)	1,850.0000		\$ 1,850.00
Cavity Cooling and Monitoring thermocouple mounted under package substrate will provide monitoring of cavity temperature, with adjustable maxtemperature alarm and cutback if adjustable N2 flooding is insufficient to control temperature buildup at component level.	06/30/2026	1.000 Unit(s)	435.0000		\$ 435.00
[H4WHSC99] Custom Combo Shearfoot	06/30/2026	1.000 Unit(s)	750.0000		\$ 750.00
				Subtotal	\$ 3,035.00
Install, Training					
[40109210101] 1-Day Install	06/30/2026	8.000 Unit(s)	185.0000		\$ 1,480.00
[40109160102] Travel Travel & Living [estimated]	06/30/2026	1.000 Unit(s)	2,500.0000		\$ 2,500.00
				Subtotal	\$ 3,980.00
				Total	\$ 59,715.00

Terms and Conditions (Summary)

Terms of Delivery:

Delivery is understood EXW Turnpack Production Site.

From date down payment is received.

Delivery time is approx. 3 months following receipt of written order and clarification of all technical details and provision free of charge of an adequate quantity of suitable patterns for contractually specified components.



Terms of Payment:

30% down / 1% Net 10, 30 days net

Customer responsible for wire and/or credit card fees. ACH available free of charge.

Guarantee/warranty:

The warranty period is 12 months from install date against defects on all equipment supplied from installation (concurrent with OEM component guarantees). Repair or replace, at manufacturer option, any such defective items.

SHIPPING:

Freight account is required for shipment. PPA, available upon request.

Dimensions: 33.36in x 28.44in x 18.23in

Estimated Weight: 160lbs

CRATING:

No charge if case is returned undamaged freight prepaid within 30 days after receipt of order.

VENDOR IS: A US SBA Small Business, EEO, less than 51% minority and/or women ownership.

Acceptance:

Preliminary Acceptance:

Preliminary Acceptance shall be conducted by the customer's agents on the seller's premises using materials supplied by the customer. Preliminary Acceptance shall be conducted under conditions as close as possible to production conditions and shall include checking of

- functioning of machine
- completeness of execution of order
- attainment of performance data

A record of the Preliminary Acceptance shall be drawn up.

Machine Acceptance:

Machine Acceptance shall take place on the customer's premises. A record of the Machine Acceptance shall be drawn up. Any defects determined shall be remedied under the warranty. Commencement and term of the warranty period shall not be affected hereby.

Materials for Preliminary Acceptance / Machine Acceptance:

The materials needed for final testing, Preliminary Acceptance and Machine Acceptance are to be supplied by the customer in adequate quantity and quality. The customer alone is liable for the suitability and quality of the supplied materials.

General Terms and Conditions of Offer and Sale of Turnpack, LLC. (hereinafter referred to as "Turnpack")

1. General

- a. These General Terms and Conditions of Offer and Sale (hereinafter referred to as “General Terms”) shall apply to the contract (the “contract”) for the supply of goods and/or services by Turnpack to the customer. . Any other terms defined by the customer or in other documents shall not apply to the contract unless they have been expressly accepted by Turnpack in writing or electronically. THESE GENERAL TERMS EXPRESSLY LIMIT ACCEPTANCE TO ITS TERMS AND CONSTITUTE NOTICE OF OBJECTION TO ANY ADDITIONAL OR DIFFERENT TERMS IN THE CUSTOMER’S DOCUMENTS SO AS TO PRECLUDE THE INCLUSION OF ANY DIFFERENT OR ADDITIONAL TERMS IN THE CONTRACT.
- b. All quotations are valid for 30 days from the date of quotation, unless Turnpack states otherwise in writing.
- c. The contract shall become valid and effective only upon the issue by Turnpack of a written or electronic order confirmation. An invoice issued by Turnpack to the customer can serve as an order confirmation.

2. Scope of Supply and Services

Only Turnpack scope of supply and services referred to in the order confirmation shall form part of the contract. Further goods and services not specified therein shall be charged separately.

3. Technical Documentation

- a. Sales brochures and catalogues are not binding, unless expressly stated otherwise. Specifications in technical documents are only binding as far as they have been expressly guaranteed.
- b. Technical documents such as drawings, descriptions, illustrations and data on dimensions, performance and weight are for information purposes only and shall not imply any warranties. Turnpack reserves the right to make any changes as it deems necessary.
- c. All technical documentation and technical data remain the intellectual property of the third party owners from whom Turnpack derives the right to use them. Without Turnpack prior written consent, the technical documentation and technical data shall not be reproduced, published or made available to third parties.

4. Copyright Protection, Patent and Trademark Rights

All intellectual property rights in respect of the goods and services, including, but not limited to, trademarks, designs and projects, shall vest in Turnpack or the manufacturer of the goods (as the case may be). The Customer acknowledges that, in respect of any intellectual property rights in respect of the goods and services vested in any third party, the customer’s use of any such intellectual property rights is conditional on Turnpack obtaining a written license from the relevant licensor on such terms as will entitle Turnpack to license such rights to the customer. Without Turnpack’s prior written consent, the reproduction, utilization by or handing over to third parties is prohibited. Particularly the goods must not be made available directly or indirectly (through drawings, diagrams, schematics etc.) to any third party without Turnpack’s prior written authorization.

5. Prices

- a. Prices are net, ex works the production site of the goods to be delivered, and exclusive of value added tax or goods and services tax, sales tax and packing, unless expressly otherwise provided for in Turnpack’s quotation.
- b. Any and all additional charges such as, but not limited to, freight charges, insurance premiums, customs duties, any and all taxes, fees etc. shall be borne by the customer.
- c. Prices are valid only if the quantities, performances and specifications stated in the quotation are ordered without any change or reduction and if the quotation is still valid.

6. Terms of Payment

- a. Payments shall be made by the customer according to the agreed terms of payment, without any deductions. The customer shall not set off any debt to Turnpack against a claim on Turnpack. With respect to the goods supplied or services rendered, the customer shall have no right of suspension of any of its payment obligations. The dates of payment shall also be observed if transport, delivery, installation, commissioning or acceptance of

the goods are delayed or prevented due to reasons beyond Turnpack's control or if non-material parts are missing.

- b. If the advance payment or the contractually agreed securities are not provided or if other obligations of the customer are not fulfilled in accordance with the contract terms, Turnpack shall be entitled to cancel the contract and to claim damages.
- c. If Turnpack does not receive payment by the stipulated date, interest shall therefore accrue on the sum due and shall be charged immediately to the customer at the current base lending rate in the customer's domicile in accordance with LIBOR plus 4% provided that such rate shall not be less than 1.5% per month. The right to claim further damages is reserved.

7. Reservation of Title

- a. Turnpack shall remain the owner of all goods until full payment in accordance with the contract is received.
- b. The customer shall cooperate with any measures necessary for the protection of Turnpack's title. In particular, upon entering into the contract, the customer authorizes Turnpack to enter or notify the reservation of title in the required form in public registers, books or similar records, all in accordance with relevant national laws and to fulfil all corresponding formalities at the customer's cost.
- c. During the period of the reservation of title, the customer shall, at his own cost, maintain the goods and insure them for Turnpack's benefit against theft, breakdown, fire, water and other risks. The customer shall further take all measures to ensure that Turnpack's title is in no way prejudiced.
- d. In the case of the customer's default, particularly in the case of arrears, Turnpack shall be entitled to take possession of the goods and the customer shall be obliged to surrender them.

8. Delivery Time

- a. 8.1. The delivery time starts with the issuance date of Turnpack's order confirmation. It ends when Turnpack has sent a notice to the customer informing that the shipment is ready for dispatch. Turnpack's compliance with the delivery time is conditional upon the customer fulfilling its contractual obligations, e.g. notification of all essential technical specifications, availability of samples, import permits, advance payments, letters of credit etc.
- b. 8.2. The delivery time is reasonably extended:
 - i. if the information required by Turnpack for the performance of the contract is not received in time or if the customer subsequently changes it thereby causing a delay of the delivery of the goods;
 - ii. in the event of force majeure. The performance of the contract shall be fully or partially suspended for as long as the situation of force majeure continues, without Turnpack being liable for payment of any compensation to the customer. If the force majeure situation is reasonably expected to continue for more than three (3) months, Turnpack may terminate the contract by registered letter with immediate effect and without recourse to the courts, without thereby creating any rights to compensation. For the purpose of this Clause, "force majeure" shall mean any circumstance not within the reasonable control of a party, including but not limited to, epidemics, mobilization, war, revolution, serious breakdowns in the works, accidents, labor conflicts, late or deficient delivery by subcontractors of raw material, semi-finished or finished products, official actions or omissions by any state authorities or public bodies and natural catastrophes.
- c. Liquidated damages for delayed delivery shall not exceed 0.5% per every full week of delay and shall in no case whatsoever exceed 5% of the delayed contract part. No damages at all shall be due for the first four (4) weeks of delay. If the customer claims such damages for delayed delivery, it must be proved that the delay has been caused through Turnpack's fault and that the customer has suffered a loss as a result of such delay. If substitute material can be supplied to accommodate the customer, the customer is not entitled to claim any damages for

delay.

- d. Any delayed delivery does not entitle the customer to any rights and claims other than those expressly stipulated in this Clause 8. The customer has no right to rescind the contract.

9. Cancellation of Purchase Order

- a. Cancellation of a purchase order after Turnpack issues an order confirmation shall be a breach of the contract on the part of the customer. In the event of cancellation of a purchase order, Turnpack is entitled to liquidated damages as follows:
- i. more than 90 days before the confirmed scheduled shipment: 10% of the total purchase price plus the costs for customer specific parts.
 - ii. 90 to 61 days before the confirmed scheduled shipment: 30% of the total purchase price plus the costs for customer specific parts.
 - iii. 60 to 30 days before the confirmed scheduled shipment: 50% of the total purchase price plus the costs for customer specific parts.
 - iv. less than 30 days before the confirmed scheduled shipment: 80% of the total purchase price plus the costs for customer specific parts.

10. Passing of Benefit and Risk

- a. The benefit and the risk of the goods shall pass to the customer by the date of shipment ex works the production site of the goods, according to Incoterms 2010 at the latest.
- b. If delivery is delayed at the request of the customer or otherwise due to reasons beyond Turnpack's control, the risk shall pass to the customer at the date originally agreed for delivery ex works. From this date onwards, the goods shall be stored and insured at the customer's expense and risk and all payments shall become due on the agreed date of delivery.

11. Forwarding, Transport and Insurance

Transport shall be at the customer's expense and risk. The customer shall be responsible for taking insurance against risks of any kind. Objections regarding forwarding or transport shall be immediately submitted by the customer to the last carrier upon receipt of the goods or of the shipping documents (whichever is the earlier).

12. Inspection and Acceptance of Goods and Services

- a. The customer shall inspect the goods and services within three (3) working days of receipt and shall immediately notify Turnpack of any defects in writing. If the customer fails to do so, the goods shall be deemed to have been accepted, unless a procedure for a final acceptance test to be performed is prescribed in accordance with the contract terms.
- b. A final acceptance test of the goods shall be performed by Turnpack in the presence of the customer if prescribed in accordance with terms to be mutually agreed upon separately.
- c. Upon completion of the final acceptance test a final acceptance report shall be signed by the customer and Turnpack. Such report shall either state that the goods have been accepted or accepted with reservation by the customer, or that the customer has refused the acceptance. In the last two cases, the defects shall be listed individually in a separate report that shall be signed by both parties.
- d. Any defect listed in such a report shall not give rise to a right on the part of the customer to reject the goods, but in the event of any defect in the goods and/or installation, Turnpack shall make such modifications or adjustments to the goods as it considers appropriate to rectify these defects. Thereafter, the procedure outlined in this Clause 12 shall be repeated on a second and, if necessary, a third date (such dates to be agreed between Turnpack and the customer).
- e. In the event that the final acceptance of the goods has not been achieved after a third date then both parties

will assess the overall position with a view to reaching a mutually acceptable solution to enable final acceptance of the goods to be achieved.

- f. The final acceptance test shall be deemed completed:
- i. if the final acceptance test is delayed for one (1) month from the date on which Turnpack notifies the customer it is ready to conduct the final acceptance test, due to reasons beyond Turnpack's control;
 - ii. if the customer refuses to grant Turnpack unlimited access to the goods to perform all works necessary and/or appropriate until completion of the final acceptance test;
 - iii. if the customer declines to accept the goods without reasonable grounds for doing so; or
 - iv. immediately if the customer uses the goods for production purposes, including but not limited to, so called trial or qualification runs, if and to the extent that the products produced during such production activities should be offered for sale by the customer.

13. Warranty

- a. The warranty period is twelve (12) months. The warranty period either begins on the date of dispatch ex works or if such a procedure has been agreed upon after acceptance. If acceptance is delayed due to reasons beyond Turnpack's control, the warranty period shall end not later than thirteen (13) months from the date of delivery ex works the production site of the goods to be delivered.
- b. Upon written request from the customer during the warranty period Turnpack shall, at its discretion procure the repair or replacement of all parts which become defective if determined to be due to bad material or poor workmanship. Replaced parts are Turnpack's property. Only costs for the repair or replacement of the defective parts are at Turnpack's expense.
- c. The warranty expressly does not cover consumable parts or damage caused by normal wear and tear, faulty maintenance, failure to observe the operating instructions, installation not carried out by Turnpack, non-compliance with the specifications, damage caused by viruses as well as due to other reasons for which Turnpack is not responsible. For goods or essential components or spare parts manufactured by a third party and not authorized by Turnpack, there is no warranty. For goods or essential components or spare parts manufactured by a third party and supplied by Turnpack, the warranty is limited to the warranty provided by said third party to Turnpack.
- d. The customer shall not be entitled to any warranty, express or implied, except those specifically set forth in this Clause 13.

14. Exclusion of further Liability

- a. Turnpack makes no representation or warranty of any kind with respect to infringement of intellectual property rights of third parties.
- b. Turnpack ASSUMES NO RESPONSIBILITY FOR ANY WARRANTY, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY (SATISFACTORY QUALITY) OR FITNESS FOR A PARTICULAR PURPOSE, EXCEPT AS SPECIFICALLY PROVIDED IN THESE GENERAL TERMS OR AS IMPLIED BY LAW AND WHICH BY LAW CANNOT BE EXCLUDED.
- c. Turnpack shall not be liable for any type of damage, direct or indirect, suffered on the part of the customer, including but not limited to damage to the customer's property, personal injury, loss of profit or any other incidental or consequential loss ("damage"), unless the damage results from willful misconduct or gross negligence on the part of Turnpack's executive staff.
- d. Nothing in this General Terms shall limit or exclude Turnpack's liability for death or personal injury caused by its negligence, or the negligence of its staff.
- e. Without prejudice to the foregoing, Turnpack's total liability shall in no event exceed the purchase price of the

goods and services concerned.

15. License Agreement

- a. The computer software programs remain the property of the third party licensor from whom Turnpack derives the right to use them (as the case may be). Turnpack grants to the customer a non-exclusive license to use the proprietary software programs with the goods specified in the contract and under the General Terms specified herein.
- b. The customer acknowledges that the non-exclusive license to use the proprietary software programs is conditional on Turnpack obtaining a written license from the relevant third party licensor on such terms as will entitle Turnpack to license such rights to the customer. The license conditions specified by the third party licensor apply. Turnpack is not liable for the functionality of third party components. The customer will not disassemble or have disassembled the licensed software programs or parts thereof.
- c. The customer will not distribute and not disclose the software programs or their documentation to third parties.
- d. Turnpack is not aware of any rights of third parties, which would oppose the utilization purposes of the licensed software programs. In the event that the software programs infringe on the rights of a third party, Turnpack will not be liable.
- e. Turnpack will not be liable for delays or errors or failures in the performance due to causes beyond its control or operation by unqualified personnel. Turnpack's warranty expires immediately if changes in the setup of the goods or the exchange of goods the licensed software programs are running on take place without written confirmation of Turnpack.
- f. Turnpack will not be liable for any damage due to errors of the licensed software programs.
- g. Turnpack excludes any liability for any damage arising out of any misuse, including malware (viruses, worms etc.), occurring during the use of the goods in a network or the use of virus infected floppy discs/CD-ROMs or any other external data medium. Turnpack strongly recommends making periodical virus scans on hard disks and floppy discs/CD-ROMs to avoid such damage. Upon the customer's request, Turnpack can provide malware protection software and security patches based on the original configuration. Turnpack excludes any liability for damage and derogation occurring due to the use of such malware protection software made available to the customer.
- h. Turnpack's guarantee does not extend to software programs delivered for testing or analyzing purposes. Turnpack does not guarantee the operability and interoperability of the software programs with other software and will not be liable for its operation, unless specified to the contrary in the contract.
- i. After expiry of the warranty period, Turnpack will provide error maintenance and other support only if the customer agreed upon and entered into a maintenance and service contract.
- j. The customer will perform backup operations to protect himself from loss of data due to any error conditions.

16. Severability

If any Clause of these General Terms is declared by a court of competent jurisdiction to be void, invalid or unenforceable in whole or in part, such declaration shall not affect the remaining parts of the Clause or any other Clause in these General Terms, which shall remain valid and enforceable. In any such case, the Clause or provision shall be replaced by a clause or provision that reflects to the fullest extent possible the original intention of the parties and the economic purpose that the parties intended to achieve with such Clause or provision.

17. Jurisdiction and Applicable Law

These General Terms shall be construed and the legal relations between the parties shall be determined in accordance with United States law, with the exclusion of the conflict of laws provisions of Queen Creek, AZ, USA. The uniform UN Convention on Contracts for the International Sale of Goods (CISG) shall not be applicable. Any



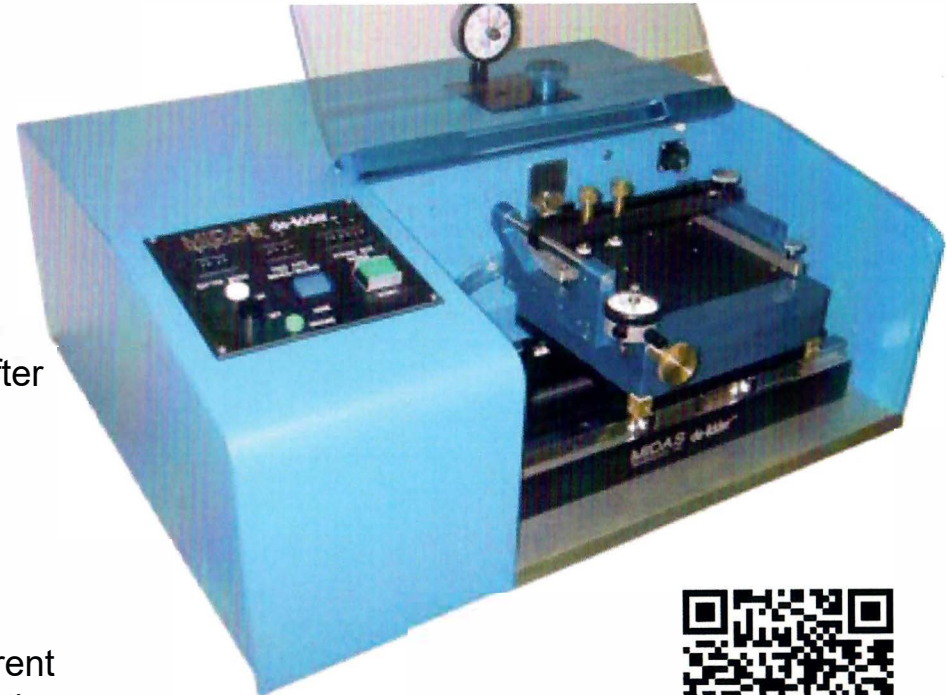
Turnpack, LLC
22425 S Scotland Ct, Suite 104
Queen Creek AZ 85142
United States

dispute arising in connection with these General Terms or any related contract shall be submitted to jurisdiction of the courts of Queen Creek, AZ, USA, provided that Turnpack shall always be permitted to bring any action or proceedings against the customer in any court of competent jurisdiction.

MIDAS TECHNOLOGY, INC

for microelectronic rework since 1986

D5 Series *de-lidder™*



WHAT IS A *de-lidder™*?

It's a Midas Technology-trademarked system designed to remove lids from hermetic microelectronic packages, so successful that after 24 years, the term *de-lidder™* has become an industry standard.

It mills through lid flanges so precisely that packages can be resealed without further processing. It is clean-room friendly, so packages in rework cycles never leave controlled atmosphere.

The *de-lidder™* system has been adapted to numerous different industries and applications throughout the world, and it is still the unchallenged leader in hermetic lid removal.



WHO NEEDS TO OPEN MICROCIRCUIT PACKAGES?

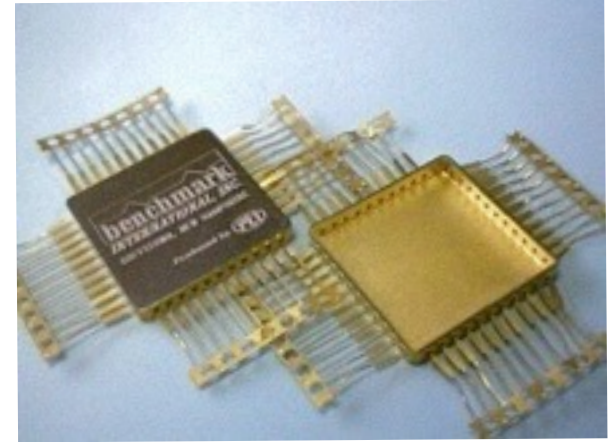
Every facility involved with high-reliability, high-value packaged electronics wants the capability to open them, whether for rework, quality control or failure analysis.

WHY DO THEY NEED *de-lidder™* TECHNOLOGY?

Whatever the application, microcircuits must be opened cleanly, so no particulates contaminate the cavity. They must be handled with a minimum of vibration and stress, and machined so precisely that no significant package material is removed. And to keep product in the clean-room, the machine must be designed for clean-room staff, not skilled machinists.

BASICS OF HERMETIC PACKAGE SEALING: A typical hermetic product consists of a nickel-plated metal package (containing electronics) and lid. These are sealed together by a “seam welder” machine which rolls electrodes along two opposite sides of the lid, rapidly pulsing electricity to melt the lid and package plating together. This creates a continuous, airtight bead of nickel between the lid and package. The bead runs from the outside edge of the package about halfway across the package wall.

Key Fact: *The process is designed to keep melted nickel away from the cavity, so there is a width of package wall between the nickel and the cavity that is not affected by the sealer.*



FIVE ESSENTIALS OF THE de-lidder™ PROCESS:

These are things we must control to be successful. This brochure illustrates how we do.

DEPTH: We only want to machine through the lid, not the package wall. To do this we need to precisely control how much of the lid’s thickness we machine through (the depth of cut). To do this we also need a good “zero” height reference.

WIDTH: We can’t expose the cavity to debris, so we won’t machine any part of the lid that is over the cavity. Fortunately, we only have to machine away the attached part of the lid which is away from the cavity. So we need precise control of “width of cut”, and we need a good “zero” width reference.

SURFACE FINISH: We need to leave a good surface finish which will reseal. For this we need an appropriate cutting tool, and we need to provide adjustments to allow the tool to work at its best with typical microelectronic materials.

CLEANLINESS: Microelectronics are vulnerable to contamination by machining lubricants and conductive particles. It can be difficult to successfully clean them out of a package cavity - much easier to keep them out in the first place.

LOW VIBRATION: Normal milling tools and saw blades can create damaging vibration in packages, breaking wire bonds and sensitive components. We have created special high speed tooling to eliminate these traditional problems.

DEPTH OF CUT CONTROL: Every Midas **de-lidder™** since the 1990 DL-4 has featured a height-adjustable tool spindle, with a precision vertical slide and leadscrew. Standard models have about 1" vertical adjustment. This provides range for doing packages on the turntable option and other special configurations described later.

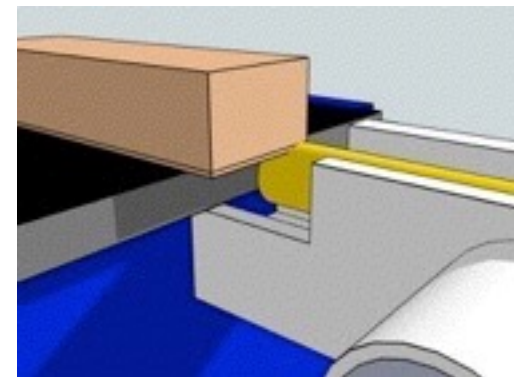
Height is changed simply by turning a top-mounted knob with reference to a dial indicator. The T-handle spindle lock tool (shown at right) can be inserted in the knob for the most sensitive height adjustments ($\pm .0001$ ")

"ZERO" DEPTH OF CUT: For repeatable results, it is critical to have a consistent and accurate "zero". If you try to de-lid on a standard milling machine, you hold the package with the lid facing up, and measure zero at the top of the lid. But packages have wide height tolerances, so unless special leveling steps are taken, you will mill deeper on some places than others. This creates steps that have to be removed by sanding, changing the finished package dimensions. **We have a much better approach!**

LID-DOWN FIXTURING: We flip the package over and set the lid on a precisely level surface. This obviously helps keep debris out - but more importantly, placing the lid on a known level surface gives us an ideal height reference. We set "Zero" depth of cut where the cutting tool is just flush with the work surface; this way it is good for every package.

By locating our cutting tool underneath the package, we can machine just through the flange of the package lid with great consistency, without cutting into the package wall.

NOTE: once you set "zero" depth, you do not need to reset it for different packages.



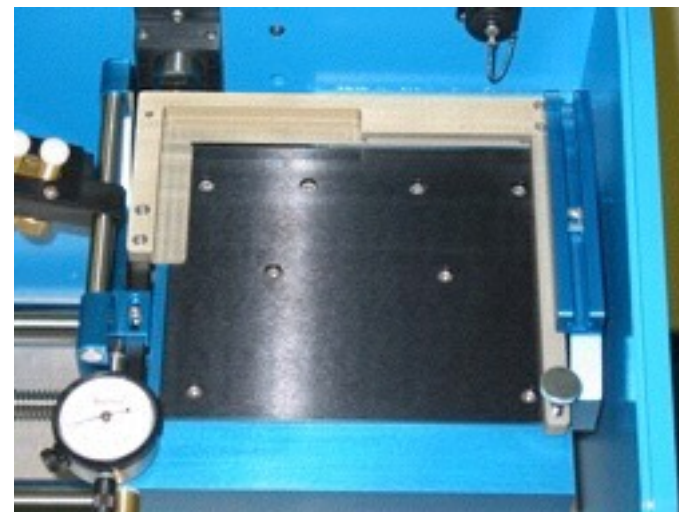
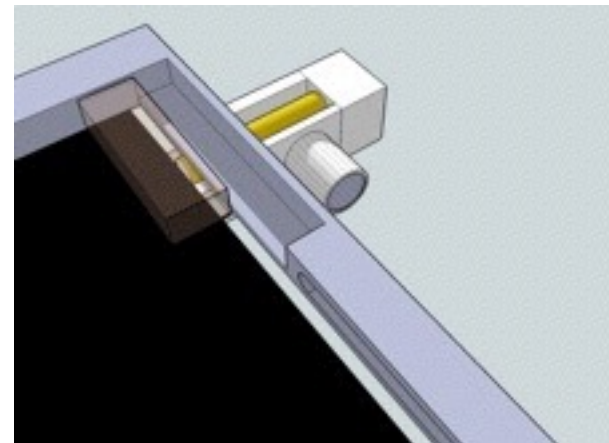
WIDTH OF CUT REFERENCE: Since we do not want to cut all the way across the package wall, but only enough to remove the melted nickel plating, we need to set “zero” width at the outside edge of the package. We have an easy way to do that.

“DATUM STOP” FIXTURE: Our machines include a stop, or fence, fixture. Each package side is pushed against this stop, locating it in precisely with respect to the cutting tool. These fixtures can be simple straight edges, or quite complex machined pieces with cutouts for specific package features - the important thing is when the side of a package is set against the stop, it will be aligned properly with the cutting tool.

ADJUSTING WIDTH OF CUT: The cutter position is fixed, so to adjust how much we cut in from the side of the package, we adjust the position of the datum stop. It slides forward and back on a rail, as an operator knob on the worktable is turned. The operator can see on the attached dial indicator exactly how much of the package will be cut,.

“ZERO” WIDTH OF CUT: The indicator is normally set to “zero” when the fixture edge is exactly over the operator side of the cutting tool - at the position where the cutting tool only brushes the side of the package.

NOTE: Once you set “zero” width on the standard fixture, you do not need to change it for different size packages.



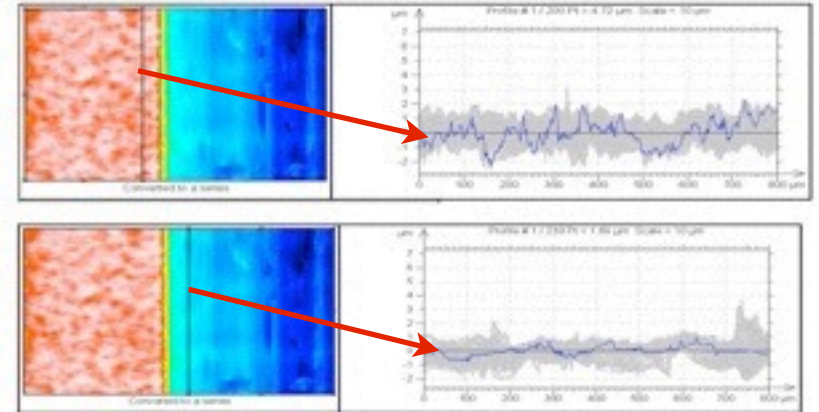
RESEALABLE SURFACE FINISH: is achieved by a combination of tool geometry, tool orientation, speed settings, and high quality, smooth-running tool and work table drive systems.

In the surface analysis at right, the finish of the original gold plating is graphed above a comparable section of our machined surface. In this sample, the machined surface actually appears smoother; it is certainly comparable.

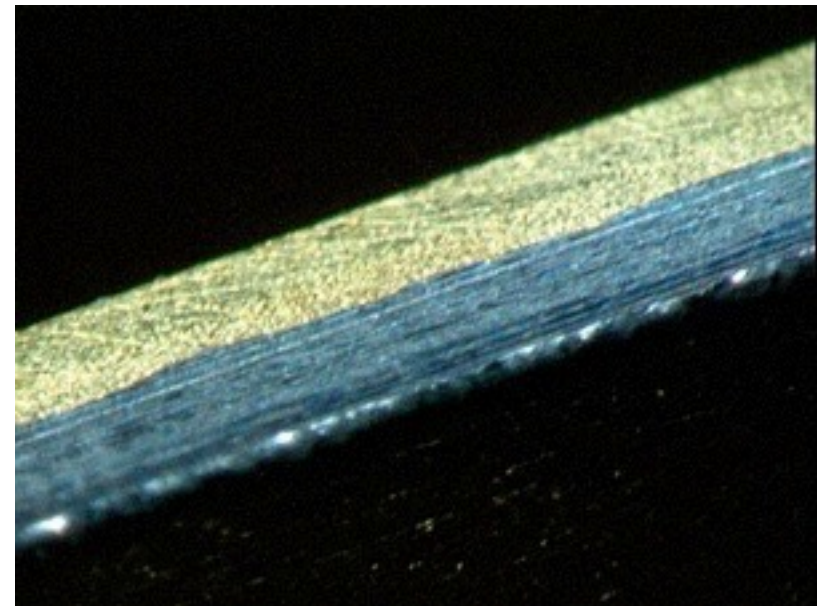
The photo at right shows a 1mm (.040") wide de-lidded package wall. The gold plating (toward the top) has not been touched. The machined surface (below the gold) shows tool marks. During reseal, nickel from the new lid will flow into and along these tool marks actually enhancing the seal quality. Since our tool marks add to sealability, and our flatness specifications exceed those for virgin packages, it is not surprising that reseal yields for de-lidded packages are equivalent to new package yields.

nanofocus[®]
see more

MIDAS Technology
Butterfly package
µsurf professional



NOTE: this photo also shows how well our machine controls depth and width of cut; exactly matching the original gold surface and staying parallel to the cavity.

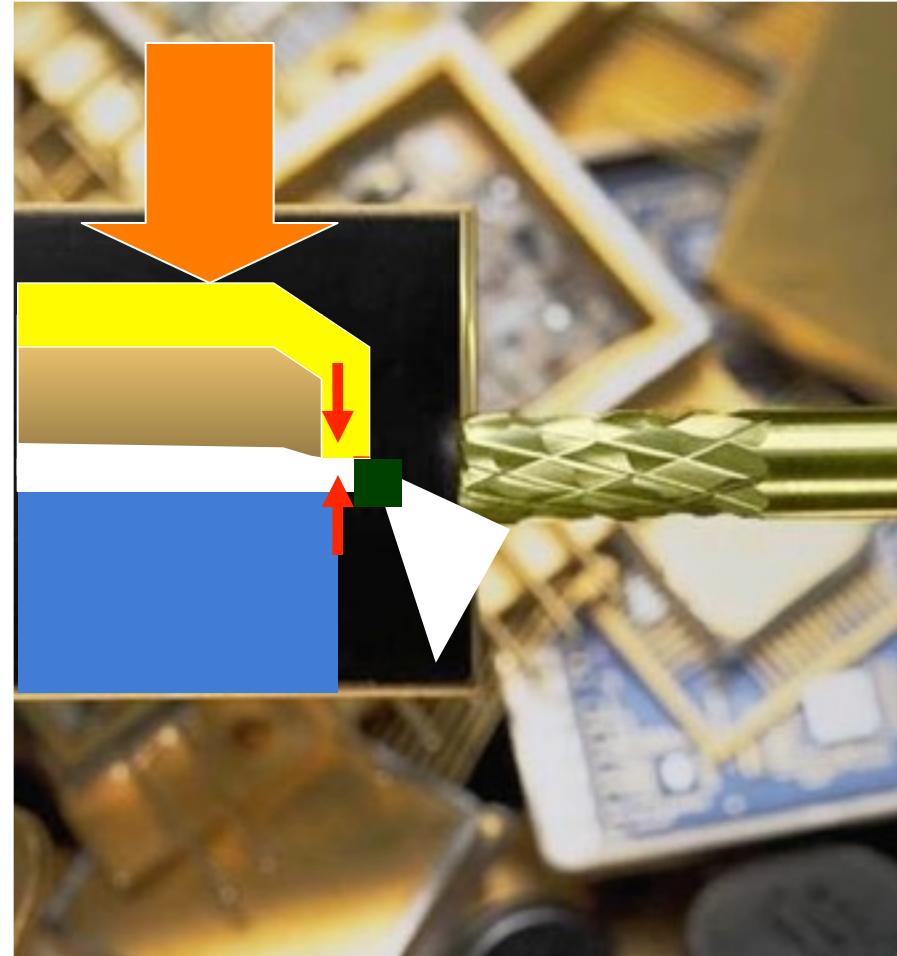


CLEANLINESS: in de-lid terms means that we protect the package and cavity from lubricants and particles created by machining.

The first problem, lubricants, is easily dealt with. We have created a dry (air cooled) machining process using Titanium Nitride-coated tools.

The second problem, protection from particulates, is more difficult. We tackle this in several complementary ways.

- **GRAVITY** the lid facing down helps keep debris out.
- **MECHANICAL SEAL** we press the lid down against the inside package wall to keep debris out of the cavity
- **VACUUM** We provide high vacuum around the cutting tool to pull contaminants away from the package
- **TOOL GEOMETRY** twists away from the package, so particles are pulled from the package, not forced into it.
- **ENVIRONMENT** Our unit is designed for use in cleanrooms, so your packages never encounter machine-shop conditions.



LOW VIBRATION: The most critical source of vibration in the de-lid process comes primarily from the contact of cutting flutes with the package lid. This was an industry-wide problem when Midas entered the industry, and our successful solutions led us rapidly to market leadership.

- **LOW IMPACT** our cutting system is designed to reduce impact on the package by turning the cutting tool in the same direction as the package is moved (i.e. “Ramp” milling) and by removing a very small amount of material with each contact.
- **HIGH FREQUENCY**, for many years we’ve pushed vibration beyond wire bond damage range by using high flute count tools and high cutter speeds.
- **RESONANCE DAMPING** most recently we have added a higher speed tool (ASHO8 Asynchronous Helix™) which adds variable flute spacing to eliminate resonance and reduce tool wear.
- **CHATTER DAMPING** Our holddown system provides adjustable force (allowing consistent, maximum safe pressure on the device) with a mechanically soft, non-elastic interface.
- **MACHINE MASS** The entire de-lidder™ machine is massive and thoroughly bolted into a rigid assembly; the heavy carriage and table assembly blocks virtually all drivetrain vibration from the package.

PANEL

- **CUTTER SPEED** determines spindle speed through belt drive, normal range in kovar and similar materials is 90-96 (on DL-4A shown, max is 6930, on D5 about 8400 RPM). *Rarely changed unless different materials are used.*
- **FEED RATE**, shows table speed in inches per second. Normal is 1.0-1.5
- **STROKE SIZE** how far table will travel, from edge of fixture to auto return, *also used with START button to re-program table home position to any desired point.*
- **START** initiates cutting sequence, *also used on power-up to program "Datum Offset" -resets table "home" to any desired position.*
- **HOME** returns table to starting position, *also used on power-up to toggle "HomeRun™" dual-direction cutting and vacuum feature.*
- **ON-OFF** Machine power, *ON used with HOME and START for programming.*



HOLDDOWN:

- **TORQUE LIMITER** adjusts to provide consistent, safe clamping force suitable for rigid metal packages as well as more fragile ceramics and MCMs.
- **HOLDDOWN FEET** are provided in three sizes to suit small DIPs and large modules.

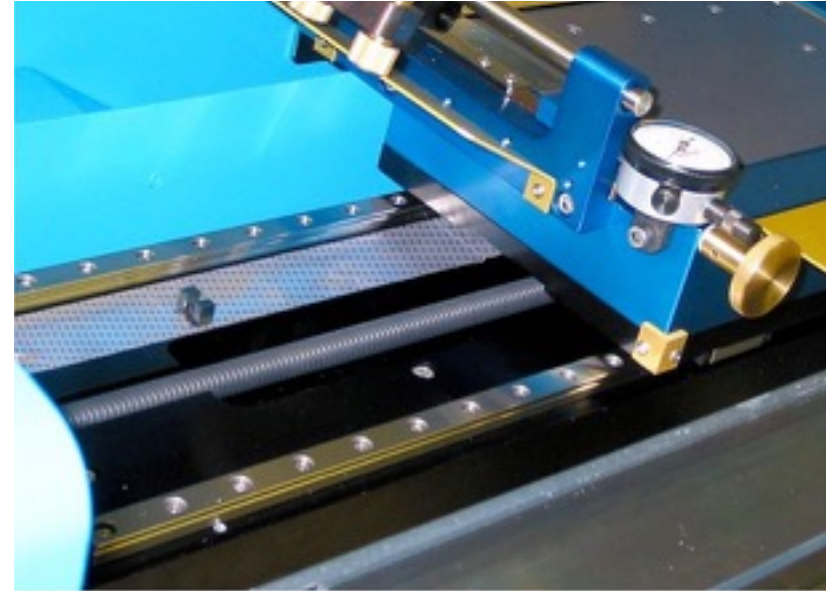
TOOL PATH:

- **DEPTH & WIDTH OF CUT** Knobs and Indicators discussed on previous pages

Series 5 de-lidder™ Design Features

NEW CONSTRUCTION FEATURES

- **IMPROVED CARRIAGE ASSEMBLY** on flat rails; massive unitized structure holds to .0002" flatness; *replaces DL-4A and earlier dual round rails and trestle supports.*
- **IMPROVED TABLE DRIVE** with programmable, plug & play replaceable servomotor; *replaces worm gear/potentiometer and voltage comparator circuits, and limit switches*
- **IMPROVED POSITIONING** using permanent hard stop and home position reset on boot-up, *speeds cutter changes and eliminates electrical setup following maintenance/repairs.*
- **IMPROVED CHASSIS** with heavier frame and more rigid, 3-D interlocking assembly design
- **IMPROVED CUTTER DRIVE** upgraded higher speed motor and turning components
- **IMPROVED SERVICEABILITY** with central relay circuit board, panel lamp error code diagnostics



NEW PANEL SELECTABLE FEATURES

- **HOMERUN** home stroke (bidirectional) cutting with vacuum, can improve surface finish and add protection from particle intrusion during home stroke
- **DATUM OFFSET** relocates table home position to any desired point, so tool is closer to package on start - reduced process time

Series D5 de-lidder™ Setup Options

PACKAGE ON WORKSURFACE, LID DOWN, TOOL BELOW Our standard, most precise configuration, suitable for bathtub, plug-in, butterfly, and all other straight-sided packages with “external” seam-sealed flat lids. The top of our cutting tool is raised above the worksurface just enough to mill through the lid flange. Depth of cut is limited by clearance (normally .011”-.015”, more if needed) between the datum stop and the top of the cutting tool. Simple slots and notches can accommodate features on package sides.

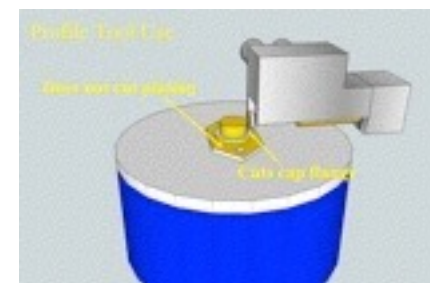
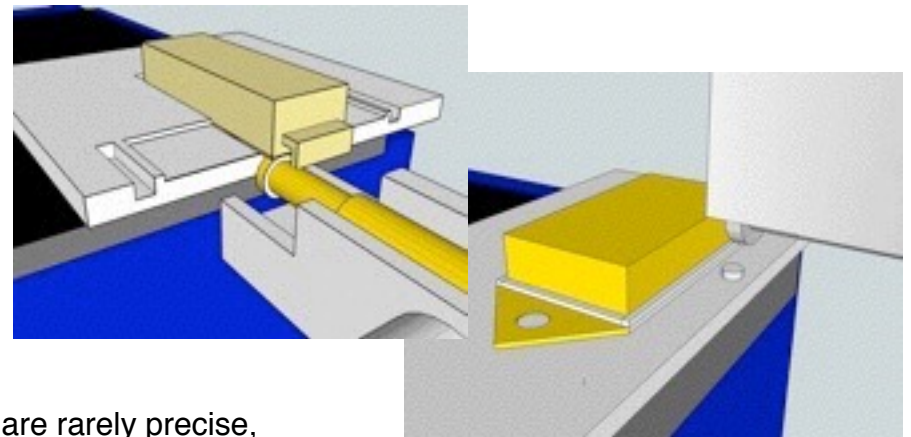
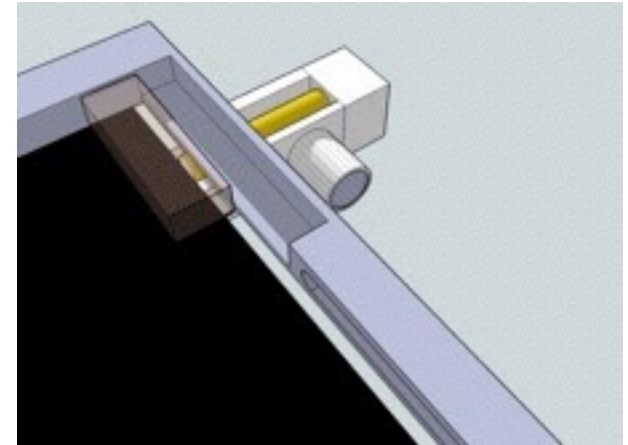
By changing to a “datum backstop” referencing the operator side of the package, depth of cut range is not limited. A backstop is also a good solution for packages with very low seal rings which do not allow the .050” required for a durable mechanical shelf.

PACKAGE ON FIXTURE, LID DOWN, TOOL BELOW When package features such as pins or connectors extend below the seal plane, we can mount a “datum plate” fixture with pockets to correctly position the package, and expose each cutting edge. The added fixture affects depth of cut accuracy slightly, and reduces vertical holddown clearance which may require minor modifications.

When additional vertical “reach” is required we provide sawblade and arbor sets which fit the standard D5 tool spindle. For more clearance between the tool tip and the spindle (untrimmed lead frames, for example) we have the larger chassis D5F series.

PACKAGE ON FIXTURE, LID UP, TOOL ABOVE Formed metal covers are rarely precise, so they will not sit flat when placed lid down. They are usually sealed to headers, which have pins underneath. The solution is to mount the package with the cover facing up, with the pins down into a fixture. We raise the cutting tool and mill through the cap flange with the bottom of the tool. Reseal is dependent on the flatness of the header. If the header cannot be made to sit flat on the fixture, the tool will cut into the header where it lifts up.

This is also the basic configuration for round parts done on our D5L6 Turntable Module; each part requires a platter fixture which holds it in the exact center of rotation.



Series 5 de-lidder™ Tool Options

MILLS We provide two lines of milling tools, both TiN coated for clean cutting and longer life.

- The original dual helix design works best at the slower spindle speeds of DL-3 and DL-4 machines, and on turntables. It also works fine on D5 series machines, but at reduced spindle speed settings.
- The new ASH08 “Asynchronous Helix” has fewer, thicker, and more durable flutes, with variable spacing to control resonant vibration. It works best with high D5 spindle speeds.

MILL OPTIONS We provide extended flute and/or shank lengths (photo, center left), “T” shaped or “profiled” tools (center right), and different shank diameters (standard 8mm, 6mm for more clearance, 10mm for more rigidity)

BLADES When more tool reach is necessary (up under power hybrid leads, for example) we can mount sawblades (lower right) on arbors (upper right) which fit our spindles.

GRINDING TOOLS For special applications (ceramic lids, glass) we can provide Borazon or diamond-coated disks and drum shapes to customer-specified dimensions.



Due to our policy of continual improvement, all specifications and prices are subject to change. Export equipment requires physical modifications and additional charges. Distributor support is available in most world markets. Please contact us for a review of your application requirements and a detailed quotation.

MIDAS

TECHNOLOGY, INC

for microelectronic rework since 1986

Series 5 de-lidder™ Models

D5 Series

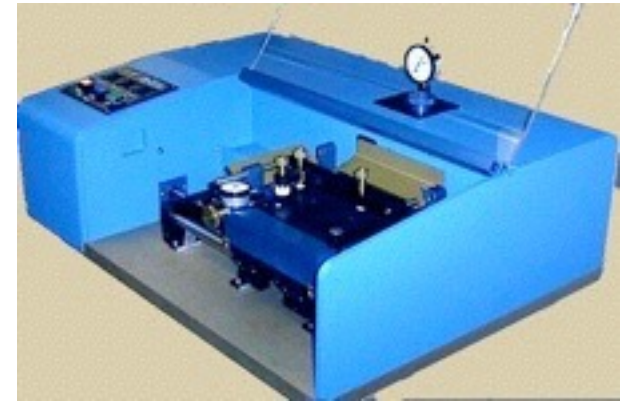
D5L SERIES for aerospace hybrids, DIPs, bathtub packages
Includes combo shelf & slot datum stop

D5L6 Travel 6"
D5L8 Travel 8"
D5L12 Travel 12'



D5F SERIES for packages with attached optical fiber
includes low profile steel datum stop, fiber protective trays,
and extra spindle clearance to reduce fiber bending

D5F6 Travel 6"
D5F8 Travel 8"

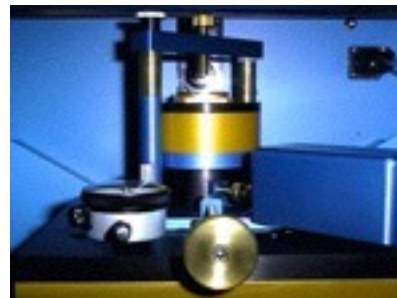


D5R SERIES for round packages

Turntable accepts parts up to 3"d,
pins to .75" long

Dedicated machine accepts 3" parts,
max lead length can exceed 1.5"

D5RT Turntable Module for D5L, D5F



D5R3 Dedicated Rotary Machine



ABOUT US

We're a privately-held specialty manufacturer incorporated in 1986, operating since 1987 in the United States of America. Our products are marketed and supported by a world-wide network of exclusive regional representatives and distributors.



de-lidder™ machines remove lids from hermetic packages nondestructively, leaving a particle-free cavity and reseal-ready surface so product can be reworked and resealed. We have multipurpose and dedicated models for rectangular , round and optical fiber modules.



HGRS *HOT* Gas Workstations safely remove components from assembled circuits with momentary jets of precisely localized very hot Nitrogen. A full suite of tools also makes these machines the ideal "thermal workbench" for prototypes and advanced applications.

OUR MARKETS

We sell to manufacturers and users of high-value, high-reliability microelectronics. As microelectronic packaging technologies have spread from defense/aerospace into telecommunications, optoelectronics, and medicine, our customer base has expanded into all these fields world-wide; wherever the time and materials invested in such products make them worth reworking.

CONTACT US

Our regional representatives can help you arrange samples and demonstrations for answers to any technical questions and a technical review of your application.

MIDAS
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