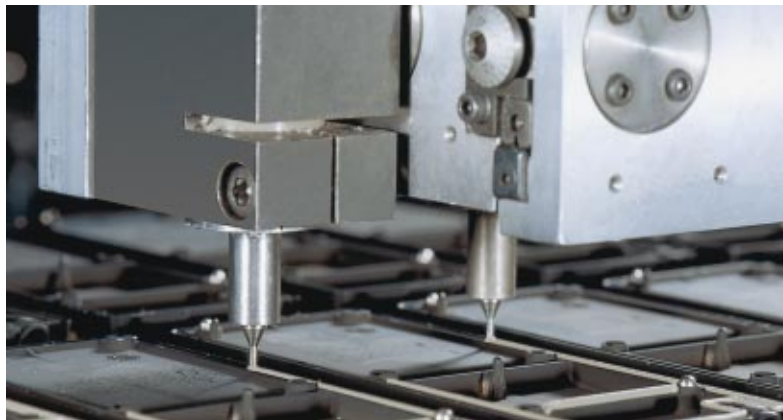
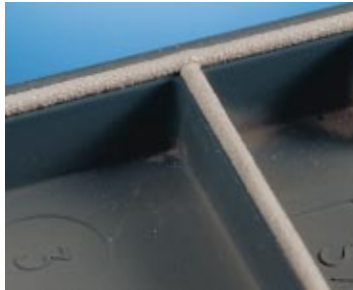


# Cho-Form<sup>®</sup>



## ***Automated Form-in-Place EMI Gasketing Technology***



***Including Complete  
EMI-Shielded Housing Assemblies***

CHOMERICS

Parker Seals

# W

ith board space at a premium, and continual pressure to lower total system cost, high-volume producers of electronic devices are taking advantage of the design and economic benefits of robotically dispensed EMI gaskets.

## Chomerics' Cho-Form® Automated EMI

**Gasketing System** was developed to meet the growing demand for high-speed, high volume application of conductive elastomer seals to metal or plastic housings. It is ideal for cellular handsets, PC cards, compartmentalized enclosures and other tightly packaged commercial electronic devices.

Cho-Form technology allows dispensing of precisely positioned, conformable gaskets in very small cross sections that free valuable package space. The durable, highly conductive seals have low compression set, ensuring years of effective EMI shielding and mechanical performance.



With gasket dispensing primarily software driven, Cho-Form technology permits rapid prototyping, changes in design, and production scale-up at nominal cost. Its inherent flexibility accommodates batch runs or continuous production, from ten to ten million parts.

Wide acceptance of the Cho-Form automated gasket dispensing system can be attributed to a successful blend of manufacturing and materials expertise. Among its important design and performance benefits are:



- up to 60% space saved — flanges as narrow as 0.030 inch (0.76 mm) can be gasketed
- more than 75 dB shielding effectiveness from 200 MHz to 10 GHz with very small gasket beads
- accuracy for gasket location within 0.001 inch (0.025 mm)
- more than 4 Newtons/cm shear adhesion to common housing substrates and coatings
- highly compressible gaskets, ideal with limited deflection force
- speed — gasketed parts typically prototyped and shipped within several days

Various manufacturing alternatives are available. Housings can be supplied directly to Chomerics or an authorized Cho-Form Application Partner for gasketing and optional secondary assembly. Chomerics is also able to produce complete shielded housing assemblies to customer specifications. If volumes are high and product life long, customers may choose to install turnkey Cho-Form application lines at their own or subcontractor facilities.

## Excellent shielding effectiveness, even in small cross sections

Shielding effectiveness of Cho-Form gaskets exceeds 75 dB between 200 MHz and 10 GHz. Shielding performance increases with cross-sectional dimensions. Results shown in Figure 1 for various Cho-Form materials were obtained with very small gaskets, 0.034 inch high by 0.040 inch wide (0.86 mm high by 1.0 mm wide).

## Denser packaging is possible

Cho-Form gaskets can be applied to walls or flanges as narrow as 0.035 inch (0.89 mm), and don't require mechanical retention. Compared with groove and friction-fit designs, the positional accuracy and self-adhesive properties of Cho-Form gaskets will typically save 60% or more space (Figure 2). This frees additional board space, or allows for smaller overall package dimensions.

## Small cross sections, complex geometries

Virtually any gasket bead path can be programmed using Cho-Form application technology. In

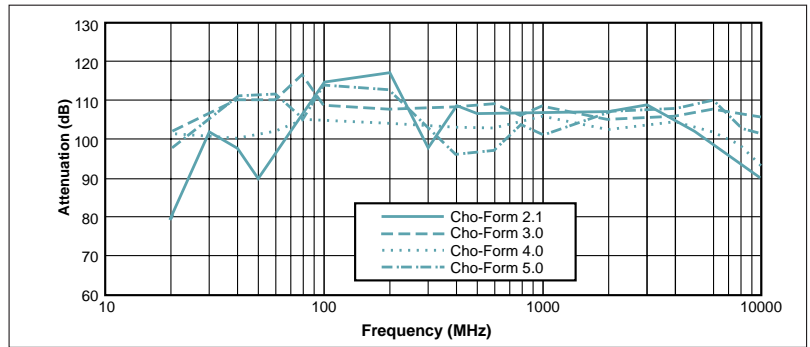


FIGURE 1 Shielding effectiveness

addition to simple straight lengths, the system applies continuous 360° perimeter gaskets in combination with any required number of internal sub-paths that form “T” joints with the perimeter seal. The system produces reliable junctions between bead paths that provide continuous EMI shielding and environmental sealing.

## Low closure force not a problem

With a nominal Shore A hardness of 45, Cho-Form gasket materials are ideal for low closure force designs, or those whose mating surfaces have little mechanical rigidity. Deflection below 10% or above 50% is not recommended. Nominal deflection of 30% and a mechanical compression stop are recommended. Compression-

deflection behavior of dispensed gaskets in various Cho-Form materials appears in Figure 3.

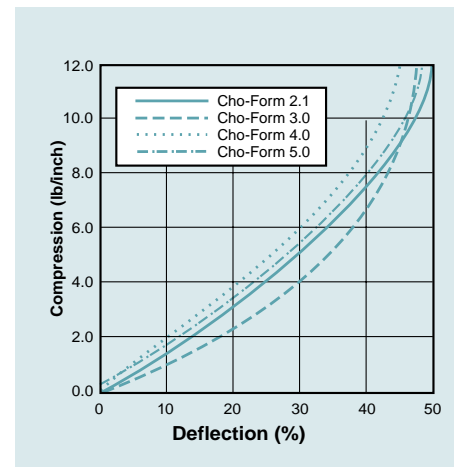


FIGURE 3 Compression-deflection

## Secure gasket adhesion

Cho-Form gaskets exhibit >4N/cm of shear adhesion to a variety of common housing substrates, including:

- cast aluminum, magnesium or zinc alloys with various platings\*
- nickel-copper plating on plastics
- stainless steel (300 series)
- CHO-SHIELD® 2052 conductive coating on plastics
- vacuum metallized aluminum

\* CrO<sub>4</sub>, black chrome, black nickel, bright nickel, tin

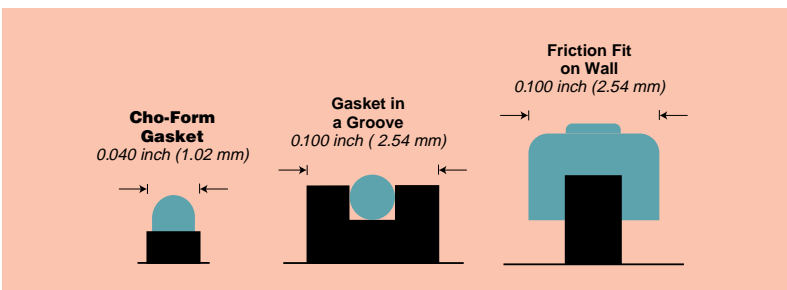


FIGURE 2 Cho-Form gaskets applied to narrow flanges typically use 60% less space than other gasket designs



### Gasket application fully programmable in 3 axes

Full 3-axis motion of the Cho-Form dispensing system accommodates the uneven surfaces (with a maximum slope of 70°) common in castings or injection-molded parts. The result is enhanced control of the gasket cross section.

Competing systems handle only “2½” axes, with Z-axis motion requiring the interruption of X-Y axis motion. The resulting loss of cross-sectional control typically produces a “blob.”



**FIGURE 4** Gasket application to sloped surfaces is fully programmable

### Tight dimensional control and “tail-less” terminations

Cho-Form gasket beads are dispensed with an accuracy of 0.001 inch (0.025 mm), and a cross-sectional height tolerance of 0.004 inch (0.10 mm).

This innovative, proprietary technology produces clean bead ends without the “tail”

characteristic of other processes. The key is precise management of the flow rate of material through the nozzle, material viscosity and dispensing speed.

**Note:** Gasket cross section and tolerances will vary slightly at the site of “start” or “stop” events in the dispense cycle (see page 9).

## A Choice of Cho-Form Materials

The electrically conductive materials developed for the Cho-Form automated dispensing technology produce durable, conformable gaskets.

**Cho-Form 2.1** — Two-component, thermal cure silicone system. Requires a minimum cure temperature of 130°C (266°F). Ag/Cu particle filler makes it the best performing gasket for metallic housings such as aluminum or magnesium castings. Excellent adhesion to a wide variety of substrates, including plated metal film on plastic and conductive paints.

**Cho-Form 3.0** — Two-component, thermal cure silicone system with Ag/Cu particle filler. Minimum cure temperature is only 85°C (185°F). Formulated for painted, plated or metallized plastic housings that will not withstand higher temperature bake. Also provides excellent adhesion to metallic housings.

**Cho-Form 4.0** — One-component, thermal cure silicone system, with Ni/Graphite filler.

Minimum cure temperature is 100°C (212°F). A low-cost solution for EMI shielding, it is specially formulated to reduce galvanic activity between the housing and EMI gasket, and for use on outdoor applications requiring long-term corrosion resistance.

**Cho-Form 5.0** — One-part, room-temperature moisture cure silicone resin with Ag/Cu particle filler. Formulated for use on plastic housings that cannot tolerate elevated bake temperatures. Also suitable for other substrates, including die-cast metallic housings.





## High levels of quality control

Chomerics performs automated dimensional verification of gasket bead placement and height for statistical process control, using fully programmable, optical coordinate measuring technology and vision systems. Electrical resistance of cured gasket material is tested with a multimeter capable of measuring to 0.001 ohm. Typical Cp and Cpk values are approximately 1.5.



**Typical Properties of Cho-Form Materials**

Property	Test Method	Cho-Form 2.1	Cho-Form 3.0	Cho-Form 4.0	Cho-Form 5.0
Base Resin		Silicone (2-part)	Silicone (2-part)	Silicone (1-part)	Silicone (1-part)
Conductive Filler		Ag/Cu	Ag/Cu	Ni/Graphite	Ag/Cu
Shielding Effectiveness 200 MHz to 10 GHz, 0.034 x 0.040 inch bead (0.86 x 1.02 mm)	CHO-TM TP08*	80-100 dB	80-100 dB	75-85 dB	80-100 dB
Volume Resistivity (Initial), ohm-cm, max.	MIL-G-83528 Para. 4.6.11	0.008	0.010	0.44	0.02
Volume Resistivity (Aged), ohm-cm, max.	MIL-G-83528 Para. 4.6.15	0.010	0.05	0.51	0.03
Compression Set, 22 hrs. at 85°C (185°F), percent, max.	ASTM D395 Method B**	25	30	25	30
Tensile Strength, psi (MPa), min.	ASTM D412	300 (2.07)	350 (2.42)	500 (3.45)	100 (0.70)
Elongation, percent, min.	ASTM D412	250	250	130	100
Hardness (Shore A), +15, -10	ASTM D2240	45	45	47	50
Deflection Force, lb/inch (kg/cm) 25% deflection 50% deflection		4 (0.71) 12 (2.14)	3 (0.53) 12.5 (2.22)	5 (0.89) 16 (2.84)	4 (0.71) 12 (2.14)

\*Copies of CHO-TM TP08 are available from Chomerics.

\*\* Compression set is expressed as a percentage of deflection per ASTM D395 Method B at 25% deflection. To determine percent recovery, subtract 1/4 of stated compression set value from 100%. For example, in the case of 30% compression set, recovery is 92.5%.



# Simplify Supply Logistics and Upgrade Quality for EMI Shielded Housings



**More than ever, high volume electronic device manufacturers are striving to integrate production processes to the greatest extent possible.**

**For EMI shielded housings, choosing Chomerics as lead vendor to manage the overall supply chain greatly simplifies production and scheduling. It also brings significant cost and quality benefits.**

## **Housing designs are optimized for automated gasketing**

By the time housing parts have been produced, coated and sent to an EMI gasket dispensing operation, tolerance discrepancies and preventable design oversights often compromise production speed.

When Chomerics interfaces with housing suppliers, results are optimized. Common design faults that hinder gasket dispensing are avoided. Part tolerances appropriate for maximum throughput are ensured. This keeps costs under control, too.

## **Accountability is maximized**

Excuses and finger-pointing are eliminated. Chomerics produces complete assemblies to specifications that establish qualified suppliers, and set performance and quality criteria. Delivery times, tooling cost and price are negotiated with a single vendor.

## **Production times shrink**

Typically, housing parts travel from a die-caster or plastics molder to a plating or conductive coating supplier, then on to an EMI gasket dispensing

operation, on to an assembler, and finally to the OEM. The logistics are deplorable.

Transportation costs and elapsed time are excessive.

Instead, Chomerics can handle most secondary operations at one location, trimming time and cost significantly.



## **Conductive coating and EMI gasket are applied on the same automated line**

Chomerics offers the logistical advantage of fully integrating conductive coating application with the gasket dispensing operation. High performance CHO-SHIELD® 2052 conductive coating is compatible with all Cho-Form materials, avoiding testing delay and expense.

***Chomerics' Cho-Form Business Unit is ready to help streamline the purchase and production of shielded housings. Call today to review your requirements***



# High Speed, Modular Application Lines Installed On-Site

**Customers with ongoing, high-volume requirements for form-in-place EMI gaskets and environmental seals may opt to install one or more complete Cho-Form application lines at their own facility or that of a subcontractor. Chomerics or its authorized representatives will install and prepare each system for full operation.**

Cho-Form application technology provides a one-step, turn-key system with high production efficiencies. Application systems using Chomerics' dispense head technology, gasket compounds, and process can dispense at a rate of 3.5 inches per second per dispense head. This translates to an output of 3,150,000 feet (800 km), or greater, of form-in-place gasket per 8-hour shift per year per dispense head. The Cho-Form system has the lowest capital cost per foot of dispensed bead of any form-in-place EMI gasket system. The proprietary dispensing technology entirely eliminates the need for secondary gasket trimming operations.

Single and dual dispensing gantry models are available, and gantries can be fitted with single, dual or a greater number

of gasket dispensing heads. As volume requirements increase, single gantries and dispense heads can be converted to dual systems, thereby increasing capacity by a factor of four.

To change from one part design to another, the system operator simply switches the dispensing program and part pallets, and begins producing the next design. A changeover should not require more than five minutes.

Standard horizontal and vertical in-line curing ovens, both with cooling zones, are available for all Cho-Form application lines. A typical cure cycle takes 15-30 minutes.

Cho-Form gasketing may also be applied using other commercially available dispensing systems.



Chomerics fields a team of specialists who support Cho-Form equipment and similar form-in-place gasket application systems, with services ranging from programming and material handling, to equipment start-up and maintenance.

As part of a **total technology partnership**, Chomerics will design gasket shapes, application programs, and other custom inputs. The partnership includes Cho-Form compound supply, as well as training, routine service, hardware/software upgrades and design consultation.

## Application Partners & General Application Sites

A growing network of Authorized Cho-Form Application Partners offer most of the services described in this booklet, sometimes at closer proximity to customers' own or subcontractor locations:

### UNITED STATES

**Chomerics**  
Division of Parker Hannifin  
Woburn, MA and Detroit, MI\*  
Tel: 781-935-4850  
Fax: 781-933-4318

**Chromium Corp.**  
Dallas, TX  
Tel: 972-851-0472  
Fax: 972-851-0568

**K.R. Anderson Co., Inc.**  
Santa Clara, CA  
Tel: 408-727-2800  
Fax: 408-727-2959

### EUROPE

**Parker Hannifin PLC**  
Chomerics Europe  
Marlow, UK  
Tel: 1628 404000  
Fax: 1628 404090

### SOUTH AMERICA

**Parker Hannifin Ind. e Com. Ltda.**  
São Paulo, Brazil  
Tel: 55-11-847-1222  
Fax: 55-11-847-0817

\*through contractor

### ASIA

**Parker Hannifin Japan, Ltd.**  
Yokohama, Japan  
Tel: 81-45-861-3811  
Fax: 81-45-864-5305

**Parker Hannifin Singapore**  
Singapore  
Tel: 65-261-5233  
Fax: 65-265-5125

**Taiyo Wire Cloth /Japan**  
Tokyo, Japan  
Tel: 81-3-3493-7851  
Fax: 81-3-3493-7115



# Important Considerations for Optimizing Quality & Production Efficiency

metal and injection-molded plastic housings in advance of tool design and production. Detailed guidance is provided on part and tool design, part reproducibility, locating features, tolerances and surface conditions — issues that are key to the quality and economics of robotic gasket dispensing.

As discussed on page 6, Chomerics is also prepared to act as lead vendor, managing the entire housing supply chain to ensure the best results for OEM customers.

The following section provides answers to commonly asked questions, and highlights critical design issues that affect production efficiency and cost.

A shielded housing is an *assembly* whose quality and performance are functions of all the parts and processes used to produce it.

Whenever possible, Chomerics interfaces on behalf of OEM customers with suppliers of die-cast

## Housing Material Considerations

### Plastic substrate selection

If the housing is an injection-molded thermoplastic, the gasket cure temperature is an important parameter. Different thermoplastics soften or stress-relieve at different temperatures.

Polycarbonate/ABS blends offer significant process advantages for Cho-Form gasket application. While somewhat more expensive than other plastics, virtually all PC/ABS blends will withstand 85°C (185°F), and therefore allow efficient gasket “quick cure” in-line. In contrast, plastics that require room temperature gasket curing necessitate batch

processing, with attendant cost and logistic (time) disadvantages.

For maximum production throughput, Chomerics generally recommends that plastic housings be able to withstand curing at 85°C for up to 40 minutes without deforming.

### Surface preparation

Metal or plastic surfaces to be gasketed with Cho-Form materials should exhibit electrical resistance of <0.01 ohm. They should be clean and free of dirt, oils and organic solvents.

**Metallic housings** must be treated to remove release agents and machining oils. Aluminum parts should be chromate conversion coated (alodine or irridite) per MIL-C-5541 Class 3. Magnesium parts should be protected with Dow 20 modified chrome pickle or equivalent.

**Plastic housings** require metallizing, which may be accomplished by plating, aluminum vacuum deposition or conductive paint.

For plating, nickel-copper is preferred. It adheres well, provides 80+ dB of shielding effectiveness, and remains electrically stable over time.

If **vacuum deposition** is chosen, a nitrogen purge is mandatory to ensure good adhesion.

Differences in commercially available *conductive paints* necessitates testing them with the selected Cho-Form gasketing material. Chomerics' CHO-SHIELD® 2052 conductive coating has been formulated to adhere well and be galvanically compatible with Cho-Form materials. The superior performance and batch-to-batch uniformity of this silver-copper-filled paint has been extensively demonstrated in these applications. Its high abrasion resistance provides protection during product assembly and use.

Chomerics applies CHO-SHIELD 2052 coating robotically in-line, as an integrated part of the automated Cho-Form application process. This capability provides significant logistical, time and cost benefits.

### Protective packaging

To avoid cosmetic injuries such as surface scratches, parts should be shipped in compartmentalized plastic or corrugated paper trays. If requested, Chomerics will arrange for specialized packaging to be delivered to the housing manufacturer.



# Gasket Design Considerations

## Start/Stop bead profiles

Designers should anticipate slight differences in gasket bead cross section in the start/stop zones compared with the very uniform profile produced during steady-state dispensing of straight runs. Figures 5-8 illustrate the nature of these intrinsic differences and the adjusted tolerances in the initiation and termination zones, which are defined as 0.100 inch (2.54 mm) long.



a. starting event



b. "T" stop



c. full circle perimeter stop

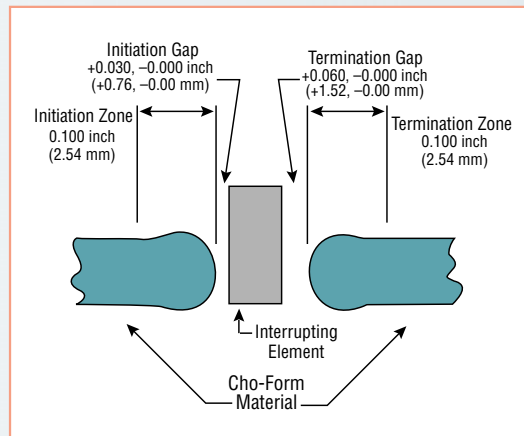


d. straight run stop

**FIGURE 5** Characteristic appearance of start/stop events

Engineering drawings should reflect a less well-defined gasket profile in start/stop zones, to facilitate Quality Control inspections of incoming parts. Suggested drawing references appear in Figures 6 & 7.

In programming the dispense path, sufficient flexibility exists to minimize the number of start/stop events and to locate such events where the gasket profile is not critical. Part drawings should identify any areas in which the increased cross section tolerances associated with start/stop zones would create a problem.



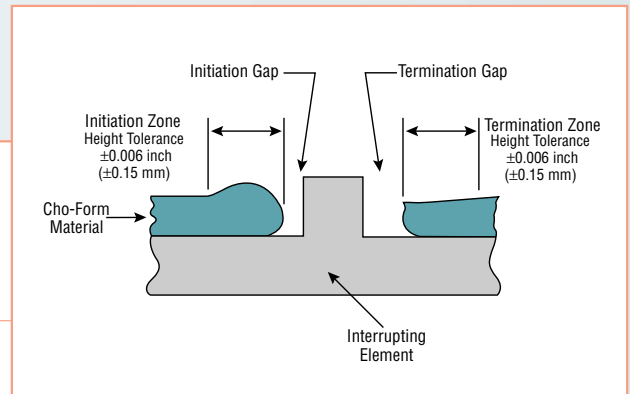
**FIGURE 6** Location tolerances for bead initiation & termination zones (cross-sectional view)

Cho-Form gasket beads are dispensed with an accuracy of 0.001 inch (0.025 mm) and a straight-run height tolerance of  $\pm 0.004$  inch ( $\pm 0.10$  mm). The exception is within 0.100 inch (2.54 mm) at the start and end of a bead (initiation zone and termination zone respectively), where  $\pm 0.006$  inch ( $\pm 0.15$  mm) is the height tolerance.

0.034  $\pm$  0.004 inch high by  
0.040  $\pm$  0.004 inch wide  
(0.864  $\pm$  0.10 mm high by  
1.016  $\pm$  0.10 mm wide)

0.052  $\pm$  0.004 inch high by  
0.062  $\pm$  0.004 inch wide  
(1.321  $\pm$  0.10 mm high by  
1.575  $\pm$  0.10 mm wide)

Deflection range for both cross sections: Nominal: 30%, Minimum: 10%, Maximum: 50%



**FIGURE 7** Gasket height tolerances

**FIGURE 8** Suggested cross sections with height-to-width ratio of 0.85

# Critical Housing Design Issues

***Cho-Form FIP gasket technology accommodates a reasonable degree of variability in housing part dimensions. However, setup and dispensing speed are directly impacted by part uniformity. In addition, the housing design can pose obstacles to efficient gasket dispensing.***

***The most common avoidable problem is warped or non-uniform housings. If housings are not sufficiently flat and dimensionally uniform, they must be restrained by special alignment and hold-down fixtures, which can add substantial setup time.***

***For best results and production economics, designs should reflect the following considerations:***

## Positive locating features speed production

### Parts should be easily fixtured for fast, accurate dispensing

Reproducible positioning of the parts beneath the dispensing head is fundamental to this automated technology. Maximum production speed can be achieved when through-holes are available to pin-position parts on the pallets that transport them to the dispensing head. If through-holes are not available, two sides can be pushed against pallet rails for positioning. This requires hold-down clamps that must be positioned without interfering with the dispensing needle.

### Avoid features that complicate design of a locating system

Parting lines in dies or molds can interfere with the establishment of a locating edge. Mold gates, runners or flash can interfere with positioning pins or fixtures.

## Part reproducibility is critical

### Flanges, rails or ribs to be gasketed should have part-to-part location reproducibility (X and Y dimensions) within 0.008 inch (0.20 mm)

Once the dispense path is programmed, all surfaces to be gasketed must be located where the program assumes them to be. Variation greater than 0.008 inch (0.203 mm) will result in gasket beads dispensed partly on and partly off the intended surfaces.

### Housings must be reproducible in the Z axis within 0.012 inch (0.30mm)

Manufacturing processes for die-cast metal and injection molded plastic housings generally can produce parts with intrinsically reproducible, uniform dimensions in the Z axis.

Several factors determine the gasket bead profile — air pressure in the needle, material viscosity, needle diameter, feed rate and needle height (Z) above the part. Accurate Z-axis programming is central to dispensing an optimum gasket profile. Full 3-axis programmability of the Cho-Form dispensing heads is an important advantage in accommodating the necessary tolerances on the Z-axis position of the surface to be gasketed.

Selection of a housing supplier able to meet the reproducibility requirements for the Z-axis can make a real difference in the quality, speed and economics of gasket dispensing.

### Production housing functions as master

The Cho-Form gasket dispensing head is programmed in 3 axes by plotting the path which the needle will follow, using a representative production housing as the master. Programming can account for unintended but consistent deviations in elevation, such as:

- non-parallelism
- non-flatness
- warping

In aggregate, these elevation deviations must be consistent from part to part within 0.012 inch (0.30 mm). If

not, special mechanical restraint fixturing will probably be required to ensure accurate gasket dispensing. Fixturing schemes usually entail delay and expense and may also impact production speed.

### Parallelism to a defined plane

Using one or more specific part features for locating purposes, housings are mounted on a machined pallet and conveyed to the dispensing head. The pallet surface defines the “datum plane” for Z-axis motion of the dispensing needle.

A Cho-Form gasket can be dispensed onto a part surface of known slope with respect to the datum plane (up to 70°). Application onto a flat surface (i.e., 0° slope) can actually be more difficult than application to a sloped surface if part thickness is not consistent. Variation in overall part thickness will cause the surface to be gasketed to be non-parallel with the datum plane. Z-axis adjustments to the needle's path are programmed using the representative “master” part. However, these variations must be consistent in both location and degree, and within the 0.012 inch (0.30 mm) aggregate allowable tolerance to avoid the need for special fixturing. (Figures 9a - b.)

### Flatness of the surface to be gasketed

Unevenness in flanges, rails or ribs to be gasketed can be programmed into the Z-axis motion of the dispensing head. Again, this Z-axis variation must be consistent from part-to-part within the 0.012 inch (0.30 mm) aggregate tolerance to avoid the need for fixturing. (Figures 10a - b.)

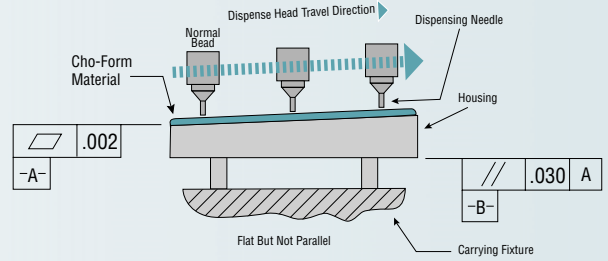
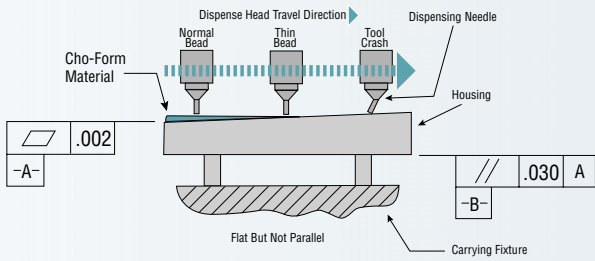
### Warping of the housing

As with parallelism and flatness of the surface to be gasketed, warping of the entire part can contribute to a Z-axis variation that exceeds the 0.012 inch



**9a Non-reproducible non-parallelism >0.012 inch (0.30 mm) results in uneven bead**

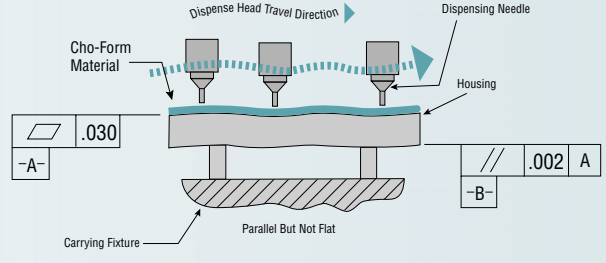
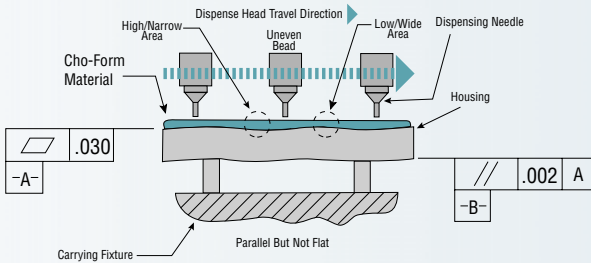
**9b Program adjusted for reproducible non-parallelism >0.012 inch (0.30 mm) results in uniform bead**



**FIGURE 9 Non-parallelism between receiving surface and pallet surface**

**10a Non-reproducible non-flatness >0.012 inch (0.30 mm) results in uneven bead**

**10b Program adjusted for reproducible non-flatness >0.012 inch (0.30 mm) results in uniform bead**



**FIGURE 10 Non-flatness of gasketed surface**

(0.30 mm) tolerance for reproducibility. The trend toward smaller electronic packages with thin housing walls makes this a common occurrence. If surfaces for part hold-down are available, this condition can be accommodated by fixturing. However, setup and production time will be affected.

**Keep the need for part restraint to a minimum**

When the part-to-part reproducibility requirement cannot be met, mechanical restraints are fabricated which temporarily flatten the part for proper dispensing of the gasket. Whenever possible, Chomerics exploits design features such as

through-holes and edge rails for clamping. If such features do not exist, more complicated fixturing schemes must be designed to induce the necessary flatness, with a corresponding time and cost penalty.

**Avoid Z-axis obstructions**

**Sidewall proximity to the dispensing needle**

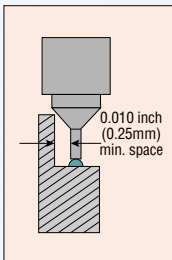
Often, a form-in-place EMI gasket is applied along a “ledge” adjacent to a higher sidewall. The dimensional tolerances on ledge and sidewall locations are particularly critical, to avoid sidewall interference with the moving needle (Figure 11).

Side pressure on the needle produces a change in gasket profile. However, because the Cho-Form dispensing head positions the needle with 0.001 inch (0.025 mm) accuracy, this should not be a concern provided that part-to-part dimensional consistency is within 0.010 inch (0.25 mm).

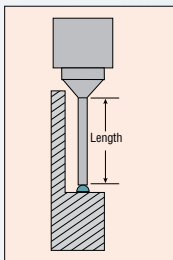
**High sidewalls slow dispensing**

High sidewalls adjacent to the gasket dispensing path may require an elongated needle to provide the necessary

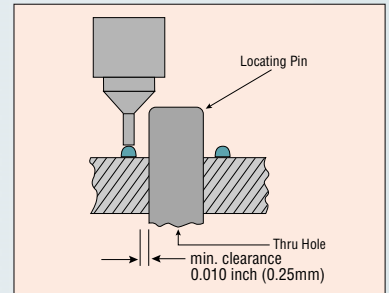
clearance for the dispensing head (Figure 12). The longer needle adds friction to material flow, reducing dispensing speed by as much as 75%. This can frequently be avoided by positioning high sidewalls on the mating part or by reducing their height.



**FIGURE 11 Sidewall interference with dispensing needle**



**FIGURE 12 High sidewalls may necessitate longer needles, reducing speed**



**FIGURE 13 Dispensing path obstructed by screw heads or locator pins**

**Through-hole interference**

In cases where the housing incorporates through-holes used to position the part on its pallet, the holes must not intersect the dispensing path. Clearance of less than 0.010 inch (0.25 mm) could result in screw heads or locating pins obstructing the dispensing needle (Figure 13).

**Chomerics** is the world's largest manufacturer of EMI (electromagnetic interference) shielding materials. Our strengths are service, experience, technology, and unparalleled design capabilities.

Since 1961, Chomerics has been the primary force in the development and application of conductive elastomer technology in extruded, molded and RTV compound forms and with Form-in-Place gasketing technology.

Chomerics products have been designed into thousands of applications: telecommunications systems, from cellular handsets to base stations and switch gear; information systems, from laptops to mainframes; cables and connectors; GPS systems; industrial controls; medical devices; fire control systems... and many more.

Our comprehensive compliance and safety testing facilities provide us constant exposure to real-world problems. We meet shielding challenges head on, and respond with effective solutions.

[www.chomerics.com](http://www.chomerics.com)



Chomerics is a division of the Seal Group of the Parker Hannifin Corporation. Parker Seal is one of the world's largest and most experienced manufacturers of elastomer and other sealing and shielding devices.

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