3M™ Dynamic Mixing System
Dent Repair Techniques
Technician Training Program

Technician’s Manual
Introduction

3M’s new Dynamic Mixing System offers the opportunity to update the Dent Repair Process from the traditional “Batch” process to a more modern, lean, “Continuous” process. Along the way, the user and shop should see benefits in Reduced Waste, Fewer Pinholes, and Improved Productivity.

However, the basics of the process haven’t really changed. Metal work and surface preparation are as important as they ever were to the achievement of a Quality Repair.

This manual discusses what happens AFTER the Metal Work is complete, and the surface is ready for finishing. While the sanding and refinish process outlined represents 3M’s recommendation, it can be taken as a fairly conservative approach. It is not meant to replace exiting process recommendations in place from your paint manufacturer. The Dynamic Mixing System can be used as successfully, if not more so, than traditional Filler and Glaze products in your paint manufacturer’s SOP.

Should you have any questions, please don’t hesitate to contact your local 3M Automotive Aftermarket Sales Representative.

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SAFETY PRECAUTION:

Always use appropriate personal protective equipment
DMS Component Identification

3M™ Dynamic Mixing Gun - Pneumatic

- Manual Return Rod
  - Retracted
- Drive Socket
- Twist and Lock Interface
- Regulator
- Air Inlet
- Trigger
- Manual Return Rod
  - Extended
- Plunger Rods
  - Extended
3M™ Dynamic Mixing Cartridge

- Cartridge End Cap
- Nozzle Retaining Tabs
- Large Outlet
- Mixing Rod
- Small Outlet
- Twist and Lock Interface Plate
- Large Plunger Seal
- Mixing Rod
- Small Plunger Seal
- Cartridge Fill Gauge
3M™ Dynamic Mixing Nozzle

- Dynamic Mixing Element
- Small Inlet
- Nozzle Outlet
- Nozzle Drive Socket
- Large Inlet
3M™ Bulk Nozzle Rack

3M™ Applicator Gun Shop Rack
DMS Technician Techniques & Tips

As the Dynamic Mixing System gains in popularity, body technicians continue to give us the Tips and Techniques that make them successful. Please find the best suggestions, organized by topic: Some suggestions are so powerful, they may be found in multiple sections.

► Reducing Waste and Mess

1. The 3M™ Dynamic Mixing Gun – Pneumatic (PN05846) comes equipped with a built-in regulator to control the material dispense rate.
   1.1. Rotating the regulator knob counter-clockwise (to the left) will reduce the material dispense rate.
   1.2. Rotating the regulator knob clockwise (to the right) will increase the material dispense rate.
   1.3. Before installing a cartridge onto the applicator gun, it is recommended that the user turn the regulator to the “OFF” position by rotating the knob counter-clockwise (to the left) until it stops.
   1.4. When using Dent Filling Compound and other Body Fillers, a setting of 2.5 – 3.0 full turns (clockwise from “OFF”) is recommended.
      1.4.1. Running the regulator at a higher setting will result in potential issues
         1.4.1.1. Over-application / over-build on the panel
         1.4.1.2. More color variation (aka “Striping”) throughout the bead
         1.4.1.3. Increased amount of product at the end of the cartridge without hardener
   1.5. When using Dent Finishing Glaze, and other thin glazes, a setting of 1.25 – 1.5 full turns (clockwise from “OFF”) is recommended.
      1.5.1. Running the regulator at a higher setting will result in potential issues
         1.5.1.1. Increased waste – more product will be dispensed that can be used
         1.5.1.2. Poor mixing – material will flood the dynamic mixing nozzle
         1.5.1.3. Increase amount of product at the end of the cartridge without hardener

2. Equalize cartridges with the Dynamic Mixing Nozzle ON.

   2.1. Unlike products with a “static” mixing nozzle, equalizing the cartridge with the dynamic mixing nozzle ON does not skew the delivered mix ratio.
   2.2. Equalizing with the dynamic mixing nozzle ON minimizes waste by allowing air to be purged from the nozzle at the same time the cartridge plungers are leveled.
   2.3. Equalizing with the dynamic mixing nozzle ON reduces the mess associated with equalization.
   2.4. Cartridges CAN be equalized with the mixing nozzle OFF, should the user desire.

3. If not continuously dispensing, periodically purge a small amount of product (about the size of a large grape) into a paper towel to extend the nozzle’s Work Time.
   3.1. Depending upon the ambient temperature, material will start to gel within the nozzle after a couple of minutes.
   3.2. If this material is not disposed of, the nozzle will soon expire or harden, and will have to be changed before material can once again be dispensed.
   3.3. Extruding a small amount of gelling product from the nozzle before it hardens will “reset the clock” on the nozzle Work Time, and allow the user to continue using the same nozzle.
4. **Build upon the repair surface in multiple thin layers.**
   4.1. Working with thin layers ensures that the filler gets good “wet-out” to the surface, while preventing any pockets of air that could become a pinhole or void.
   4.2. Thick coats of filler cure much faster than thin layer. Thin layers allow for the most work / spread time.
   4.3. Thick coats of filler generate excess heat, which, in turn, can create pinholes.
   4.4. Thick coats of filler can be harder to sand than thin layers.
   4.5. Building in thin layers helps to minimize the waste associated with overbuilding
       4.5.1. Excess filler material
       4.5.2. More material to remove through sanding
       4.5.3. More time spent sanding
       4.5.4. Extend Work Time

5. **Use the Fill Gauge to job cost or estimate the amount needed for a repair**

   5.1. While every repair is different, a “Rule of Thumb” is developing. A single/complete cartridge of DMS filler contains approximately the amount of product to complete an 8 – 10 hour dent.
       5.1.1. Before you begin working the repair, add up the dent repair hours on the Repair Order and divide by 10 to estimate the number of filler cartridges you can expect to use.
   5.2. The pull tab on the Manual Return Rod will travel along the face of the Fill Gauge as the product is dispensed to help keep track of the amount of material remaining in the cartridge.
       5.2.1. Marking the Fill Gauge with the RO Number at the beginning and end of a job can help you document the amount of filler or glaze used, and determine a Job Cost to the operation.

6. **Don’t mix DMS Filler or Glaze on a Mixing Board**

   6.1. While dispensing DMS Filler or Glaze onto a mixing board does not harm the product, it does reduce the potential benefit users see from the system.
       6.1.1. Dispensing on to a mixing board or pallet will most likely eliminate much of the material waste savings possible with DMS, as more product will likely be put on the board than the repair calls for.
       6.1.2. Transferring filler/glaze from a mixing board to another surface is a large source of pinholes, so pinhole reduction will be reduced dramatically if the product is not applied directly to the panel.

7. **When using Glaze, keep the cartridge upright to minimize dripping.**

   7.1. While the integrated “back-off” mechanism in the applicator releases the pressure in the cartridge (preventing “ooze out”), the low viscosity of glaze may still result in some dripping.
   7.2. Keeping the cartridge upright when not dispensing should minimize any mess experienced with dripping glaze.
Minimizing Pinholes

1. **Build upon the repair surface in multiple thin layers.**
   1.1. Working with thin layers ensures that the filler gets good “wet-out” to the surface, while preventing any pockets of air that could become a pinhole or void.
   1.2. Thick coats of filler cure much faster than thin layer. Thin layers allow for the most work/spread time.
   1.3. Thick coats of filler generate excess heat, which, in turn, can create pinholes.
   1.4. Thick coats of filler can be harder to sand than thin layers.
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      1.5.1. Excess filler material
      1.5.2. More material to remove through sanding
      1.5.3. More time spent sanding
      1.5.4. Extend Work Time

2. **Don’t apply beads in a Serpentine (Zig-Zag) pattern.**
   2.1. While multiple beads can be placed on a panel, make sure to lay them touching each other, side-by-side.
   2.2. Any gap between beads can develop into a void or pinhole as the product is spread.
   2.3. The best practice is to keep the tip of the nozzle buried in the adjacent bead of filler as more is dispensed.

3. **Don’t apply beads in a Spaghetti Ball.**
   3.1. When applying filler directly to a panel, do not allow the bead to “fall” into a pile on the surface.
      3.1.1. As the bead “piles” or “coils” – forming the “Spaghetti Ball” – pockets of air get trapped between the beads.
      3.1.2. When the filler is spread, these pockets of air can become strings of pinholes in the final finish
   3.2. When applying filler directly to a panel, keep the tip of the nozzle lightly against the surface, almost “injecting” the filler onto the panel.

4. **Don’t mix DMS Filler or Glaze on a Mixing Board**
   4.1. While dispensing DMS Filler or Glaze onto a mixing board does not harm the product, it does reduce the potential benefit users see from the system.
      4.1.1. Dispensing on to a mixing board or pallet will most likely eliminate much of the material waste savings possible with DMS, as more product will likely be put on the board than the repair calls for.
      4.1.2. Transferring filler/glaze from a mixing board to another surface is a large source of pinholes, so pinhole reduction will be reduced dramatically if the product is not applied directly to the panel.
5. Keep the nozzle buried in the bead of filler or glaze as you dispense the product

5.1. Keeping the tip of the nozzle buried in the bead of filler/glaze will prevent the entrainment of air – air that can become a source of pinholes in the final finish.

6. For the “Tight Coat / Wet Coat” application, apply the filler/glaze to the spreader.

6.1. The purpose of a “Tight” or “Wet” coat is to push material (filler/glaze) into every nook and cranny and to the bottom of every sand scratch on the surface. Achieving this level of application increases mechanical adhesion (great for featheredging) and decreases pinholes.

6.2. When filler/glaze is placed on the spreader, most of the application force goes towards pushing the material into the panel, rather than spreading it across the surface.

7. Don’t overwork the filler, it just makes pinholes.

7.1. Every pass a spreader makes over the surface of body filler can trap a little air in the mix.

7.2. Initial spreader passes tend to have more application force, and so manage to “wipe” the air out.

7.3. Subsequent spreads tend to use less force, and any entrained air will remain to become a pinhole.

7.4. Spreading body filler is not like buttering toast – one to two passes is generally the target.

8. Use 3M™ Dry Guide Coat to inspect the surface for pinholes.

8.1. 3M™ Dry Guide Coat is used to identify surface imperfections such as pinholes and deep scratches in primer.

8.1.1. Requires no masking and there is no dry time involved.

8.1.2. Can be used for both wet and dry sanding.

8.1.3. Contains no solvents.

8.2. When sanding body filler, it ensures the filler is flat (no ripples) and that the body styling lines and contours are straight and correct.
Increasing Productivity

1. If not continuously dispensing, periodically purge a small amount of product (about the size of a large grape) into a paper towel to extend the nozzle’s Work Time.
   1.1. Depending upon the ambient temperature, material will start to gel within the nozzle after a couple of minutes.
   1.2. If this material is not disposed of, the nozzle will soon expire or harden, and will have to be changed before material can once again be dispensed.
   1.3. Extruding a small amount of gelling product from the nozzle before it hardens will “reset the clock” on the nozzle Work Time, and allow the user to continue using the same nozzle.

2. Always keep additional (clean) spreaders within easy reach.
   2.1. As the Dynamic Mixing System is a “Filler On Demand” technology, residual filler on your spreader may gel/harden before you are done working with fresher filler from the nozzle.
      2.1.1. Gelled filler on the spreader may create drag marks through a smooth spread of filler.
      2.1.2. Set the used spreader aside and begin using a clean spreader to continue working.
      2.1.3. Filler will harden on the used spreader, and be easy to remove without harsh chemicals (if plastic)

   2.2. A variety of spreader sizes (4”, 5”, 6”, etc.) can help reduce the amount of finishing work that needs to be done.
      2.2.1. Start with a narrower spreader to make sure that filler is being applied to the specific deepest parts of the repair first.
      2.2.2. A narrower spreader also allows for more down-force to better wet the surface and fill all scratches to their root.
      2.2.3. Migrate to wider spreaders with additional layers of filler, to both bridge across adjacent sections, and reduce the frequency of “spreader ridges.”

3. Build upon the repair surface in multiple thin layers.
   3.1. Working with thin layers ensures that the filler gets good “wet-out” to the surface, while preventing any pockets of air that could become a pinhole or void.
   3.2. Thick coats of filler cure much faster than thin layer. Thin layers allow for the most work / spread time.
   3.3. Thick coats of filler generate excess heat, which, in turn, can create pinholes.
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      3.5.1. Excess filler material
      3.5.2. More material to remove through sanding
      3.5.3. More time spent sanding
      3.5.4. Extend Work Time
4. Use 3M™ Purple Abrasives for shaping, sanding, and finishing

4.1. 3M™ Purple Abrasives clear out more dust with less loading
4.2. Increased life of the abrasive leads to increased productivity and reduced material costs
4.3. Improved cutting ability delivers increased cut rate and consistent finish

5. Rough Shape the surface at approximately 8 – 10 minutes (75°F)

5.1. DMS is a production tool that rewards Techs for staying on the job.
5.2. Use a (used) coarse grade abrasive (40 – 80 grit) on a hand pad with light pressure early in the shaping time to knock down any ridges or high spots. This will open up the sub-layer of filler, and allow for better sanding throughout the refinish process.
5.3. This Rough Shaping may occur while the filler still feels slightly “softer” than traditional fillers when you begin.

6. Use the Fill Gauge to job cost or estimate the amount needed for a repair

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Application Process

1. Use a paper towel to keep the nozzle outlet clean during dispensing.

   1.1. Material can accumulate around the rim of the nozzle outlet. As that material cures, it may drop into the work area, drag an unintended line, or otherwise negatively impact the work surface.
   1.2. Periodically wiping the end of the nozzle outlet will prevent material accumulation.

2. If not continuously dispensing, periodically purge a small amount of product (about the size of a large grape) into a paper towel to extend the nozzle’s Work Time.

   2.1. Depending upon the ambient temperature, material will start to gel within the nozzle after a couple of minutes.
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   7.2.1. Marking the Fill Gauge with the RO Number at the beginning and end of a job can help you document the amount of filler or glaze used, and determine a Job Cost to the operation.

8. When Work Time is an issue, avoid dispensing multiple beads before spreading
   8.1. While multiple beads can be placed (touching, side-by-side) on a panel, please remember that filler generates heat as it cures – and thick cross-sections of filler generate even more heat.
   8.1.1. The more heat that is generated, the faster the product cures – and the less work time the user has to spread it.
   8.1.2. Leaving DMS filler in thick beads will reduce the work time.
   8.2. Further, when the ambient temperature is warm/hot, the work time of the filler will be shorter than you would see at 75°F.
   8.2.1. When the temperature is warm/hot (95°F, for example), the user may not have enough time to dispense multiple beads before the first bead has cured beyond the point of spreading.
   8.3. When short Work Time becomes an issue, dispense shorter beads (12” rather than 3’) and spread them immediately.
DMS Technician Techniques & Tips – Application Process

9. Feel free to use the Applicator upside-down in low applications (i.e. rocker panels)

9.1. The applicator gun can be used in any orientation. When applying filler along sections that are close to the floor, it is often more comfortable to invert the gun.

10. For the “Tight Coat / Wet Coat” application, apply the filler/glaze to the spreader.

10.1. The purpose of a “Tight” or “Wet” coat is to push material (filler/glaze) into every nook and cranny and to the bottom of every sand scratch on the surface. Achieving this level of application increases mechanical adhesion (great for featheredging) and decreases pinholes.

10.2. When filler/glaze is placed on the spreader, most of the application force goes towards pushing the material into the panel, rather than spreading it across the surface.

11. Try refrigerating DMS cartridges to increase work time in high temperature situations.

11.1. The optimum storage temperature is 65 °F – 80 °F. Elevated storage temperatures will reduce the products’ shelf life.

11.2. As with any body filler/glaze, the cure rates of DMS products are influenced by temperature.

11.2.1. Cure Rates are developed and documented for each product at 70 °F – 75 °F.

11.2.2. If the temperature is 20 °F higher (~ 90 °F), the cure rate will roughly double (the time will be cut in half).

11.2.3. If the temperature is 20 °F lower (~ 55 °F), the cure rate will roughly be cut in half (the time will double).

11.3. In high temperature environments, refrigerating DMS cartridges before use will reduce the reaction rate and extend the work time seen by the user.

12. DMS allows for additional coats of filler or glaze to be applied without sanding between coats.

12.1. As you are working a large repair (or in high temperature), it is important to remember that the Dynamic Mixing System process allows multiple coats of filler to be applied to a surface without sanding in between coats.

12.1.1. As you are working with the filler, dispense and spread what can be worked before the product starts to set up.

12.1.2. Once the filler starts to “shear” or “drag”, stop spreading.

12.1.3. After about 5 – 6 minutes, the filler should have gelled to the point that application can continue. This can be tested by dragging a spreader across the filler without disrupting the surface.

12.1.4. Immediately dispense additional filler, and continue to spread, working the repair.

12.1.5. If this process is followed, there is no need to take the time to sand between coats.
Equipment

1. For best results, incoming Line Air Pressure should be regulated to between 90 PSI and 120 PSI, for the 3M™ Dynamic Mixing Gun – Pneumatic (PN05846).
   1.1. Should the line pressure drop below 90 PSI, depending upon shop conditions, air flow/volume may not be enough to drive the applicator gun, and poor mixing may result.
   1.2. Should the line pressure exceed 120 PSI, “O” Rings within the trigger spool assembly may become displaced, causing erratic performance.
   1.3. Use caution to prevent thread tape from contaminating and damaging the trigger valve assembly on the DMS gun when installing the air connector fitting.

2. An in-line air regulator (or “cheater valve”) is not required or recommended for use with the 3M™ Dynamic Mixing Gun – Pneumatic (PN05846).
   2.1. Many of these in-line regulators are actually FLOW regulators, rather than PRESSURE regulators. If a FLOW regulator is mistakenly used, the applicator will most likely be starved for air volume, and poor mixing may result.
   2.2. Avoid the use of in-line regulators.

3. The 3M™ Dynamic Mixing Gun – Pneumatic (PN05846) comes equipped with a built-in regulator to control the material dispense rate.
   3.1. Rotating the regulator knob counter-clockwise (to the left) will reduce the material dispense rate.
   3.2. Rotating the regulator knob clockwise (to the right) will increase the material dispense rate.
   3.3. Before installing a cartridge onto the applicator gun, it is recommended that the user turn the regulator to the “OFF” position by rotating the knob counter-clockwise (to the left) until it stops.
   3.4. When using Dent Filling Compound and other Body Fillers, a setting of 2.5 – 3.0 full turns (clockwise from “OFF”) is recommended.
      3.4.1. Running the regulator at a higher setting will result in potential issues
         3.4.1.1. Over-application / over-build on the panel
         3.4.1.2. More color variation (aka “Striping”) throughout the bead
         3.4.1.3. Increased amount of product at the end of the cartridge without hardener
   3.5. When using Dent Finishing Glaze, and other thin glazes, a setting of 1.25 – 1.5 full turns (clockwise from “OFF”) is recommended.
      3.5.1. Running the regulator at a higher setting will result in potential issues
         3.5.1.1. Increased waste – more product will be dispensed that can be used
         3.5.1.2. Poor mixing – material will flood the dynamic mixing nozzle
         3.5.1.3. Increase amount of product at the end of the cartridge without hardener
4. When loading a cartridge, briefly toggle the applicator gun trigger to help the cartridge mixing rod seat in the drive socket.

4.1. The cartridge mixing rod tapers slightly to allow for some amount of self-alignment with the applicator gun drive socket. However, if a cartridge will not seat to the applicator gun’s Twist and Lock interface, due to a misalignment of the mixing rod and drive socket:

4.1.1. Make sure the material dispense rate regulator knob is turned to the “OFF” position.

4.1.2. Briefly toggle the applicator gun trigger to spin the drive socket while holding the cartridge in the load position.

4.1.2.1. Once the drive socket has turned to be in alignment with the mixing rod, the cartridge will seat.

5. Feel free to use the Applicator upside-down in low applications (i.e. rocker panels)

5.1. The applicator gun can be used in any orientation. When applying filler along sections that are close to the floor, it is often more comfortable to invert the gun.

6. Oil the DMS Applicator regularly.

6.1. The 3M™ Dynamic Mixing Gun should be stored and cared for as any high-quality pneumatic tool:

6.1.1. Keep the air inlet clean and free from foreign matter

6.1.2. Apply 2 drops of lubricating oil at the air inlet weekly to maintain proper motor function. Do not over apply oil as this may result in airborne contamination.

6.1.3. Use a clean, dry air supply – free of moisture and other contaminates to extend the life of the tool.

6.2. Inspect the Regulator, Twist-and-Lock Interface, and Drive Socket areas for damage prior to each use.

6.3. Use caution to prevent thread tape from contaminating and damaging the trigger valve assembly on the DMS gun when installing the air connector fitting.
Cartridges

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   1. The cartridge mixing rod tapers slightly to allow for some amount of self-alignment with the applicator gun drive socket. However, if a cartridge will not seat to the applicator gun’s Twist and Lock interface, due to a misalignment of the mixing rod and drive socket:
      1.1. Make sure the material dispense rate regulator knob is turned to the "OFF" position.
      1.1.2. Briefly toggle the applicator gun trigger to spin the drive socket while holding the cartridge in the load position.
      1.1.2.1. Once the drive socket has turned to be in alignment with the mixing rod, the cartridge will seat.

2. Inspect the Cartridge Outlets and remove any obstructions that may be a result of clogging or cross-contamination.

   2.1. As with any two-component cartridge, small amounts of material can migrate from one side to the other, typically via the mixing nozzle.
   2.2. Attempting to push material through an expired (or hardened) mix nozzle dramatically increases the risk of cross contamination.
   2.3. When cross-contamination occurs, it typically clogs the small (hardener) outlet on the cartridge – the large outlet is much less susceptible to clogging. To clear an obstruction:
      2.3.1. Purge a small amount of material out of the cartridge WITHOUT the nozzle in place. The small inlet has been designed with an inverted cone design to allow plugs to clear easily.
      2.3.2. If purging a small amount does not readily clear the obstruction, remove the cartridge from the applicator gun, and use a small pick to clear the outlet orifice.

   2.4. Failure to clear an obstruction will alter the delivered mix ratio of the product, and (in the case of a hardener plug) result in a dramatic under catalyzation that will not cure.

3. Do NOT force the Dynamic Mixing Nozzle onto the cartridge.

   3.1. If the nozzle doesn’t connect easily to the cartridge, the nozzle inlets are most likely out of alignment with the cartridge outlets.
   3.2. Forcing the connection will damage the plastic forming either the nozzle inlet, the cartridge outlet, or both.
   3.3. If the nozzle inlet or cartridge outlets are damaged, the connection will probably leak, resulting in waste/mess, wrong mix ratio, and unpredictable product performance.
4. If the cartridge mixing rod should pop out of the top of the cartridge, simply push it back into place (from the top) until you hear a “Click”.

4.1. The mixing rod extends slightly beyond the base of the cartridge.
   4.1.1. Pushing the cartridge Twist and Lock interface plate down against a solid surface may force the mixing rod to pop out.
   4.1.2. Trying to force the mixing rod to seat into the drive socket when misaligned, may force the mixing rod to pop out.
4.2. The cartridge mixing rod is held in place within the cartridge using a simple snap-fit, which makes it easy to re-install, or replace, should it be necessary.

5. Equalize cartridges with the Dynamic Mixing Nozzle ON.

5.1. Unlike products with a “static” mixing nozzle, equalizing the cartridge with the dynamic mixing nozzle ON does not skew the delivered mix ratio.
5.2. Equalizing with the dynamic mixing nozzle ON minimizes waste by allowing air to be purged from the nozzle at the same time the cartridge plungers are leveled.
5.3. Equalizing with the dynamic mixing nozzle ON reduces the mess associated with equalization.
5.4. Cartridges CAN be equalized with the mixing nozzle OFF, should the user desire.

6. Use the Fill Gauge to job cost or estimate the amount needed for a repair

6.1. While every repair is different, a “Rule of Thumb” is developing. A single/complete cartridge of DMS filler contains approximately the amount of product to complete an 8 – 10 hour dent.
   6.1.1. Before you begin working the repair, add up the dent repair hours on the Repair Order and divide by 10 to estimate the number of filler cartridges you can expect to use.
6.2. The pull tab on the Manual Return Rod will travel along the face of the Fill Gauge as the product is dispensed to help keep track of the amount of material remaining in the cartridge.
   6.2.1. Marking the Fill Gauge with the RO Number at the beginning and end of a job can help you document the amount of filler or glaze used, and determine a Job Cost to the operation.

7. Leave a hardened nozzle on the cartridge as a cap, until the cartridge needs to be used again.

7.1. Leaving a hardened nozzle on the cartridge during storing will ensure that solvents will not evaporate out of the product, keeping it creamy and fresh, and maintaining the shelf life.
7.2. If the cartridge is stored with a “new” or empty nozzle, the product will be exposed to air and may dry out.
Nozzles

1. Do NOT force the Dynamic Mixing Nozzle onto the cartridge.
   1.1. If the nozzle doesn’t connect easily to the cartridge, the nozzle inlets are most likely out of alignment with the cartridge outlets.
   1.2. Forcing the connection will damage the plastic forming either the nozzle inlet, the cartridge outlet, or both.
   1.3. If the nozzle inlet or cartridge outlets are damaged, the connection will probably leak, resulting in waste/mess, wrong mix ratio, and unpredictable product performance.

2. Equalize cartridges with the Dynamic Mixing Nozzle ON.
   2.1. Unlike products with a “static” mixing nozzle, equalizing the cartridge with the dynamic mixing nozzle ON does not skew the delivered mix ratio.
   2.2. Equalizing with the dynamic mixing nozzle ON minimizes waste by allowing air to be purged from the nozzle at the same time the cartridge plungers are leveled.
   2.3. Equalizing with the dynamic mixing nozzle ON reduces the mess associated with equalization.
   2.4. Cartridges CAN be equalized with the mixing nozzle OFF, should the user desire.

3. Use a paper towel to keep the nozzle outlet clean during dispensing.
   3.1. Material can accumulate around the rim of the nozzle outlet. As that material cures, it may drop into the work area, drag an unintended line, or otherwise negatively impact the work surface.
   3.2. Periodically wiping the end of the nozzle outlet will prevent material accumulation.

4. If not continuously dispensing, periodically purge a small amount of product (about the size of a large grape) into a paper towel to extend the nozzle’s Work Time.
   4.1. Depending upon the ambient temperature, material will start to gel within the nozzle after a couple of minutes.
   4.2. If this material is not disposed of, the nozzle will soon expire or harden, and will have to be changed before material can once again be dispensed.
   4.3. Extruding a small amount of gelling product from the nozzle before it hardens will “reset the clock” on the nozzle Work Time, and allow the user to continue using the same nozzle.
Repair Categorization

When approaching a repair, it can be useful to categorize the damage, up front, in order to better plan the work, estimate materials, and gather supplies.

Express Damage

Express Damage is described as any extremely minor surface damage, such as scratches, hail damage, and parking lot dings, that does not result in a break/crack/chip in the Base Coat.

With Express Damage Repair, every attempt is made to minimize the size of the repair area, and to maintain the integrity of OEM applied coatings.

As such, smaller equipment (3” D/A’s for example) and finer abrasive grades are used. Typically, a Glaze can be used, without any Filler.

Small Damage

If the damage is small, but the base coat has been cracked, exposing the primer or bare metal, it should be classified as Small Damage. Deep gouges or areas requiring light sheet metal straitening are good examples.

Express and Small damage are distinguished from each other simply by the need to remove cracked paint.

Again, the size of the repair should be kept to a minimum – but a Small Damage Repair will remove the coatings down to bare metal.

Typically, with the Dynamic Mixing System, the repair can be completed with only Filler, and no Glaze.

Large Damage

When medium to significant sheet metal work is called for, or if there are large areas of minor to medium damage, then the area can be said to have Large Damage.

Small and Large damage are distinguished from each other by the scope and severity.

Again, coatings are being removed down to the bare metal, and the repair area will be larger to accommodate the more extensive metal work.

With the Dynamic Mixing System, there still remains the possibility for a Filler only repair. However, it will be common for Glaze to be used, as well.
Express Damage Repair

Express Damage is described as any extremely minor surface damage, such as scratches, hail damage, and parking lot dings, that does not result in a break/crack/chip in the Base Coat.

Step 1
Surface Preparation

Materials Needed:
- Bucket
- Sponge / Rag
- Water
- Car Wash Soap
- VOC Compliant Surface Cleaner
- Clean/Dry Compressed Air
- 3" D/A Sander
- 3" grade 180 abrasives
- Air Blower

1.1. Clean the damaged area, first with soap and water, then with a VOC compliant solvent cleaner to remove any and all contaminants from the surface. These contaminants will clog abrasives and cause premature loading and reduced disc life.

1.2. Next, using a 3” grade 180 abrasive, sand the immediate damaged area and the surrounding 2” to 4” around the damage.

1.3. Using clean and dry compressed air, remove sanding dust and re-clean with a surface cleaner.

CAUTION: DO NOT CUT THROUGH THE TOP COATS.
Should you expose primer or bare metal, proceed to the Small Damage Repair Process.

SAFETY PRECAUTION:
Always use appropriate personal protective equipment
Step 2
DMS System Set-Up for Glaze

Material Needed:
- 3M™ Dent Finishing Glaze Cartridge
- 3M™ Dynamic Mixing Nozzle
- 3M™ Dynamic Mixing Gun
- Clean/Dry Compressed Air
- Disposable Surface

2.1. Select a cartridge of 3M™ Dent Finishing Glaze.

2.2. Remove the white cartridge end cap and discard.

2.3. Install 3M™ Dynamic Mixing Nozzle. Align the large nozzle inlet with the large cartridge outlet, and the small inlet with the small outlet.

2.4. Press firmly into place until locking tabs snap into place.

2.5. Make sure the mixing nozzle is seated securely before continuing.

2.6. Make sure incoming line pressure is set between 90psi and 120psi for best results.
2.7. Adjust applicator regulator to off by turning it counterclockwise until it stops.

2.8. Connect airline to fitting at base of applicator handle.

2.9. Hold the gun in an upright position that allows good visibility of the applicator drive socket.

2.10. Install Cartridge onto Applicator by aligning cartridge mixing shaft with the applicator drive socket and twisting ¼ turn.

2.11. Set regulator to 1.25 to 1.5 full (clockwise) turns.

2.12. On a disposable surface, dispense enough material to ensure proper equalization. Note the color change to indicate that the hardener is present.
Step 3
Glaze Application SOP

**Materials Needed:**
- 3M™ Dent Finishing Glaze Cartridge
- 3M™ Dynamic Mixing Nozzle
- 3M™ Dynamic Mixing Gun
- 3M™ Dry Guide Coat
- Clean/Dry Compressed Air
- Plastic or Metal Spreader
- Hand Sanding Block
- D/A Sander
- Grade 180 Abrasive
- Grade 320 Abrasive
- Air Blower

3.1. Apply a tight coat of glaze to the surface in order to ensure good wet-out to the base of any scratches.

3.2. Apply glaze to the center (lowest portion) of the damaged area. Using a "center-out" process, draw the glaze from the center to the outside edges.

3.3. Cover the entire sanded repair area.

3.4. Allow the glaze to cure/harden (15 minutes at 75°F).

3.5. Use 3M™ Dry Guide Coat throughout the sanding process to reveal any imperfections.
3.6. Using a grade 180 abrasive on a hand block, sand the glaze.

3.7. Sand the repair using a grade 320 abrasive on a D/A sander.

3.8. Using clean and dry compressed air, remove any sanding dust.

3.9. Follow your paint manufacturer's guidelines to prepare for subsequent primer and paint application steps.

**SAFETY PRECAUTION:**
Always use appropriate personal protective equipment
Small Damage Repair

If the damage is small, but the base coat has been cracked, exposing the primer or bare metal, it should be classified as Small Damage. Deep gouges or areas requiring light sheet metal straightening are good examples.

Step 1
Surface Preparation

Materials Needed:
- Bucket
- Sponge / Rag
- Water
- Car Wash Soap
- VOC Compliant Surface Cleaner
- Clean/Dry Compressed Air
- Pistol Grip Grinder
- 3” grade 50 grinding disc
- D/A Sander
- 6” grade 80 abrasives
- Air Blower

1.1. Clean the damaged area, first with soap and water, then with a VOC compliant solvent cleaner to remove any and all contaminants from the surface.

1.2. Using a 3” grade 50 grinding disc, abrade any welds, weld nuggets, or low spots, as needed.

1.3. Next, using a 3” – 6” grade 80 abrasive, remove the paint by sanding the damaged area with a D/A or rotary sander. Extend beyond the metal worked area by approximately 2” to 4”.

1.4. Using clean and dry compressed air, remove sanding dust and re-clean with a surface cleaner.

SAFETY PRECAUTION:
Always use appropriate personal protective equipment
Step 2
DMS System Set-Up for Filler

Materials Needed:
- 3M™ Dent Filling Compound
- 3M™ Dynamic Mixing Nozzle
- 3M™ Dynamic Mixing Gun
- Clean/Dry Compressed Air
- Disposable Surface

2.1. Select a cartridge of 3M™ Dent Filling Compound.

2.2. Remove the white cartridge end cap and discard.

2.3. Install 3M™ Dynamic Mixing Nozzle. Align the large nozzle inlet with large cartridge outlet, and the small inlet with the small outlet.

2.4. Press firmly into place until locking tabs snap into place.

2.5. Make sure the mixing nozzle is seated securely before continuing.

2.6. Make sure incoming line pressure is set between 90psi and 120psi for best results.
2.7. Adjust applicator regulator to off by turning it counter-clockwise until it stops.

2.8. Connect airline to fitting at base of applicator handle.

2.9. Hold the gun in an upright position that allows good visibility of the applicator drive socket.

2.10. Install Cartridge onto Applicator by aligning cartridge mixing shaft with the applicator drive socket and twisting ¼ turn.

2.11. Set regulator to 2.5 to 3.0 full (clockwise) turns.

2.12. On a disposable surface, dispense enough material to ensure proper equalization. Note the color change to indicate that the hardener is present.
Step 3
Filler Application SOP: Single-Coat Single Application Method

**Materials Needed:**
- 3M™ Dent Filling Cartridge
- 3M™ Dynamic Mixing Nozzle
- 3M™ Dynamic Mixing Gun
- 3M™ Dry Guide Coat
- Clean/Dry Compressed Air
- Plastic or Metal Spreader
- Hand Sanding Block
- D/A Sander
- Grade 80 Abrasive
- Grade 150 Abrasive
- Grade 180 Abrasive
- Air Blower

3.1. Apply a tight coat of filler to the surface in order to ensure good wet-out to the base of any scratches.

3.2. Build up the repair in thin layers. Spread beads immediately after dispensing.

3.3. Using grade 80 abrasive on a hand block, lightly rough sand to remove any major surface imperfections (such as ridges, body feature shapes, etc.).

NOTE: This rough shaping occurs while the filler is still in a “green” state. Some loading of the abrasive is not uncommon.

3.4. Finish sand with grade 150 abrasive on a hand block.

3.5. Use 3M™ Dry Guide Coat throughout the sanding process to reveal any imperfections.

NOTE: Keep the filler within the paint edge. Do not overlap the painted surface.
3.6. Rough featheredge the repair using grade 180 abrasive on a D/A Sander.

3.7. Using clean and dry compressed air, remove sanding dust.

3.8. Inspect the surface for minor imperfections (rogue scratches, low spots, etc.). If needed, proceed to the Glaze Application SOP, as outlined on page 38.

3.9. Follow your paint manufacturer’s guidelines to prepare for subsequent primer and paint application steps.

**SAFETY PRECAUTION:**

Always use appropriate personal protective equipment.
Large Damage Repair

When medium to significant sheet metal work is called for, or if there are large areas of minor to medium damage, then the area can be said to have Large Damage.

**Step 1**

**Surface Preparation**

**Materials Needed:**
- Bucket
- Sponge / Rag
- Water
- Car Wash Soap
- VOC Compliant Surface Cleaner
- Clean/Dry Compressed Air
- Pistol Grip Grinder
- 3” grade 50 grinding disc
- D/A Sander
- 6” grade 80 abrasives
- Air Blower

1.1. Clean the damaged area, first with soap and water, then with a VOC compliant solvent cleaner to remove any and all contaminants from the surface.

1.2. Using a 3” grade 50 grinding disc, abrade any welds, weld nuggets, or low spots, as needed.

1.3. Next, using a 6” – 8” grade 40 or 80 abrasive, remove the paint by sanding the damaged area with a D/A or rotary sander. Extend beyond the metal worked area by approximately 2” to 4”.

1.4. Using clean and dry compressed air, remove sanding dust and re-clean with a surface cleaner.

**SAFETY PRECAUTION:**

Always use appropriate personal protective equipment.
Large Damage Repair

### Step 2
DMS System Set-Up for Filler

**Materials Needed:**
- 3M™ Dent Filling Compound
- 3M™ Dynamic Mixing Nozzle
- 3M™ Dynamic Mixing Gun
- Clean/Dry Compressed Air
- Disposable Surface

2.1. Select a cartridge of 3M™ Dent Filling Compound.

2.2. Remove the white cartridge end cap and discard.

2.3. Install 3M™ Dynamic Mixing Nozzle. Align the large nozzle inlet with large cartridge outlet, and the small inlet with the small outlet.

2.4. Press firmly into place until locking tabs snap into place.

2.5. Make sure the mixing nozzle is seated securely before continuing.

2.6. Make sure incoming line pressure is set between 90psi and 120psi for best results.
2.7. Adjust applicator regulator to off by turning it counterclockwise until it stops.

2.8. Connect airline to fitting at base of applicator handle.

2.9. Hold the gun in an upright position that allows good visibility of the applicator drive socket.

2.10. Install Cartridge onto Applicator by aligning cartridge mixing shaft with the applicator drive socket and twisting ¼ turn.

2.11. Set regulator to 2.5 to 3.0 full (clockwise) turns.

2.12. On a disposable surface, dispense enough material to ensure proper equalization. Note the color change to indicate that the hardener is present.
Step 3
Filler Application SOP: Multi-Coat Single Application Method

**Materials Needed:**
- 3M™ Dent Filling Cartridge
- 3M™ Dynamic Mixing Nozzle
- 3M™ Dynamic Mixing Gun
- 3M™ Dry Guide Coat
- Clean/Dry Compressed Air
- Plastic or Metal Spreader
- Hand Sanding Block
- D/A Sander
- Grade 40 Abrasive
- Grade 80 Abrasive
- Grade 180 Abrasive
- Air Blower

3.1. Apply a tight coat of filler to the surface in order to ensure good wet-out to the base of any scratches.

3.2. Build up the repair in thin layers. Spread beads immediately after dispensing.

   **NOTE:** Keep the filler within the paint edge. Do not overlap the painted surface.

3.2.1. In hot temperatures or in large repair areas, where work time can be critical, divide the repair into easily manageable sections.

3.2.2. Apply one coat of filler to each section, with a slight overlap.

3.2.3. Once the filler surface has gelled to the point that it will no longer tear with subsequent spreading, apply additional coats using the same method.

   **NOTE:** This can be done without sanding between coats of filler.

3.3. Using grade 40 abrasive on a hand block, lightly sand to remove any major surface imperfections (such as ridges, body feature shapes, etc.).

   **NOTE:** This rough shaping occurs while the filler is still in a “green” state. Some loading of the abrasive is not uncommon.
3.4. Complete shape sanding with grade 80 abrasive on a hand block.

3.5. Use 3M™ Dry Guide Coat throughout the sanding process to reveal any imperfections.

3.6. Rough featheredge the repair using grade 180 abrasive on a D/A Sander.

3.7. Using clean and dry compressed air, remove sanding dust.

3.8. Inspect the surface for minor imperfections (rogue scratches, low spots, etc.). If needed, proceed to the Glaze Application SOP, as outlined on page 38.

3.9. Follow your paint manufacturer's guidelines to prepare for subsequent primer and paint application steps.

SAFETY PRECAUTION:
Always use appropriate personal protective equipment
Step 4
Glaze Application SOP

Materials Needed:
- 3M™ Dent Finishing Glaze Cartridge
- 3M™ Dynamic Mixing Nozzle
- 3M™ Dynamic Mixing Gun
- 3M™ Dry Guide Coat
- Clean/Dry Compressed Air
- Plastic or Metal Spreader
- Hand Sanding Block
- D/A Sander
- Grade 180 Abrasive
- Grade 320 Abrasive
- Air Blower

4.1. Apply a tight coat of glaze to the surface in order to ensure good wet-out to the base of any scratches.

4.2. Apply a bead of glaze to either the spreader or directly to the panel. Spread beads immediately after dispensing.

4.3. Cover the entire body filler repair surface, extending the glaze into the featheredged primer area.

4.4. Allow the glaze to cure/harden (15 minutes at 75°F).

4.5. Using grade 150 abrasive on a hand block, sand the glaze.
4.6. Use 3M™ Dry Guide Coat throughout the sanding process to reveal any surface imperfections.

4.7. Continue sanding the area with a grade 180 abrasive on a hand block.

4.8. Fine featheredge the repair using a grade 320 abrasive on a D/A sander.

4.9. Using clean and dry compressed air, remove any sanding dust.

4.10. Follow your paint manufacturer's guidelines to prepare for subsequent primer and paint application steps.

SAFETY PRECAUTION:
Always use appropriate personal protective equipment