Adjusting a Dual Gas Press for optimum performance.

For best results, there are several different steps that need to be taken to adjust a gasfill press. Often no single adjustment will put things in spec.

The gasfill press blows argon into the side of the unit, pushing the existing air out the top of the gasfill chamber. The base glass with the spacer attached and the cap are held apart by the machine with suction cups and the air is introduced by an air knife, broken up into several vertical sections mounted inside the "nozzle" on the infeed edge of the gasfill chamber. One of several partitions, depending on size, extends to seal the gasfill chamber at the outfeed end of the chamber. The glass conveyor raises, sealing the bottom of the chamber, leaving only the top open.

Gas is dispensed from the nozzle using the sections up to, but not exceeding the height of the glass. Using higher nozzles does not improve gas fill and the higher nozzles may actively block the exit of the regular air being pushed out from below.

Lower flow rates of the incoming argon reduce turbulence during filling, decreasing the time required to fill and use of excess argon. This is noticeably more important on smaller units. Larger units may allow for proportionally higher flow rates.

Smaller units also require larger percentages of fill then larger ones and consequently, those parameters are higher.

It is recommended that, when connected to a liquid argon tank, a vaporizer is used connected to the **gas** line of the liquid argon tank. This achieves the best possible flow rates, roughly equal the combined rates of a tank without a vaporizer and a tank with vaporizer connected to the liquid port of the liquid argon tank.

The pressure regulator on the outlet of the argon supply (tank and vaporizer if used) should ultimately be set to 140 psi. The pressure on the flow meter inlet pressure switch should be near 140psi while running, 150psi max

Make sure that the running glass data matches the glass. Glass thickness data typically runs high relative to actual glass while Dura spacer thickness is typically thicker than the nominal value entered (e.g. 1/2" or 9/16").

Make sure that the **Argon Enabled** key is actuated

Press Home Position

A good starting point is to make sure that slide plate home positions are correct. To check and adjust, set the **Service Position** parameter to a desired reference. A 123 block is useful here but other distances and blocks may be used. Normally, this parameter is set to open up to a wide position for service or inspection of the inside of the chamber.

It is recommended that a reference block of some type be used rather than calipers as calipers lead to inconsistent readings from person to person and from time to time by the any given individual. Calipers will also "bite" into felt and give a different measurement that a reference block or IG will. Don't use an IG as a reference block. Do not use bore gauges as a reference.

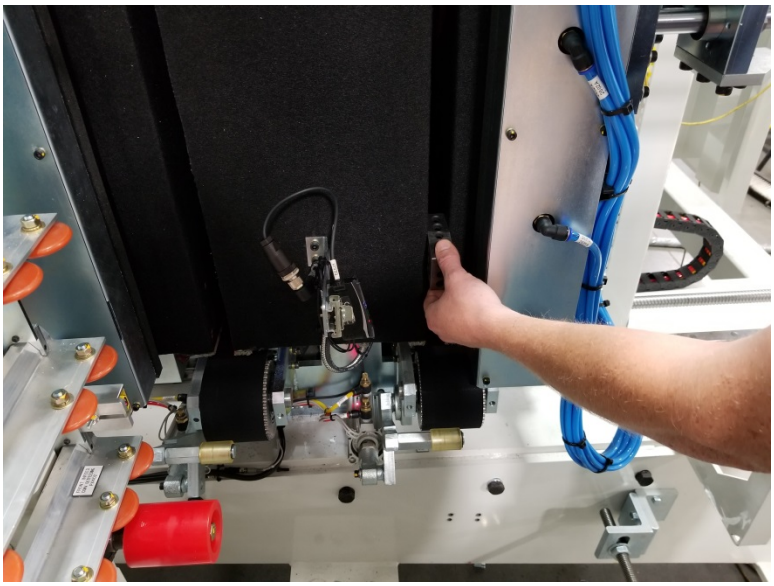
With main and safety power enabled, from the **Main Screen** press the **Service Position** key and press the START button. Both press slide plates will move to the programed position.

(The Infeed and Outfeed Conveyor Shuttles should move to the retracted position. If not, select **Service Position** again and press the START button again.)

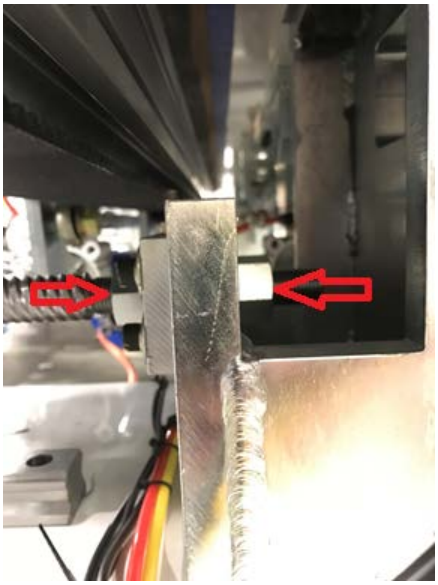
Try to insert the reference block into the opening. If the reference block will not fit, decrease the value of the **Press Slide Plate Home Position** parameter. If the reference block is loose, increase the **Press Slide Plate Home Position**.

Home the machine and repeat until desired position is found.

The reference block should fit snuggly and be held in place by the felt on either side of the press. You should not need to force or “squeeze” the block in.



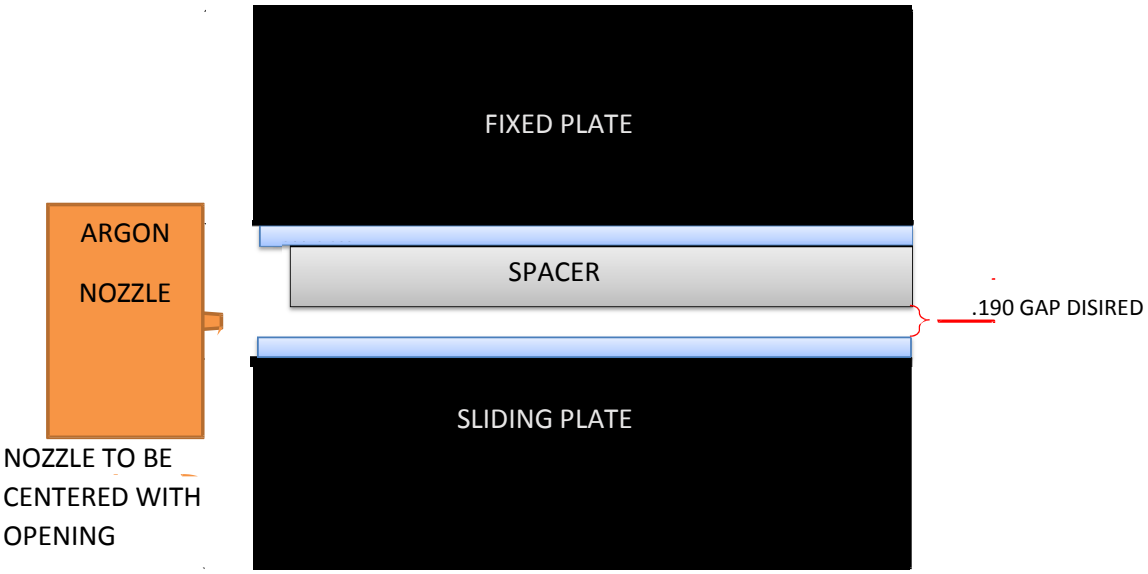
The block should be able to move up and down the height of the slide plate with more or less similar resistance. Some high and low spots may be normal. Check the top and bottom and infeed and outfeed sides. If there is a discrepancy from top to bottom or front to back, the ball screw mounting nuts may need to be adjusted by loosening and adjusting the lock nuts.



Return the **Service Position** to its original setting.

Gap

The gap between the spacer on the base glass and the inside of the cap glass should be to be about 5mm or 0.190" or about the width of the nozzle's air knife. This value is hard coded in the PLC program. This position may be tweaked slightly by adjusting the **Gasfill Gas Filling Opening Adj** offset parameter. Do not move more than 0.050" in either direction.



A larger value will tend to decrease the fill values, even longer fill times.

Please note that Dura spacer will measure thicker than its nominal value until pressed by later machines. This is the one instance where a slight increase in the offset parameter may be desirable although the gap when measured should remain with above mentioned tolerances.

The only way to measure the gap between the spacer and cap is in cycle. (One can try adding the dimension of the glass and spacer and subtracting it from the position of the slide plate displayed during gas filling but that is quite untrustworthy in practice so don't do it.)

Disable argon.

Disable power to the Grid Apply or previous station.

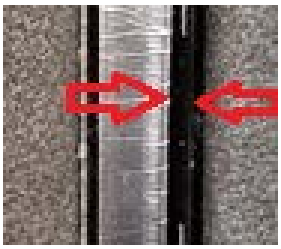
Run test unit, making sure that the glass and spacer matches the line data entered. The cap is un-sandwiched and the base should have fresh spacer applied.

When the base glass enters the press, switch to **Step** mode by pressing the **Step** key on the hmi. Press the **START** button to step through the cycle until the gas nozzle pulls in and the conveyor is raised. Do not continue the cycle.

Press the **Presentation*** key, visible only at the appropriate moment in the cycle and in Step mode. The Gasfill Nozzle will move out of the way allowing access to the gasfill chamber. With another technician ready on the E-Stop go beyond the guarding without disabling safety voltage.

[Note: with the machine in Step mode and the previous station disabled, there should be no unexpected movement. Do not trust this and be prepared and alert.]

With a caliper, measure the distance between the spacer and the inside edge of the cap glass near the bottom. (On certain sizes it may be normal for the cap glass to sag at the top or back due to the positioning of the vacuum cups and the wide array of glass sizes. The measurements near the bottom are the ones that are important for the gasfill process.) Note this measurement.



Adjust the **Gasfill Gas Filling Opening Adj**. offset parameter to achieve the desired 5mm or 0.190" gap. Increase the offset to increase the gap.

The machine may then be put into auto mode and the current cycle completed or the machine reset and the glass removed.

Repeat as necessary.

Re-enable argon from running screen.

Return all stations to Auto mode as described in the manual.

Further (slight!) adjustments may be required after argon measurements have been taken. See below.

* If the **Presentation** key is not available, it may be required to have a laptop connected for this test.

Nozzle Parallelism

The nozzle should be aligned with the slide plate, neither pulling away at the top (forming a 'V') nor pulling away at the bottom (forming an 'A').

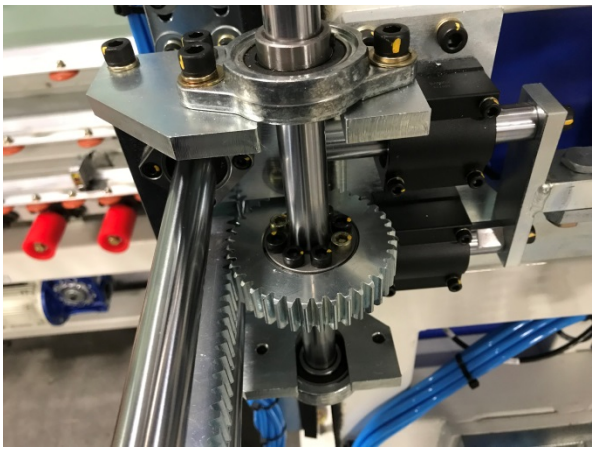
Open up the Gasfill Press slide plate by moving to service position (see above) or by manually jogging the servo axes from the **Jog Screen**. If the nozzle servo is not extended past the surface of the slide plate so that the nozzle is exposed as seen from the inside, jog the nozzle forward from the **Jog Screen**. Jogging to a position of positive 0.375" - 1.000" should be sufficient.

It may be helpful to manually lock the pneumatic valve to press the nozzle assembly into the slide plate. During the normal sequence, this is the valve that pulls the nozzle in and creates a seal in the infeed side of the gasfill press.

Press E-Stop. If necessary or reliable coworkers are not found, disconnect the machine from power and follow proper lock-out tag-out procedures.

Look from the inside of the press at the nozzle air-knife position.

If the nozzle is not a consistent distance from the slide plate from top to bottom, the nozzle must be mechanically adjusted. Do so now by loosening the hub on one of the spur gears, rotate into position and retighten.



If valve was locked it should be unlocked to release the nozzle from the press and allow nozzle movement without rubbing or damage.

Nozzle Position Relative to the IG Gap

The nozzle position must be correctly set in relation to the opened IG unit during cycle and the gap between the base glass with spacer and cap glass. This check may need to be done several times throughout the adjustment process at various steps.

The position of the nozzle may be checked in several ways, either while in cycle or out of cycle. However, checking during cycle will give you the most accurate and reliable results.

Out of Cycle checking (Depreciated): Run a cycle. On the **Axis Status** screen make note of the position of the **Nozzle Axis Servo** to the thousandths of an inch.

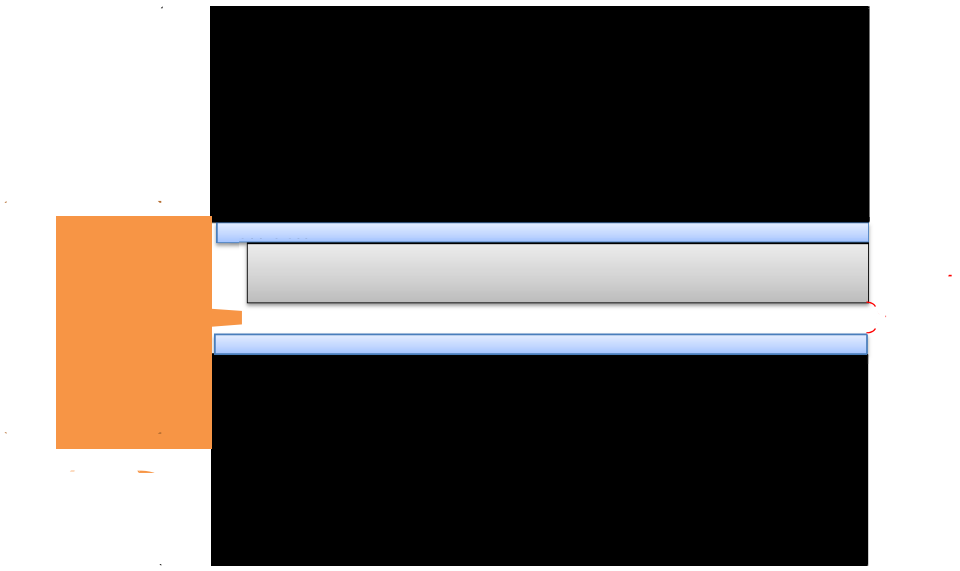
After the cycle has completed, reset the machine. In the parameter screen, set the **Gasfill Nozzle Service Position** parameter to the value noted in earlier step.

It is necessary to lock the pneumatic valve to press the nozzle assembly into the slide plate. During the normal sequence, this is the valve that pulls the nozzle in and creates a seal in the infeed side of the gasfill press.

Press E-Stop. If necessary or reliable coworkers are not found, disconnect the machine from power and follow proper lock-out tag-out procedures.

Using proper PPE, place a piece of glass (in the front chamber) or a piece of glass with applied spacer (in the rear chamber). Place and hold the glass firmly up against the felt on the side of the press and up to the nozzle. But, do not put the glass so close to the nozzle that it digs into the foam seal on either side of the air knife.

Look from the inside of the press at the nozzle air-knife. The inside edges of the air knife channel should be just clear of the glass (front chamber) or spacer (rear chamber). The nozzle should never be covered by the glass although depending on other settings, it may be slightly obscured by the spacer.



Adjust the **Gasfill Gas Filling Nozzle Offset** accordingly. Increase the parameter positive to move the nozzle away from the cap. Do not adjust air knife past the inside edge of the glass.

Remove the reference glass piece.

Disengage manual the lock of the pneumatic valve to release the nozzle from the press and allow nozzle movement without rubbing or damage.

Repeat Auto cycle and recheck until the Gasfill Nozzle is correctly positioned.

(Make sure that the glass and spacer matches the data of the earlier unit run in **Auto Mode**)

In Cycle Nozzle Position Checking (preferred method):

Disable argon.

Have one technician climb up on top of the machine, making sure to be clear of any and all moving parts. Do not use the slide plate as a rest or foot step. Stay clear of the timing belt and ball screws. Make sure to be balanced and well supported by the frame. Do not wear loose clothes, etc. Be safe. Bring a flash light. If available, bring a camera with an optical zoom lens.

A second technician will run a test unit, making sure that the glass and spacer matches the line data entered. The cap is un-sandwiched and the base should have fresh spacer applied.

When the base glass enters the press, switch to **Step** mode by pressing the **Step** key on the hmi. Press the **START** button to step through the cycle until the gas nozzle pulls in and the conveyor is raised. Do not continue the cycle. Stand back.

The tech on top of the machine should now look down into the gas chamber with the flash light to observe the position of the nozzle relative to the cap glass. The inside edges of the air knife channel should be just clear of the cap. The nozzle should never be covered by the glass although depending on other settings, it may be slightly obscured by the spacer.

After noting and reporting the position adjustments required, again make sure to be clear of any moving parts.

The technician on the ground adjusts the **Gasfill Gas Filling Nozzle Offset** accordingly. Increase the parameter positive to move the nozzle away from the cap. Do not adjust air knife past the inside edge of the glass.

The machine may then be put into auto mode and the current cycle completed or the machine reset and the glass removed.

Repeat until the outside edge of the air knife of the nozzle is in line with the inside edge of the cap glass.

The second technician kills power and the first technician safely climbs down.

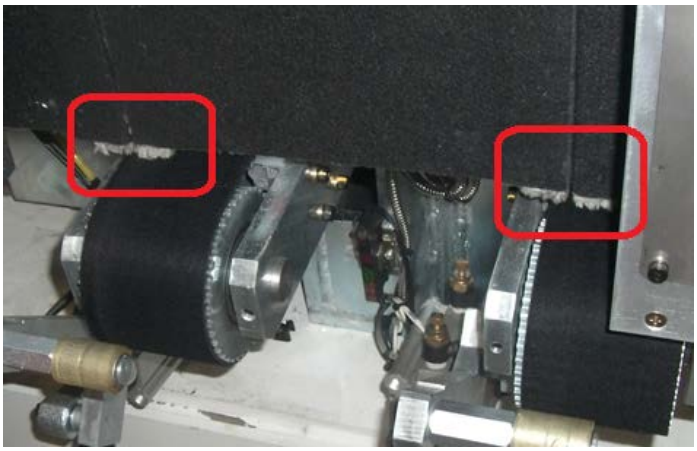
Re-enable argon from running screen.

Return to normal operation or further adjustments below.

Seal

The glass conveyor raises to create a seal along the bottom of the gasfill chamber. The argon nozzle pulls in to the slide plate to create a seal along the infeed side of the gasfill chamber.

Make sure that when the conveyor extends up to the press, it creates a good seal. A 0.020" shim or feeler gauge should not be able to fit easily under the fuzzy weather-strip seal on the bottom of the press plates and the top of the conveyor. (The seal should of course be tighter than 20 thousandths. However, a 0.020" ship will supply enough rigidity to effectively probe the brushes while a lesser shim will fold, bend or crinkle.)



Using jog mode, move the slide plate in so that the position is less than 2". Manually raise the conveyor by locking the pneumatic valve. Probe the seal from the inside of the chamber out. Do not probe from the outside of the chamber in because the placement of the conveyor will tend to angle the feeler gauge up to ward the top of the weather stripping where it attaches to the press while the gap, if any, is at the bottom.

If necessary, mechanically adjust the Conveyor Raise / Lower cylinder until the desired seal is created.

Release any locked pneumatic valves at the end of the procedure or before moving the press plates.

Make sure that when the argon nozzle pulls into the press plate it creates a good seal. Note, like with the conveyor, because the seal is pliable, it will always be possible to jam something under it during this check. Please use common sense when checking. A 0.020" shim or feeler gauge should not be able to fit easily between the foam of the nozzle and the felt of the press plates.

Method one: In jog mode, move the press plate to approximately 1". Move the nozzle axis to 0.75" to 1.00". Manually pull in the argon nozzle by locking the pneumatic valve. Probe seal with feeler gauge.

Method two: While in cycle, after the base glass enters the press, switch to **Step** mode by pressing the **Step** key on the hmi. Press the **START** button to step through the cycle until the gas nozzle pulls in and the conveyor is raised. Step back from the operator interface and do not continue the cycle. Using proper safety precautions, probe the seal with a feeler gauge or shim.

A shim forced underneath the seal should be able to support the hanging weight of a sheet of paper. Mechanically adjust the stops on the nozzle cylinder until a good seal is made and confirmed.

Release any locked pneumatic valves at the end of the procedure or before moving the press plates. If check was done while in cycle, return to **Auto** mode and press the **START** button.

Make sure that there is an appropriate seal between the bottom of the argon nozzle and the top of the glass conveyor for gas filling.

Method one: In jog mode, move the press plate to approximately 1". Move the nozzle axis to 0.75" to 1.00". Manually raise the conveyor by locking the pneumatic valve. Manually pull in the argon nozzle by locking the pneumatic valve. Probe seal with feeler gauge.

Method two: While in cycle, after the base glass enters the press, switch to **Step** mode by pressing the **Step** key on the hmi. Press the **START** button to step through the cycle until the gas nozzle pulls in and the conveyor is raised. Step back from the operator interface and do not continue the cycle. Using proper safety precautions, probe the seal with a feeler gauge or shim.

The nozzle assembly may be raised or lowered by loosening the bolts holding the nozzle.

In the unlikely event that the foam is significantly deformed or the nozzle prevents the conveyor from raising to seat with the seal on the bottom of the press plates, the nozzle may be raised.

Release any locked pneumatic valves at the end of the procedure or before moving the press plates. If check was done while in cycle, return to **Auto** mode and press the **START** button.

Press Squish Amount

Over squeezing or pressing the cap glass to the base and spacer will cause normal air to be pulled in to the IG upon release and during transfer down the line. This is true of both squiggle and foam type spacers.

For squiggle / Dura spacer, adjust the **Gasfill Squish Amount** to the minimum amount that allows both pieces of glass to stick to the spacer. The IG will be squished to desired value later down the line and minimal gas should be lost during the transfer process if the line is running normally.

The **Gasfill Squish Amount** for Dura will tend to be slightly positive, 0.010" - 0.050".

For foam / Super Spacer, adjust the **Gasfill Squish Amount** to the minimum amount achieves proper wet-out that may be seen as a "sugaring" effect on the acrylic sticky edge.

The **Gasfill Squish Amount** Super Spacer will tend to be slightly negative, -0.030" - -0.060".

Adjusting the **Gasfill Squish Amount** to a more positive value will keep the slide plates further apart at the end of squish and thus will have less squish. Decrease negatively to squish more.

The **Gasfill Squish Amount** value is measured from the nominal values of the IG, final / desired spacer thickness and base and cap glass thicknesses.

A value of 0.000" will move the press to 0.750" for a IG with 1/2" spacer and 0.125" glass (0.500 + (0.125 * 2)). A positive value of 0.010" will press to 0.7**6**0" while a negative value of 0.040" will press to 0.7**1**0"

Make sure that the running glass data matches the glass. Glass thickness data typically runs high relative to actual glass while Dura spacer thickness is typically thicker than the nominal value entered (e.g. 1/2" or 9/16"). Discrepancy between data from the network and the actual glass will affect the actual press squish amount.

Press2 Argon Blow-off

For squiggle / Dura product there is a second platen press that presses the glass and spacer to size, effectively wetting-out the butyl spacer. This station has an argon nozzle that is set to blow around the start/stop corner of the IG at the end of pressing.

The functional setup of this nozzle is actually to create a light argon cloud around the start / stop corner (4th corner) so that if the IG rebounds slightly when the press relaxes, any air that gets sucked in by the pressure change is just from that argon cloud and not regular air.

It is not the job of this nozzle to fill, inject or top off the unit's argon. It wastes argon, masks real problems / solutions and results in lower fill percentages.

There are some perceived benefits of using this nozzle under high argon pressure, but they end up being red herrings in the quest to achieve good argon fill. The end result, however, is the IG ends up with a lower fill in the end.

High pressure, especially with a larger gap in the start / stop corner tends to mix up the air inside the unit so that all four corners seem to be about the same fill percentage. The upper corners tend to have higher fill percentage, the lower corners tends be lower. That would be fine if the fill values were higher after sitting, but they are not.

Another danger in trying to 'fill' with the nozzle on the second press is that the overall IG thickness can be pushed out of tolerance, reading too thick by 0.010" to 0.050" or more.

The end result, however, is the IG ends up with a lower fill or out of thickness tolerance in the end.

Start / Stop Corner

The starting and stopping corner of the spacer as laid down by the Spacer Applicator Machine (SAM) also plays an important part in maintaining high fill percentages. Coming off of the SAM, the gap should be largely closed, with a gap less than 0.050".

Larger gaps will exaggerate the effects of having the pressure and flow times too high on the second press (Press2).

Consistent and tight corners are desirable while open corners should be prevented and addressed when present by adjusting the SAM parameters. Mechanical adjustment may be necessary.