

Setting Clamp Parallelism - Clamps With Tie Bar Nuts

For Uniloy IBS Models 90J, 122-3, 128-3, 150-3, and 189-3S

Note: It is strongly recommended that you replace the upper nuts on the upper cross arm with Superbolt tensioners in order to eliminate the pre-loading of the tie bar nuts as described in step 8 of "How to Adjust for Parallelism" below.

Why is Even Tonnage Distribution Important?

A mold that is not clamping parallel will tend to flash on the side that is higher. Picture the clamp at the moment the mold touches on one side. In order for the other side to close, something has to give and with the amount of tonnage on the machine, it does! The side that has the platen set lower will cause one tie bar to carry the tonnage that the other is not. The tie bars bend, the cross arms flex and the whole tie bar/cross arm assembly will shift causing side load on the rods of the hydraulic cylinder(s). As a result, eventual mold damage, tie bar breakage or cylinder failure will occur.

When to Check for Parallelism

- * In between mold changes. An indicator base and indicator should always be readily available. Prior to installing another mold, a quick check is all that is required and should be part of the standard procedure for installing a new job in a machine.
- * At least once a year. As part of the annual maintenance program, it should be among the first ten on top of the list! (as well as checking for loose tie bar nuts).
- * Whenever a loose tie bar nut is found. Periodic checks should be made as the machine is in production simply by sighting one eye in-between the contact surfaces of the inner nuts and the cross arm while the clamps are closed and full tonnage is applied. Any light detection (a flashlight held on the other side would assist) should be addressed immediately. If any of the tie bar nuts are found to be loose, stop the machine immediately and proceed to correct the problem by removing the mold and checking parallelism.

In most cases, it is the inner nuts (the lower nuts on the upper cross arm and the upper nuts on the lower cross arm), that work their way loose. This is because when the clamp closes and full tonnage is applied, the tie bars stretch and the inner nuts pull away from their cross arm. After continuous cycles and vibration, the nut works itself loose. If left unchecked, the gap will increase. As a result, when the clamp opens, the inner nut will hammer on the cross arm, causing the nut to mushroom and freeze on the tie bar threads. The burr which is created is certain to bind the nut up if any attempt is made to turn it. Furthermore, a common error made is that when a nut is found to be loose, the machine is stopped and the outer nut is tightened down, rather than the inner nut, with no regard to checking parallelism, which only makes the situation worse.

How to Check for Parallelism

This procedure applies to all Uniloy IBS machines Which have upper and lower cross arms with tie bar nuts on both sides of each cross arm. For clarity in this instruction, we will refer to:

- * The lower tie bar nuts on the upper cross arm and the upper tie bar nuts on the lower cross arm as the inner tie bar nuts.
- * The upper tie bar nuts on the upper cross arm and the lower tie bar nuts on the lower cross arm as the outer tie bar nuts.

- 1.) Remove mold and core rods from the area.
- 2.) Close clamp and turn off pump. Follow Lockout/Tag out Procedure's.
- 3.) Stone off the surface of the table and the surface of the upper platen using a flat surface stone and kerosene (preferred).
- 4.) Check the stack height from the surface of the table to the bottom surface of the platen using a machinist combination square. The dimension should be $9.930" + 000"/-.030"$ ($9-29/32" - 9-15/16"$). If this dimension is off by $.040"$ or more go the "How To Adjust for Parallelism" section below.
- 5.) "Gauge Blocks" (see note below) are needed to set the lower cross arm parallel to the table. To install, set each gauge block on either side of the outboard cylinders between the lower cross arm and the underside of table. Make sure gauge blocks are held snug by using a bottle jack under the cross arm.
- 6.) To check, "Left to Right Parallelism" (tie bar to tie bar), set up an indicator base to the underside of the platen. Move the indicator from left to right. Be sure to keep the plunger an equal distance from either side of the platen as much as possible. T.I.R should be less than $.005"$. If readings are greater than $.005"$ go to procedure – "How To Adjust For Parallelism" section below.

Note: Gauge blocks are only needed for the injection clamp. The blow clamp will be set in the full down position. Gauge blocks can be made from two pieces of approx. $1\frac{1}{2}" \times 2\frac{1}{2}"$ bar stock. The lengths must be ground as a matched set (within $.001"$). The following are the preferred lengths:

- * Models 90J, 122-3, and 128-3 with 5" stroke Clamps -----21"
- * Models 150-3, and 189-3 with 5" stroke Clamps-----24"

How To Adjust For Parallelism

- 1.) Remove mold and core rods from the area.
- 2.) Close clamp and turn off pump. Follow Lockout/Tag out Procedure's.
- 3.) Stone off the surface of the table and the surface of the upper platen using a flat surface stone and kerosene (preferred).
- 4.) First set "Stack Height" from the surface of the table to the bottom surface of the platen using a machinist combination square at the extreme ends of the platen. The dimension should be $9.930" + 000"/-030"$ ($9-29/32" - 9-15/16"$). If this dimension is off by $.040"$ or more, see "Cylinder Specifications" section.
- 5.) "Rough Adjustment" is made by first loosening the tie bar nuts on top of both tie bars only. Turn the tie bar nut located under the cross arm to set the clamp opening at $9-29/32" - 9-15/16"$. Turn both upper tie bar nuts back down and tighten snug using a hand held wrench. For the blow clamp, skip 6.) and proceed 7.)
- 6.) Once "Rough Adjustment" is complete, parallelism needs to be set using "Gauge Blocks". To install, set each gauge block on either side of the outboard cylinders between the lower cross arm and the underside of the table. Make sure gauge blocks are held snug by using a bottle jack under the cross arm (crack the upper hydraulic hose to allow movement).
- 7.) To Set "Left to Right Parallelism" (tie bar to tie bar) set up an indicator base to the underside of the platen. Move the indicator from left to right. Be sure to keep the plunger an equal distance from either side of the platen as much as possible. T.I.R should be less than $.002"$. If readings are greater than $.002"$, find the higher of the two sides and lower the high side to within $.002"$.
- 8.) Torque the nuts to 6,000 ft./lbs for all injection clamp nuts
Torque the nuts to 2,000 ft./lbs for all blow clamp nuts

If a torque wrench is unavailable, tighten the nuts using a 48" wrench with a 6' pipe. In addition, it will be necessary to pre-load the tie bars. **Extreme caution must be exercised in this operation and should be completed by a trained technician who is familiar with the functions of the machine, assisted by 3 helpers.**

- Step 1: Install a 10" high spacer block which covers a minimum area of 8" x 15" under the clamp area (a mold can be used as well).
 - Step 2: Close the clamp and open the guard.
 - Step 3: Make certain all of the set screws on all of the inner tie bar nuts are still loose.
 - Step 4: On all Model 90J, 128-3, and 150-3 machines, manually energize SV-21 (3,000 psi), SV-5 (Clamp Close), and SV-21A outboard cylinder prefill valves.
On all Model 122-3, and 189-3 machines, manually energize SV-27 (3,000 psi), and SV-21 outboard cylinder prefill valves.
 - Step 5: The tie bars will stretch and the four inner tie bar nuts will pull away from their cross arms. Tighten the inner nuts using the 48" wrench with the 6' pipe and 2 men.
 - Step 6: Release all valves.
- 9.) After the tie bar nuts are either torqued or pre-loaded as described above in 8.), check the readings again using the gauge blocks to make sure nothing has moved. Be sure to tighten all set screws in the nuts.
 - 10.) To set "Front to Back" parallelism, remove the gauge blocks and the hydraulic jack below, tighten the upper hydraulic hose and close the clamps. Using the indicator base, move the indicator from front to back. Readings should be within $.005"$. Although rare, if necessary, set by loosening the four bolts securing the platen up to the cross arm enough to insert a strip of steel shim. Be sure the shim is at least 1" wide and the entire length of the contact surface of the platen. It may be necessary on some machines to notch the shim for the bolts securing the platen. Secure bolts and check

indications. At this point, the total parallelism left to right and front to back should be within .002".

Cylinder Specifications

There have been occasions when the cylinder rod unscrews from the piston in spite of the use of set screws, pins and Loctite. This becomes apparent in the machine in three areas:

- * The mold starts to slam due to the cylinder not entering the cushion enough.
- * The parisons hit the injection manifold due to the injection clamp not lifting the head enough.
- * The blown bottles hit the upper half of the blow mold due to the blow cylinder not lifting high enough.

The following are the dimensions of the cylinders used in the retracted position. Measurements are taken from the cylinder base to the face of the rod.

Clamp Cylinder Size	Part #	Measurement
4" bore x 5 1/4" stroke	64491-T	13.25"
5" bore x 5 1/4" stroke	1295052	13.75"
5" bore x 5 1/4" stroke	63119	16.13"
6" bore x 5 1/4" stroke	63260	16.76"
4" bore x 7 1/4" stroke	1295062	15.25"
5" bore x 7 1/4" stroke	1295111	15.72"
6" bore x 7 1/4" stroke	62084	16.88"
6" bore x 7 1/4" stroke	62580	20.35"
7" bore x 7 1/4" stroke	61833	19.38'