

SHANK CHECKING PROCEDURE

A. CHECKING PARAMETERS

1. Check each pallet of shanks as follows:
 - a. Initially check two (2) shanks which are picked at random from each pallet.
 - b. If both shanks checked pass the inspection then the whole pallet of shanks is passed and considered fine.
 - c. If both shanks checked fail the inspection then the whole pallet of shanks is suspected, and a non-conformance must be completed. The two failed shanks are returned to the supplier and the pallet quarantined until further direction from the supplier is received.
 - d. If one passes and one fails from the two (2) shanks initially checked, then five (5) more shanks must be checked at random from the pallet. If all five (5) of these shanks pass then the pallet is passed and just the one (1) shank which initially failed is rejected, and returned to the supplier. If one (1) more from the five (5) checked is failed then the whole pallet is suspected, and a non-conformance must be completed and the two failed shanks returned to the supplier and the pallet quarantined until further direction from the supplier is received.
 - e. On top of all the checks mentioned in a-d above, each pallet from Standens comes with four (4) shanks which are checked and marked by Standens. These 4 shanks must also be checked and the results marked as "Standens #1, Standens #2, etc...". The results from these shanks may be added to the same check sheet as our regular checks if there is room, or on a new check sheet which must be stapled to the first one.
2. Identify each shank that is being tested from each pallet by using a white paint marker to mark #1, #2 ... on each shank. Document the test from all the shanks tested from one pallet on a single "Shank Testing Log" sheet. Mark #1, #2. Etc. on log sheet to correspond to the shank being tested. Enter all required information at the top of the sheet and record all test measurements. Compare test measurements to the allowable tolerance and mark "Pass" or "Fail" below each check.
3. A shank is failed when:
 - a. one or more of the measurements are out of limits on the parameters as set by engineering.
 - b. a "go/no-go" check is a "no-go".
 - c. the cumulative tolerances are out of limits as set by engineering.

4. When a shank has failed:
 - a. remove the failed shank from the test jig and have another competent employee or supervisor re-test the failed shank to verify the test result and if there was only one failed shank from the pallet, the failed shank along with a copy of the “shank testing log” must be taken to “Material Management - Returns Dept.”. The rest of the pallet of shanks is “passed” and can be painted. The “Material Management - Returns Dept.” will return the failed shank to the “supplier” along with the test sheet and communicate the results to the “Quality Assurance Manager”.
 - b. and if there are two failed shanks from the same pallet, then the failed shanks along with the rest of the pallet of shanks and two copies of the “Shank Testing Log” must be taken to the “Material Management - Returns Dept.”. This department will then return the two failed shanks along with the Test log sheets to the “Supplier”. The rest of the pallet will be quarantined until results from the supplier are received and a decision has been made on whether to reject the whole pallet of shanks or to use it.
5. Each shank from rework, return, or used pallets of shanks must be tested before being used in the system again.

B. CHECK SET-UP

1. Each shank that is checked must be checked for:

a. Height	e. Centerline	h. Cope Fit
b. Length	f. Shank Angle	i. Opener Hole
c. Tilt	g. Mount Hole	Spacing
d. Twist	Position	
2. Place shank in “Shank Test Jig”
 - a. Place the mount end of the shank, (end of shank which has only one hole), between the clamping blocks of the jig, with the pin through the mount hole of the shank.

Note: If the locator pin will not allow the shank to sit flat on the table, push the pin down until shank will sit flat. As long as the pin starts in the hole, this is acceptable. The pin only restricts the fore/aft movement of the shank position in jig.

- b. Swing the rotator arm over top of shank, snug down but do not tighten yet.
- c. Make sure the flat, straight area of the shank sits flat on the jig table and tighten the two clamp handles on the side of the jig.
- d. Now tighten down the rotator arm from the top of the shank.

3. Mount the clamp plate to shank:
 - a. Select the correct clamp plate for the shank being tested, (2 1/4" or 1 3/4" hole spacing), to match the two holes in the shovel end of the shank.
 - b. Clamp the clamp plate to the inside face of the shank with the dowels positioned squarely in both shovel holes of the shank. Clamp must be tight enough to not allow more than 1/32" movement on the ends of the clamping plate.
4. All measurements must be to the nearest 1/32" or 0.1°.

C. CHECKS

1. Height - Measure the height of the shank by placing the short side of the builders square on the table with the long side vertical and against the back of the clamping jig in the notch near the shank. The heel of the square must face towards the mount hole end of the shank. Read the height of the shank at the point of the square which is even to the top edge of the lower notch on the clamping plate (see figure #1). Record height on check sheet and compare to min/mix tolerances to see if the height is within range.
2. Length - To measure the length of the shank position the square the same as to measure the height and read the length on the rule of the table at the heel of the square. (See figure #1.) Record the length on the check sheet and compare to the min/max tolerances to see if the length is within range.

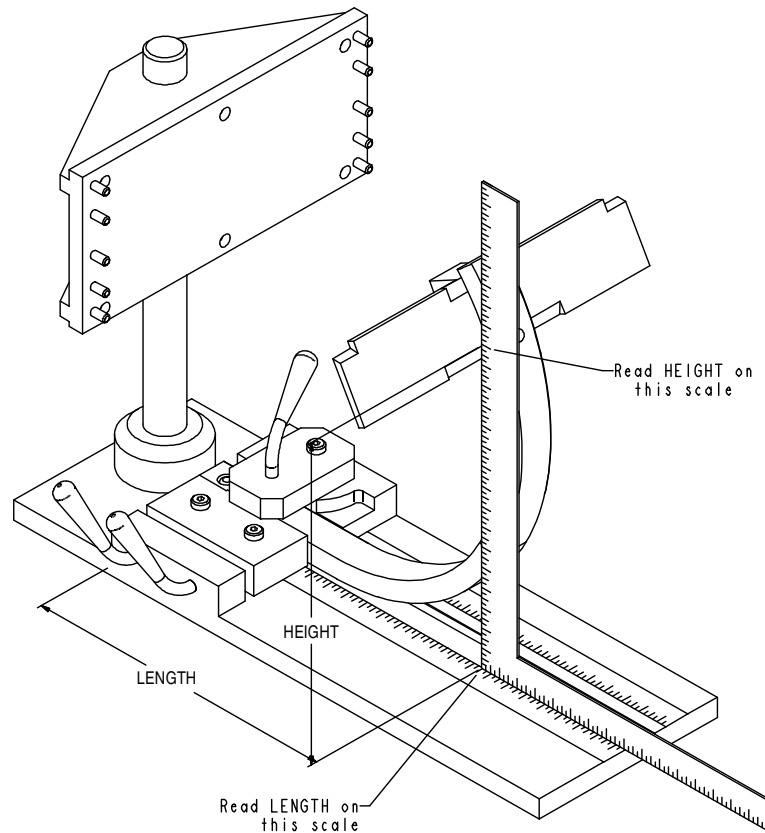


Figure 1 - Height & Length Measurement

3. Tilt - To check the tilt of the shank use the square to measure the distance from the table top to the cut out notch at the top corner of the clamping plate. Record this reading as measurement #1. Repeat this measurement at the other end of the clamping plate and record this measurement as #2. Now subtract the smaller measurement from the larger and record the difference. Compare this difference to the allowable maximum difference from the tolerance chart to see if the tilt is within range. (See figure #2.)

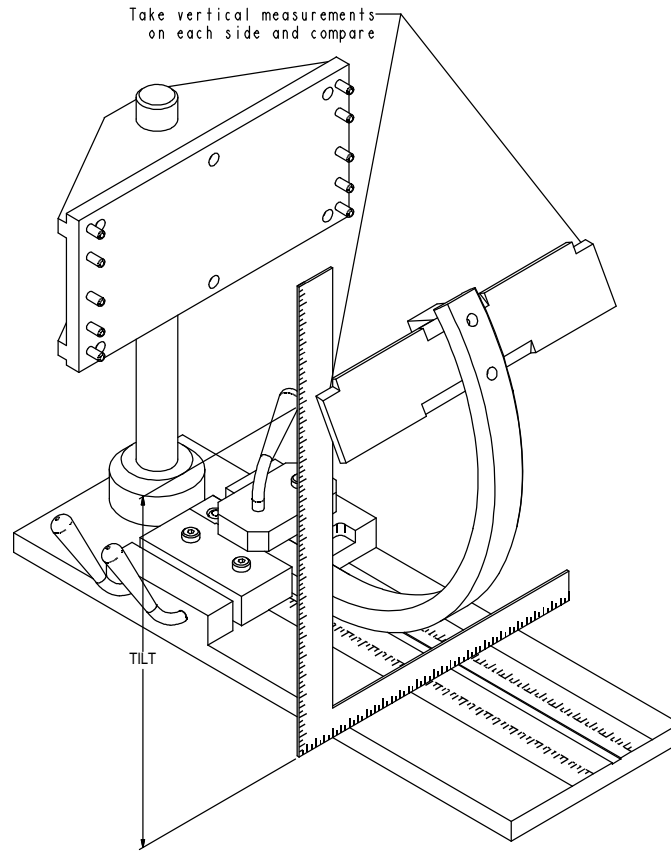


Figure 2: Tilt Measurement

4. Twist - To check the twist of the shank, hold the shorter side of the square flat against plate at the mount hole end of the shank and with the longer side of the square lying horizontal. Rest the longer side of the square in one of the notches of the clamping plate. Use the pegs in the front plate to adjust the square to its most horizontal position for the shank being checked. Read the measurement at the point where the square meets the clamping plate. Record this measurement.

Repeat procedure at the other end of the clamping plate. Read and record this measurement. Now subtract the smaller measurement from the larger and record the difference. Compare this difference to the maximum allowable difference from the tolerance chart to see if the twist of the shank is within range. (See figure #3.)

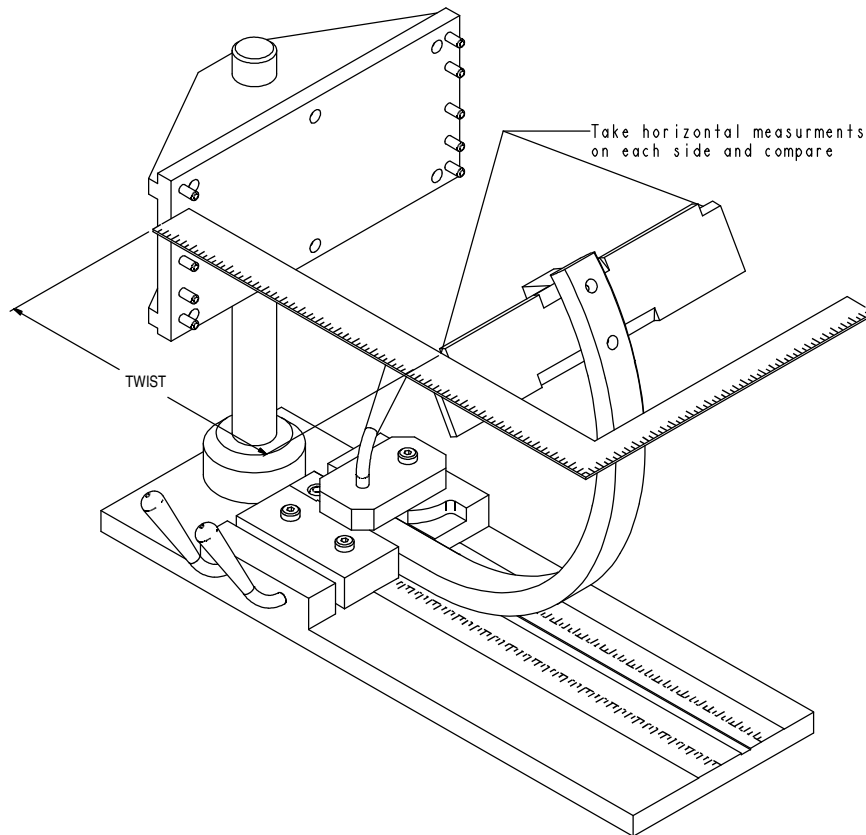


Figure 3: Twist Measurement

5. Centerline - This measures the position of the shank's centerline in relationship to the true centerline. Place the square with the shorter side on the table and the longer side vertical with the heel of the square facing away from the side of the shank. Position the square in the notch of the clamping plate which is next to the shank. The square must be pushed against the end of the notch which is away from the shank. Read and record the distance from the heel of the square to the centerline on the jig table. Repeat this procedure on the other side of the shank and record this measurement. Subtract the smaller of the two measurements from the larger and record this difference. Compare this difference with the centerline maximum allowable difference to see if it is in the range of tolerance. (See figure #4.)

Note: When checking the centerline for off-set shanks; position the square in the notch of the clamping plate which is located directly next to the shank. This measurement

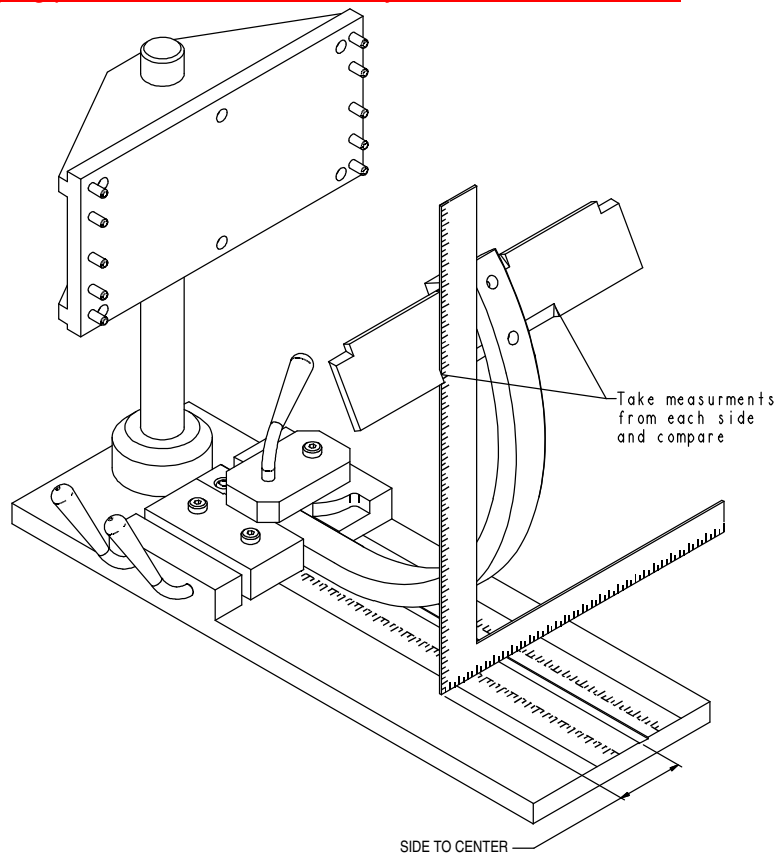


Figure 4: Centerline Measurement

6. Shank Angle - This measures the angle at the shovel hole end of the shank. You must use the “Smart level” to measure this angle. Before you measure this angle you must zero the “Smart level” to the table top of the jig. See “Setting an Angle” on the “Smart level Manual”. After the “Smart level” has been zeroed to the table top, place it against the inside surface of the clamping plate in a vertical position. Wait 10 seconds read and record the shank angle. Compare this to the minimum/maximum allowable tolerance on tolerance chart to see if the shank angle is within range. (See figure #5.) **Note:** Two (2) of the three (3) feet of the “Smart level” must be placed against the surface of the clamping plate when measuring.

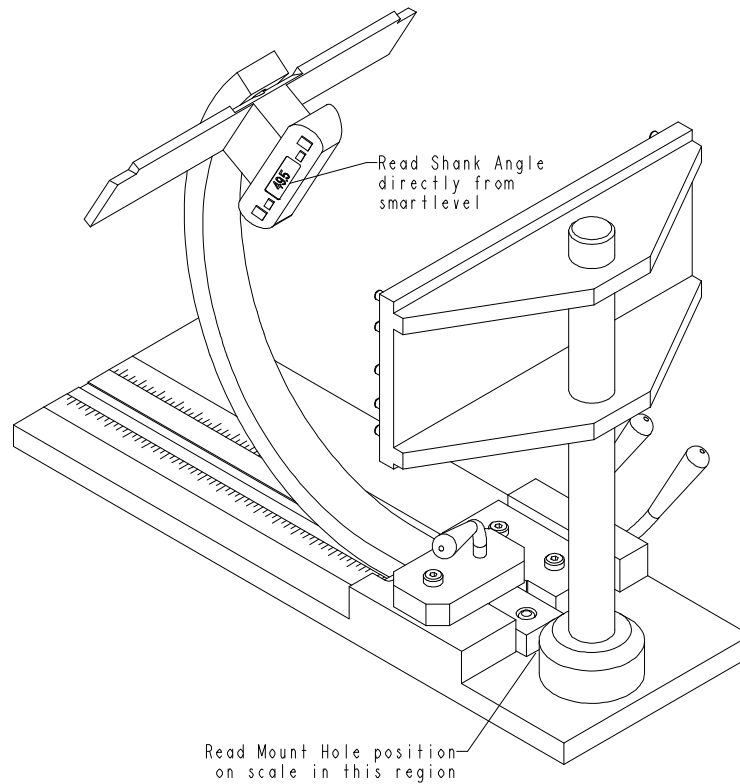


Figure 5: Shank Angle & Mount Hole Position Measurement

7. Mount Hole Position - This checks the distance from the center of the mount hole to the forward end of the shank. Simply read the rule on the table top at the mount end of the shank. Must be read at the longest point of shank. Record this reading and compare to the minimum/maximum tolerance from the tolerance chart to see if the Mount Hole Position is within range. See figure #5.
8. Cope Fit - (when applicable). Remove the clamping plate from the shank. If the shank comes with a cope, (formed at shovel end of shank), you must check it using the go/no-go test piece. Simply place the go/no-go test piece on shank to make sure that the “go” end of test piece fits well on cope. If shank has no cope check the chart to make sure that it does not need one.

9. Opener Hole Spacing - Check the shanks opener hole spacing using either the 1 3/4" or 2 1/4" test piece specially designed for this test. Place test piece on the inside curvature of the shank and push each of the two (2) dowels into the opener holes. Do not use force. The dowels must seat properly in the holes when pushed in by hand. Check chart for proper hole spacing.

SHANK	Height		Length		Tilt MAX DIFF	Twist MAX DIFF	Centerline MAX DIFF	Centerline Max Offset	Centerline Min Offset	Shank Angle		Mount Hole Pitch		Cope Fit Yes/No	Opener Hole Spacing	Mount Hole Dia	
	MIN	MAX	MIN	MAX						MIN	MAX	MIN	MAX			MIN	MAX
5177	12-3/8	12-5/8	17-11/16	18-1/16	1/4	3/16	1/2	N/A	N/A	66.5	67.5	3/4	1	N	1-3/4	5/8	3/4
6113	19-1/4	19-1/2	19-3/4	20-1/8	1/4	7/32	1/2	N/A	N/A	59.5	61.5	3/4	1	N	2-1/4		
6130	14-1/4	14-1/2	15-5/16	15-11/16	7/32	3/16	1/2	N/A	N/A	67.0	69.0	3/4	1	Y	1-3/4		
6131	13	13-1/4	18-5/32	18-17/32	1/4	7/32	1/2	N/A	N/A	70.0	72.0	3/4	1	N	2-1/4		
6222	14-1/2	14-3/4	15-7/32	15-19/32	1/4	7/32	1/2	N/A	N/A	66.0	68.4	13/16	1-1/16	N	1-3/4		
6640	14-1/4	14-1/2	15-5/16	15-11/16	7/32	7/32	N/A	5-3/16	4-13/16	67.0	69.0	3/4	1	Y	1-3/4		
6641	14-1/4	14-1/2	15-5/16	15-11/16	7/32	7/32	N/A	5-3/16	4-13/16	67.0	69.0	3/4	1	Y	1-3/4		
7862	17-3/8	17-5/8	14-3/8	14-3/4	7/32	3/16	1/2	N/A	N/A	57.3	59.3	3/4	1	Y	1-3/4		
7863	15-13/16	16-1/16	15-1/4	15-5/8	1/4	7/32	1/2	N/A	N/A	60.3	62.3	3/4	1	N	2-1/4		
7864	15-13/16	16-1/16	15-1/4	15-5/8	1/4	3/16	N/A	5-11/16	5-5/16	60.3	62.3	3/4	1	N	2-1/4		
7865	15-13/16	16-1/16	15-1/4	15-5/8	1/4	3/16	N/A	5-11/16	5-5/16	60.3	62.3	3/4	1	N	2-1/4		
7866	17-3/8	17-5/8	14-3/8	14-3/4	1/4	7/32	N/A	5-5/16	5-5/16	57.3	59.3	3/4	1	Y	1-3/4		
7867	17-3/8	17-5/8	14-3/8	14-3/4	1/4	7/32	N/A	5-5/16	5-5/16	57.3	59.3	3/4	1	Y	1-3/4		
8674	17-3/8	17-5/8	14-3/8	14-3/4	7/32	7/32	1/2	N/A	N/A	57.3	59.3	3/4	1	Y	1-3/4		
8677	17-3/8	17-5/8	14-3/8	14-3/4	7/32	7/32	N/A	5-11/16	5-5/16	57.3	59.3	3/4	1	Y	1-3/4		
8678	17-3/8	17-5/8	14-3/8	14-3/4	7/32	7/32	N/A	5-11/16	5-5/16	57.3	59.3	3/4	1	Y	1-3/4		