OSD Maintenance Challenge

Abstract Form	
Paper Title:	Stem Centerline Measuring (SCM) Fixture
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Abstract: (300-500 words)

The Stem Centerline Measuring (SCM) fixture was conceived during the inaugural precision machining modification of a 5 inch ball valve. Mechanics were unable to accomplish measurements mechanically during the machining process which therefore, required assistance from a specialized group. The SCM fixture consists of a modified replica stem and stem retainer manufactured separately, to plan specifications. The modified replica stem has a machined radius cut-out approximately 9” long which creates a tangible stem centerline plane (previously imaginary) and provides a flat, firm surface for a depth micrometer to bear against, so that mechanics can accomplish the crucial “flange face-to-stem centerline” measurements for the modification of the ball valve. The replica stem retainer is fixed to the modified replica stem, after the validation process, to allow the assembly to be secured using the existing retainer holes on the top of the valve body. This prevents the SCM fixture from inadvertent movement during the measuring procedure and allows it to remain installed throughout the precision machining process. The fixture was manufactured using re-purposed aluminum bar stock, which provides mechanics with a lightweight, portable tool (approximately 20 lbs. 22” L by 6” W [widest point]) that is easily transported shipboard and from valve to valve. The SCM fixture eliminates the need for a priority categorized, highly specialized Coordinate Measuring Machine (CMM) group. This creates the ability to accomplish dimensions as often as desired during the precision machining process without removing the machine, which routinely takes up to 8 hours to align on all 3 axes (X, Y, and Z). During the validation process, a groove for an o-ring was machined into the modified replica stem to ensure that when installed into the valve body, the stem was centered within the valve stem bore. While working with the CMM group, measurements were constantly taken with the CMM, as well as a depth micrometer, and adjustments were made until both measurements were close to identical (0.001” – 0.002” tolerance for mechanic’s feel and thermal expansion). The replica stem retainer was then affixed to the replica stem to lock in the fixture. The SCM Fixture was then transferred to another identical valve and the validation procedure was completed again with both the CMM, as well as a depth micrometer to confirm repeatability of the fixture. Finally, the dimensions of the SCM Fixture itself were taken with the CMM to ensure that the SCM fixture was manufactured to the correct specifications and that the valve measurement data that was recorded using the fixture was accurate. Based on the job data gathered during both occasions the measuring procedure was completed, there is a projected average man-hour cost reduction of 93%. The SCM Fixture saves time, money, and ultimately accomplishes the goal of providing mechanics with a quick and basic way to accomplish measurements that previously could not be accomplished mechanically.