

Electric Boat Corporation, Quonset Point Facility - North Kingstown, RI

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Best Practice : Handrail Fabrication

(equipment: RMD Model 800 Tube and Pipe Notcher)

In the past, Electric Boat Corporation, Quonset Point Facility used hand-held vibratory machinery to make the notches for handrail assembly, a method that took many hours to complete. The process was redesigned, utilizing a dedicated work cell and a new automatic notching machine for the manufacture of handrails. This resulted in substantial labor savings and quality improvements.

In the past, Electric Boat Corporation, Quonset Point Facility (EBQP) used a standard workbench with a variety of tools to fabricate more than 500 handrails used on nuclear submarines. A time-consuming task, the mechanic would inventory a package of bent pipe to ensure that it was bent correctly before a template could be made for the notch locations. Mechanics were required to use hand-held grinders and cutters for one to one-and-one half hours for each straight cut on standard 1.90 pipe for handrails, and more time on the angle cut. This caused user fatigue, cut uniformity varied widely, and symmetry could never be obtained on pipe ends. Hand-held tools left gaps on the cut surface of the notches making fit-up for welding challenging. Because welding on the rails was performed elsewhere at EBQP, cycle time was high as handrails traveled between departments.

In March 2003, a process improvement was initiated for handrail fabrication. A search for a semi-automated tube and pipe notcher was conducted by EBQP personnel. The company chose the RMD Machine (Figure 2-3), which is compact, user-friendly, flexible, and operates on 110 volt power supply. The operator can adjust the angle of intersection from 30° to 90° and use the cam motor that rotates a cylindrical cutting tool to make contoured notches in pipes from a one-inch to a three-inch outside diameter. The operator then simply rotates a wheel to drive the pipe into the cutting tool until an indicator tells him to stop. The entire cutting process takes less than one minute, a vast improvement over the workbench configuration. In addition, EBQP created a dedicated work cell for the handrail operation. The handrail mechanics designed their own work tables that enabled them to freely walk around the table and clamp assemblies down to the surface during fit-up and welding. The dedicated work cell also includes overhead crane service and a welding machine.

Currently, EBQP is in the process of certifying the handrail mechanics so that one person can complete handrail layout, notching, fit-up, tack welding while the assembly is flat, and final welding of assemblies in one location. This will eliminate the need for three mechanics previously required, and reduce the unnecessary down-time for trips to welding and the tool crib. EBQP's new approach to handrail fabrication significantly increases safety and reduces vibration-related injury. Quality is vastly improved, scrap is nearly eliminated, and products are produced ahead of schedule. The cost of handrails has been reduced by at least 50%, as labor time has been dramatically slashed.