Turn a Quality Cannon Barrel in Ten Minutes or Less

By David C. Leach and David M. Sherwood
Photographs by David C. Leach

DAVID SHERWOOD, an accomplished Southern California ship modeler, was inspired by the sections on Alfred in Harold Hahn's book Ships of The American Revolution and Their Models (London: Conway Maritime Press Ltd., 1988). David began construction of his own 1:64-scale model of Alfred in the autumn of 1995 with a goal to complete it in three years.

When the hull was finished and the time came to make and install the cannon, David was faced with what could have been a monumental task. He reckoned that it would take him as many as twenty working days to manufacture the cannon barrels to go aboard his model if he was to turn them on a lathe in the usual way, in brass, one at a time, by hand. Purchasing them ready made wasn't an option; the quality of the store-bought stuff wasn't up to David's high standards. To adapt some computer-driven machining process was also out of the question; the cost could not be justified. So he began to search for a practical, economical solution to cannon barrel making which would reduce production time, yet still furnish a quality product.

"The problem", David said, "is that turning a piece of brass on a lathe is a one-off process. You cut, then measure, cut some more, then measure again, from as many as ten dimensions for a 32-pounder. It's painstaking, laborious, and what you end up with is a piece that can't possibly match the curves of a real cannon, and no two ever come out the same. Furthermore, the brass has to be polished and chemically blackened. I just had to find another way!" The solution proved to lie in a combination of existing tools and techniques as opposed to a revolutionary new discovery.

An illustration of a cannon-making technique in Hahn's book got David thinking. Hahn suggested making a paper template to locate the various points along the barrel. While this approach represented an improvement over stopping frequently to measure the work, it was still a one-off process which required free-hand filing which causes variations from piece to piece. David's big idea came together when he spotted a duplicator attachment for the Carba-Tec wood-turning lathe. It used a metal template to produce look-alike screwdriver handles and such. "Why not adapt the duplicator to my Unimat SL 1000 and make the cannon out of ebony?" he reasoned.

The idea had a lot of things going for it. One template, from which hundreds of identical pieces can
be generated, gets made one time. Accuracy and consistency can he maintained and small adjustments to the template enable changes which result in overall higher quality. Ebony is naturally black, so there would be no time-consuming polishing and blackening or painting as there is with brass. Additionally, wood's lighter weight made the cannon less likely to shake loose in transit and damage the model.

There was also the promise of cost benefits. The duplicator approach represented a relatively inexpensive solution. Computer-controlled machines cost thousands of dollars; the catalog price for the duplicator was a comparatively low $129. The cost of seventy-four pre-made cannon would have exceeded that of the duplicator. Furthermore, neither of these approaches would provide the level of quality David desired. So, he set to work to marry the duplicator with his venerable Unimat, as shown in the photograph (Figure 1), and to develop a process to turn out perfect cannon in minutes rather than hours.

The first order of business was to create a template from a flat piece of 0.040-inch-thick brass stock. Remembering to halve the diameters and allow space for clamping, David traced the barrel diameters onto the brass, cut out the pattern with his band saw, then finished the template with a file until he was satisfied with its shape.

Confident that his approach would work after some experimental tinkering and fine tuning, David was ready to demonstrate the technique before a live audience. He invited me over to his shop to have a look and greeted me at the door by handing me a small tray containing about thirty miniature cannon, which, except for their size, looked exactly like the real thing. Each had authentic curves at the cascabels, pleasing bell-like flares at the muzzles, and sported a semi-gloss black sheen. What's more, they were all alike. Clearly he was onto something. I watched, made notes for an article, and took pictures as he worked.

The first production step was to chuck a squared and cut-to-length ebony blank in the lathe (Figure 2). David used a four-jaw chuck at the head stock to tightly grip and center the workpiece and he made final adjustments with the aid of a height gauge. At the tail stock, he first used a center-bit in a Jacobs chuck to align the workpiece. The barrel would be made with the breech end toward the head stock and the muzzle end toward the tail stock. After alignment, he replaced the center-bit in the tail stock with a drill to bore the barrel. See Figure 3; note the brass template in position at lower left. Once the barrel was bored, he inserted a live center in the tail stock, and adjusted and locked up the lathe settings — the ebony was then ready to turn.

Next, the template was arranged to gauge the proper depth of cut. Test cuts were made and adjustments were measured with a vernier caliper. Once the template was positioned and clamped, David flicked the switch and the lathe began spinning the workpiece. He started at the muzzle and worked toward the chuck (Figure 4), He used pressure against the template as a guide, finished as he went, and formed perfect rings and curves (Figure 5). Within a few minutes he had reached the cascabel and, with a final push of the cutting tool, a miniature cannon dropped to the lathe bed.

Finishing the piece required just another minute or two. A dab of oil, some 0000 steel wool, and a few twists of the wrist were all it took to make the barrel presentable (Figure 6). After drilling for and installing the trunnions, the cannon barrel was ready to be installed on its carriage and take its place on the ship. Simple as that.