Henry Maudslay

"A Founding Father of machine tool technology"

Jack McGuinn, Senior Editor

Here is some history that bears repeating—or at least re-reading. So take a few minutes to give it up for a long-gone Brit named Henry Maudslay (August 22, 1771 – February 14, 1831)—also known as "A Founding Father of Machine Tool Technology." You might also consider him an early leader in inspection, as he also invented the first bench micrometer capable of measuring to one ten-thousandth of an inch (0.0001 in ≈ 3 µm). Maudslay dubbed it the "Lord Chancellor," as it was used to settle any questions regarding accuracy of workmanship.

Maudslay was the son of a wheelwright in the Royal Engineers who was later a storekeeper. Like many boys of his era, Henry began his work in manufacturing quite young. Upon his father's death around age 12, he worked as a "powder monkey" at the Royal Engineers Arsenal—i.e., one who filled cartridges at the facility. Within two years he was transferred to the carpenter's shop, followed by the blacksmith's shop, where at 15 he began training as a blacksmith. His innate skills allowed him to specialize in the lighter, more complex kind of forge work.

Seemingly born for the work, Maudslay excelled at his craft—so much so that Joseph Bramah (inventor of the hydraulic press) recruited him to work in his shop. Bramah had recently designed and patented an improved type of lock based on the tumbler principle, but was having difficulty in manufacturing the complex lock at reasonable cost. Although only 18, Maudslay quickly demonstrated his ability and was retained in Bramah's employ. It was Maudslay who built the lock that was in Bramah's shop window with a notice offering a reward of 200 guineas to anyone who could pick it. Maudslay designed and made a set of special tools and machines that allowed the lock to be made cost-effectively. It resisted all efforts to open it for 47 years.

Bramah had also designed a hydraulic press, but again was having problems closing the deal—this time in sealing both the piston and the piston rod where it fitted into the cylinder. Maudslay designed a leather cup washer that provided a perfect seal. The new hydraulic press worked perfectly thereafter, but again, Maudslay received little recognition—monetarily or otherwise.

When Maudslay first began working for Bramah, the typical lathe was worked by a treadle and the workman held the cutting tool against the workpiece. Precision was almost an afterthought—especially when cutting iron. Maudslay designed a tool holder into which the cutting tool would be clamped and would slide on accurately planed surfaces to allow the cutting tool to move in either direction. The slide rest was positioned by a lead-screw to which power was transmitted through a pair of changeable gears so that it traveled in proportion to the turning of the work. This allowed screw threads to be precisely cut. Changing the gears gave various pitches. As knowing readers will appreciate, the ability of Maudslay's slide-rest lathe to produce precision parts revolutionized the production of machine components.

While not its inventor, Maudslay *was* in fact the first to combine the slide rest, lead-screw, *and* change gears in a precision machine—which popularized the concept and caused modern industry to widely adopt it. Maudslay's original screw-cutting lathe is at the Science Museum in London.

It was in 1797—with Maudslay having toiled for Bramah for eight very productive years—that trouble visited Paradise. Maudslay dared one day to ask for an increase in his wage of only 30s a week. Pennywise, pound-stupid, Bramah refused. Maudslay's next career move was to set out on his own. He first rented a small shop, and then in 1800 moved to larger premises on Cavendish Square. His first major commission was to build a series of 42 woodworking machines to produce wooden rigging blocks (an order of some magnitude) for the Navy under Sir Marc Isambard Brunel. The machines were installed in the purpose-built Portsmouth Block Mills—which still survive, including some of the original machinery. The machines were capable of making 130,000 ships' blocks a year, needing only ten unskilled men to operate them, compared with the *110 skilled workers* needed before their installation. This was the first commonly known example of specialized machinery leading to downsizing.

Maudslay went on to develop in 1800 the first work-practical screw-cutting lathe, thus introducing the very first standardized screw sizes and threads. Until now, screw threads were usually made freehand by chipping and filing with chisels and files. Maudslay standardized the screw threads used in his workshop and produced sets of taps and dies that would make nuts and bolts consistently to those standards, so that any bolt of the appropriate size would fit any nut of the same size—yet another breakthrough.

Henry Maudslay played his part in the development of mechanical engineering when it was in its infancy, but the "Founding Father of Machine Tool Technology" was especially pioneering in the development of machine tools to be used in factories, job shops, and other end-user facilities around the world. *(Sources: britannica.com; todayinscience.com.)*