Y-12 expands metal working and pushes state-of-the-art in machining

After examination of Y-12's history with regard to special programs such as the Training and Technology School, the Oak Ridge Centers for Manufacturing Technology, the Manufacturing Skills Campus, and brief looks at technology transfer and expanded missions of the present as well as future potential for Y-12, we now resume a more chronological account of Y-12's history. Picking up where we left off in the 1950's and 1960's, we will continue highlighting the ever-expanding role Y-12 played in the winning of the Cold War and other national and international efforts.

Throughout the 1950's and into the 1960's, Y-12 continued to expand its metal-working capabilities. By the 1960's the turning machines and milling machines were becoming some of the most accurate metal working machines in the world. Extremely close tolerances for machining nuclear weapon components required very specialized machines, many of which did not exist before Y-12's requirements caused them to be designed and built. Vendors and Y-12 engineers worked closely together to advance the state-of-the-art in machine tools and precise measurement tools and techniques.

This growth in metal working at Y-12 was happening along with the major project to separate lithium-6. The COLEX (column exchange) process occupied Buildings 9201-4 and 9201-5, two of the largest buildings at Y-12. This tremendously important mission lasted from 1955 through 1963 with Building 9201-4 (Alpha 4) carrying the largest production load.

Alpha 4 remains in much the same condition as it was left in 1963. The COLEX process remains there, and the building has been maintained over the years with only minor use being made of the huge building. Some storage capacity has been utilized, and maintenance and surveillance activities have continued.

Efforts to remove as much of the mercury contamination as feasible, while not removing the entire COLEX process, continued for years into the 1970's and 1980's. Today, Alpha 4 stands as both a reminder of the historic mission to separate the lithium-6 and the resulting contamination of mercury resulting from the process.

Alpha 5, unlike Alpha 4, had the COLEX process removed quickly and was converted to many other production missions over the years. Today, it stands empty as it has recently been cleaned out using the stimulus funds. It was one of the highly successful American Recovery and Reinvestment Act projects executed at Y-12.

This multiple mission approach was becoming the way of Y-12; and as the Cold War production efforts both in weapons and atomic tests continued to grow, so did Y-12's technical capabilities. Within the Manhattan Project era buildings, remember there were nine major buildings that originally held Calutrons to separate the uranium for Little Boy. Now there were shiny new machine tools and complex metal working facilities being placed in every nook and cranny of the old buildings. Creative use of the available space also became the "way of Y-12."

Building 9201-5 West was built in 1967, Building 9204-2 Extension in 1969 and Building 9201-5 North in 1972. All three of these buildings were constructed as additions to existing buildings but were the result of much needed space within which to locate production facilities needed to successfully meet the demanding production schedule of nuclear weapons components and nuclear test apparatus. Y-12 never missed a single production shipment schedule during the Cold War years!

It was not unusual to see Y-12 engineers beginning to travel to machine tool manufacturers and providing personal guidance regarding the exacting specifications required for the highly precise equipment being purchased. This practice continued well into the 1990's and still exists today. However, the early years saw giant strides made in metal working because of Y-12's influence in the industry.

In 1956 an accelerated program of providing technical information and assistance to industry interested in uranium salvage and recovery operations began. Y-12 was among the very few places where such processes had been developed. This continued in the 1960's as well.

On June 16, 1958, the world's first industrial criticality accident happened at Y-12 in Building 9212. Eight workers were exposed to radiation. They quickly evacuated the area limiting their exposure. However, they were hospitalized for 44 days and struggled with radiation related health issues for several months.

The Critical Experiments Facility located just south of Y-12 was used to duplicate the exposure and determine how much radiation the workers were likely to have gotten. There were no fatalities and all of the eight people returned to work. Criticality safety remains a main component of Y-12's safety program to this day.

This accident resulted in increased emphasis on engineered solutions to criticality safety issues. By the 1960's criticality safety had become a sacred requirement, not to be violated regardless of the circumstances.

Handling special and hazardous materials require the discipline that comes with understanding and respecting uranium and other special nuclear materials. Y-12 has remained a primary leader in criticality safety through the years.