Getting a Handle on Improved Telemanipulator Operation HOTLAB 2018

Amos Avery, Steve Williams and Steve Chunglo

Central Research Laboratories (CRL), Minnesota, USA
Corresponding author: Steve Chunglo <schunglo@destaco.com>

A persuasive argument can be made that one of the most significant days in the evolution of hazardous material handling in industrial applications occurred in 1949. That's when inventor Ray Goertz first publicly demonstrated, at the behest of the U.S. Atomic Energy Commission for use at its Argonne National Laboratory, his invention that would come to be known as a "telemanipulator."

During that same era, three scientists from the Massachusetts Institute of Technology founded Central Research Laboratories (CRL) and began working on developing safer methods for handling hazardous and toxic products. This led to CRL's development of command-remote telemanipulators that could be used for the safe and efficient handling of nuclear materials by eliminating the need for the human operator to have direct contact with what could be extremely harmful and hazardous substances.

Since then, CRL has manufactured and installed more than 7,800 telemanipulators in 22 countries. Every telemanipulator that CRL manufactures is designed for the specific needs of the user and takes into account many varying factors in developing the most customized solution available.

With that commitment in mind, in the ensuing decades the design and operation of telemanipulators have undergone a series of technical enhancements and improvements. Most of these enhancements were to meet application specific needs.

Surprisingly, though, one critical component of the telemanipulator has been relatively immune to change; the handle that the operator grips and manipulates to complete the precise hand movements which are translated to, and mimicked by the telemanipulator tong.

Since the invention of the first telemanipulators, the handle design has stayed roughly the same, though there have been calls for its refinement. This paper will illustrate what the challenges have traditionally been in telemanipulator operation and construction, what changes were required in handle design, and how a new handle design can help improve performance in those areas.

Figure 14: The evolution of the VERSA Handle System.