Barrett Technology,® Inc., of Cambridge, Massachusetts, received the 2003 Robotic Industries Association’s Joseph Engelberger Award for Technology Leadership based on successful commercialization of its novel robotic manipulators. Designed for applications requiring superior adaptability, programmability, and dexterity, Barrett’s devices provide state-of-the-art functionality and capability, as well as product integration with existing technology. The cutting-edge robotic manipulators originated through collaboration with NASA, the National Science Foundation, and the U.S. Air Force.

In the 1990s, NASA’s Johnson Space Center awarded Barrett four Small Business Innovation Research (SBIR) contracts, leading the company to develop the first commercially available cable-driven robots. Today, the company supports two robotic manipulator product lines: the Whole-Arm Manipulation System (WAM™) and its BH8-Series™ hands, both of which received funding through SBIR contracts. During a Phase II SBIR contract with Johnson, Barrett designed the EVA-Retriever WAM arm for NASA’s use as an autonomous robot to recover crew or tools outside of the Space Station.

The WAM arm outperforms today’s conventional robots through its extraordinary dexterity, transparent dynamics, high bandwidth, zero backlash, and near-zero friction. The device can reach around objects and clasp them, much like a person holding a large item between his or her forearm and upper arm without compromising the use of hands for small items. Conventional robotic arms are strictly limited to the use of hand end-effectors and therefore small payloads. The WAM arm is also distinguished from other arms with its use of gear-free cable drives to manipulate its joints.

Listed in the Millennium Edition of The Guinness Book of World Records (2000) as the world’s most advanced robotic arm, the WAM arm closely resembles its human counterpart. The arm consists of a shoulder that operates on a gearless differential mechanism, an upper arm, a gear-free elbow, forearm, and wrist. This arrangement of joints coincides with the human shoulder and elbow, but with much greater range of motion. Like a person’s arm, but unlike any industrial robotic arm, the
The BarrettHand™, a multi-fingered programmable grasper, can pick up objects of various shapes and sizes.