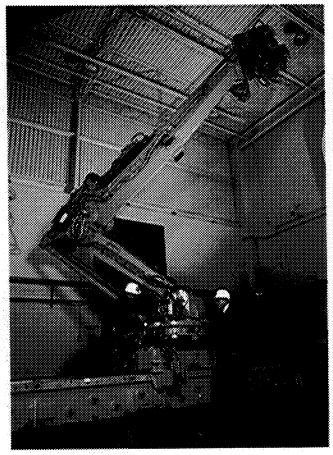
The Space Shuttle's Remote Manipulator System—known to its builders as Canadarm—is a 50-foot robot arm used to deploy, retrieve or repair satellites in orbit. It made its debut in 1981 and operated successfully on 18 missions prior to the Shuttle standdown that began in 1986.

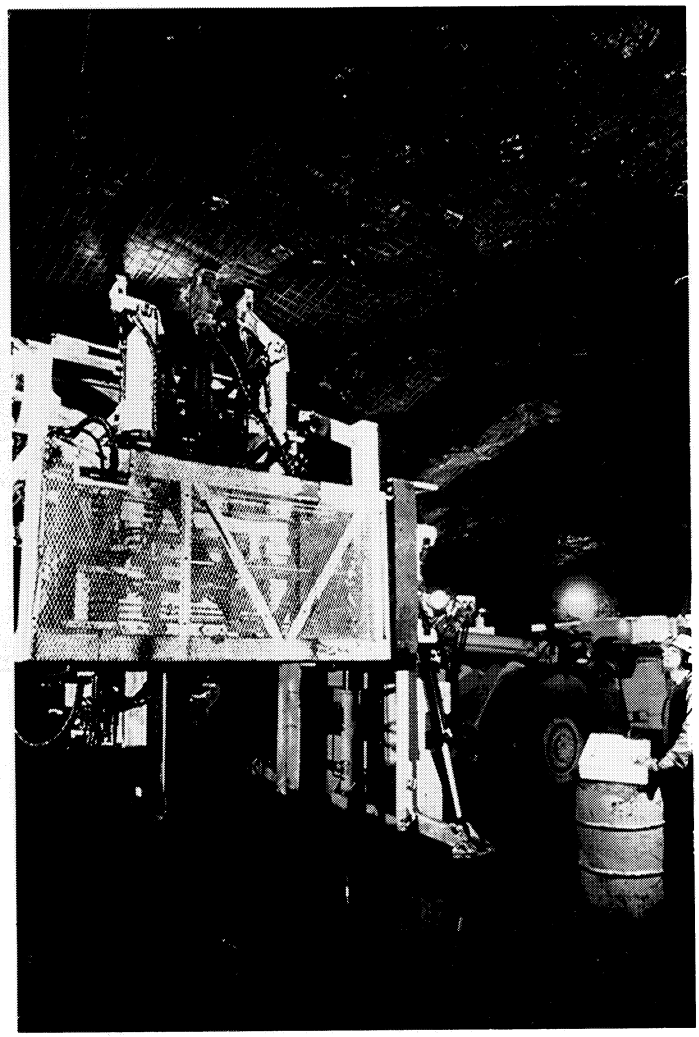
Canadarm was designed and built by Spar Aerospace Limited, Toronto, Ontario under contract to the National Research Council of Canada as Canada's contribution to the Space Shuttle program. The project was funded by the Canadian government in the conviction that the technology would generate important Earth-use spinoffs. It has. In fact, Spar Aerospace has formed a Remote Manipulator Systems Division specifically dedicated to development and construction of robotic systems.

The initial spinoff version, shown above, is designed to remove, inspect and replace large components of Ontario Hydro's CANDU nuclear reactors, which supply some 50 percent of Ontario Hydro's total power reduction. All work is controlled from an operations



center remote from the reactor. Cameras on the robot arm provide the operators views of each stage of the operation, while the job is monitored over a communications network. The CANDU robot is the first of Spar's Remote Manipulator Systems intended for remote material handling operations in nuclear servicing, chemical processing, smelting and manufacturing.

A second spinoff program began in 1985 with the signing of an agreement with Inco Limited for development of remote controlled mining equipment to enhance the safety and productivity of Inco's hardrock mining operations. The first such system, now in service, is a machine for installing wire mesh screening and rock bolts to shore up the roofs of mine corridors, as pictured at right above. An operator controls the machine from a position under an already-screened area, where he is protected from rockfall; he positions the mesh, drills in a predetermined pattern, then inserts and tightens the rock bolts, handling 35 feet of screening and 18 bolts in a three-hour sequence. The system not only improves safety in a hazardous operation that costs more than a score of lives annually, it also increases productivity fourfold.



The Remote Manipulator System Division is also manufacturing a line of industrial robots and developing additional systems for nuclear servicing, mining, defense and space operations. ▲