

## Ships and the sea



International Submarine Engineering manufactures the Dolphin (above) and Arc, radio-remote-controlled submersibles.

As with air transportation, Canadians responded with the same creativity and ingenuity when it came to developing technology for the sea. Bordered by the Atlantic on the east, the Pacific on the west and the Arctic Ocean to the north, and with much of the country blessed with thousands of lakes of all sizes, it is not surprising that Canadians are experts in marine technology.

Shipbuilding was one of the nation's first major industries and Canadians have developed specialized ships such as the *self-unloading freighter*. The bottom of the hold feeds bulk cargo to a moving conveyor belt, allowing quick and efficient loading and unloading. These ships have been adapted for use in the Caribbean and other parts of the world.

The great advances that have been made in shipbuilding have been matched by those in marine technology. From the Gulf of St. Lawrence on the Atlantic coast, a system of connected inland waterways permits ocean-going freighters and other vessels to travel thousands of kilometres into the heart of Canada. These waterways, which are an outstanding feat of engineering, use a system of locks to raise and lower ships, allowing them to bypass navigational obstacles like Niagara Falls.

### Ice breakers

In the Arctic, winter sets in early and stays late. Ice floes block shipping lanes and restrict access to northern communities for much of the year. To create year-round access to Arctic shipping lanes, Canadians have developed the world's most sophisticated ice-breaking technology.

Canadian icebreakers built with special hulls can plough through Arctic ice from spring to early winter. They can clear a path for cargo ships, tow oil rigs from one site to another and move dangerous ice floes away from anchored rigs. They can also lasso icebergs and tow them out of harm's way.

Some of the biggest icebreakers in the world are built in Canada. The *Terry Fox*, for example, uses a gently sloped "spoon bow" that lets the ship ride gradually up onto the ice instead of ramming or crushing it. The ice bends and then breaks under the weight of the ship. Controllable-pitch propellers (another Canadian innovation) allow more efficient power control in varying ice and sea conditions.

Canada is committed to the construction of the largest conventionally powered icebreaker in the world, the *Polar 8*. It is scheduled to be operational in early 1993.



Canada Steamship Lines' Self-Unloader is a totally self-contained system that unloads thousands of tonnes an hour automatically, with significant savings in stevedore work and shore equipment.