from the traditional fields of mapping and surveying, it could be the answer here. An Albacore was made available to them by Skene Boats Limited of Ottawa, and they approached the Photogrammetric Research Section of the Division.

"How do you define the shape of this boat," they asked Marius van Wijk? "Oh, it's easy — no problem at all — we'll just take photographs," he said. A total of 200 points (or crosses) were marked on the hull to be used as control or reference points. Since close range was necessary in order to obtain the required accuracy, and the boat was too large to be covered on one photograph, several overlapping photographs would be needed to make up the whole. These would then be measured analytically in a stereocomparator.

The Marine Dynamics and Ship Laboratory then obtained a set of Albacore lines from the Canadian Albacore Association and fed them into their standard computer system for making ship models. "This enabled us," explains David Murdey, "to get within the computer direct comparisons between the lines and the real Albacore at the point on the hull where the crosses were put for the photogrammetric measurement. From this we determined that the hull actually had more curvature in the profile than the lines called for. Furthermore, the port and starboard sides of the hull were not identical."

These discoveries led the Laboratory into another aspect of the operation. The hull measured had been manufactured from an existing standard Canadian master plug (the form which is the basis for the manufacturing process), and it was inferred that all boats made from the same plug would show the same characteristics. The Association again asked for help, this time to manufacture a new plug.

"We knew that we could build a plug that was exactly to the lines, which would mean that the builders could build a boat which was just as good as the imported model; so we undertook the job," says David Murdey. "Using lines which we put into our computer system — our standard method of making models — we obtained an accurate, smooth representation which was precisely symmetrical. Skene Boats Limited assisted us with some details —there were places on the hull, for instance, which were not completely defined, where builders had a certain degree of choice —and we incorporated their practical suggestions."

Because of limitations in the size of models that could be accommodated in the Laboratory's milling machine, the plug was made in four parts and these were joined after the milling was completed. Skene finished the plug to a high degree of gloss (it had only been finished in the Laboratory so that it would not absorb moisture). On seeing the first boat and the standard of finish, American dealers ordered 21 boats. The company sold 30 at the Toronto Boat Show last January and another 40 have subsequently been delivered.

"The high quality product that has been achieved with NRC expertise has been a definite boon to Canadian business," says Carl Strike, President of Skene. "Not only are we heavily exporting the Albacore, but our other lines have picked up as well."

Although this is the first time photogrammetry has been used by the Photogrammetric Research Section to determine the shape of a boat, "should there be an interest from the industry, we certainly would be interested in expanding this field," says Marius van Wijk. "The main advantages are, of course, that it takes less time than the mechanical method, less field work is required, and the boat is 'tied up' for a much shorter period. It all fits in with our work in the field of plotting."

Concludes David Murdey: "Acting as the catalyst, the Council was able to provide the knowledge and the know-how which enabled one builder to reverse a declining pattern of sales with a more satisfactory product. In addition, it has encouraged the consumer to 'buy Canadian'." □

Joan Powers Rickerd

Because of limitations in the size of models that can be accommodated in the Laboratory's milling machine, the plug, made from laminations of pine, was finished in four parts and these were joined after the milling was completed. Photos show partial block before milling (top) and after (bottom). *(Photo: Div. of Mech. Eng.)*

Étant donné que la fraiseuse du laboratoire ne peut pas être adaptée à des modèles volumineux, le gabarit, constitué de lamelles de pin, a été fait en quatre parties que l'on a assemblées lorsque le meulage a été achevé. Les photos montrent la surface du gabarit avant le meulage (en haut) et après le meulage (en bas). *(Photo: Division de génie mécanique)*