

AN ACTIVE trawl system in which variable thrust vector devices replace conventional otterboards to 'steer' fishing gear is being developed in South Africa.

By controlling both the magnitude and direction of the lift force generated by each device, significant advantages over conventional and automated trawl systems presently in use can be attained, it is claimed.

Some expected advantages are:

- Depth and lateral position of a trawl can be achieved independent of trawl speed and warp length, thereby enlarging the trawl envelope.
- The trawl can be operated at greater depths with the same warp length and size.
- The trawl can be towed on steep slopes and rough grounds.
- Fast response time.
- Undersea current compensation.
- Increased net effectivity.
- Reduced operating costs.
- Suitable for bottom and mid-water trawling.

"The development of the trawl gear at the business end of the warp has not kept pace with that of the modern trawler," according to Maurice I. Shenker, who has sent me some preliminary information about his system.

Included is a simulation program which demonstrates how, by using the proposed active trawl system, a trawl can be manoeuvred up and down, from side to side and even turned at an angle to fish on a slope.

"The variable thrust vector devices, which differ radically in both design and function from conventional trawl doors, could be the key elements for a new generation of trawl gear," he tells me.

"The active trawl system incorporates many of the modern technologies available today, tailored and/or specifically designed for this application."

Compared to a conven-

# 'Steer' the trawl!

## - variable thrust device could replace doors, says inventor

tional trawl system with "passive" shearing devices (doors), the active trawl system with variable thrust vector devices has a number of advantages for bottom and mid-water trawling, says Maurice Shenker.

Claimed capabilities and functions of the active trawl system in bottom trawling include:

- Sea bottom drag or controlled height above sea bottom.
- Minimal damage to trawl gear.
- New trawl grounds with

rougher topography or steeper slopes could be exploited.

- Limited lateral motion control.
- Absolute position of trawl net known.
- Integration of data and optimised control effected by control system, reducing skipper involvement.
- Reduced power requirement.

Capabilities and functions of the active trawling system in mid-water trawling include:

- Two axis control over

trawl path.

- Depth controlled by variable lift doors.
- Reduced response time to change in trawl position.
- Smaller net can be used.
- Higher trawl speed.
- Integrated control.

Several options for the active trawl system are envisaged by Maurice Shenker.

The most basic system would be the active trawl gear with variable thrust vector devices controlled by a joystick.

The next option could incorporate pre-set depth or height above sea bottom control.

A further option would have a display showing the relative position of the net as well as depth and other user-defined information.

The next option would have a data base of the fishing grounds and be interfaced to navigational equipment. This display would show the absolute position of the trawl gear.

A "full-house" system would have a large data base of fishery and fishing ground information. It would be interfaced to the autopilot and engine management system. The skipper would pre-select a trawl path and pass control over to the system.

## 'Tank test proves concept'

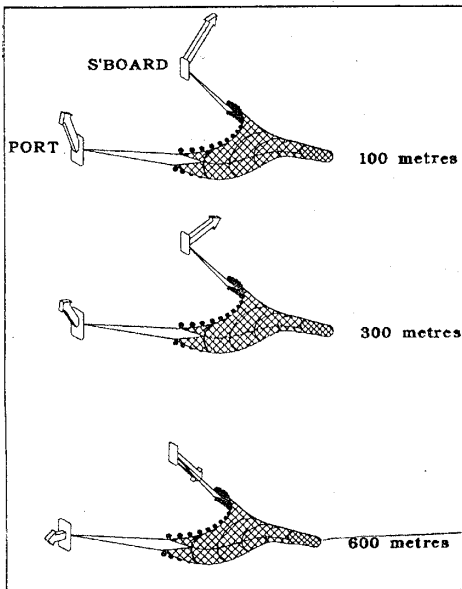
**WHY** are there no variable thrust vector devices on the market?

"It's not because they have been tried and found not to work, but because the devices are a unique and novel application of a well-known fluid dynamic device," according to Maurice Shenker.

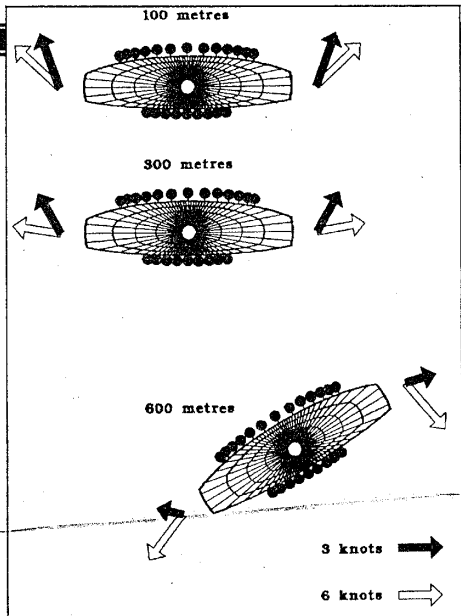
"Perhaps it needed the right combination of fisherman, engineer, analyst and part-time inventor to come up with the idea!"

He says that the basic theory of his active trawl system has been researched, fluid dynamic equations have been established, and computer simulation programs written and used for theoretical predictions of performance.

A concept demonstrator



Above: Three-dimensional view. The arrows represent the directions and magnitudes (the vectors) of the lift forces which must be generated by each door to maintain the net at set depths, with a trawl warp length of 1000 metres. These are shown for trawl speeds of three and six knots. To avoid confusion, the vectors on the port doors are those for three knots and on the starboard doors those for six knots.



Right: Two-dimensional view. The three knot vector arrows are filled whereas the six knot vector arrows are unfilled. A view of the net laterally displaced and rotated is also shown, although the difference in angles and magnitude cannot easily be seen.

model has also been constructed and successfully tank tested, he adds.

Further towing tank testing is planned to establish design parameters, a small prototype is in the design stage, manufacturing methods and mate-

rials are being evaluated.

According to Maurice Shenker, a patent search revealed the devices to be unique and the technology novel.

The building blocks of the active trawl system include a

pair of variable thrust vectoring doors and sensors to determine what the gear is doing and, also, where it is.

There is a control system to process and display the information from the sensors, to accept input from the skipper and to output signals to the devices so that the desired trawl position is reached.

An electrical link between the trawler and the devices is required. The variable thrust vector devices require power to operate and, in addition, there must be a communication channel between the

trawler and the devices.

Maurice Shenker tells me that an electrical cable seems at this moment to be the most reliable link, although a cable-less version may be a possibility.

In addition to this basic system, interfaces to existing and/or additional trawl gear borne fish detection equipment as well as to weather, navigational, winch control and engine management systems - plus a fishery database - could be used to automate and/or increase the catching efficiency of the fishing operation.

## Thrust devices under wraps

TO MARKET a new concept when only a prototype is available can be very difficult, admits Maurice Shenker.

The active trawl system concept has been presented to South Africa's trawling industry and the Department of Sea Fisheries. Both are said to be receptive to the idea and willing (and waiting) to test a working system.

Maurice Shenker has not included details of the variable thrust vector devices. One reason for this is that his only protection at present is a South African provisional patent.

He is also talking to local and overseas trawl gear manufacturing companies and does not want to jeopardise any negotiations with them.

Born in Cape Town, South Africa, in 1948, Maurice Shenker says he became actively involved in many aspects of, and pioneering ventures in, the local fishing industry.

These included rock lobster catching and processing, abalone canning, shark processing, fresh and smoked fish producing, and salted fish exporter.

He studied for a BSc (Mechanical Engineering) at the University of Cape Town.

He owned and operated fishing boats, worked for Lusitania Sea Products and the Freddy Hirsch-Bizerba Group as an engineer, and in 1976 joined the Council for Scientific and Industrial Research (CSIR).

Maurice Shenker was then seconded to work on defence projects. Work included project and system engineering of various missile sub-systems, some of the technologies of which he says are incorporated in his active trawl system.

Besides the active trawl system, he is working on some smaller fishing related products.

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