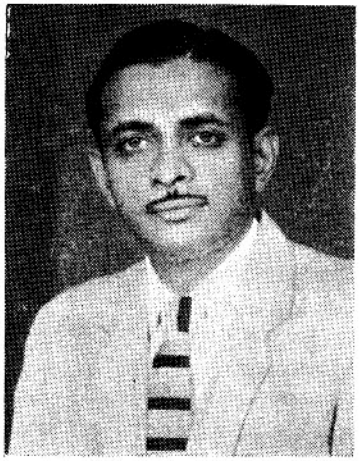
NYLON FOR FISHING NET



G. K. KURIYAN

Director-in-Charge of the Central Institute of Fisheries Technology, Mr. G. K. Kuriyan, is one of the pioneers in fishing craft and gear research in India. After getting post graduate degree, Mr. Kuriyan joined the Inland Development Section of the Department of Fisheries, Madras, in 1945. Later as Assistant Director of Fisheries (Craft and Tackle) he was in charge of the mechanisation programme. Later he was nominated as the Chief counterpart to the FAO Naval Architect, Mr. Paul B. Zeiner and the F. A. O. Gear Technologist, Mr. G. S. Illugason. "Pablo", the first mechanised fishing boat, was built by him under the guidance of Mr. Zeiner. The design of this boat was subsequently adopted in the States of Kerala, Mysore and Andhra. The Government of India then appointed him in Central Services to organise particularly the Craft and Gear Wing of the Central Fisheries Technological Research Station at Cochin. He was also counterpart to Mr. H. Miyamoto, the FAO Gear Technologist. who was on an assignment to Govt. of India for organising the Technological Station. The scheme for Craft and Gear Wing was approved by the Govt. of India. After Cochin, Substations were organised at Veraval, Kakinada and Burla and units at Nangal and Goa. He conducted three *ad-hoc* training courses for supervisory work at the State level. In 1963 Govt. of India deputed him under Colombo Plan for training in Gear Technology at the Tokai Regional Fisheries Research Station, Tokyo. Mr. Kuriyan has contributed more than thirty scientific papers on fishing craft and gear technology in journals in India and abroad.

Nylon, a synthetic fibre of the polyamide group, has become very popular in fishing since the World War II, although its actual invention dates prior to the declaration of that war. The new fibre was intially known as "polymer 66". Nylon, the name commonly used in English speaking countries, seems to have been derived subsequently as a tribute to the research workers of U. S. A. (Ny = New York) and U. K. (Lon = London) in search of new man-made fibres.

Nylon yarn is made under three principal forms namely (i) continuous multifilament, (ii) continuous monofilament and (iii) staple fibre. Although staple fibre and monofilament yarns have considerable uses, this article deals with the characteristics of continuous multifilament yarn, because it is in this form that nylon is extensively used in this country for fishing nets.

The more common sizes of nylon continuous multifilament yarn for fishing are of

110; 180; 210 denier (den.) each yarn containing 15 to 36 filaments. Denier is an indirect measure of the thickness of the yarn, being weight in grams of 9000 metres of yarn. Indian nylon twines are made mainly with 210 den. yarn. 840 den. yarn is also available.

Nylon twines, to denote their thickness, are occasionally referred to in the trade by code numbers. Except for Code No. 1, which are of 2 ply (or strand), from Code No. 2 onwards, the number of yarns in each strand denotes the Code No. of the twine concerned.

Nylon is stronger than most other yarns used in fishing. The additional strength enables a reduction in the thickness making it less visible in gill nets and creating less resistance in dragged gear. Reduction in the size of the yarn brings about a reduction in the weight per unit length, which would in turn help easier handling of the gear.

The strength of nylon yarn is expressed as tenacity and is indicated as gms/den. The majority of nylon yarn for fishing are of high tenacity which varies between 6-7 gms/den or more. The strength of individual yarn is fair index of the strength of the twine, as nylon has fairly high doubling efficiency. When several nylon yarns are twisted together, the resulting twine has a breaking strength, which represents a high percentage of the theoretical figure obtained by adding up the strength of individual yarns. The strength loss due to doubling and twisting is between 3 to 5%.

Perhaps even more important than tenacity is the high ability of nylon to absorb sudden and severe shocks and strains like strong current, rough sea, struggling fish and similar causes. This property is the outcome of the combination of high tensile strength, extensibility and elastic recovery. A natural fibre twine may stretch to a small extent, due mainly to twist, thereafter the deformation of the twine structure occurs by fibre slippage. On the other hand, nylon has considerable true elasticity and with continuous filament yarn there is practically no fibre slippage. High tenacity yarn extends between 15% to 19 % before it breaks. It has been estimated that extensions upto 7% recovered completely when load was removed. For extensions beyond 7% there was a small permanent increase in the original length. Nylon twine has greater extensibility than yarn because of the twist. However, as extension does not cause deformation of twine structure, nylon twine can, not only withstand a sudden load but also repeated loads without causing damage to the structure of the twine.

Nylon is lighter than many other fibres; specific gravity being 1.14. The low relative density helps to keep the weight of the net down and for certain types of netting, may enable the fishermen to carry a greater length than was previously possible in a limited deck space. However, as the sinking speed is slow, in purse seine and the like, where speed of operation is important, the low specific gravity is a distinct disadvantage. Further, being light, the net may not assume the required form and shape in a short time.

The moisture uptake of nylon is lower than that of natural fibres. Low moisture absorption gives the nylon net two advantages namely (a) handling of the net is easier and (b) the net dries more rapidly. However, unlike most natural fibres, nylon loses strength in the wet state. It retains about 85 to 90% of the dry strength in the wet condition.

Nylon twines can give excellent stability when properly treated. Most nylon nets are, therefore, made from twines, which have been subjected to some form of heat treatment. The treatments followed are heat setting, stabilising and heat stretching.

Heat setting : The twine is subjected to dry heat and the tendency to shrink is resisted by holding at length. The treatment helps to remove the internal stresses built up as a result of twisting. The twine loses its torque or tendency to snarl.

Stabilising : The twine is subjected to moist heat in a relaxed state. Virtually all the shrinkage takes place during this process and further shrinkage would be negligible. Stabilized twines are popular for gill nets, where mesh sizes are critical.

Heat stretching : The twine is slightly stretched while it is exposed to heat. The process has the effect of increasing the modulus and reducing extensibility. An incidental effect is a slight reduction in the thickness of the twine. The treatment is advantageous in nets where strength and fineness are primary considerations.

The surface of nylon twine is uniform and smooth. This has a distinct advantage in gill nets making the twine less visible to the fish. A plumy twine is seldom invisible. However, the smooth surface can cause knot slippage, while pulling strain is applied to the webbing. Knot fastness in nylon nets is ensured either by double knots or by setting the knots by heating and stretching.

Nylon has exceedingly good resistance to abrasion in the wet state. This quality is of great importance in bottom trawls and other dragged gear.

Nylon being rot resistant, the nets are more durable and can come to no harm when stored for a considerable period before use even if the storage conditions are not ideal. This quality also eliminates the need for lengthy and normally expensive rot proofing treatments so essential for natural fibres. Further, it enables to dispense with elaborate drying of nets and to store them immediately after use, without risk of damage. It must be mentioned that long exposure to direct sunlight might possibly deteriorate the fibre seriously.

Ever since the production of industrial nylon yarn for fishing in this country, the Central Institute of Fisheries Technology had been studying the characteristics of nylon yarns and twines. The Institute also drew up the specifications of twines required for gill nets and trawls. The former has since been translated into the form of an Indian Standard (IS: 4401-1967) by the Indian Standards Institution.

Gill nets and such other wall nets were the first types for which nylon was extensively used. Recently, however, there has been increasing interest in the use of nylon for other gear like bottom and midwater trawls. Even though great developments succeeded its invention, nylon is still at the threshold of its career in the fishing industry; research and developments are going on constantly.