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Knotless braided netting - new material for the fishery

by

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1. INTRODUCTION

Knotless braided netting is a new material for fishing gears specially for bottom, pelagic and semi-pelagic trawl.

The development of this material was started in the Institute for Deep Sea Fisheries and Fish Processing and a research of many years resulted in the introduction of knotless braided netting into the fishery of GDR.

In 1974 knotless braided netting was introduced into the fishery. At present the development of the producing technique and the employment of this material have reached a stage, which makes it possible to give a comprehensive review of the advantages of knotless braided netting.

Knotless nets and the adequate manufacturing techniques have been well known for a long time.
Knotless netting made by twisting technique and Raschel-technique are the most popular ones. Both are only used by fishermen for special gears or for parts of them.

At present knotted netting is still the main material for modern fishing gears.

In the following a short compendium about conditions and results of substituting knotless braided netting for knotted netting in modern fishing gears has been presented.

In favour of informations about the most important results no comprehensive description of the test-methods has been given. Generally must be said, that the testing results apply to the comparison of knotless braided netting with knotted netting (twisted bar) in raw, white condition.

2. STRUCTURE OF KNOTLESS BRAIDED NETTING

The bars of the meshes are built up by four quadrat-braided twines. In the joining point all twines of two adjoining mesh-bars are braided also. The twines of a bar run through the netting diagonally (Fig. 1).

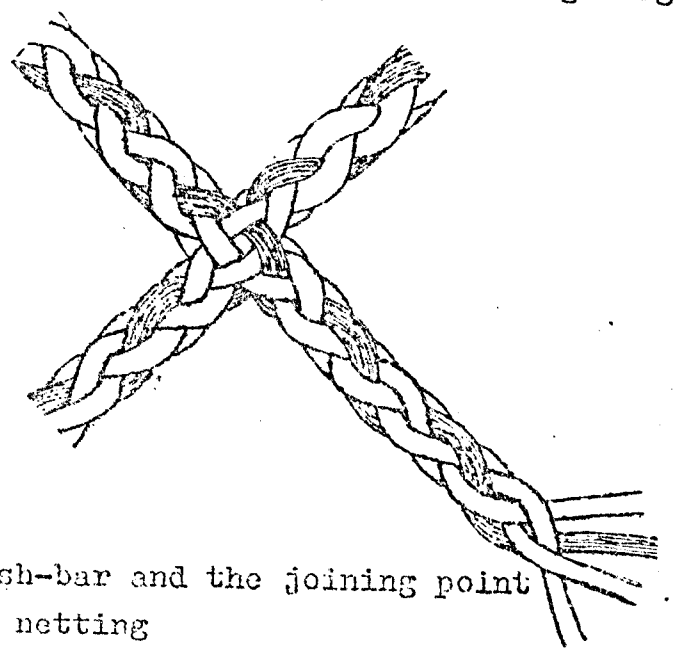


Fig. 1 Structure of the mesh-bar and the joining point of knotless braided netting

Twines, processed by the knotless braiding machine, must be twisted in S and Z direction. On principle the number of turns per metre depends on the number of crossings per metre of the mesh-bar and is limited by the processing range.
Polyamide multifilaments in a single or multiplex form are the most important basic materials.

3. ADVANTAGES OF KNOTLESS BRAIDED NETTING

The principal advantages of knotless braided netting specially in comparison with knotted netting are :

- Higher strength
- Higher resistance to abrasion
- Lower weight
- Less hydrodynamic resistance
- Higher mesh-constance
- Accurate meshsize
- Better to handle

The summary of these advantages result in larger catches of trawls and lower consumption of netting material.

Following rules for substituting knotless braided netting for knotted netting have been applied to our fishing gears :

- Equal mesh strength in wet condition for bottom trawls
- Equal strength of joining points in wet condition for pelagic trawls.

During tests with bottom trawls it was found, that it is possible to differ from the first rule in favour of reducing of net-weight.

On the base of various tests it was tried to give a review to the most important properties of knotless braided netting in the following figures.

Fig. 2 shows, that the strength of meshes and joining points in wet condition depends on the number of crossings per metre, characterized by the braiding coefficient α. A growing number of crossings per metre or a growing braiding coefficient α result in a sinking of related strength and in a growing net-weight.
It is possible to use this Fig. in a range of resulting fineness

of mesh-bar from R 2000 tex to R 6000 tex. Beyond these limits only approximate results are given.

Fig. 3 shows the resistance to abrasion of knotless braided netting in comparison with knotted netting in wet condition, found in laboratory test with joining points. It demonstrates quite clearly a good resistance to abrasion of knotless braiding netting.

Fig. 4 shows the results of substitution with condition of equal strength of joining point. It is shown, that in certain cases special aspects of the type of fishing gears have to be considered for substitution. The curves crossing line shows the possibility for substitution on base of the resulting fineness of mesh-bar.

Fig. 5 shows the standard deviation related to the meshsize of knotless braided netting and knotted netting after 100 trawl-hours. This is an important fact in connection with the regulations of International Conventions.

Fig. 6 gives an example for the possibility of preventing great losses of joining point-strength by using suitable yarns for assembly an repair of knotless braided nettings. The resulting joining point was called a combined joining point.

4. RESULTS OF PRACTICAL USE BY FISHERMEN

By trials under fishery conditions the final decision for the introduction of a new netting material is taken.
In 1974 knotless braided netting was introduced into the fishery of the GDR, specially for botton trawls.
After one year of practical employment can be said, that knotless braided netting for this type of fishing gear is profitable. This can be said also about the manufacturing technique.

It has been found, that by use of knotless braided netting the following advantages can be achieved (in comparison with knotted netting) :

- 40 % less consumption of netting material as a result of higher strength, higher resistance to abrasion and of the special structure

- Catches increased by 7 % as a result of lower hydrodynamic resistance, higher resistance to abrasion, higher mesh-constancy and better handling.
- Finally the fishermen say, that the knotless braided netting is a good material and they want it for regular use.

Hence it follows clearly, that the use of this new material is becoming increasingly important for the fishery.

The reached stage of development of this manufacturing technique and the employment of this material for the fishery have resulted in the new knowledge, that it will be possible to expand the applicability of knotless braided netting for other fishing gears or sections of them.

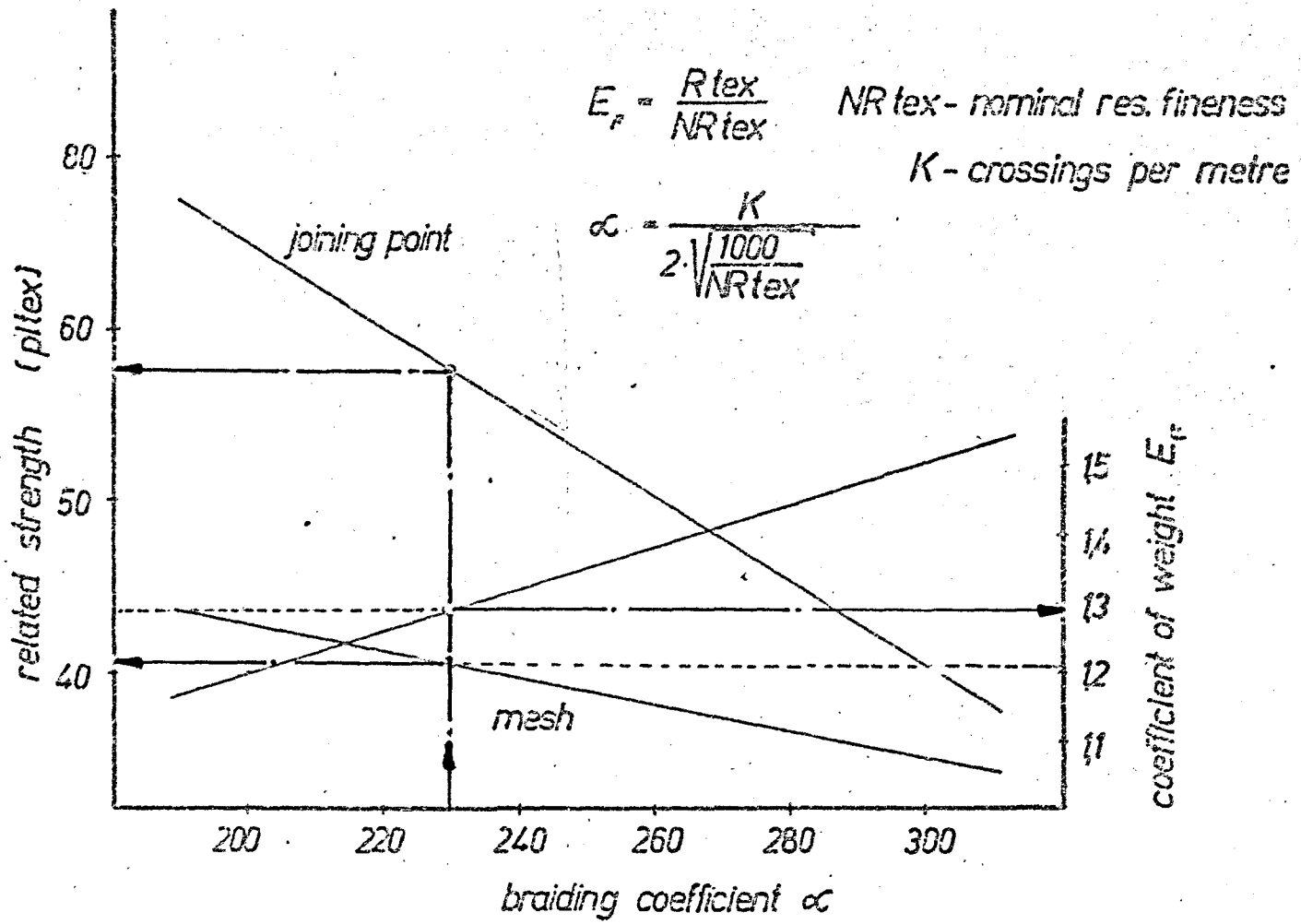


Fig. 2 General characteristics of strength and weight of knotless braided netting (basic material: PA-S)

Fig. 3 Strength of net-joining point in dependence on the number of abrasion-cycles

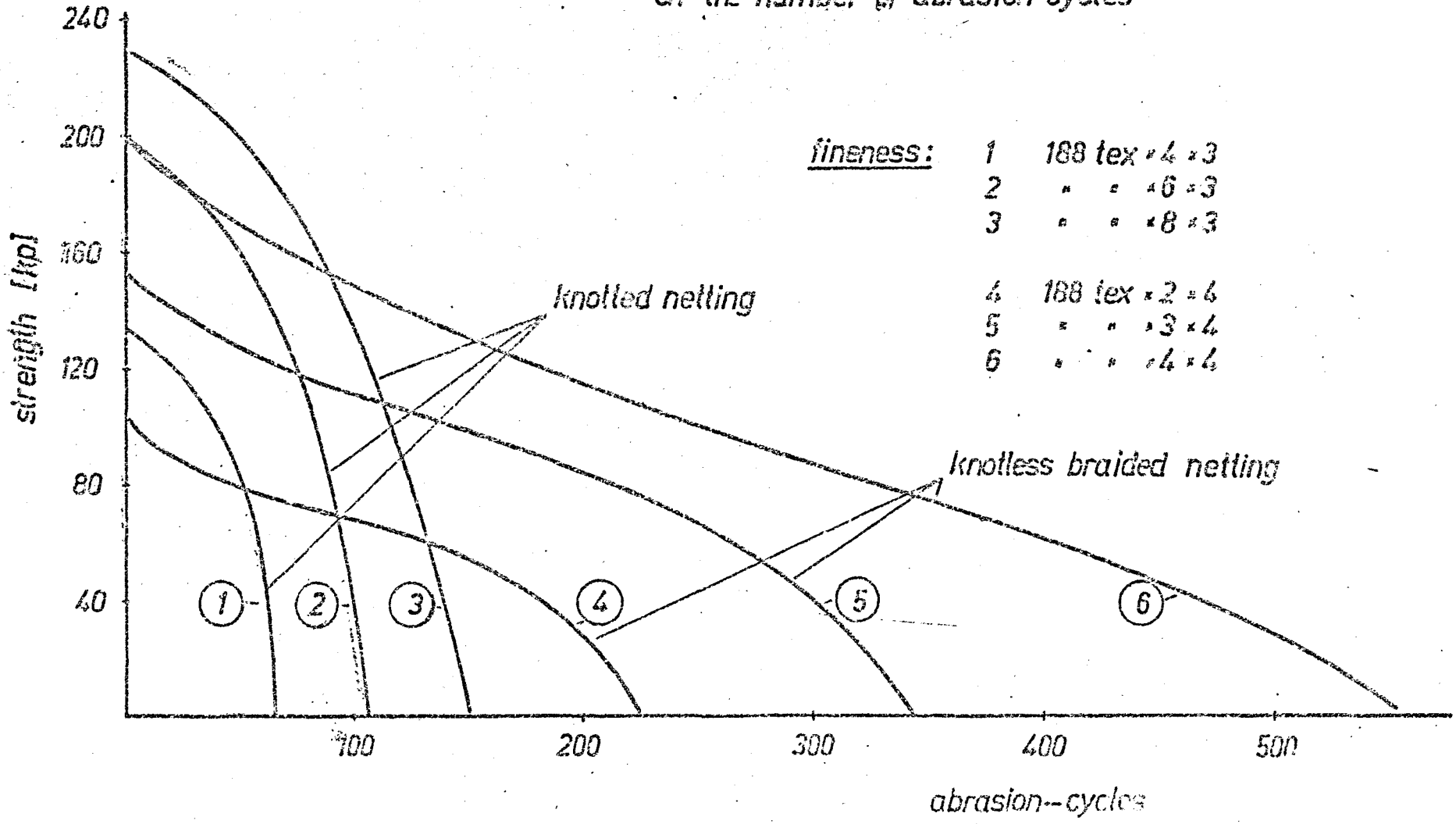
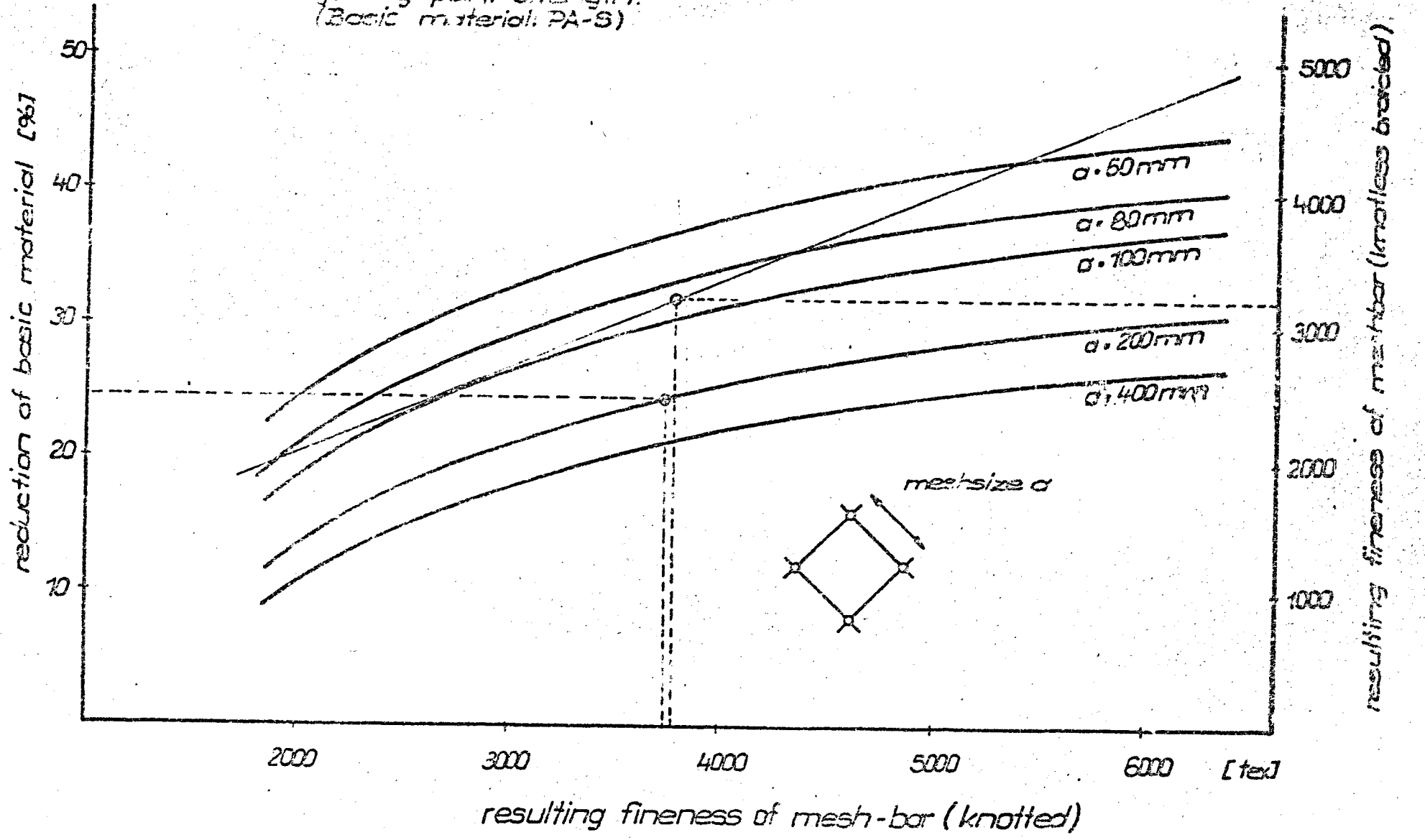


Fig. 4 Reduction of basic material by substituting knotless braided netting for knotted netting with equal joining point-strength.
(Basic material: PA-S)



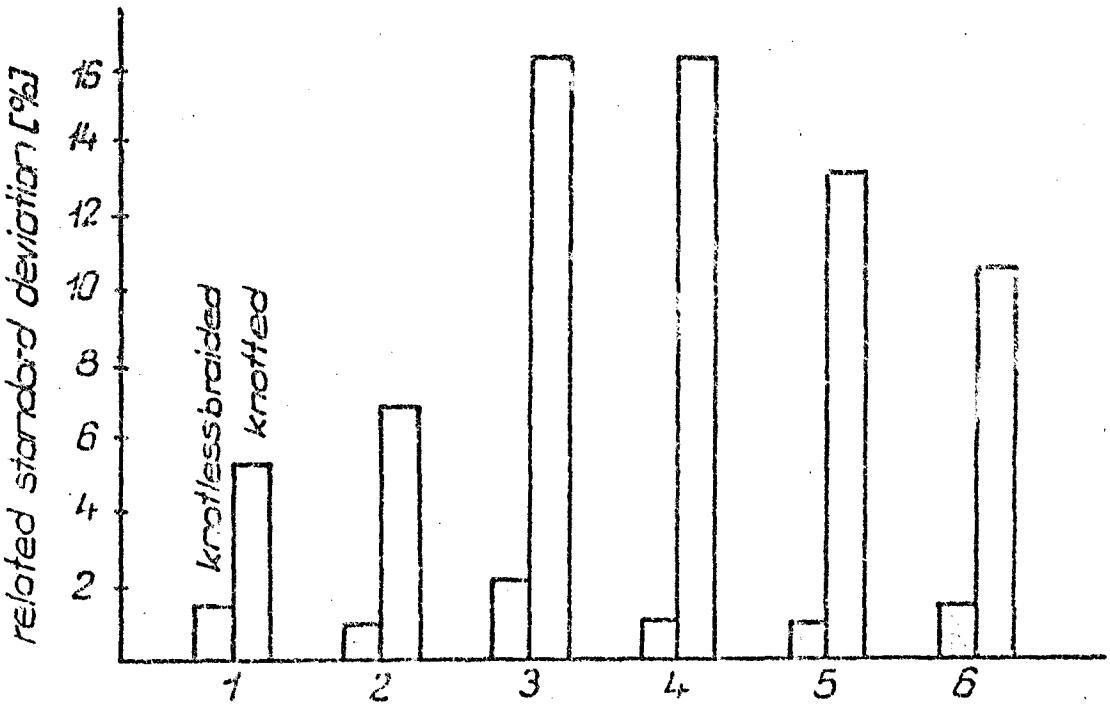


Fig.5 Standard deviation related to the meshsize of knotless braided and knotted netting after 100 trawl-hours

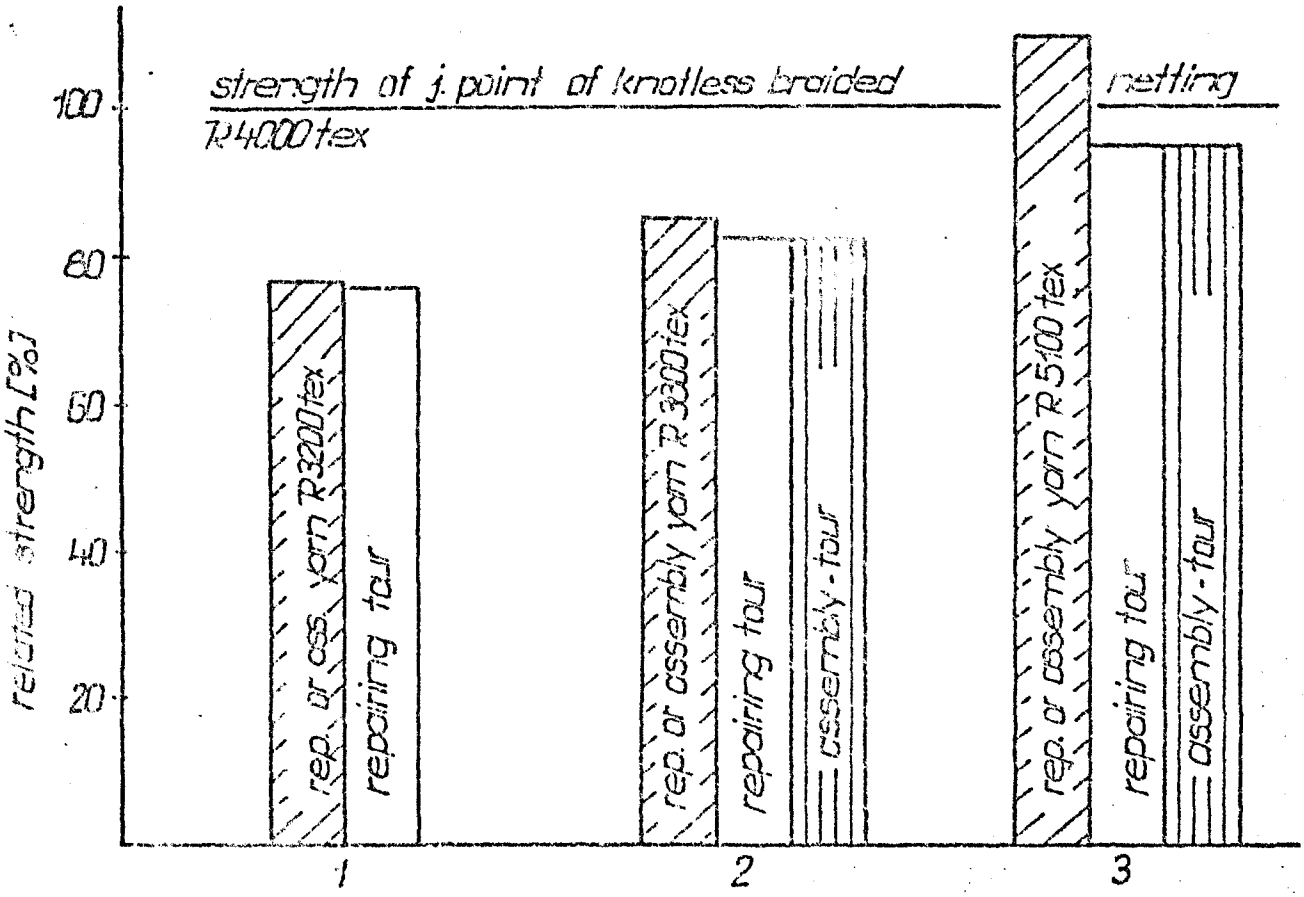


Fig.6 Related strength of combined joining point in dependence on different assembly-or repairing yarns