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PRESS FELTS : NEW TYPES,OBJECTIVES AXES OF DEVELOPMENT

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Summary

During pressing, water is essentially eliminated from the wet paper sheet by the deformation of its solid matrix. Marking is one of the souvenirs of the deformation undergone.

The felt must enable a uniform pressure to be exerted on the sheet whilst permitting the drainage of the water squeezed out of it.

Today's felts, as well as those in course of development, tend to offer a face structure to the sheet which is even more uniform, and with increased hydraulic properties.

The problem is more complex than it seems for the water flow in the sheet, as well as in the felt, modifies the deformability of these two fibrous structures. The type of press, nip loading, dwell time in the nip, and more and more the temperature, tend to increase the quantity of water extracted at each press and the risk of marking.

Nevertheless, evolution is made possible by the creation of increasingly complex base cloths and the use of continuous monofilaments, supported by a favourable development in textile raw materials.

On the other hand, the problem of felt stiffness is gradually being avoided by progress made in wet felt seaming: one can foresee that this in its turn will permit new developments in press design.

Different types of marking are seen after passing through the presses

MARKING RELATED TO THE PRESS ROLLS

* Shadow-Marking — Suction Press / Blind—Drilled Press
* Groove Marking

MARKING RELATED TO THE CLOTHING

* Inner Press Fabric
* Felt's Base Cloth
* Needling of the Batt
* Batt Fibres

These marks are not always perceptible at the end of the machine from the point of view of quality management, the most fearsome are those which appear after conversion.

The marking observed results from a modification of the sheet structure on the same scale as the observed fault from which it derived.

In Any Case, It can be a question of :
either- an imprint, a moulding corresponding to creep of all or part of the sheet, or - a difference in the relative arrangement of the sheets' constituants.

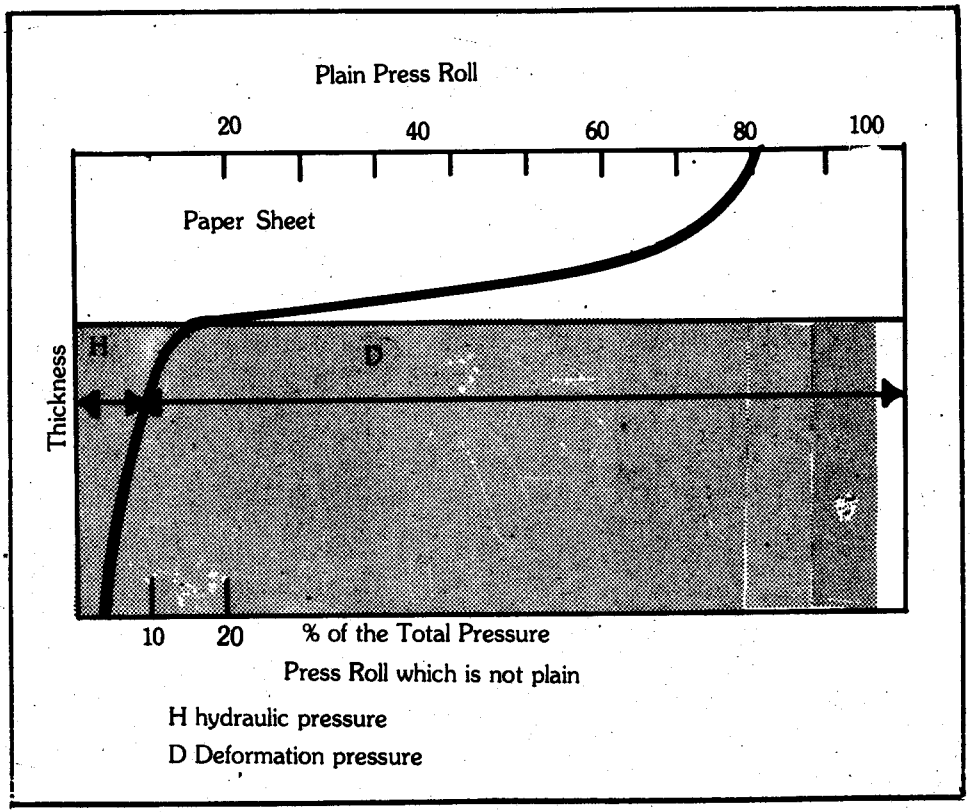
Creep or mechanical faults will have an effect on the sheet's surface which can be measured by BENDTSEN for example, whilst the type 'arrangement' or 'hydraulic' will be discovered optically.

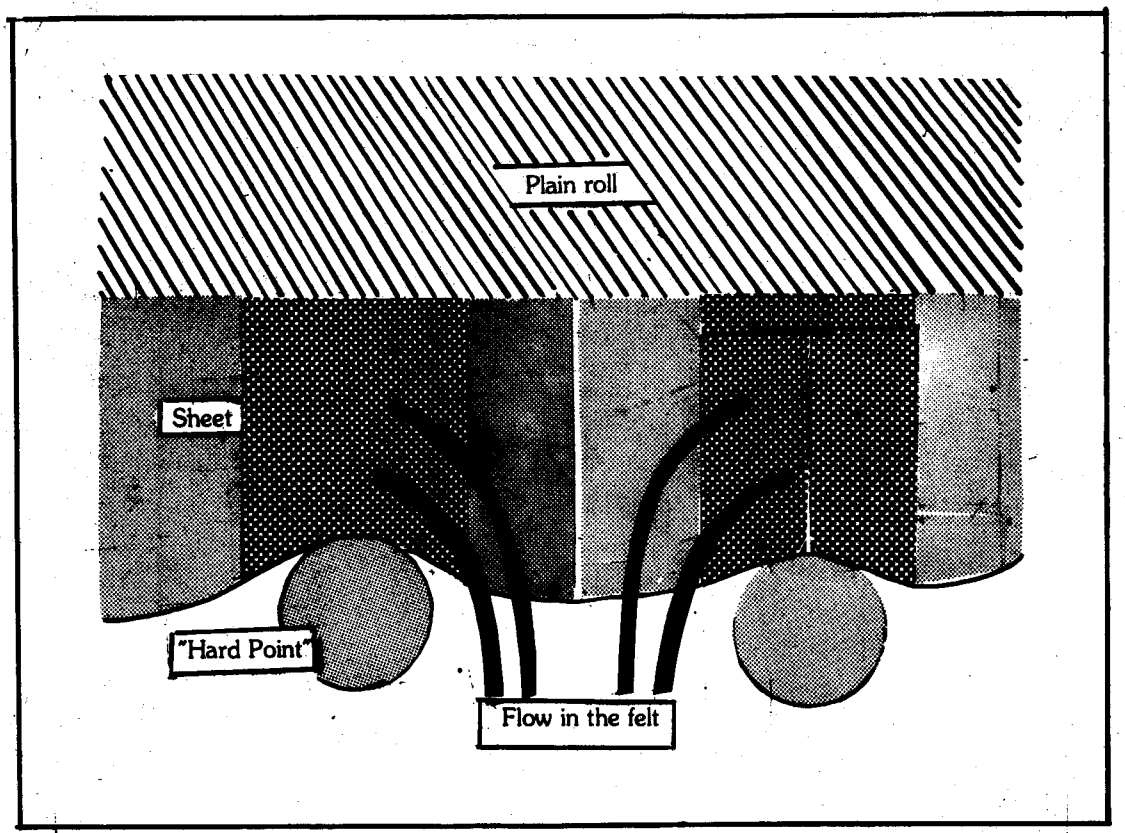
FREQUENCY OF THE TYPES OF MARKING

N = a marking element in new condition
U = a marking element in worn condition

		Mechanical	Hydraulic
Shadow-marking	N		xxxxx
	U	x	xxxx
Groove	N	x	xxxx
	U	xx	xxx
Inner press fabric	N	x	xxxx
	U		xxxxx
Felt's base cloth	N	xxx	xx
	U	xx	xxx
Needing	N	xxx	xx
	U	xx	xxx
Felt fibres		xxxx	

The approach of using a model distributing the pressures in the nip between hydraulic counter-pressure and deformation constraints, enable the phenomenon to be better understood.


Plain Press Roll
20
40
60
80
100
Paper Sheet
H
D
Thickness
10
20
% of the Total Pressure
Press Roll which is not plain
H hydraulic pressure
D Deformation pressure


Plain roll
Sheet
"Hard Point"
Flow in the felt

It seems at first that the deformation of the sheet surface can only be produced on the face of drainage.

As a corollary, the loss of the sheets thickness starts from the draining face towards the interior. Also, an impermeable "hard point" can only leave its imprint if the local mechanical pressure which it applies is not opposed by an important hydraulic pressure in the sheet.

. The size of marking elements are as follows:

Diametres

in mm

Paper fibres	0,004	a	0,040
Felt fibres			
*Against the paper	0,012	a	0,070
*Underlayer	0,040	a	0,100
*Monofilament	0,080	a	0700

POSSIBLE PERMEABILITIES

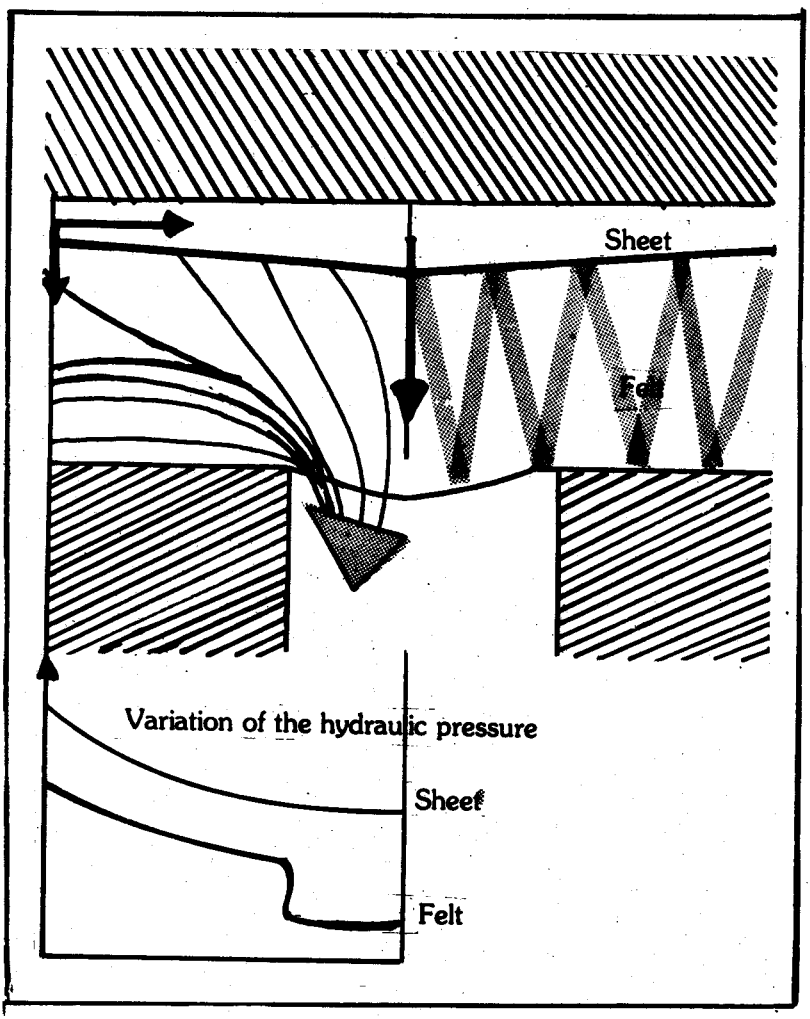
(ln/1/mn/dm2 : 200Pa)

The finest fibres	30
Useful for machines	150-750
For the biggest elements	1500

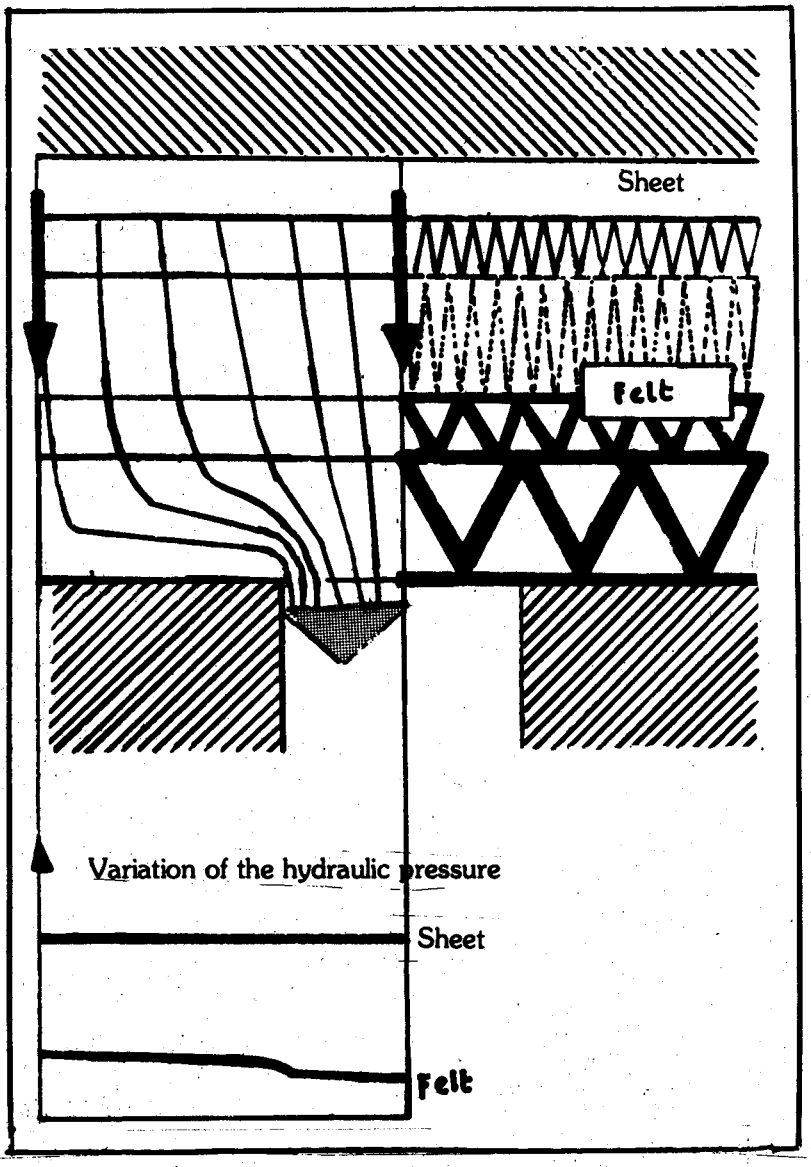
(100 1/min/dm2 = 22,3 CFM)

The goal of the least marking by the elements nearest to the sheet imposes another goal of finding the minimum flow resistance of the underlying layers right up to the drilling in the press roll. If not, the mechanical marking is substitutes by hydraulic marking.

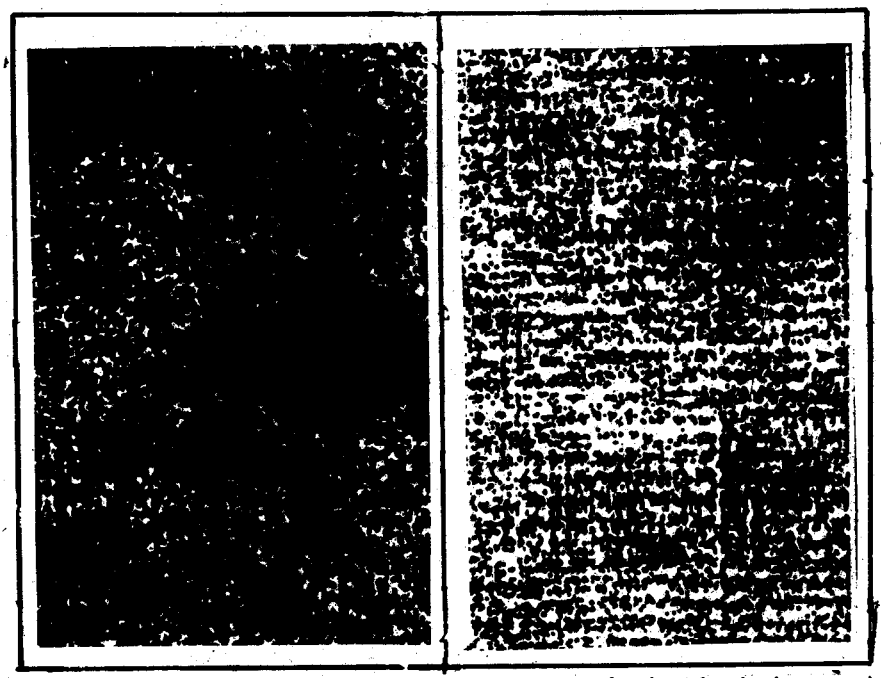
Subsidiary water flows, which are born in the sheet thickness, modify the fibre orientation and the local composition in the passages they pass through.



The present conception, which is in full development, consists of constructing a multi-layer system where each level ensures the drainage of the finer structured level above it. The permanence of this edifice is assured by the use of monofilament.



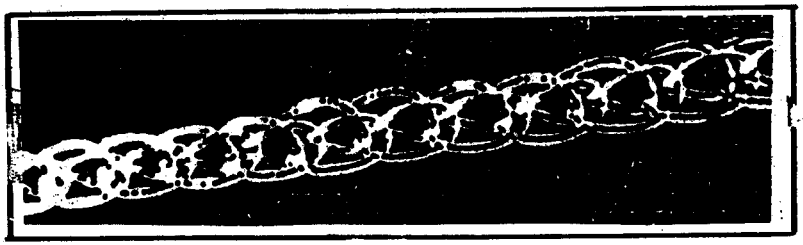
Hydraulic marking can be produced by one of the base cloth layers. The same surface layer base cloth laid on the same underlayer base cloth gives, for example, a marking perpendicular to the axis of least permeability.



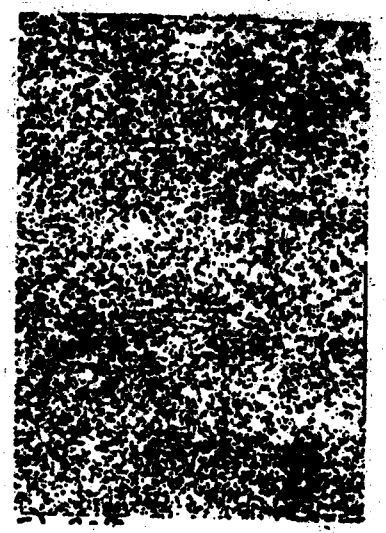
As well as the increase in pressing time, press technology for the future underlines the reduction in water viscosity by heating the sheet.

Cellulose fibres, this rendered more supple, will deform more and more susceptible to marking problems. Felts will compact quicker which brings the risk of hydraulic marking a little nearer.

The introduction of 3-dimensionally structured threads enables a pressure spreading layer to be made which also offers a big density of pressure points.



Twisted monofilament threads



new

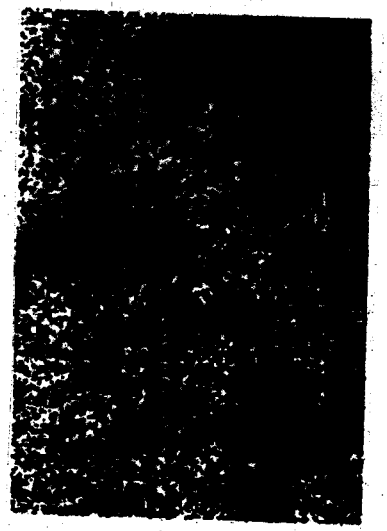
385* 580

Compacted

at 25° C

200 340

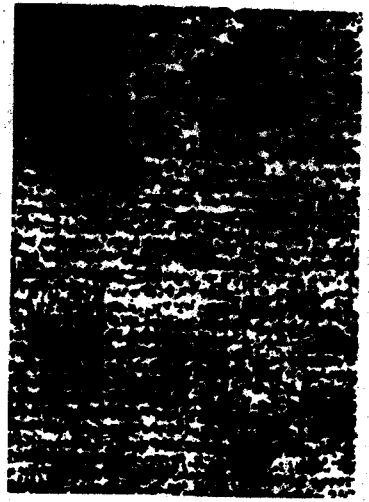
3 - Dimensional threads



Compacted

at 90° C

65 115



* l/min/dm2 ; 200 Pa

The search for quality and productivity has been made possible on paper machines of all kinds and can continue. For this, an increase in the average weight and stiffness of felts has been necessary and will still be necessary in the future.

For applications which are still on the horizon, seamed wet felts which are today adolescent, will became in the future adult partners.