

# Portable Moisture Meters Boost Paper Machine Performance

ARNE OLLAS

Monitoring and correcting the operation of the press section has become a key factor in modern paper-making. An improperly trimmed press section, unevenly worn felts, vibrations and other periodic disturbances inhibit production and send costs soaring. Another very important reason why effective dewatering is being given such close attention is the sharp rise in energy costs over the last years.

There are a number of facts which together tell if a press section is running properly. The web should have a high dry content after the last press, the moisture-content profile should be uniform, felt life should be optimized and very few operational disturbances should occur.

The highly efficient Scanpro Jet-MEM moisture meter designed especially for felts and wet webs permits faults to be detected at an early stage, thus providing a sound basis for making the adjustments needed to maintain production at its most economical level.

But qualified, portable moisture meters are a great asset in the dry end of the machine, too. The new Paper Jet-MEM is intended for dry end measurements as well as for light and medium paper webs before the dryer section.

## Causes and effects

Correcting an unsatisfactory moisture content profile by adding water to the web or by sectionized drying is gaining popularity. Methods like these often provide excellent results, and their growth is expected to continue.

However, a very old rule says that it's better to attack the root of a problem than to try to alleviate its effects. In the paper machine, this approach definitely pays off. Problems involving poor moisture content profiles in the dry end and an excessively low dry

content level before the drying section often stem from the press section. That's why it's so important to keep the press section well trimmed.

Causes and effects also come to the front when you analyze what is happening in the press section itself. The dry content of the paper web when it leaves the last press is the result of what was accomplished throughout the entire press section. But this does not tell you *how* the press section should operate. Neither can you ascertain from a streaky or skewed moisture content profile *where* the trouble is originating.

## Why felt moisture content is so important

The answers to the aforesaid questions often lie in the moisture content profile of the press felts and the ways in which water is transported by the felt. Quite often, a streak of moisture in the paper web corresponds closely to a peak in the moisture content profile of one of the felts. A low dry content before the drying section can be attributed to unsatisfactory dewatering or poor water transport of one or more felts. And this, in turn, can be attributed to insufficient felt conditioning, using felts too long or improper selection of felts.

Not seldom an acceptable moisture content profile in the web is achieved by means of several presses with improperly crowned rolls and skewed loads that compensate for each other to produce the desired results. However, this still causes heavy felt wear and reduces the dry content level.

The water content of felts thus provide more detailed information about the dewatering process than the water content of the web alone. Moreover, it's often much easier to measure water content on the felts than

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Skandinaviska Processinstrument AB,  
Stockholm, Sweden.

on the web. There is no risk whatsoever of web breakage, and—particularly in modern machines with closed or short draws—it can be very difficult to get access to the paper web for measurement.

The felt's cross profile thus contains information that is extremely valuable when one wishes to find and eliminate causes of obvious faults in the web's moisture content profile. Machine direction profiles taken during a number of felt revolutions also provide information about periodic disturbances in the operation of the felt and other parts of the machinery. Values of moisture-content levels obtained from different positions around the felts make it possible to study in detail the dewatering effects of the presses.

### Typical applications

Since the introduction of the first portable moisture content meter for press felts and wet webs by Scanpro in 1968, moisture content measurement in the press section has been accepted as a standard method, particularly in large and fast machines.

A number of typical applications have crystallized in recent years :

- \* Fault tracing in the press section.
- \* Trimming of presses, suction boxes and other machine components.
- \* Optimization of the amounts of washing water and detergent that are added.
- \* Monitoring of changes in the moisture content of the felts and web as time passes in order to optimize the service life on the felt.
- \* The taking of water balances used to study the performance of individual presses or an entire press section.
- \* Tracing vibrations and other periodic disturbances.

### Dramatic effects

The results of a moisture-content study of a press section can be dramatic. Hard-to-trace disturbances can be found quickly. Mistakes that lead to the cutting of expensive felts can be eliminated. Needless regrinding of press rolls can be avoided. And felt-conditioning

faults can be remedied quickly, thus boosting production by several percentage points in a single stroke.

However, the really impressive gains are made after the performance of the press section has been followed up carefully so that gradual improvements can be made that will enhance process economy and product quality steadily and efficiently. Some paper mills have saved hundreds of thousands dollars in lowered energy costs alone by conducting systematic dewatering checks in all of their press sections.

### Improved measurement technology

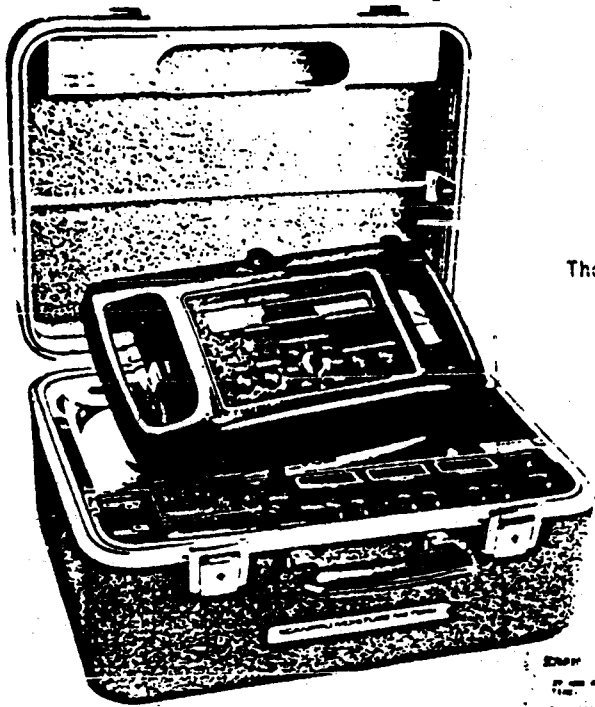
Scanpro's first moisture meter, introduced in 1968, included a recorder and wheeled trolley and weighed 40 kg. However, the cable between the measuring head and central unit was not always popular with mill safety engineers. In 1978, this cable was replaced with an electronic memory in a battery-powered measuring head. And in today's new Jet-MEM, micro-computers have been introduced in both the measuring head and central unit. An integrated printer draws curves and prints out text, and the small size of the complete instrument makes it a truly portable unit.

Figs 1 and 2 show typical Jet-MEM charts. The number of each measurement is set on the measuring head. The time of day is recorded in the measuring head memory when measurement starts. A special marker can be set any time during measurement to indicate events of special interest.

The capacity of the memory in the measuring head is sufficient to allow very detailed measurements. You can, for example, study fast moisture content variations along a felt. When normal resolution requirements are imposed, the memory can be used to store up to nine numbered profiles.

### Editing and printout

Measurement results are edited and presented on the printer unit. The advantage of a memory-equipped meter is that you can edit measurement results as often as you like—until you obtain a printout that is as clear as you want it to be.



The complete unit.

Cross machine and  
machine direction  
profiles.

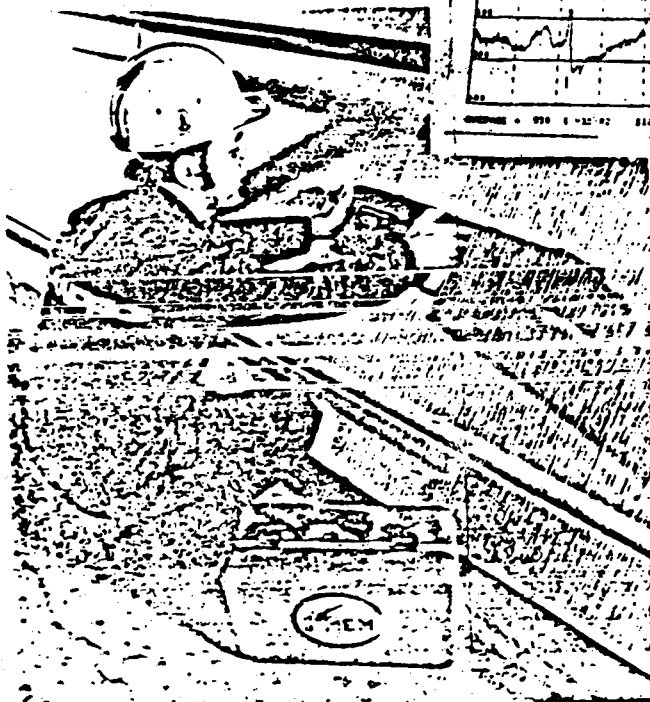
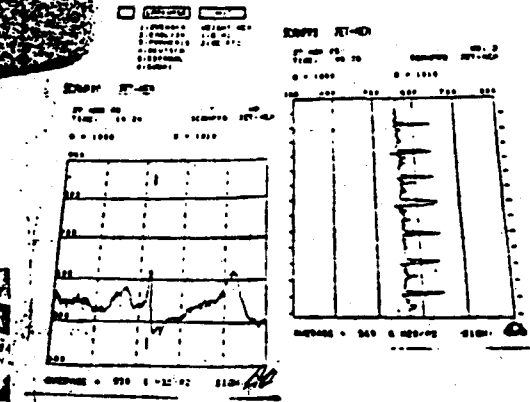
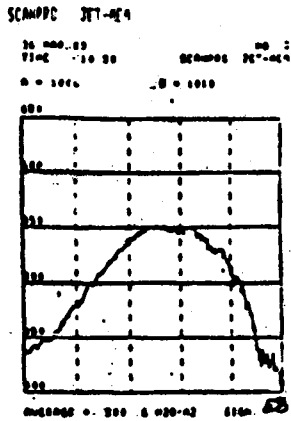
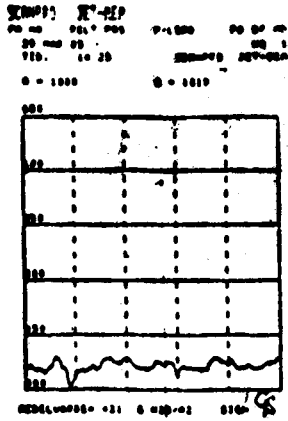


Fig 1  
The Scanpro Jet III.

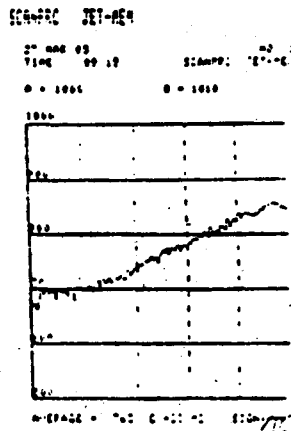


BEFORE

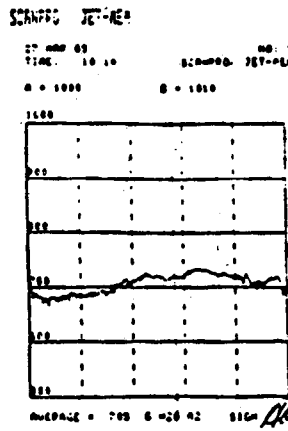


AFTER

● Press roll with incorrect crown before and after regrinding.

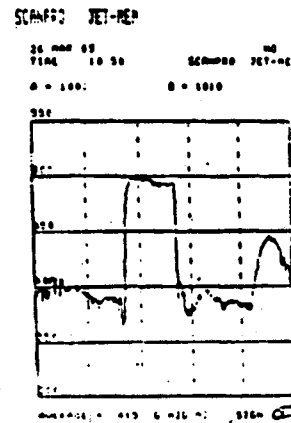


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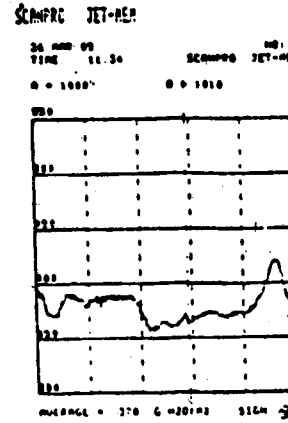


AFTER

Press with uneven loading before and after adjustment.



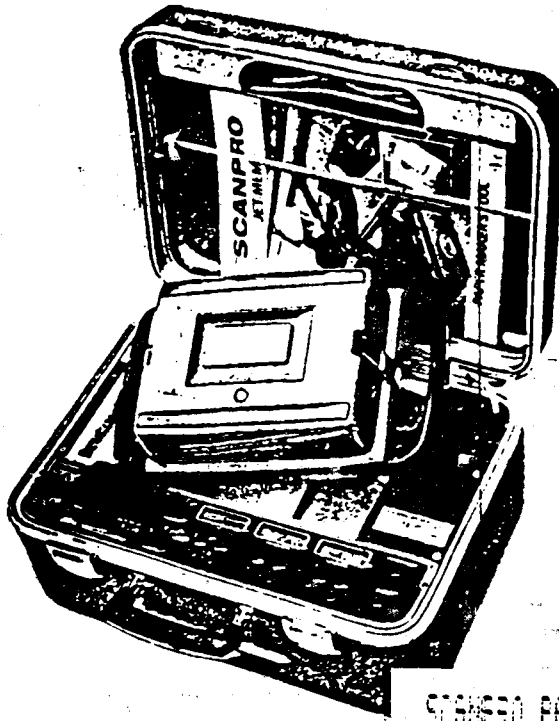
BEFORE



AFTER

Clogged Uhle box before and after cleaning.

Fig 2  
 Typical felt moisture profiles (half size).



The complete unit.

SCANPRO PAPER JET MEM

02 DEC 86 NO: 5  
 ZEIT: 10.00 SCANPRO PAPER JET MEM  
 BW 200.0 G/M2  
 C = 1000 D = 1000

A typical recording  
(full size).

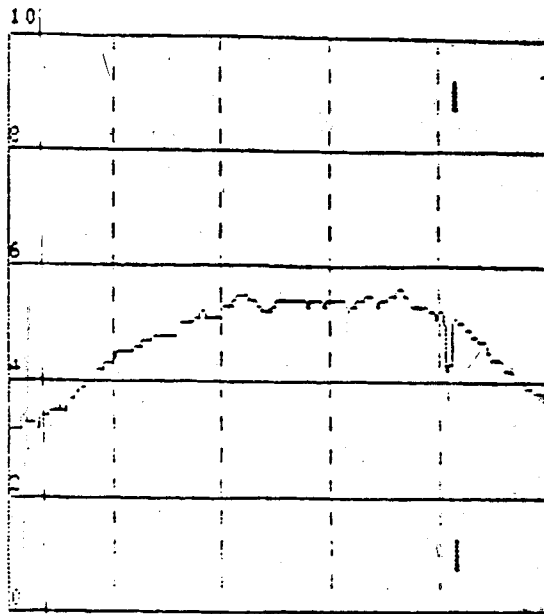


Fig 3  
 The Scanpro Paper Jet Mem.

STRENGTH OF THE RECORDING

When you take a cross profile, it's easy to advance the measuring head at constant speed across the felt, but it's almost impossible to utilize exactly the same time interval for each pass. Time dependent printouts thus differ in length from measurement to measurement.

The micro computer in the Scanpro Jet-MEM solves this problem by making a compensatory calculation that provides profiles of equal width. As a result, the different cross-profiles can be very easily compared. See Fig 2.

For detailed studies, especially of periodic or other time-dependent cycles, you can obtain a printout whose length is proportional to the measurement time. Moreover, this printout will be provided with marks at 1-second intervals. See Fig 1.

Normally, continuous profiles are taken for felts. However, the Scanpro Jet-MEM can also be used on board or pulp webs in the press section. To reduce risk of web breakage and simultaneously ensure good contact with the web, a cross profile can be taken as a series of point measurements.

The built-in printer draws curves, plots the chart grid and provides a moisture scale that is automatically adapted to the selected measurement range. The average value of the profile is printed out. Three types of units are available :

$\text{g/m}^2$ ,  $\text{oz/ft}^2$  and  $\% \text{H}_2\text{O}$ .

The meter also prints out instructions for the different setting procedures (needed only occasionally). From the panel, the user can select among six different printout languages.

#### THE PAPER JETMEM.

The original Jet-Mem is essentially a moisture meter for the press section. Today it has got a companion, covering the applications for which the original version is not intended. The new model is called the Paper JetMEM.

The ordinary JetMem can be used not only for press felts but also for heavy grades in the press section, like paper board and pulp web. But for ordinary

paper grades in the same position, the Paper JetMEM is the right instrument.

In the dry end, most large machines and many small ones have got a permanently installed moisture meter, often included in a process computer system. The Paper JetMEM has turned out to be a most useful backup instrument for such installations. It is readily available to the machine crew if something should go wrong with the big system. And because of its high accuracy and its low sensitivity to the composition of the paper, it can also be used as a secondary standard for the calibration of any on-line moisture meter.

For special process investigations the Paper JetMEM is the ideal tool, because it can be used in different positions before, inside and after the dryer section. Like with the felt model, cross machine as well as machine direction recordings can be made.

The Paper JetMEM operates together with the same printout unit as the ordinary JetMEM does. With two measuring heads and one printout unit the paper maker will thus be able to cope with virtually every moisture measuring problem from the press section to the reel.

#### MEASUREMENT CUTS COSTS.

The knowledge of how press sections and felts perform has increased markedly during recent years. Better measurement and analysis methods, including moisture-content measurement in the press section, have contributed to this advance. More and more papermakers are routinely measuring the press section at regular intervals to maintain constant, efficient control of the dewatering process.

In the dry end of the machine, portable instruments serve as a back-up to the big systems-or as the main source of information for machines that haven't got any on-line moisture meters. And they make useful process studies possible in the dry end as well.

New and more efficient instruments are making this work easier and more profitable. Papermakers everywhere are finding reduced production costs and improved product quality on the bottom line.