

The MK Formation Tester

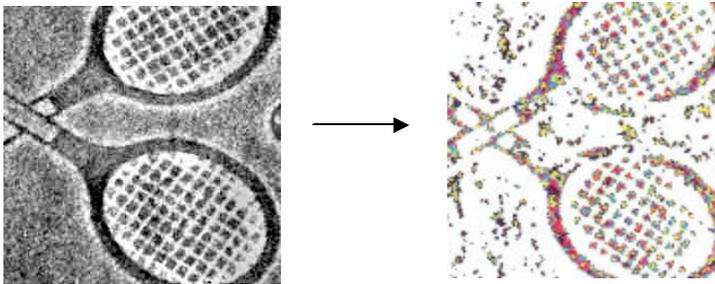
A Complete 3-Dimensional Sheet Analyzer

Formation Analysis • Floc and lightweight data • Internal & Surface Roughness • Optical basis weight



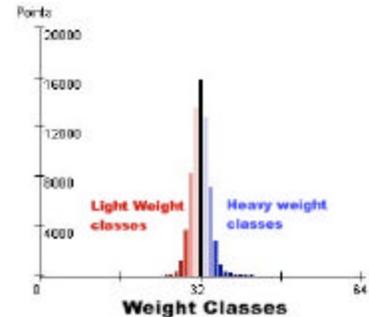
- **MK testers calculate the M/K Formation Index** that ranks your sheet's formation from 1-100. The higher the MK Index, the better the formation.
- **Easy to use.** Just push a button to run the device.
- **The MK is portable.** This compact device is easily moved between locations
- **The MK tester quantifies floc sizes, lightweight & low density areas, internal surface variations,** and other sheet defects in your product.
- **Both Transmission analysis and Surface reflection analysis** are available.
- MK Formation Tester is the **most widely used formation tester in the industry** with international recognition.
- The MK tester also **measures basis weight** optically.

The MK reveals flocs and other optical density variations



Copyright © 2009 M/K Systems

Histogram and formation data



Copyright © 2009 M/K Systems

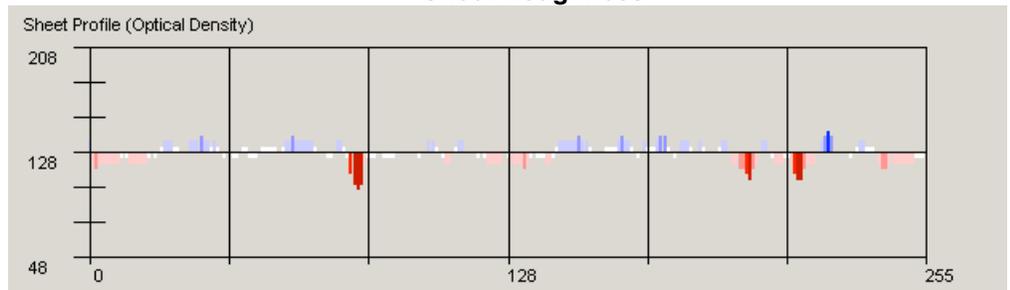
The M/K 3D analyzer: More than a visual ranking

The MK analyzer converts the above watermark into a color-coded distribution of heavy (floc) and lightweight mass variations. This translation is obtained through MK's highly sensitive optical detector. The floc, lightweight, and MK uniformity index provide the user a complete formation analysis not obtainable through visual ranking.

The M/K Index **ranks your sheet's formation** from 1-100. A histogram is also generated, revealing the distribution of different weight classes in the sheet.

The MK 3-D tester reveals **internal and surface roughness index**. Additionally a unique peak-and-valley image is generated such as the image to the right. The roughness index is measured over a 10cm x 10cm area, far greater than other roughness measures.

Sheet Roughness



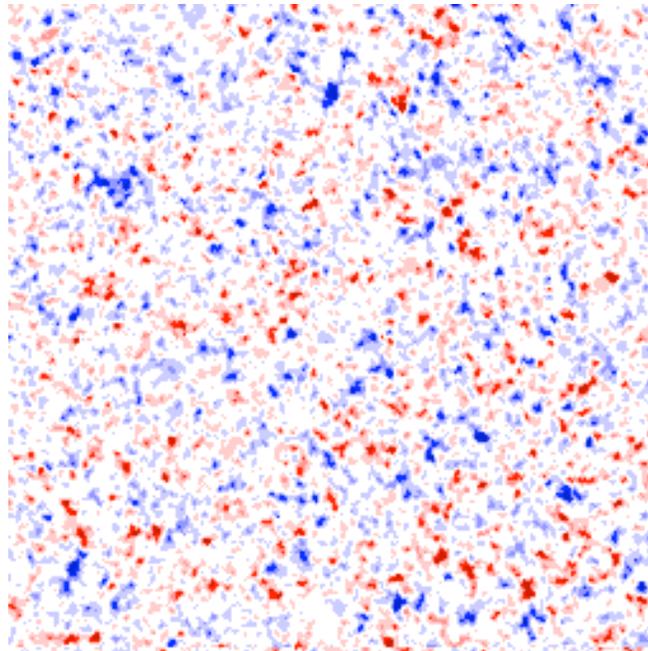
Formation Tester development since 1975

M/K has been designing formation tester equipment for more than 30 years. The basic principle behind calculating accurate formation data is the ability to see both small and large differences inside the substrate, then quantify the uniformity into a formation index. This formation index we developed is known as the M/K Formation Index, which ranks paper or other substrates from 1-100. The higher the formation index, the better the uniformity in the substrate.

All M/K formation devices reveal a material's formation index, ranked from 1 to 100. Perfect materials (such as a uniform sheet of fabric) have a formation index near 100. Typical copy paper has a formation index from 20-30. Linerboard materials with worse formation have indices from 10-20. Tissue papers usually have a formation index ranging from 2-10. Below is an example of the structure revealed in color by the M/K 3D analyzer.

M/K Formation Analyzer Floc Images

The different densities are analyzed for size, distribution, and significantly influence the M/K formation Index. Additionally, the various different density variations are converted into easily identified colors, giving the user a clear understanding of the flocs and density variations in his sheet.



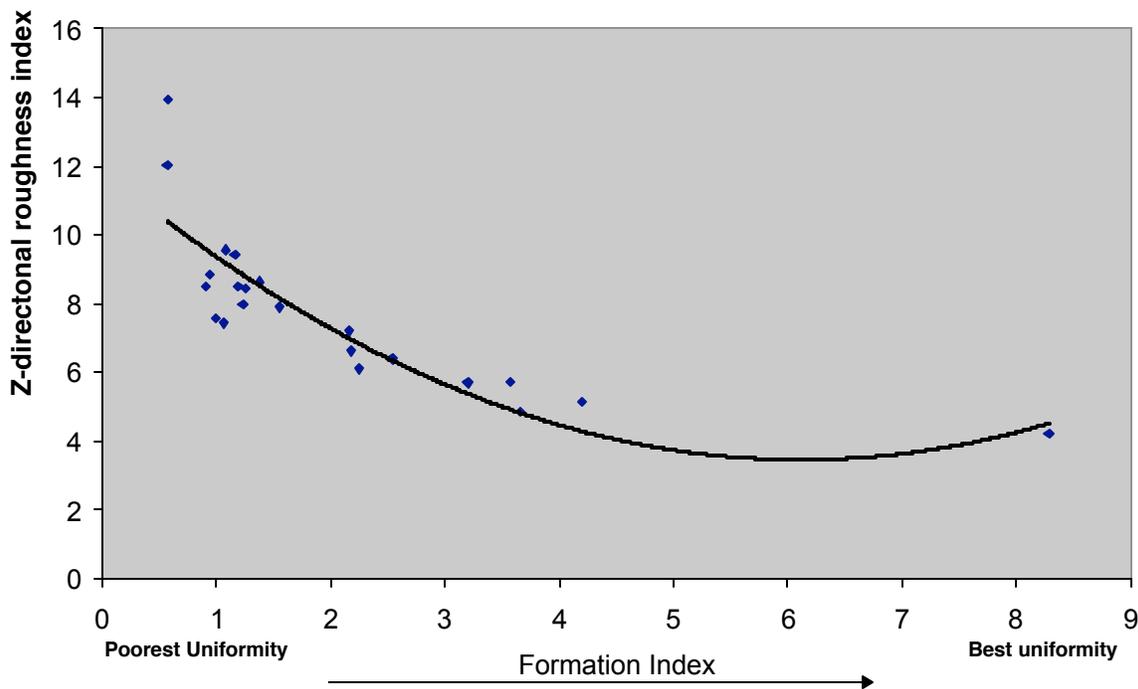
Copyright © 2009 M/K Systems

Z-Directional analysis using the M/K Formation Tester

Now you can understand the three dimensional effects of flocs

The M/K 3D formation analyzer is designed to reveal the internal density variations found in the internal structure of paper and other substrates. The internal density variations, or "Z-directional variations", are revealed in the MK Internal roughness index. Often the Z-directional data correspond with the overall strength and other physical properties. The MK device also provides a formation index value, floc size data, and low density pockets in the structure. This allows the user to understand why some papers are stronger, have better print properties, and have better physical properties than other papers.

Z-directional Roughness Index vs Formation



The MK 3D analyzer has the flexibility to allow the user *to change the device sensitivity* from low to maximum sensitivity.

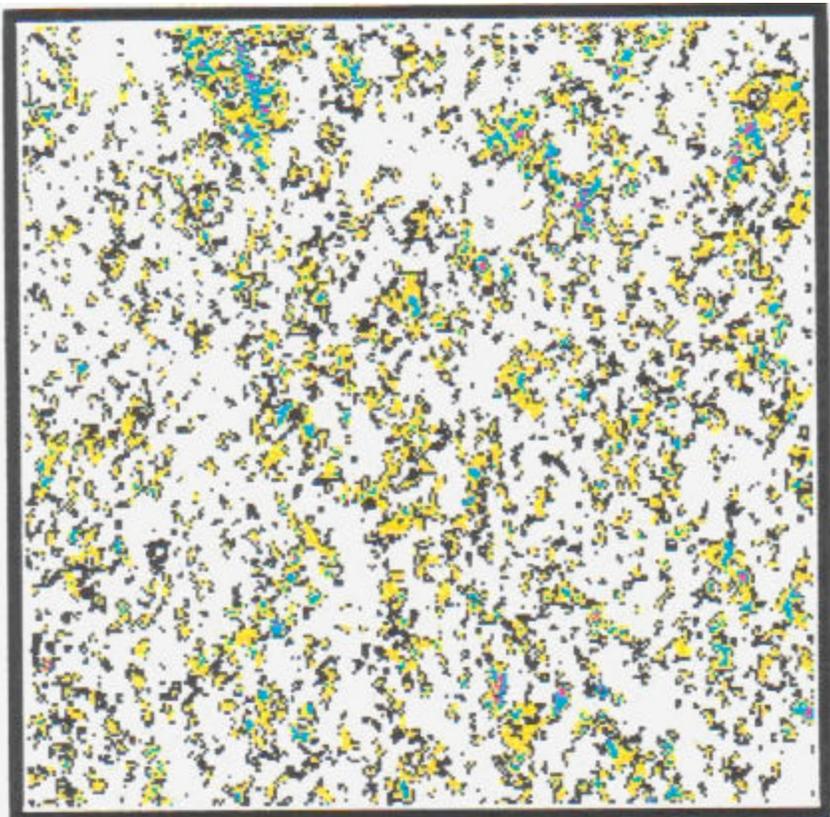
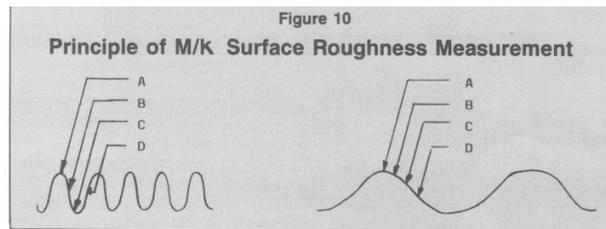
- When using the lowest sensitivity, the instrument reveals only the densest flocs.
- When using the highest sensitivity, the instrument reveals all the flocs and defects.

These two types of tests— high and low sensitivity structural analysis - allow the user to determine if just the largest flocs (low sensitive test), or perhaps all of the flocs (high sensitivity test), are influencing the strength and other physical properties of paper. Such sensitive analyses are only available from the MK tester. Internal variations are quantified in the Z-directional roughness index and as a graphical image. It is easy to see the internal structural variations in your substrate. The internal density variations are shown as peaks and valleys, and the average internal density is drawn as a thin straight line across the image.

SURFACE ROUGHNESS

Area of analysis: **10cm x 10cm**

The M/K surface roughness is unique and precise. It has a precise method of measuring the surface variations using a sensitive silicon detector. The method of surface measurement is shown in the below image. Essentially, the high sensitivity of M/K's surface module measures the peaks and valleys of the surface. The variations are calculated and summarized in a Surface Roughness Index.



Surface Roughness Index = 1875
Total Floc Count = 569
Floc Area = 34.8 %
Average Size = 6.4 mm²



The M/K Surface Formation Index reveals that **poor surface formation** might actually be necessary for a obtaining a **smooth surface**

A healthy distribution of different surface floc sizes is necessary for a smooth surface

Measuring Surface Smoothness

Conventional methods of quantifying smoothness, such as the Parker Print Surf (PPS) device, can quantify how rough or smooth a paper surface is. However, the problem as to *why* the sample is smooth or rough typically remains a mystery. Not understanding the surface details inhibits the user from improving his material surface efficiently.

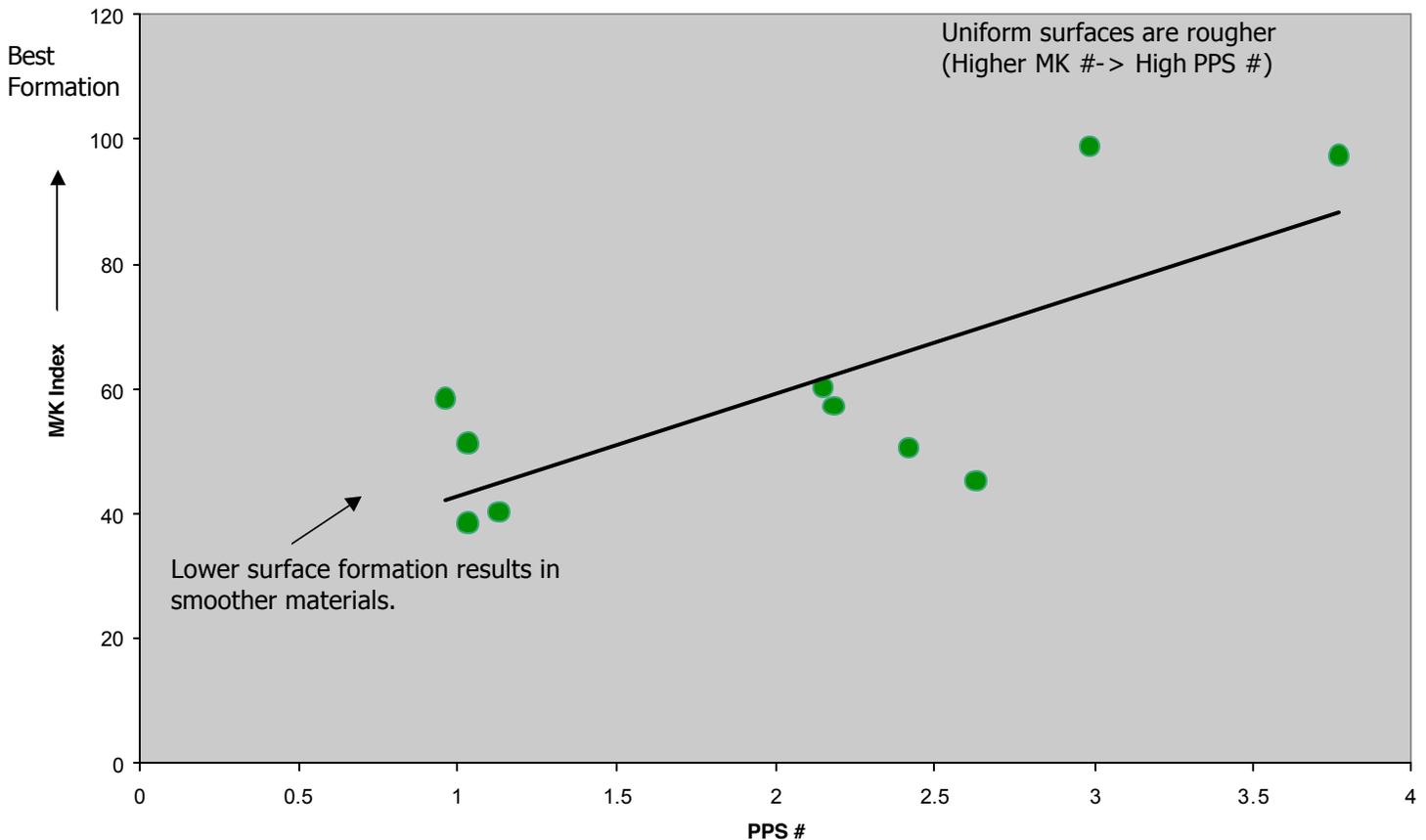
Determining surface floc sizes

Now, M/K Systems has revealed that it can accurately measure the surface properties optically and correlate the data with existing technologies such as the PPS value (see below example of 5 different papers, tested each side, Vs. the M/K Surface Formation Index).

Once you have determined that a surface is rough or smooth, you can easily printout the size/disturbing and quantity of surface flocs. **This is the essential information needed to understand what makes your substrate smooth or rough.**

M/K Surface Index Vs. PPS

5 different grades of paper// each side tested, Correlation Coefficient = 0.74



← Smoother