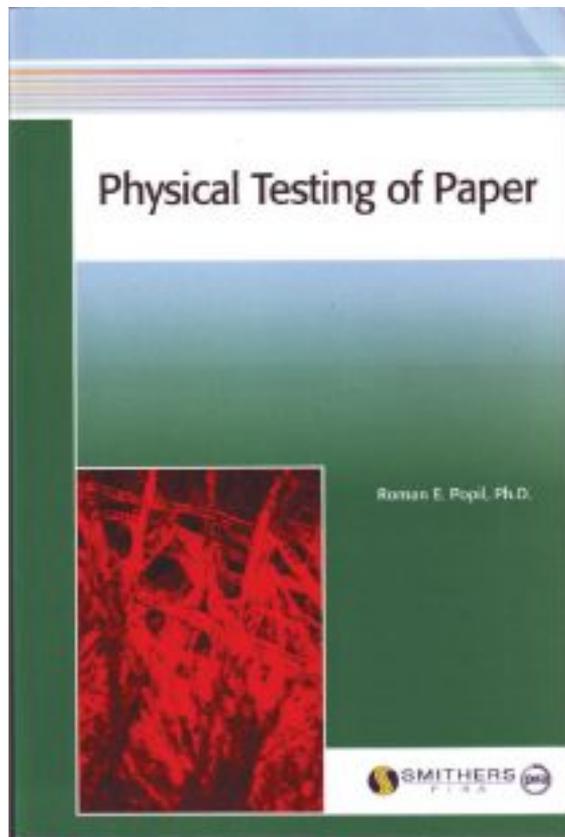


# Book Review



## *Physical Testing of Paper*

**Roman E. Popil, Smithers Pira, Shropshire, 2017.**  
**Paperback, 230 pages, ISBN 978-191024-292-6. (Available direct from [www.smitherspira.com](http://www.smitherspira.com))**

Testing of paper products is something that occurs in ALL paper mills, and additionally in a large number of converting plants. For something so fundamental to our sector, it is surprising that there are so few specialist publications covering the topic. True, it tends to form a chapter in most general textbooks, but given the scope that needs to be covered these isolated chapters are never truly satisfying. Therefore, it comes as a pleasant surprise that a detailed, low cost textbook has finally been issued; indeed, barring revisions of older texts, it is the first such text to be published in two decades!

The chapter titles are an obvious place to start, as they convey the scope that the author, who manages the Physical Analysis Laboratory at the Renewable Bioproducts Institute, Georgia Institute of Technology, wishes to cover, and equally, what he does not:

- Introduction (what is paper?)
- Tensile Properties
- Ultrasound Testing
- Bending Stiffness
- Compression Testing
- Test Methods for Writability and Printability
- Beater Curves to evaluate Pulp Potential

The initial chapter sets the scene, and to some extent is aimed at the non-specialist who has just come into the industry. It covers fibres, formation, hydrophilicity, hysteresis and similar properties. In doing so the author uses a nice range of analogies; I particularly liked formation being compared to a plate of cooked fettuccine pasta!

The second chapter focuses heavily upon the most fundamental of the destructive strength tests: tensile. Although many other tests, notably burst, are related, tensile gives the researcher far more information and a better understanding of the strength and stiffness properties than other destructive tests. This leads seamlessly to the third chapter, which outlines ultrasonic testing; a test that was first applied to paper in the 1960s but which, apart from on hugely expensive automated test units (such as the L&W Autoline) has never really taken off. Yet it has the benefit, over tensile, of requiring almost no sample preparation, of being non-destructive, and of giving a similar amount of detail as tensile with regard to the fibre network properties.

The next two chapters are related to what has gone previously, and deal with two more important strength characteristics: bending stiffness / rigidity, and resistance to compression. Together they account for almost 80 pages, and cover the importance of basis weight, caliper, flute type and testing regime on these key functional properties for packaging boards.

The penultimate chapter is the first to deviate from what until now has been a logical exposition of strength-related properties and their measurement. Here we encounter characterisation tests for surface texture (air leak roughness and contacting stylus profilers); liquid-paper interactions (Cobb, Hercules sizing test, Bristow wheel and contact angle); caliper and basis weight; and finally a bit about inkjet printability assessment.

The final chapter goes back to strength assessment, as it is applied to pulp evaluation, looking at beater curves and the effect of beating on tensile, tear, burst and opacity.

The book ends with the most comprehensive index I have ever seen, encompassing over 30 pages on its own merit. There is certainly no excuse for not being able to find the point or explanation you are searching for with this degree of coverage!

Overall the book gives an excellent introduction to physical testing as applied particularly to packaging grades (corrugated and carton), and to a lesser extent to fine papers. If you are interested in tissue products, or speciality papers, it is fair to say there is much less in here for you; however, no single text has so far been written to cover these areas, and a lot in this book can still be applied to these grades. The publication is very well illustrated, with numerous photographs of equipment, along with charts and tables and equations to explain concepts. One slightly anomaly is the eclectic mix of metric and US imperial units throughout, which is something the reader must just get used to. That, and a few textural errors aside, this book is well worth the money, and is a welcome and recommended addition to the rather limited canon dedicated to this much neglected area of papermaking. Without doubt it is a text that should find its way into every mill library.

**Daven Chamberlain**