

Setting specifications that make sense

Without common-sense expectations and clear specifications it may be hard to generate the value from consistent quality.

RUSSELL J. ALLAN, IAN M. MACDONALD

The value from quality comes from doing the right things well enough to make a difference but not so well that extra time, effort and cost make the going harder than it needs to be. This is the tension facing all manufacturing industries – the trade off between quality, need and cost. It is estimated that 20-40% of the fibre put into corrugated boxes is wasted due to damage in the manufacturing and subsequent conversion operations at the box plant.

So what is needed to take the value offered by improving corrugated board quality? One clear piece of knowledge needed to judge whether processes are close to acceptable or not is the expectation of value from the board BQM measurement. BQM shear measurements differ from other available shear torsion or twisting measurements in that they are largely independent of the liner weight. The BQM value is representative of the medium shear stiffness component only. The advantage of this type of measurement becomes clearer when setting specifications for the plant. In twisting systems where the liner weight impacts the reported value for md shear stiffness, a level must be set for every grade that the plant runs to ensure that the shear measurement can be simply related to plant and board quality performance.

Exhibit 1 shows the sensitivity of torsion type measurements to changing liner weights for various medium weights. Typically, the md shear stiffness reported by torsional systems vary by 0.5 kN/m for every 100 gsm of total liner weight change. This means that a grade consisting of 150 gsm liners and 150 gsm medium will differ from a 250 gsm liner and 150 gsm medium combination by more than 1 kN/m in its reported value. This change is due to the difference in liner components and has nothing to do with the actual “quality” of the medium or the damage experienced by the board during manufacture and conversion.

The practical outcome of this measurement interaction with the liner weight is that a plant manufacturing 30 different board grades will need at least 30 specific specification levels to properly monitor, compare and control board quality. New grades require additional levels to be set.

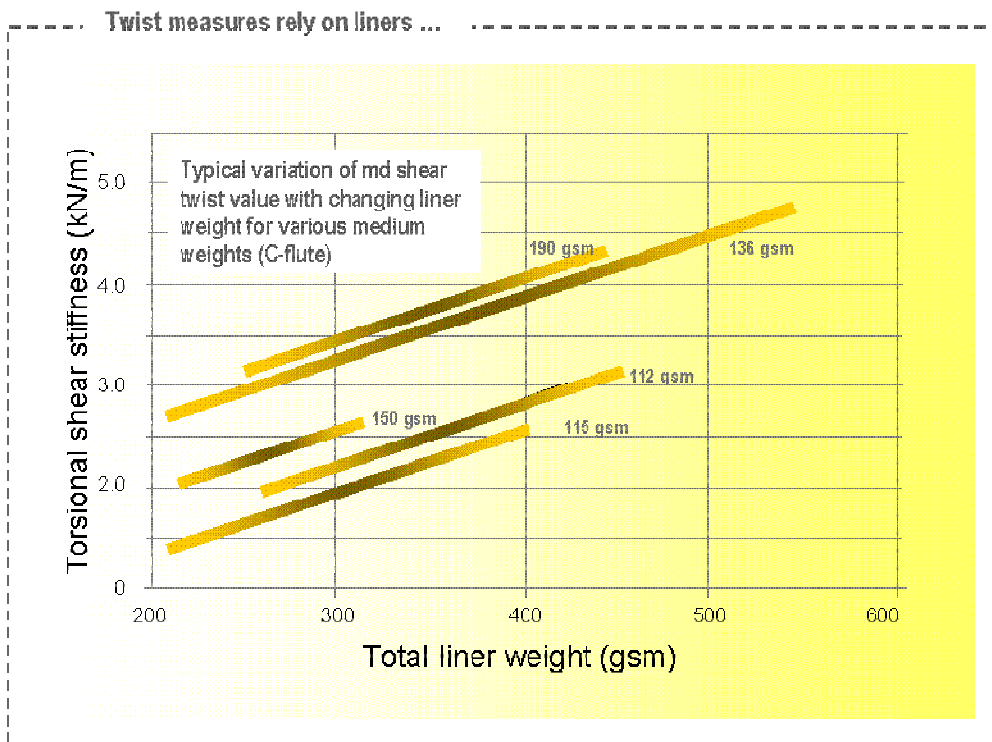
In contrast the BQM-1 delivers a measurement that is practically independent of the liners. Under these circumstances the only specifications required to ensure process stability and quality aims is a value for each medium grade used in the plant. It would be unusual to have many more than half a dozen different medium weights. New grades, where liners are changed or mixed to give unbalanced structures, do not require new specifications to be set if the same medium papers are used This is a very significant saving in system monitoring, set up and maintenance of a performance quality system.

So how do we set levels for a particular plant? Users appear to take a number of different paths. The main strategies are:

- Average existing quality performance
- Specify the best quality observed from the plant
- Identify and aspire to the best industry performance

EXHIBIT 1

Older Twist measures have strong liner dependencies



The first two strategies tend to re-enforce existing quality cultures both within a plant or within the company at large. The third creates a tension or gap for improvement and urgency but must be tempered against aims that are either impossible to achieve because of poor or old equipment or that lower morale at a particular plant where change is slow and training has been neglected over time.

If a company wishes to market itself on the basis of consistent quality and reliable box performance then strategy 3 must be considered as it provides a true industry and competitive benchmark. To aid in this effort Exhibit 2 indicates the level of shear stiffness expected from different medium weights from the BQM unit in kN/m.

EXHIBIT 2

Without solid aims, consistency in quality is hard to achieve

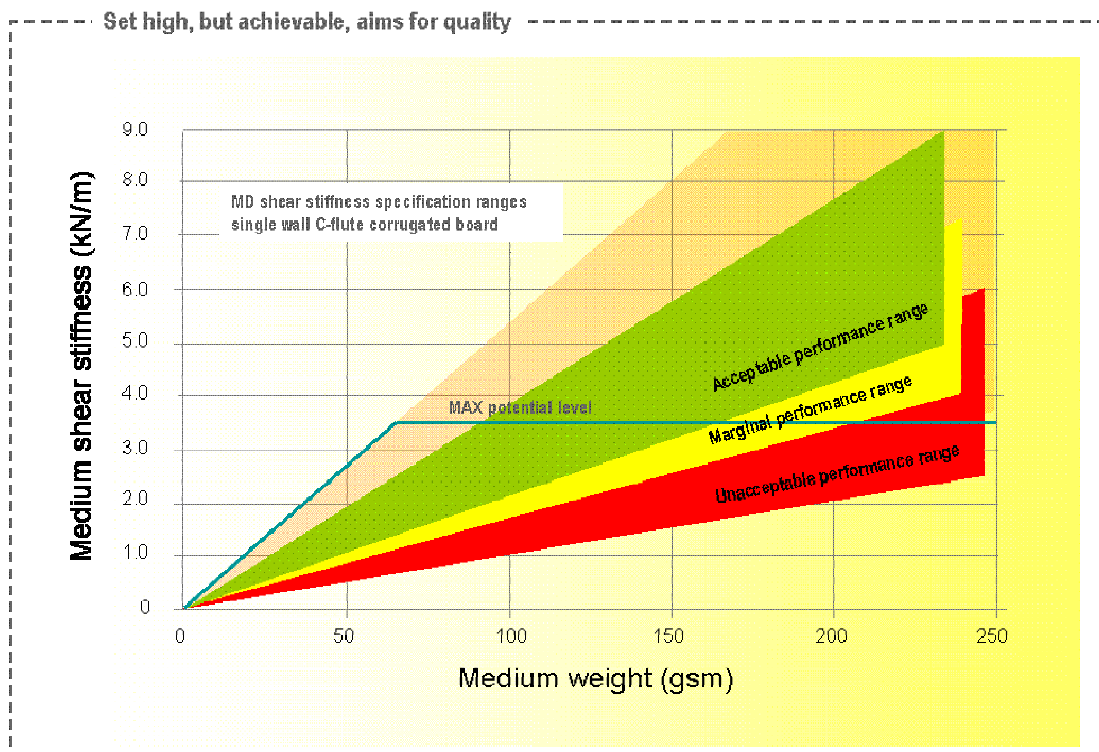


Exhibit 2 shows the ranges from job to job that would be acceptable (in green), the range that would be marginal (yellow) and the range of shear stiffness values that should be considered unacceptable. Most of the box performance investment (in terms of box compression strength) will be returned in performance for values greater than 3.3 kN/m (highlighted by the blue line). For lighter weight mediums, where this level of shear stiffness in C-flute is not generally possible, maintaining the shear stiffness levels as high as possible is the best that can be done.

Operations where corrugated board output operates in the yellow mapping of Exhibit 2 have opportunities to improve both performance and consistency of their product.

Operations dipping into the red area are in urgent need of process adjustment, operator training and monitoring. Box performance will range from between 10% and 40% lower in BCT than would be warranted by the grades used. Under these conditions performance variability, absolute performance and cost will remain key issues for your business.

Exhibit 2 seems to suggest that a medium weight or stiffness that supplies 3.3 kN/m is all that is needed to fulfill any box application requirement. This is not the case. For typical box designs over a practical range of panel sizes the value of 3.3 kN/m will ensure that losses due to board damage are kept to a minimum. However, the box compression strength is a factor not only of the damage occurring during manufacture and conversion but also the inherent paper strengths that make up the components of the box. That is, the starting potential strength of the box.

Further, it is known that starting off with a high md shear stiffness value minimises the damaging effect of subsequent conversion steps and the damage associated with processes such as printing, slotting and formation of the manufacturer's joint. The message here, is that to minimise degradation of performance, one must minimise damage events as early as possible in the manufacturing chain. That is why the best place to start a damage minimisation program is at the corrugator itself.