Printers Blankets
Setting-up the Analysis Environment

It is widely acknowledged that printers' blankets using a textile cloth-based-carcass have a variable shape.

Consideration is given below to the raw materials behaviour behind that performance.

Printers' blankets are multi layer constant thickness composites designed from rubber coated textile fabrics.

In turn, rubber grades can be either chosen from or custom engineered into an ever increasing range of solid rubber and rubber foam compounds.

Cotton is by far the preferred raw material for the fabrics used in printers blankets.

Except for the bottom carcass ply, fabrics are commonly rubber coated and impregnated so that its dimensional dependance on ambient moisture is limited.

However, bottom ply is usually rubber coated only on its interface to the next layer, leaving part of the respective fabric section exposed to environment moisture.

Depending on blanket structure design, length and width variations of up to ~1% are easily measured on a format due to ambient moisture change.

This effect should be particularly taken into consideration both during blanket conversion and the packaging and storing procedures of the finished blanket formats.

Format squareness and surface flatness distortions due to this and other reasons are also common.

In fact these distortions pose additional requirements which reflect both on the development of a comprehensive blankets' conversion technology and on the laboratory procedures for its testing and behaviour analysis.

Rubber is a generic designation describing both a natural elastomer extracted from latex and an assortment of plastic elastomer polymers after processing.

One instinctively associates rubber to a material able to store and deliver back the same amount of energy.

However, that concept may either be closely correct or quite inaccurate depending on the rubber compound under consideration.

Typical *springlike* behaviour, or *damping* properties or other characteristics can be designed and added into a particular rubber compound to obtain the desired performance of the end product.

Please see the Video Clip " The Happy and the Unhappy Balls".

In a blanket, specific rubber compounds are developed
– as bonding agents in its layers interface
– with chemical resistance and affinity suitable for each individual type of ink
– as structural elements dealing with the printing stresses, including its function in assisting the reinforcement/matrix stresses transfer

A rubber compound is an elastomer-based polymer incorporating a range of other ingredients that add technical and economically desired characteristics to the original polymer.

But to a greater or lesser degree all rubber-made components exhibit dimensional dependance on its stress history and very lazy and still an ill determined dimensional recovery with time after stress removal.

And dimensional dependance of a rubber component on its stress history is another way of flatly saying that it will exhibit different dimensions for a given stress value, depending, e.g. if the stress applied to the component is in the course of increasing or decreasing.

For practical purposes behaviour of rubber to mechanical stress may be divided into three stages, each of them offering distinct characteristics and technical opportunities:

- At very low stress values, rubber reaction reflects somehow rubber compounding recipe and processing procedure but exact reaction is extremely difficult to predict without extensive testing at each particular instance. Hysteresis (time-delay of) response (to stress variation) will tend to infinite at diminishing small stress values.

- Predominantly elastic properties of rubber occur at higher stresses. Except for very limited stress ranges, elastic strain ought to be considered not linear.

In a loose and non committing way, one may establish a practical deformation range for solid rubber as a function of its hardness.

Reduction of the natural dimension of a solid rubber component due to compression stress will typically vary from ~15 or 18% for hard compounds to ~35% for soft compounds.

Elongation of solid rubber may reach several times the component natural dimension.

In a solid rubber component, reduction or increase of one dimension due to applied stress means matter flow into or from other directions and shape modification but not a real volume change as solid rubber is not compressible.

To the observable changes in rubber behaviour with different rubber strain levels, structural modifications of the rubber compound are correspondingly predictable to occur. To increasing load stresses and more relevant chemical structure adjustments happen, increasingly slower rubber responses should correspond.

- Like ductile materials, rubber will drastically reduce elasticity at strains nearing rupture, becoming extremely hard, in a similar way tired humans experience cramps.

In fact a not so obvious phenomenon does occur with high natural rubber content compounds at severe deformation levels, called strain-induced crystallisation, which means a dramatic change of behaviour from elastic to rigid as well as added rubber strength before rupture.