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**DEVELOPMENT IN DOCTORING SYSTEMS AND
ITS SUITABILITY IN THE PAPER MILLS OF
DEVELOPING COUNTRIES**

M/s Vickers Ltd., London.

A doctor system has three main essential functions to perform, which must be considered when designing.

1. The doctor system must be correctly located for removal of the sheet from the surfaces of rolls and cylinders and to assist the machine operators in transporting the sheet of paper from the wet end to dry end of the machine.
2. The doctor system must be correctly designed to help with the removal of water and dirt from the surfaces of rolls and cylinders.
3. The doctor system must be designed to ensure that it constantly conditions the roll and cylinder surfaces, without causing damage so ensuring that a first class quality product is produced.

The paper industry has changed in many areas over recent decades. Perhaps the most significant with regards to the demands of doctoring is that the machines are wider, faster and the furnish has changed.

In the developing countries we find the use of short fibre, the quality of waste paper and the chemical content the most problemetical area to contend with.

In 1920, when Mr. F.W. Vickery was awarded a worldwide patent for the spring finger doctor, this was the first doctor to incorporate the unique feature of flexible and free floating blade. This principle of flexibility has always been featurette in our designs through the years to keep ahead of the demands of the paper machine.

Following the spring finger design was the Mark range. This was later replaced by the U type holder which featured a more streamline design allowing the sheet to pass over the holder with less disturbance.

The present model the Inverflex features the design requirements to handle the demands of today's doctoring requirements.

When a new doctor is developed a number of points must be considered to ensure a first class product.

1. It is essential that the blade holder has a low profile so that paper does not build up and accumulate at the blade edge and to allow the sheet to flow smoothly over the doctor.
2. The blade holder should be designed to have flexibility, so allowing for free movement of the blade under operating conditions.
3. The blade holder should be designed to have a positive register for the blade to rest against to ensure that the blade is held parallel to the surface to which it is applied.
4. The holder should be designed so that under operating conditions it is 'self-sealing' to prevent the ingress of water and fibre into the blade holder.
5. To ensure and maintain accuracy of the doctor blade holder it should be fully machined.
6. The blade holder should be of sectional construction to allow for ease of transport and handling during installation.

Many problems which arise do not always stem from the doctor holder or the blade. The design of the doctor support is critical to the performance of the doctor system.

It is essential that the doctor support is designed so that when located in position it maintains the blade in uniform contact against the surfaces of the rolls and cylinders. To achieve this we must take into consideration certain design parameters to ensure that the support has sufficient strength to span the width of the machine without deflection or movement in its cross section.

We have to consider the total weight of the doctor system and by design we can reduce this to the minimum by using modern techniques in fabrication.

Consideration must be made with respect to the space which is available on the machine for installing the doctor system without causing obstruction to the machine operators for wire and felt changing.

We have to consider the forces which are transmitted due to the frictional drag at the blade edge which is a result of the pressure applied to the system, which are transferred down the doctor blade line into the support.

We have to ensure the physical size of the journal or pivot is sufficient strength to support the doctor without flexing.

We must take into consideration the influence of temperature around the structure.

The design must ensure that the system is safe for the machine operators.

The most common problem in paper mills is the doctoring of the press section. With short fibre, pitch and high chemical content this combination tends to result in considerable downtime caused by paper breaks through a build-up of fibre and chemical on the roll surface.

We have therefore developed a doctor system which can also wash and clean the roll whilst the machine is in production. This system is called the Twin-Maxiflex.

The maxiflex doctor applies pressure to the blade edge using its own pneumatic loading tube. The support is locked into position and the holder can pivot on its centre rod.

Because of the manner in which pressure is applied to the doctor blade edge this design allows us to install two Maxiflex units on one doctor support.

The principal of operation is such that the doctor support is held in position using pneumatic locking cylinders or turnbuckles. Normal recommended pressure for the application is applied to the first position doctor and the second doctor is normally applied at approximately half the recommendation of the first doctor.

On centre press and top press applications a lubricating shower is located between the two doctors in a totally contained area. Clean water, at machine temperature is sprayed to the underside of the leading doctor which is then carried over by the relation of the roll to the second doctor so providing a full cleaning and lubricating system.

It is known that as the roll passes the doctor blade a vacuum is caused just behind the blade, the fibre and chemical are naturally pulled away from the surface and the water spray thus washes the offending agents away.

With the installation of the lubricating shower an extended blade life is obtained.

Applications suited to the twin-maxiflex system are Centre Press roll, top press rolls, top rolls of breaker stacks and M.G. cylinders.

The spray system would obviously not be utilised on the last two examples.

The spray system is ideally suited for machines which use 100% waste paper, short fibre, lightweight coated base papers, groundwood and de-ink furnishes, machines producing papers having more than 8% ash content and for machines where there is limited space for installing two separate systems.

Another problem which arises from the furnish is fluff and dust on the cylinder sections. A dust doctor is usually installed on first section cylinders after the press, cylinders following a size press or coating station and M. G. or Yankee cylinders.

We have recently introduced a new design dust doctor which unfortunately I cannot divulge the internal design features.

The new doctor is however adaptable to use with all the present holders we produce.

We have a Research & Development unit working full time to improve existing products and develop new ideas. Considerable work has been done on doctor blades which we are sure will benefit all mills and give us the competitive edge.