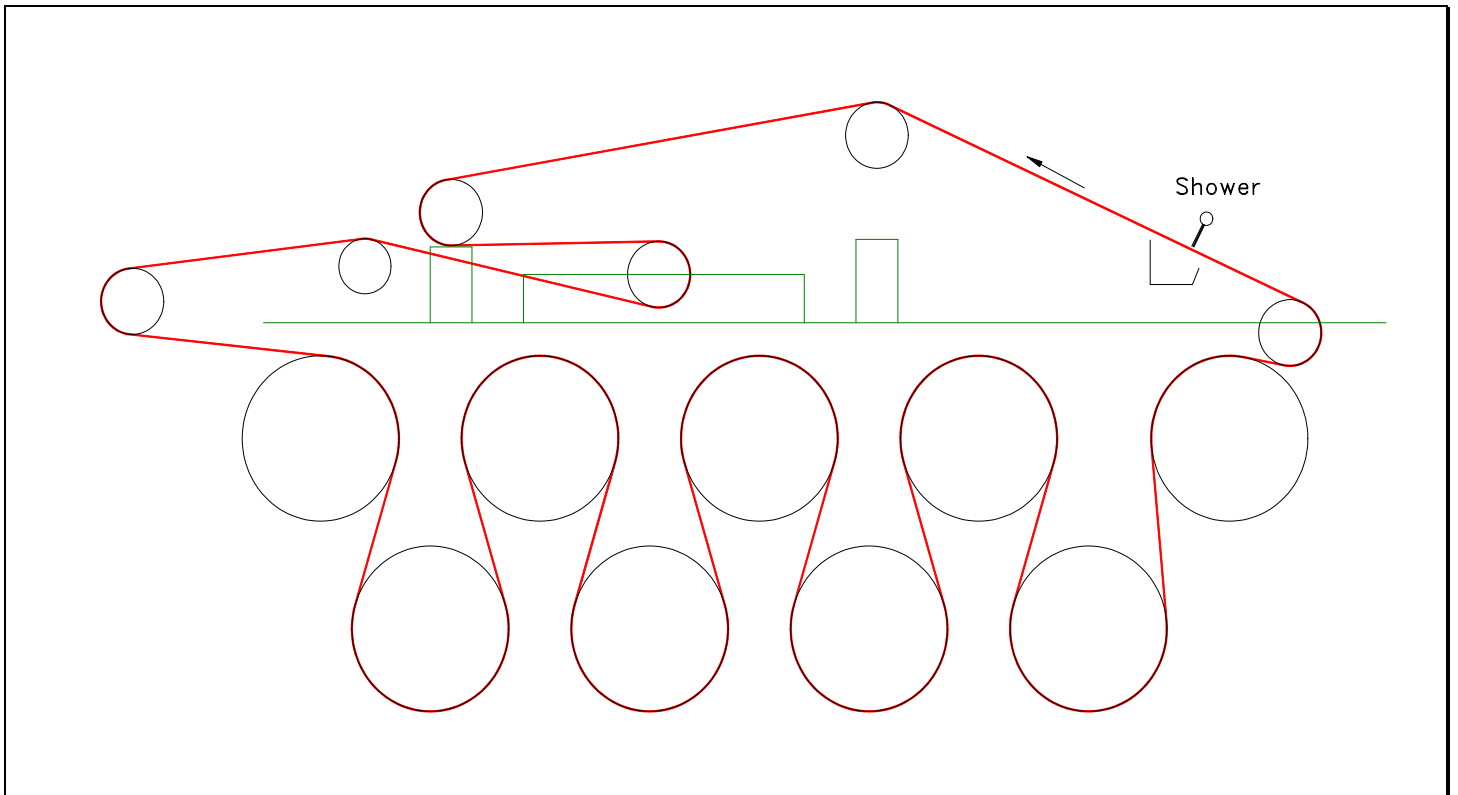


CLEANING DRYER FABRICS

By Ed Barber



DRYER FABRIC CLEANING

All dryer fabrics are contaminated to some degree during their service life. This contamination may reduce machine runnability and adversely affect paper quality while adding to your overall energy and fabric costs – problems that are often made more severe by increased machine speed. All dryer fabrics should be periodically cleaned so that their original properties are retained as long as possible and their value is optimized.

Some of the more common consequences of dryer fabric contamination are:

- Sheet moisture profile unevenness
- Sheet instability, particularly near the edges
- Inferior heat transfer and paper marking caused by dryer fabric surface deposits
- Heat transfer reduction caused by deposits left on the cylinders
- Plugged vacuum rolls
- The transfer of deposits from the dryer fabric to the paper
- The increased dryer fabric cost that results when running time (fabric life) is reduced by plugging.

TYPES OF CONTAMINANTS

Dryer fabric contaminants come primarily from the furnish (virgin pulp and recycled fibers) and its additives and from coating or size press chemicals. Cleaning should proceed only after identifying the type and degree of contamination of your particular fabric.

Tests have shown that even a small amount of contamination can cause pronounced reduction in dryer fabric permeability. Pronounced contamination is common after size presses and coating positions. In these cases, it is not unusual for dryer fabrics to be completely plugged.

Dryer fabric contaminants divide into four groups:

1. Dust
 - Short cellulose fibers
2. Organic substances not cross-linked
 - Pitch
 - Asphalt, tar, wax (often from recycled furnish)
 - Size from CMD size press, starch and casein types
 - Bearing oil and grease
3. Cross-linked organic substances
 - Wet strength resins
 - Latex based coating chemicals (SBR, acrylic, and others)
4. Non-organic substances
 - Alum, calcium carbonate, kaolin, titanium dioxide, rust and scale.

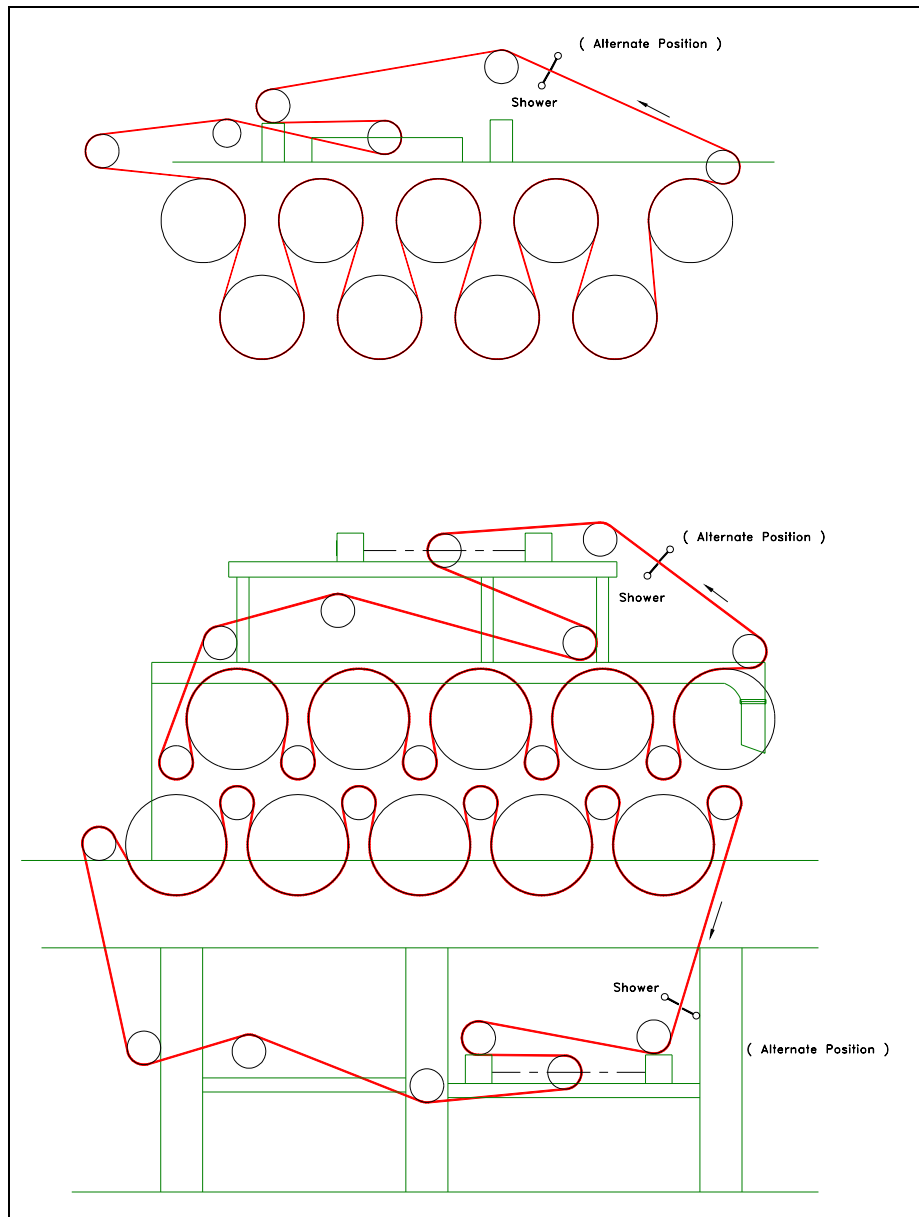
TYPES OF CLEANING METHODS

| Contamination | Cleaning Method |
|--|------------------------------|
| Cellulose fiber, fillers | Air shower |
| Cellulose fibers, coating and size press chemicals, pitch | Water shower (high pressure) |
| Pitch, asphalt, rosin size, cellulose fibers, alum, clay, titanium dioxide | Steam shower (high pressure) |
| Size press chemicals (water soluble) | Hot water (low pressure) |
| Grease, oil, size, wax, latex, asphalt | Chemicals (low pressure) |
| Cellulose fibers and surface contaminants such as stickies, wax and latex | Brush |

Recycle based furnish increases contaminants such as tar, asphalt, latex, waxes and plastics.

Dryer fabric cleaning can be performed **intermittently** during paper production – at a sheet break (full speed) or during a stop at crawl. High pressure showering with air or steam and cleaning with a brush can also be performed **continually** during paper production. Cleaning with chemicals and large volumes of water should be done during a shutdown.

AIR SHOWERING



A regular, periodic air shower is best for cleaning high permeability dryer fabrics that are plugged with fiber dust or loose dirt. The air shower is often insufficient for removing resins and sticky particles from low permeability dryer fabrics. Low perm dryer fabrics require water or steam showering.

So that loosened dirt does not circulate in the dryer hood, high pressure air showers should be placed so that the dirt can be directed toward the exit duct in the dryer hood or down into the pit.

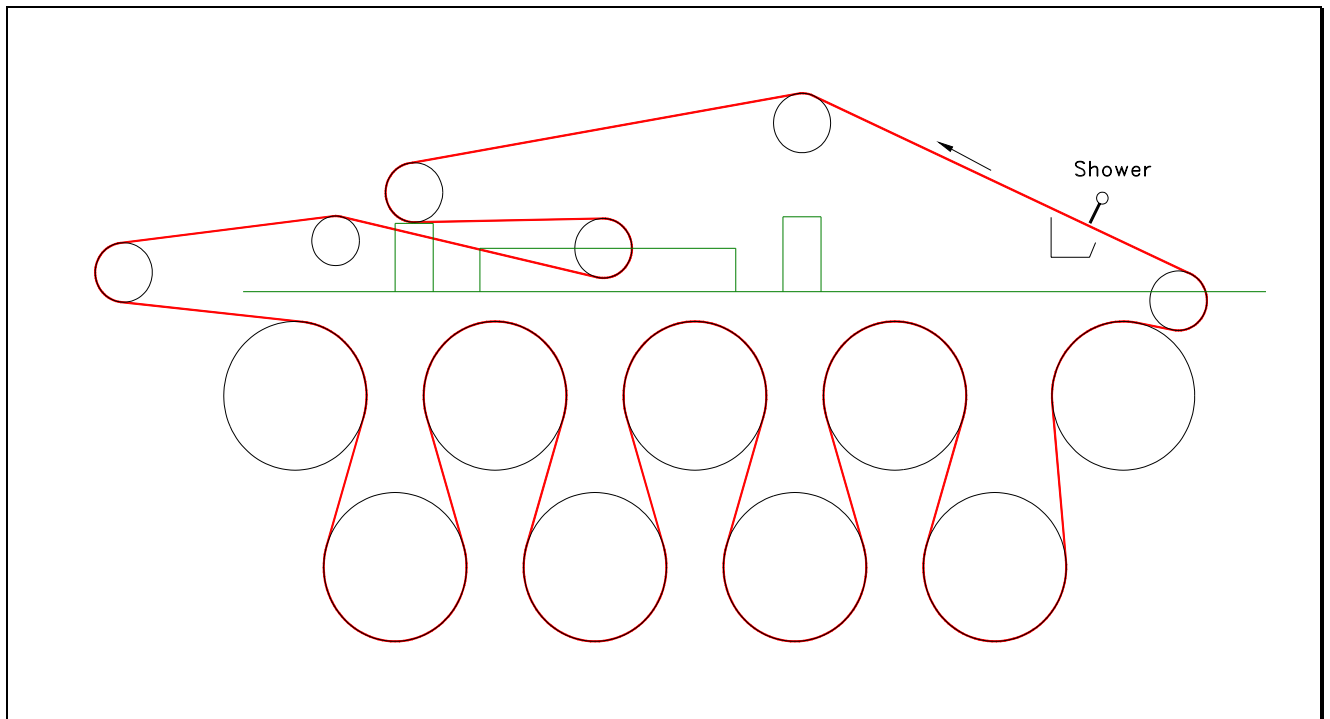
Cleaning is much better when a short distance is used between the nozzle and the fabric. At long distances, the air jet loses energy. For space and safety

reasons, distance should be 1¼" to 2 inches (30 to 50 mm). When air pressure is raised, permeability increases. Low pressure [example: 29 PSI (0.2 MPa)] results in poor cleaning.

To avoid unnecessarily large air consumption, a nozzle diameter of 7/64 inch (2.5 to 3.0 mm) is recommended.

Air showering results have been shown to be comparable regardless of whether the shower was directed against the paper side of the sheet or against its back side. However, this does not hold true when showering with water or steam. Remember, when installing your air shower, locate a position where the dust can easily be removed from the dryer section.

HIGH PRESSURE WATER SHOWERING



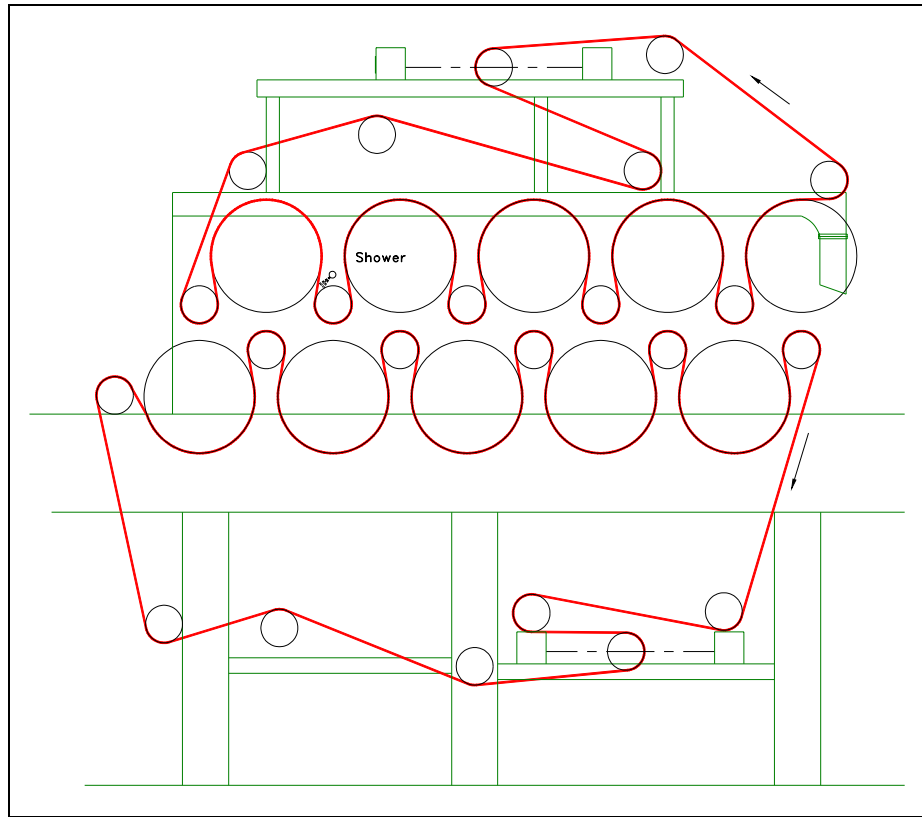
During sheet break or shutdown is the best time for oscillating high pressure water showering. Cleaning during shutdown should be at the highest speed possible to avoid streaking. Your dryer fabric should be completely dry before paper is produced again.

A jet nozzle is recommended and a tray is usually necessary for collecting dirt and water on the opposite side of the dryer fabric. You can expect improved cleaning results with higher water temperatures such as 140-185°F (80-85°C). Hot water, 176-185°F (80-85°C), can allow high pressure showering while producing paper and without streaking problems. You can minimize wet streaks by using hot water. With water temperatures of 176-185°F (80-85°C), subsequent air showering is sometimes unnecessary.

A 0.0039 inch (1 mm) nozzle for high pressure water showering is best for avoiding wet streaks. For optimum cleaning, the nozzle should be 8 to 12 inches (200-300 mm) from the dryer fabric surface. Between 6 to 8 inches (150 – 200 mm), the water forms small droplets that hit the surface of the dryer fabric. This hammering effect cleans better than the laminar flow at shorter distances.

Pressure up to 580 PSI (4 MPa) gives you the most effective cleaning using a water shower. Above 580 PSI (4 MPa), there is increased risk of damage to fabrics containing spun yarns.

LOW PRESSURE HOT WATER WASHING



After the size press, dryer fabrics can be cleaned with only hot water at low pressure during shutdown. Dryer fabrics in both the top and bottom positions can be cleaned with a shower installed in the top position (see illustration).

Water [122-175°F (50-80°C)] is sprayed onto the dryer fabric with a low pressure shower loosening the contaminant which then fastens to the heated [212°F (100°C)] cylinders. Doctor blades can then easily remove the deposits. It is best to install the

shower pipe at an incline and with a drainage outlet so that the drops from the showers are avoided after washing.

CLEANING WITH STEAM

The advantage of high pressure cleaning with steam is that good cleaning can result without soaking the dryer fabric with large amounts of water. This method can be used periodically during production or during shutdown or sheet break. (See cleaning methods chart for a list of contaminants best removed using steam.)

A constant pressure of 72 PSI (0.4 MPa) is recommended. The distance between the nozzle and the dryer fabric should be 2 inches (40 mm). For best economy, a nozzle diameter of 5/32 to ¼ inches (4 to 6 mm) is advised. As with water, the steam shower should be positioned on the paper side of the dryer fabric.

CHEMICAL WASHING

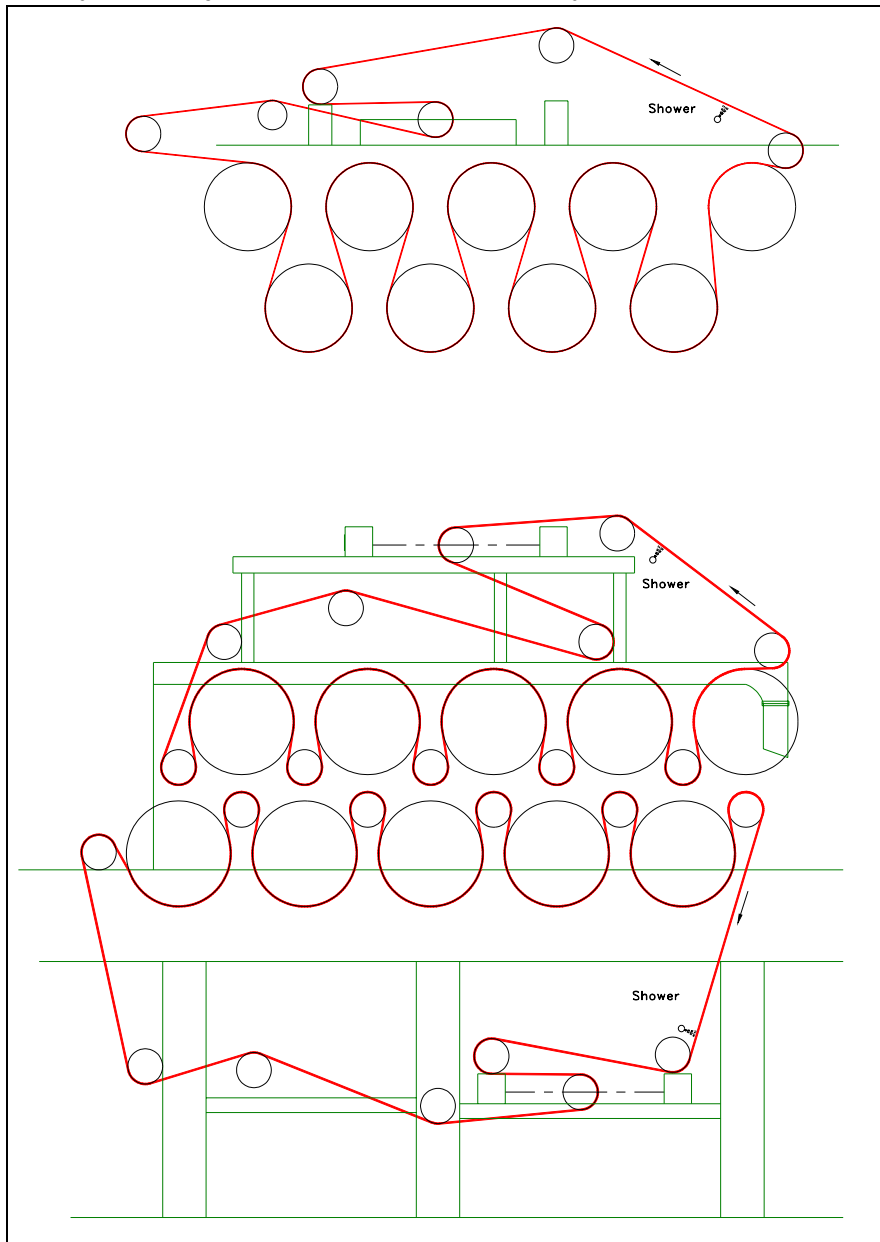
Warnings:

A chemical wash can be a health risk for personnel, a fire risk, a risk of damage to the dryer fabric, or a risk of corrosion damage to paper machine components. It is important that all environmental and fire safety regulations are met.

If possible, washing with acids in the dryer section should be avoided because of the risk of corrosion of machine components.

If mechanical washing does not work well for you, chemicals may be the answer. Always make sure that the machine and the dryer fabric (including its seam) are not damaged by any chemical.

All washing with chemicals or water in large amounts should be done during shutdown at crawl. Chemicals can be introduced onto the dryer fabric through a shower pipe placed in the top position between two cylinders before a guide roll. An alternative placement is on the inside of the dryer fabric just before or after the last cylinder. The first alternative allows the chemical



solution to saturate both the top and the bottom fabric in the section. The fabrics are then rinsed thoroughly with water from the same shower pipe.

A solution containing paraffin can be used for removing tar, asphalt or wax. A solvent can be mixed with a surface active agent (surfactant) and the mixture can then be poured into water and stirred to form an emulsion. A suitable mix is 2 to 5 gallons (7.5 to 18.9 liters) of solvent and 2 to 4 lbs. (907 to 1.814 kg) of non-ionic surfactant per 25 gallons (94.63 liters) of water. Ready-mixed washing agents based on solvents can also be used. Wash for at least 20 minutes followed by a complete rinsing with water. Washing and rinsing temperature is 122-140°F (50-60°C).

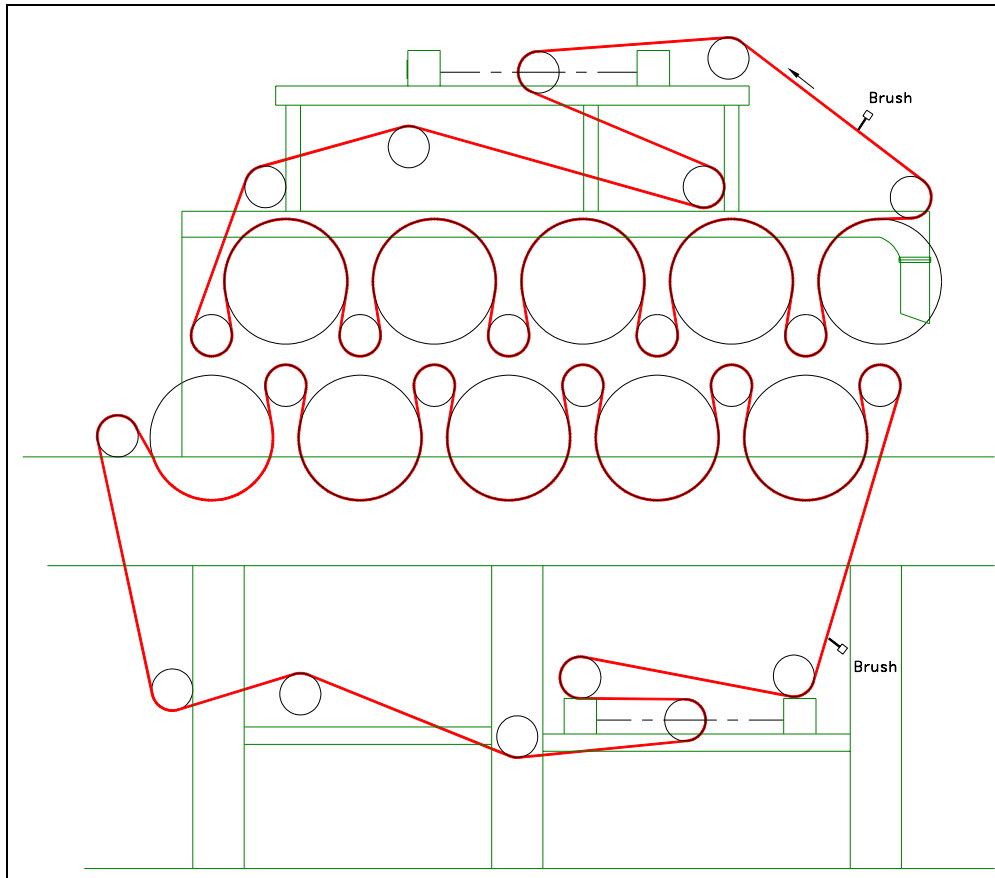
A wash of 1-2 percent caustic soda with the addition of a 0.5 percent non-ionic active tenside

can be used for removing pitch, alum and aluminum hydroxide. Wash for at least 20 minutes followed by a complete rinsing with water. The dryer fabric may be neutralized with a weak sulphamine acid (0.5 percent) followed by another water rinse at 104-122°F (40-50°C).

A solution of 2 percent sulphamine acid with 0.5 percent non-ionic active tenside and some

corrosion inhibitor may be used at 104-140°F (40-50°C) for removing aluminum hydroxide and calcium carbonate. The wash must be followed by a complete rinsing with water.

CLEANING WITH A BRUSH



An alternative for cleaning dryer fabrics in vulnerable positions such as fluting production is a permanently installed brush. The brush can remove particles that have fastened on the *surface* of the dryer fabric.

Of the several kinds of brushes available, one type is supplied in lengths of approximately one yard (one meter) and joined when installed on the paper machine.

Each section of brush is fitted with a claw coupling to ensure reliable operation and easy installation. To use continuously, the holder can employ two or four brushes so that the brushes not in use can be removed for off-machine cleaning. Rotating cylindrical brushes are also available.

The brush should be placed as early as possible in the return section, preferably before a guide roll. The brush should work the paper side of the dryer fabric at a 90° angle to the surface, pressing lightly against the dryer fabric with an adjustable distance.