



**Non-Woven Roll Products Tailor-Made
For High Quality Blank Production**

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In their perennial search for ways to reduce weight and cost, automakers are increasingly looking to the many benefits of tailor-welded blanks (TWBs). This growing use of TWBs presents all-new challenges in the area of blankwashing, which is why fabricators of roll products are stepping up to the plate with innovations of their own and partnering with both OEMs and blankwasher manufacturers to modernize the washing process.

Innovations in the material used for roll covers are making their mark, particularly in automotive press shops that have a limited number of lines running a variety of parts and various styles of tailor-welded blanks. In these operations, blanks can be processed through washer cleaning machines utilizing non-woven products in the exit and/or entry roll position within the unit. The result is excellent cleaning and wringing of the washer fluids as well establishing oil film layers necessary for deep drawing of automotive panels.

Non-woven rolls vs traditional fabric rolls

Key to the success of new roll cover materials is its resiliency. Some new non-woven materials are constructed of synthetic fibers engineered to control the fiber chemical composition, shape, diameter, and lengths. These fibers are then purposefully entwined together through various processes to form a web. These fibers are combined with engineered polymer binder material that adheres the fibers together to create a fabric matrix. How this matrix takes shape is a key factor in the fabric's ability to retain dirt, control oil films and resist blinding off or becoming 'clogged' based on the amount of void or open structure remaining in the fabric. Once the fabric is die cut into discs it is compressed onto a steel core to a hardness of range of 88 to 93 ShA, for example, to become a roll, which presses out some of this open void – like squeezing a sponge. The

remaining void in modern fabrics is typically 30% greater than that of older, more traditional fabrics. These newer fabrics, which retain their void at higher hardnesses when converted into an automotive blank washer roll, provide exceptional coefficient of friction properties that eliminate or greatly reduce hydroplaning, which provides better fluid controls and dirt pick-up.

Automakers are finding the composition of newer non-woven roll surface to be far superior to that of traditional, older varieties of fabric surfaces. Consider the fact that tailor-welded blanks typically used in structures and not outer body panels utilize dimples in various locations to aid in keeping the dissimilar thicknesses of the blanks level when stacked. When these dimples repeatedly pass through the roll bite in older varieties of fabrics they assault the fabric surface and create a permanent impression on the roll face. In some cases, the pattern will elevate to deep impressions and can rip the fabric's fibers or permanently deform the roll surface. This condition presents serious issues when outer panel processing follows running a tailor-welded blank through the same press line. These deep impressions carry fluid past the roll bite and cause oil streaks on the blanks that, when formed in a press, create fluid impressions in the steel.

When permanent damage occurs in traditional fabrics the only courses of action are either to replace sections or all of the roll cover or to grind the roll to even out the surface. With modern non-woven roll materials, the surface disruption or damage can correct itself through the resilience and elastic memory of the fabric construction.

Necessity is the mother of invention

About two years ago, FKM-Walzenttechnik's, FKM-USA's parent company, and The Freudenberg Group's product development teams set out to develop a new automotive non-woven roll product that would address the growing concerns of cleaner blanks and lower oil film layers. Also to be addressed was the aforementioned roll

surface patterning issue caused during tailor-welded blank processing. One goal of the joint product development team was to dramatically increase the amount of roll cover resilience or rebounding properties and thus greatly reduce, and hopefully eliminate, the effects caused by the tailored blank dimples. The result is a new non-woven material – VNP11A -- which illustrates a 60 to 75 percent increase in rebounding effects along a substantially greater tensile strength that addresses cut and damage resistance. This new material has been on trial for several Big-4 automakers in Europe and North America for over a year in coil and blank washing machines of German, American and Japanese design. After having been exposed to multiple conditions, the new material has exhibited several unique characteristics not seen in other fabrics, including:

- High wet coefficient of friction properties -- .28 to .30
- The ability to provide even oil film control on wide blanks -- such as bodysides
- The ability to provide dry blanks in water and oil operations -- 70-80% reductions
- Cut resistance caused by blank edges and cut outs
- Extended service life -- beyond 12 months without a service interval

Non-woven rolls can be used on a variety of flat rolled surfaces such as cold roll steel and various forms of galvanized steel, aluminum, brass, copper as well as textiles and glass. Recently several automotive companies have studied the dirt pickup ability of the non-woven roll compared to polyurethane entry roll operations. The study indicated improved cleanliness levels utilizing non-woven technology. It should be noted that the comparison also found that substituting non-woven rolls for polyurethane rolls in the entry roll location came at a higher initial cost.

Meeting high demand for lower oil levels

Due primarily to rising prices in crude oil – with no apparent end in sight -- the initial cost of blank washing oil and its disposal has seen a dramatic increase. In

addition to rising oil costs, manufacturers also face the problem of excess oil dripping from stacks of blanks, creating needless safety and housekeeping issues.

High oil levels at the press line can cause blank deformation, frequent die cleaning and elevated occurrences of dimples or other quality defects that require rework. And, manufacturers are coming to the realization that reducing and maintaining lower oil levels on blanking and press lines will contribute to numerous savings throughout an automobile manufacturing operation. Consequently, many leading automobile companies are pushing hard to find the lowest possible oil level that will consistently provide high quality parts. This involves the participation of die engineers and press line operational management to find common ground and achieve the desired goal. Several automobile companies have set standards in the 50 to 70 milligrams per square foot area (5 to 7 grams per square meter) – a challenging goal for blank washer and roll manufacturers. Meeting such standards typically would require higher roll forces that, in turn, require larger roll assemblies and machines that are more robust.

The joint development teams went to work on these challenges as well. In designing their new VNP11A cover, which is orange in color, FKM and Freudenberg for instance, set their sights on a two-fold goal -- lower oil film thickness with less demanding force. A good example of how the team met its goal can be seen on a pair of blanking lines located in a high profile North American Japanese automotive company. In this case, 40 to 60 milligrams per square foot of oil is accomplished with only 65 pounds of pressure per inch of roll face. This compares quite favorably to competitive non-woven rolls that are producing 150 to 250 milligrams per square foot with substantially higher roll pressures -- in the area of 100 to 150 pounds inch of roll face.



With successes like this, it's no wonder that automakers are embarking on a quest to modernize blankwashing. And, as the use of tailor-welded blank technology becomes more and more prevalent in today's automotive industry, it's also no wonder that the industry is turning to the roll product fabricators and their blankwasher manufacturer partners who can deliver the goods.