ARTIFICIAL LEATHER MARKETS IN ASIA

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Many years ago-before I commenced work in the Textile Industry-I was one of the last students to obtain a degree in Leather Technology from the only college of it's type devoted purely to the technical aspects of natural leather. At the time of entering that college, I along with my fellow students, was informed that I had entered the second oldest profession in the world- I leave you to guess the oldest.

Little did I know that some 35 years later I would be working in the areas of textiles using man made fibers to replace the natural product which we all then thought could not be replaced.

Can it be replaced- yes- most of the time now I find it difficult to tell some of the products apart from the natural material.

Must the natural product be replaced-yes. There are a number of reasons for this and these are the major ones-(1).

CONTINUING DEMAND FOR A NATURAL LOOK AND FEEL. There is a demand for leather goods, which continues to rise for both look and feel of the product. Artificial Leather can now be made which satisfies the vast majority of needs in this area.

COST OF NATURAL LEATHER. Many natural leathers - especially those being regarded as specialty or rare products - are becoming extremely expensive to catch - or have, as you prefer. For example- processing of natural hides for shoe soles can take as long as 8 to 12 months at an extremely high cost in all respects.

AVAILABILITY OF THE NATURAL PRODUCT. In many cases the natural product is no longer available. Some of the skins or hides we dealt with 30 years ago are no longer available. As animals become rare or protected this decline in availability will continue but the demand still increases.

VARIABILITY OF THE NATURAL PRODUCT. Natural leather is an inconsistent product of nature and the events which happened to the animal. Disease, injury, climate and feeding gave a variability, which meant craftsmen dealt with the product. The skills have died out, the availability of money to pay for such skills is no longer there and industry today does not deal comfortably with an inconsistent product. The skills have died out, the availability of money to pay for such skills is no longer there and industry today does not deal comfortably with an inconsistent product. What we in processing a natural hide regarded as an attraction- the variability- did not matter to most people.

GROWING REACTION AGAINST NATURAL PRODUCTS. As we are all fully aware there has been and will continue to be a growing reaction to 'using animals' or 'exploiting' them. We all have views on this matter but suffice it to say that this move will continue and will do so- especially when people can point to the Synthetic products now available.

What is Artificial Leather. How do we define it. Oddly enough no one has yet clearly defined it.

1) Synthetic Leather- using velour's, woven cloth, knitted fabrics or nonwoven fabrics as the base material and laminated/coated with PU to PVC film.
2) Man made leather- using nonwoven felt as the base and a complex chemical process- is the only material to make a satisfactory Artificial Leather product. It is "Leather like" in appearance, feel, durability and porosity and can be made better than the natural product in terms of resistance of aging.

Asian Market Analysis

The Artificial Leather market in Asia has been expanding rapidly in recent years. One of the main reasons is lack of natural resources.

The variety of applications and increased demand has caused people to invest in this field and this continues.

Artificial Leather is widely used for shoe material, bags, belts, clothes, upholstery etc.

The late 1990's statistics indicate a total quantity of 40 billion square meters of Artificial Leather produce in the Asian area of production. This includes ALL types of Artificial Leather.

Among these countries the main ones are:

TAIWAN	48% of product
JAPAN	22%
KOREA	18%
THAILAND	5%
INDONESIA	3%
OTHER COUNTRIES	4%

The rate growth of the market in 1998 was slightly less than 1996 and the indications for 2000 show a demand and therefore increase in production capacity.

The above mentioned statistics include both Synthetic Leather and Man Made Leather.

The technology used in the manufacture of Man Made Leather has advanced greatly in the last few years which has contributed greatly to the quality and this increased quality has helped generate additional demand for the products.

Basic Production Systems

There are 2 main parts or processes in the production of Artificial Leather.

These are the manufacture of:

A) THE BASE CLOTH AND
B) THE SUBSEQUENT CHEMICAL PROCESS.

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These are laid out simply as shown below as one of 2 types of process dependent on the chemical system used.

1) DRY TYPE.
   Base material Coating/Laminating Drying Surface Treatment.
2) WET TYPE
   Base material PU+DMF Coagulation Surface Treatment.

The first part is that of preparing the base material.

As mentioned above the best material for a base for Artificial Leather is a nonwoven felt.

The needle punched fibers entangled in 3 dimensions give the desired dimensional stability.

The use of micro fibers gives a very soft feeling needed to simulate the natural leather.

To reach the required result of evenness, thickness and dimensional stability each step from fiber preparation, opening, blending, carding, cross lapping, needling and calendaring is critical.

Any step which fails in it's desired function will result in an inferior felt.

With over 200 Shoou Shyng looms now used in the production of Artificial Leather over 19 years we believe we have developed the most advanced system and pool of needling technology in this field.

Here we see a production configuration which is recognized as being the ideal by most of our customers.

Base Cloth Manufacturing Line

FIBER OPENING
↓
BLENDING
↓
CARDING
(using Tandem Cards as an option)
↓
COMPRESSIVE BATT FEED
↓
PRE-NEEDLER
↓
1ST FINISHING LOOM
(Cross Punch- Double Sided)
↓
2ND FINISHING LOOM
(Cross Punch-Double Sided)
↓
3RD FINISHING LOOM
(Cross Punch- Double Sided)
↓
4TH FINISHING LOOM
(Cross Punch- Double Sided)
↓
CALENDAR
↓
WIND-UP

In the course of production the following key points are extremely important;

a) The less elongation- the better the product.
b) The more fibers vertically oriented the better.
c) The less the materials is punched- the less the fiber damage.
d) The finer the needle- the smoother the felt.
e) The better the entanglement- the better the dimensional stability.

To achieve the above then we recommend the following;

I. Use of a compressive batt feed device to minimize the resistance, draft and control the batt into the needling zone with minimal batt distortion.
II. We consider the ideal number of needles on the pre-needle to be around 1500/2000 per meter in a randomized arrangement. The pre-needle punches the batt relatively slowly so as to set it's basic form and avoid over drafting of the horizontal fibers. This is a key point.
III. At this point mention should be made of the overall control of line speed, the infeed/outfeed speed ratios and accuracy of 1st finishing loom especially in this respect.
IV. Using an upstroke pre-needle will help reduce the friction in movement and maintain a stable web transportation. In this case the penetration is shallow, the needling mark small, and there will be less broken needles. Any broken needle will tend to fall away from the batt to the floor instead of remaining in the loom and causing damage to the web as would happen on a downstroke loom. In addition this allows the untouched side to be more easily laminated to another web or batt. To laminate with another down stroke pre-needle the web from the second pre-needle may be punched deeper because the lower layer has already been punched and provides an excellent carrier through this second pre-needle. At this point the 2 batts are evenly laminated and are an ideal material for the 1st finish needle.
V. The stroke length for the 1st finish loom is 50mm which is enough for webs of 25/30mm thickness. The needle density is now 6900 per meter per side as the fibers are punched one way and then- on the second part of the loom- separately the other way.
VI. At this point the web is about 10mm and the 2nd finish loom can have a stroke length of 40mm. There must also be careful control of the stripper gap to avoid web up/down movement. By using a shorter stroke loom wear is minimized as is power use.
VII. The 3rd and 4th finish looms follow the same pattern as the 1st finish loom. As the material progresses through the various finish looms then needles, stroke rates- even on each side of the same loom- can be modified to suit the individuals material requirements.

Shoou Shyng looms have been developed with such as the Artificial Leather market as a major part of it's business.

This has allowed us to develop looms with following features

a) Every Shoou Shyng loom has a dynamic lubrication system with automatic filtering, automatic cooling and constant high pressure to the main bearings.
b) A special device to ensure a constant temperature for all driven parts and eliminate stresses and shearing effect on bearings.

c) Devices to maintain a constant ratio between input and output of the loom even after years of operation. This ensures a constant control of draft ratio over the complete speed range and during start and stop times.
d) A very easily accessed drive housing.
e) Long lasting but easily replaced oil seals.
f) A perfect balancing device giving less vibration, low noise levels, minimal harmonic problems and an extremely long life.
g) All bearing in the loom are designed to an international standard which allows for replacement purchase in most countries locally.

The second part of the process is that of chemical treatment. I am indebted to Crown Machinery of Taipei for the information for this part of the paper. This is a very complex system and a very simple overview is all that can be given so I have prepared flow charts of various types of chemical after treatment.

Chemical Treatment Systems

WET TYPE PU RESIN
↓
TEXTILE FABRIC
↓
COATING
↓
COAGULATION
↓
WASHING
↓
DRYING
↓
WIND-UP
↓
PRODUCT INSPECTION
↓
PRINT PROCESSING
↓
EMBOSSING
↓
SPRAYING PROCESS
↓
BUFFING
↓
FINAL PRODUCT INSPECTION

ALTERNATIVE WET TYPE PU RESIN
↓
TEXTILE NONWOVEN FABRIC
↓
DIPPING
↓
PRE-COAGULATION
↓
COATING
↓
COAGULATION
↓
WASHING
↓
DRYING
↓
WINDING
↓
PRODUCT INSPECTION
↓
PRINT PROCESSING
↓
EMBOSSING
↓
BUFFING
↓
FINISHED PRODUCT INSPECTION

DRY TYPE PU RESIN
↓
TEXTILE FABRIC
↓
RELEASE PAPER
↓
SURFACE COATING
↓
DRYING
↓
COATING
↓
LAMINATING
↓
DRYING
↓
WINDING
↓
CURING
↓
SEPARATION
↓
PRINT PROCESSING
↓
FINISHED PRODUCT INSPECTION

The chemical process is both complex and expensive- as is the base product loom with 5 looms on it.

So we will see a continuing trend to more use of Artificial Leather- and probably unnoticed by most people. This continuing growth will benefit all consumers and I suppose animal as well.