


CHAPTER 10

NON-WOVENS AND OTHER FABRICATION METHODS

- ### OBJECTIVES
- WHAT OTHER TYPES OF FABRIC CONSTRUCTION METHODS EXIST BESIDES WOVENS AND KNITS?
 - HOW ARE THEY MADE AND WHAT ARE THEY USED FOR?

- ### FABRICS FROM FIBERS
- FABRICS FROM FIBERS
 - NONWOVEN (FIBERWEB) STRUCTURES: TEXTILE SHEET STRUCTURES MADE FROM FIBROUS WEBS BONDED THROUGH USE OF RESINS, THERMAL FUSION, OR MECHANICAL MEANS
 - PROPERTIES CONTROLLED BY FIBER CONTENT, FIBER ARRANGEMENT, AND BONDING MECHANISM
 - WEB PRODUCTION, FABRIC PRODUCTION, BONDING MECHANISM


- ### NON WOVENS
- TAPA CLOTH – BARK
 - DURABLE NONWOVENS
 - DISPOSABLE NONWOVENS
 - GEOTEXTILES
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- ### NONWOVEN METHODS
- **DRY-Laid:** FIBERS ARRANGED IN RANDOM OR ORIENTED ARRANGEMENT; WIPES, WICKS, QUILT BACKING, LAMINATING/COATING BASE FABRICS.
 - **WET-Laid:** FIBERS ARRANGED FROM SLURRY OF FIBERS AND WATER; LAMINATING/COATING BASES, WIPES, ROOFING SUBSTRATE.
 - **SPUN-BONDED:** LAY CONTINUOUS FILAMENTS ON CONVEYER BELT, FUSED, HEAT/PRESSURE BONDED; CARPET BACKING, GEOTEXTILES, ENVELOPES, FILTERS, PROTECTIVE APPAREL.
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- ### NONWOVEN METHODS
- **HYDROENTANGLED (SPUN-LACED):** SIMILAR TO SPUN-BONDED, WATER JETS CREATE PATTERN; APPAREL AND FURNISHINGS.
 - **MELT-BLOWN:** EXTRUDED, BROKEN INTO SHORT FIBERS BY HIGH SPEED AIR, COLLECTED ON CONVEYOR BELT, AND BONDED; HOSPITAL-MEDICAL USES; BATTERY SEPARATORS.
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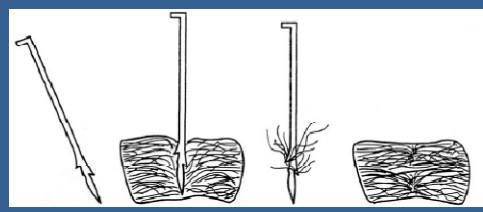
BONDING MECHANISMS

- **NEEDLING OR NEEDLE PUNCHED:** BARBED NEEDLES MECHANICALLY INTERLOCK FIBERS.



- **CHEMICAL ADHESIVE:** GLUES FIBER TOGETHER.
- **HEAT:** MELTS FIBERS TOGETHER AT OVERLAP.

NEEDLE-PUNCH PROCESS



(A) Barbed needle, (B) Needle pulling fibers through web, (C) Entangled fibers in a web cross section, (D) Needle-punched web

OTHER FIBER WEB STRUCTURES



- **FIBERFILL:** BATTING, WADDING, AND FIBERFILL
 - CHARACTERISTICS: RESILIENT, LIGHTWEIGHT, RESIST SHIFTING
 - TYPES: POLYESTER, DOWN, AND OTHERS
- **FUSIBLE FIBERWEBS**
- **FELT:** FIBERS INTERLOCKED; NO GRAIN, DOES NOT FRAY OR RAVEL; STIFF; WEAK; CRAFT AND INDUSTRIAL USES



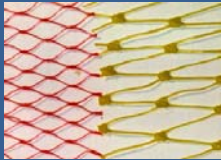
FELT







OTHER FABRIC FROM FIBERS

- **NET-LIKE STRUCTURES:** EXTRUDE ONE OR MORE FIBER-FORMING POLYMERS AS A FILM OR NETWORK OF LIGAMENTS.
 - TUBULAR NET FOR PACKAGING FRUIT AND VEGETABLES, AERICULTURAL NETS, AND FENCING



FABRIC FROM SOLUTION

- **FILM**
 - SOLUTION EXTRUDED THROUGH SLIT OR CAST ON HOT DRUM
 - FABRICS: HOT AND CLAMMY UNLESS POROUS
 - UNIFORM IN APPEARANCE AND QUALITY
 - MAY BE EMBOSSED TO RESEMBLE LEATHER
 - WATER AND AIR IMPERMEABLE
 - SOIL RESISTANT
 - WEAK AND STIFF




FILM TYPES

- VINYL FILMS STIFFEN WITH DRY CLEANING AND COLD.
- POLYURETHANE FILMS ARE WASHABLE AND DRY CLEANABLE.
 - DO NOT STIFFEN IN COLD WEATHER.



PLAIN (NONREINFORCED FILM)

- SMOOTH, FIRM AND DENSE



FILM TYPES

- EXPANDED FILM:** SOFTER, PLUMPER, MORE DRAPABLE, WEAKER, LESS ABRASION RESISTANT; LESS IMPERMEABLE TO AIR AND WATER.
- SUPPORTED FILMS (COATED FABRICS):** FILM ATTACHED TO WOVEN, KNIT, OR NONWOVEN FABRIC. (NOTE: YARNS TO RIGHT FROM WOVEN SUPPORT FABRIC.)




FABRIC FROM SOLUTIONS

- FOAM:**
 - AIRY, SPRINGY, AND LIGHTWEIGHT
 - WEAK DEPENDING ON TYPE AND WEIGHT/THICKNESS
 - LOFTY; STIFF; WARM
 - PADDING FOR UPHOLSTERY, MATTRESSES, AND CARPETING




FABRICS FROM YARNS

- Braid:** YARNS INTERLACED LENGTHWISE & DIAGONALLY; FLAT OR 3-D; GOOD ELONGATION, PLIABLE, CURVE AROUND EDGES; APPAREL TRIM, FURNISHINGS, & INDUSTRIAL GOODS.



FABRICS FROM YARNS

- Lace:** INTERMESHED YARNS WITH OPEN SPACE BETWEEN/AROUND SOLID AREAS.
 - WOVEN, KNIT, CROCHETED, NETTED, BOBBIN, ETC.
 - CLASSIFIED BY TECHNIQUE & APPEARANCE




Lace

- HAND OF MACHINE PROCESS
 - Leaver's Lace or Schiffli embroidery
 - Cordonnet or re-embroidered lace with yarn or cord outlining design




Lace Quality

- BASED ON YARN FINENESS, CLOSENESS OF GROUND, AND DESIGN INTRICACY





OTHER OPENWORK FABRICS

- CROCHET
- HAIRPIN LACE
- MACRAME
- NETTING
- TATTING









FABRICS FROM FABRICS

- **COMPOSITE FABRICS:** COMBINE SEVERAL STRUCTURES INTO A SINGLE STRUCTURE.
- **ADVANTAGES:** INTERESTING TEXTURE; LIGHT WEIGHT & WARM; MORE BODY; LESS WRINKLING; QUICK TO PRODUCE; STABLE IF WELL DONE.
- **DISADVANTAGES:** MAY SEPARATE, OFF-GRAIN; DIFFERENTIAL SHRINKAGE; SAGS; BULKY; STIFF.



COMPOSITE FABRICS



- **COATED FABRICS:** COMBINE CHARACTERISTICS OF FILM WITH TEXTILE FABRIC; FILM ATTACHED BY
 - LAMINATION (FILM ADHERED TO FABRIC BY MELTING)
 - CALENDARING (FILM HOT CALENDERED ONTO FABRIC)
 - COATING (FLUID HOT FILM APPLIED BY KNIFE OR TOLL)
 - OTHER METHODS
- **POROMERIC FABRICS:** VERY FINE, MICROPOROUS POLYMER ON SURFACE; WATER VAPOR PERMEABLE; WATERPROOF; WINDPROOF; BREATHABLE.

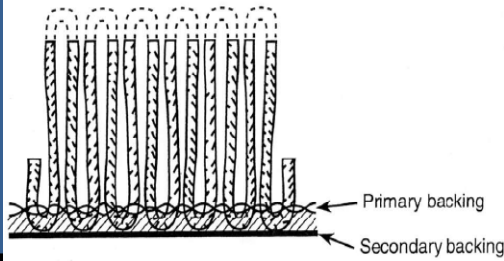


COMPOSITE FABRICS (CONT.)

- **SUEDE-LIKE FABRICS:** NEEDLEPUNCHED FABRICS OF MICROFIBERS COMBINED WITH RESIN COATING AND NONFIBROUS POLYURETHANE.
- **TUFTED:** YARN STITCHED ONTO FABRIC TO CREATE PILE-LIKE LOOK, USUALLY BACK-COATED TO LOCK YARNS IN PLACE.
 - UPHOLSTERY: IMITATION VELVET TYPES
 - CARPET: MOST COMMON TYPE ON MARKET; GAUGE, FACE WEIGHT, AND GRIN-THROUGH (RELATED TO TUFT DENSITY)




TUFTED CARPET



The diagram illustrates the cross-section of a tufted carpet. It shows a series of vertical tufts of pile yarns. Below the tufts is a layer labeled 'Primary backing', and below that is a layer labeled 'Secondary backing'.

COMPOSITE FABRICS

- **LAMINATED (BONDED):** ADHERE ONE OR TWO FABRIC LAYERS (SEE COATING METHODS); LIGHTWEIGHT, OFF-GRAIN, DIFFERENTIAL SHRINKAGE, DELAMINATION, GLUE BLEED, OR STIFFNESS PROBLEMS.
- **STITCH BONDED OR KNIT-THROUGH:** WARP KNITTING MACHINES USE NEEDLES TO INTERLACE FIBERS OF YARNS TO LOCK INLAID YARNS IN PLACE.



COMPOSITE FABRICS

- **QUILTED:** TWO LAYERS OF FABRIC WITH FIBERWEB COMBINED; BULKY, WARM, DECORATIVE.
 - THREAD QUILTING, TYPE OF STITCH & LENGTH AFFECT DURABILITY
 - PINSONIC; ULTRASONICS FUSE THERMOPLASTIC LAYERS TOGETHER
 - CHEMICAL ADHESIVES IN PATTERN FOR QUILTED EFFECT



COMPOSITE FABRICS

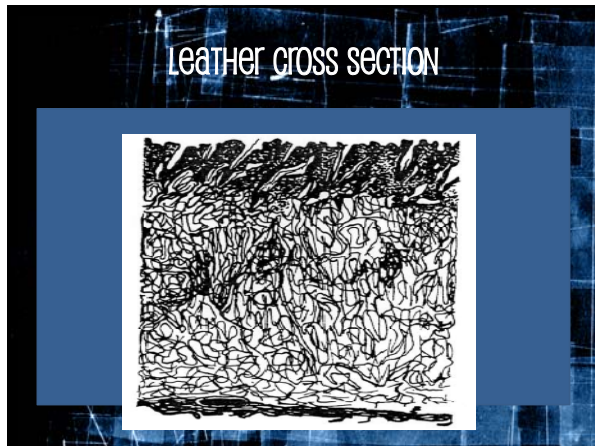
- **SUPPORTED SCFM STRUCTURES**
 - LIGHTWEIGHT NYLON SCFM SANDWICHED BETWEEN TWO FOAM LAYERS, FIBERS ADHERED TO ONE OR BOTH FOAM LAYERS; CHEAP, EASY CARE, DURABLE
- **FIBER-REINFORCED MATERIAL:** FIBERS ADDED TO RESINS, METALS, OR CERAMICS TO IMPROVE PERFORMANCE



LEATHER

- **TANNED SKIN/HIDE OF MAMMAL, REPTILE, FISH, BIRD.**
- SKIN VARIES IN QUALITY, THICKNESS, AND GRAIN.
- CLASSIFICATION BASED ON ANIMAL SOURCE.
- **TANNING:** CHEMICAL FINISH TO MAKE SKIN PLIABLE, WATER AND ROT RESISTANT.
- **OTHER PROCESSES:** BLEACH, DYE, EMBOSS, PRINT, GLAZE, BOARD, ETC.
- **Care:** LEATHER CLEANING METHOD.

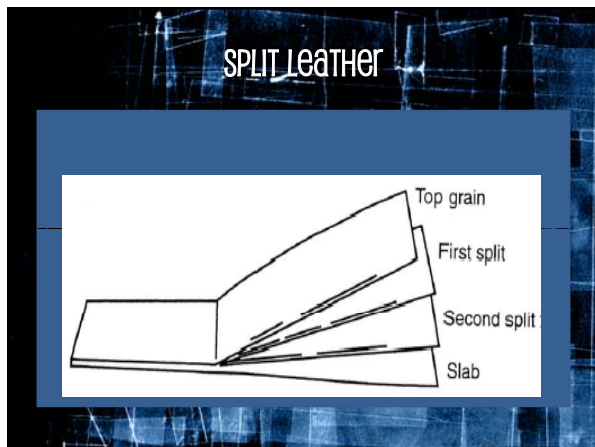




LEATHER TYPES




- **SPLITTING:** TOP GRAIN, FIRST SPLIT, AND SECOND SPLIT
- **SUEDE:** BRUSHED
- **GRAIN SUEDED LEATHER (NUBUK)** NAPPED ON GRAIN SIDE



FUR

- SKIN WITH HAIR ATTACHED
 - QUALITY VARIES
 - CHARACTERISTICS: MINIMAL SHEDDING, FIRMLY ATTACHED HAIRS; SOFT; PLIABLE; ODOR-FREE; LONG & LUSTROUS GUARD HAIR WITH DENSE, FULL UNDERHAIRS
 - CARE: FURRIER METHOD; SPECIAL STORAGE REQUIRED



SUMMARY

- FABRICS FROM FIBERS INCLUDE DISPOSABLE AND DURABLE FIBERWEBS, TAPA CLOTH, FIBERFILL, FUSIBLE FIBERWEBS (INTERFACING) AND FELT (TRUE WOOL AND NEEDLEPUNCHED/MANUFACTURED FIBERS). NET-LIKE STRUCTURES CAN ALSO BE EXTRUDED AS THE POLYMER IS FORMED.
 - FIBERWEBS ARE CREATED BY ENTANGLING THE FIBERS THROUGH DRY LAID, WET LAID, SPIN BONDED, HYDRO ENTANGLED, OR MALT BLOWN.
 - THEY ARE FUSED TOGETHER BY NEEDLEPUNCHING, CHEMICAL ADHESIVE, OR HEAT (MELTING)
- FABRICS FROM SOLUTIONS INCLUDE VINYL FILM, POLYURETHANE FILM, EXPANDED FILM, SUPPORTED FILM (COATED FABRICS), AND FOAM.
- FABRICS FROM YARNS INCLUDE NETTING, BRAID, LACE, CROCHET, HAIRPIN LACE, MACRAMÉ AND TATTING.
- COMPOSITE FABRICS USE MULTIPLE TECHNIQUES COMBINED AND INCLUDE COATED FABRICS, POROMERIC FABRICS, TUFTED FABRICS, SUEDE-LIKE FABRICS, STITCH-BONDED OR KNIT-THROUGH FABRICS, LAMINATED FABRICS, QUILTED FABRICS, SCRM SUPPORTED STRUCTURES AND FIBER-REINFORCED MATERIALS

SUMMARY

- LEATHER DOES NOT USUALLY CLASSIFY AS A "FIBER" BECAUSE IT IS THE ENTIRE SKIN OF AN ANIMAL, RATHER THAN INDIVIDUAL FIBERS THAT MAKE A YARN OR FABRIC
- THE SOFTNESS OF THE LEATHER DEPENDS ON THE ANIMAL, THE SECTION OF SKIN USED AND THE PROCESSING APPLIED TO THE LEATHER
- LEATHER CAN BE SPLIT TO CREATE SUEDE AND NUBUCK
- FUR COMES FROM THE Pelt, OR SKIN OF AN ANIMAL WITH THE FUR STILL ATTACHED. AGAIN, THIS DOES NOT CLASSIFY AS A "FIBER" AS THE ENTIRE SKIN IS USED, UNLESS THE FUR IS SEPARATED FROM THE BODY OF THE ANIMAL BY SHEARING OR BRUSHING (AS WITH ANGORA, CAMEL, WOOL, ETC.)