The Environmental Impact of reusable bed pads

An overview of the real impact of reusable bed pads from cradle to grave

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Current Status

- As an industry, we believe that reusable healthcare textiles are the socially responsible solution
- The ‘’Disposable’’ industry hasn’t taken this lying down
- We understand that no solution is perfect but one is better than the other

Evolution of Reusable Pad

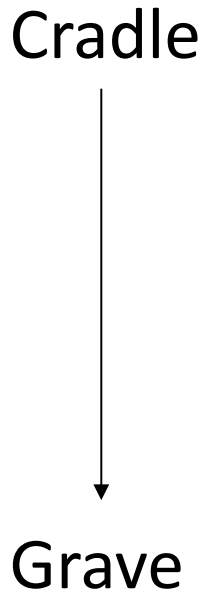
- circa 1970 –
  - Heavy butyl rubber on broadcloth, natural fiber soaker and face
  - Maximum life - ~80 cycles
- circa 1980-1990
  - Lighter weight flexible PVC on synthetic fabric
  - Synthetic/natural blends for soaker and face
  - Maximum life 200 cycles
- circa 2000
  - Increasingly lighter weight PVC on synthetic fabric
  - Optional fully bonded product
  - Maximum life 200 cycles

Circa 2010

- Face and Soaker:
  - Products can dry quicker (save energy)
  - Synthetic surfaces have quick stain-release properties (no need for rewash, save energy)
- Barrier:
  - Phthalate free and Heavy-metal free PVC
  - Light weight coatings and components
- Industry works as a team to address common environmental concerns (ARTA, etc)
- One reusable pad can replace up to 200 disposable underpads

Factors to Consider

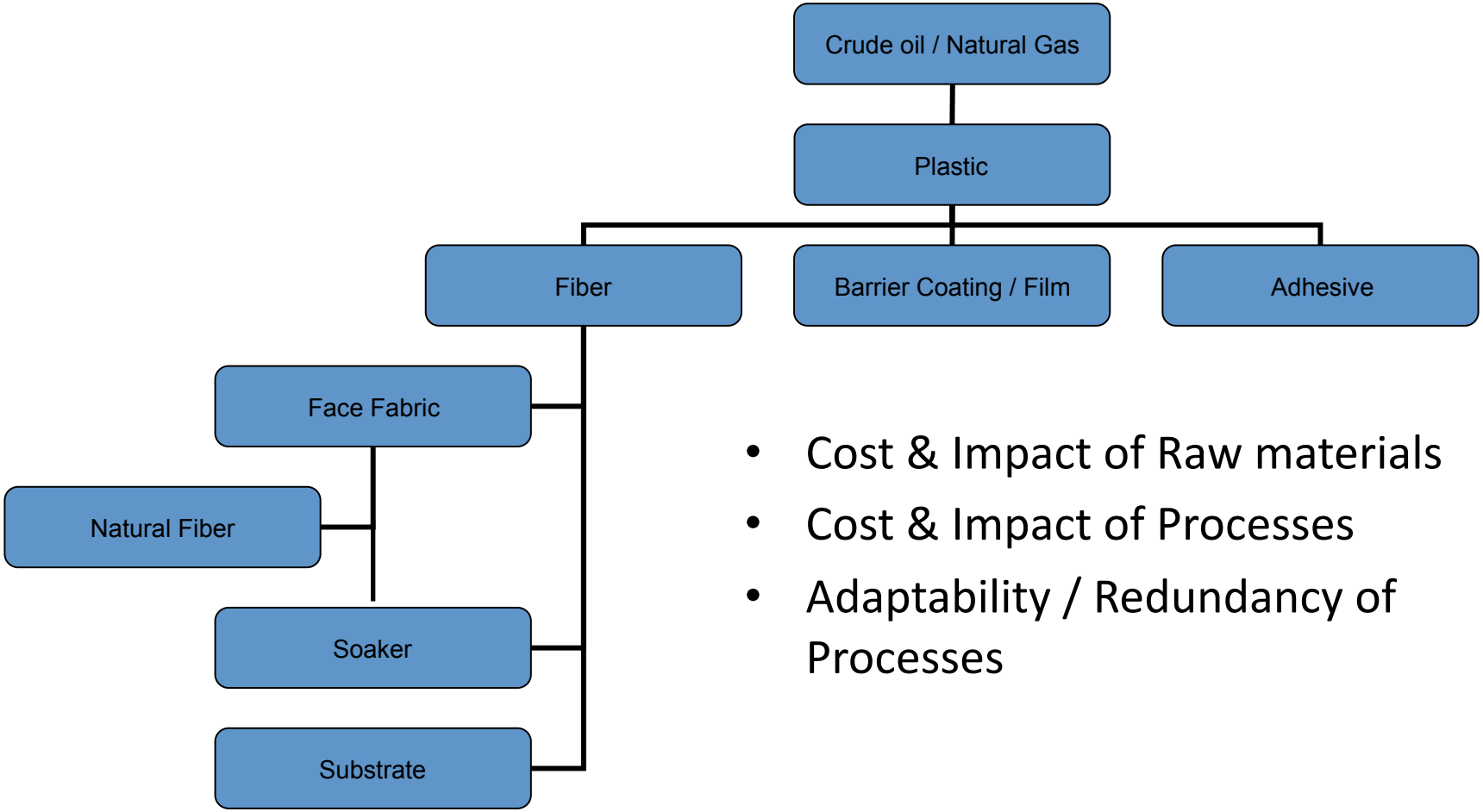
- Socio-, Economic-, Environmental-Impact of
  - Raw material manufacturing
  - Intermediate manufacturing
  - Converting / Assembly
  - Use
  - End of life



- Reusable and Disposable -

Factors to Consider

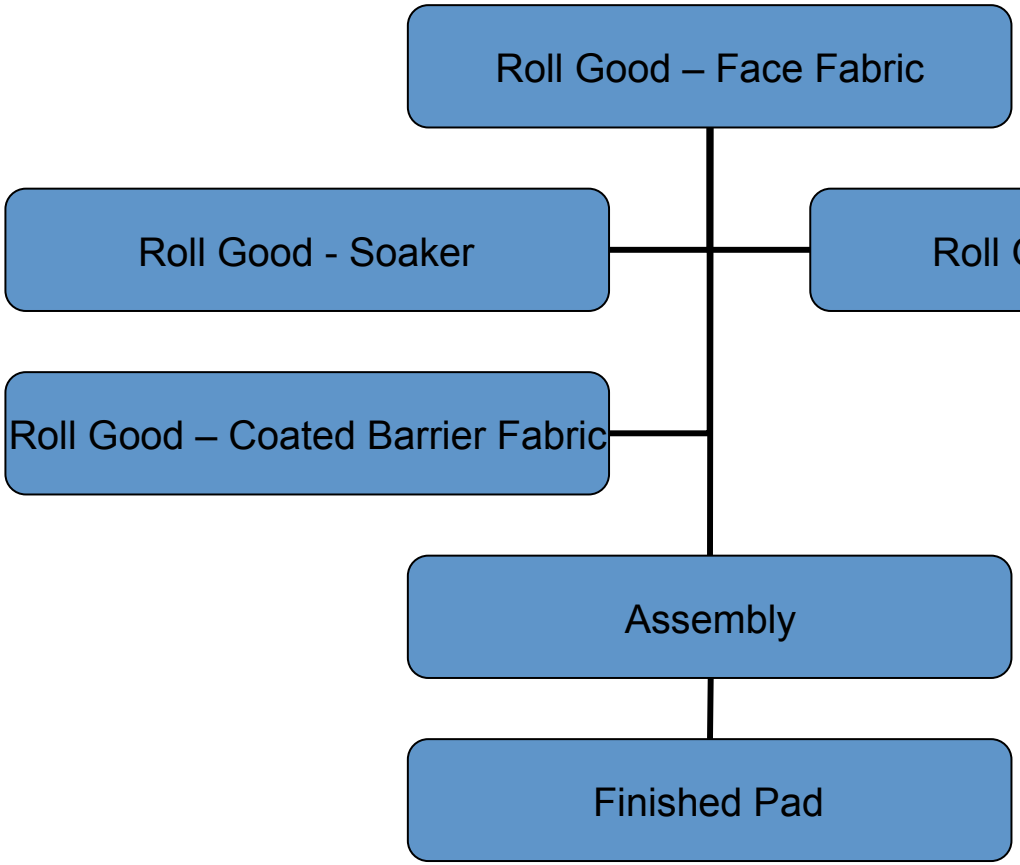
Raw Materials



- Cost & Impact of Raw materials
- Cost & Impact of Processes
- Adaptability / Redundancy of Processes

Factors to Consider

Intermediate Mfg & Converting / Assembly



- Cost & Impact of Raw materials
- Cost & Impact of Processes
- Adaptability / Redundancy of Processes

Factors to Consider

Use

- Reusable
  - Functionality
    - Single pad
    - Layflat properties
  - Long lifetime
  - Patient comfort
- Disposable
  - Functionality
    - Multi-pad application for extra protection
    - ~30% used for non-incontinence applications
    - “Pad-Lasagna”
  - Single-use
  - Patient comfort

Factors to Consider

End of Life

- Reusable
  - Laundry to re-use – 200x
    - Soiling to wastewater treatment via laundering
    - End of life pad to:
      - Landfill (0.006 lbs/pad-use impact)
      - Recycling opportunities
        - » Barrier into lower technical markets
        - » Fabric ragged out to rags or shoddy
- Disposable
  - Use to landfill – 1x
    - Soiling contamination and all pad components to landfill (0.25 lbs/pad-use)
    - Recycling is likely untenable

- 1970's

  The technological step change was going from butyl rubber to Flexible PVC.

  – Significant decrease in acquisition and maintenance cost

  – Significant increase in usage and value added

- 2000's

  Environmental and social concern regarding:

  – Recycling and re-use of products

  – Chemicals in the environment re PVC

What is PVC?

- PVC = polyvinylchloride
  - Polyvinyl chloride is produced by complete polymerization of the vinyl chloride monomer.
  - Significant proportion of its mass is chlorine:
    - PVC requires less petroleum than other polymers and uses naturally abundant Chlorine
  - Produces a very porous particle which accepts oils (plasticizers) to customize the softness / hand
  - Extremely durable, inherently flame retardant and low cost

Where is PVC used?

- WWII developed as a synthetic rubber
  - Wide adaptability (hard & soft goods) resulted in dramatic growth in use of PVC
- Applications include:
  - rainwear, blood bags, medical tubing, upholstery, flooring, trays, gloves, carts, handles, credit cards, seat covers, siding, roofing, pen barrels, weather-stripping, mud flaps, shower curtains, children's toys, pillow covers, food wrap, aprons, tents, tonneau covers, packaging, …, …

And of course <u>reusable underpads</u>

Why is PVC used?

- Durable – can last 200 wash dry cycles without leaking, cracking or losing it's flexible properties
- Controllable – applied as the protective coating without the use of adhesives
- Adaptable – can be formulated, adjusted to suit a variety of end uses
- Recyclable – all post industrial scrap (including mixed polymer streams) can be recycled; opportunities for post-consumer recycling programs
- Low cost with superior performance

What are 21st century concerns?

- Environmental and social concern regarding:
  - Recycling and Re-use of products
  - Chemicals in the environment re Flexible PVC

specifically

- Phthalates
- Heavy Metals
- End-of-life

What are the PVC Myths

PVC is not recyclable

PVC = Phthalates

PVC = Lead

Not true for the reusable underpad

PVC Recycling

- Proven infrastructure for post-industrial and some post-consumer waste
- Technologically balanced to one step-down
  - Coated textiles, flooring, floor mats, air deflectors, sound barriers, mud flaps
- Challenge – infrastructure to collect and separate coated textile from current supply chain

Plasticizers

- Plasticizers are needed to soften PVC
  - Takes PVC from the consistency of vinyl siding or credit cards to seat cushions or fishing lures
- Variety of plasticizers can be used to soften PVC
  - The technical challenges for plasticizers are:
    1. Exudation – stickiness or film build – leaving the product unusable
    2. Extraction – being removed through solvents, soaps or detergents – leaving the product stiff or brittle and subject to performance failure

Phthalate Plasticizers

- Phthalates are a broad category of highly effective plasticizers
- Have been the focus of debate re safety for use in children's toys and consumer products
- CPSIA actions:
  - Permanent restrictions to three types of phthalates in children's toys and child care articles
  - Interim (temporary) restrictions to three others in children's toys that can be placed in a child's mouth
  - Interim restriction to be re-evaluated based on a scientific study conducted by a Chronic Hazard Advisory Panel convened by the Consumer Product Safety Commission.

Phthalate Plasticizers

- North America programs provide phthalate-free, flexible PVC barrier fabrics in the market place.
- Most North American suppliers of coated textiles discontinued use of “restricted three” years ago, moved to the “interim three”
- The CPSIA legislation demonstrated the need for an alternative plasticizer package in the marketplace.
- Healthcare customers tend to err on the side of caution pertaining to the safety of their employees and people entrusted to their care.
- Majority of offshore pads contained PVC plasticized with one of the “restricted three” plasticizers…

North American programs provided a phthalate-free alternative to our healthcare customers

Metals in PVC

- Heat Stabilizers
  - PVC when exposed to intense heat can start to decompose
  - Mixed-metal heat stabilizers prevent decomposition
- Pigments and Colorants
  - Inorganic pigments are based on metal oxides
    - Iron oxide (rust) is a red pigment

Lead and other Heavy Metals

- North American coated textile manufactures do not stabilize product with lead
  - Lead and Cadmium based pigment and stabilizer discontinued in NA coated textiles over 20 years ago
  - Arsenic based antibacterial agents to control microbial growth; phased out of many PVC formulations
- CPSIA mandated increasingly lower content of lead and numerous other heavy metals in consumer products
- This legislation continues to result in significant recalls in imported consumer products (toys, bibs, bags, etc)

North American programs provide a consistent supply of barrier fabrics that meet the reduced heavy metal levels specified by CPSIA .

Evolution of Reusable Pad

- circa 1970 –
  - Heavy butyl rubber, limited re-use life
- circa 1980-1990
  - Light weight PVC , extended re-use life
- circa 2000
  - Lighter weight PVC, long life, product options
- circa 2010
  - Phthalate free, lightweight PVC, same long life and product options

Continued Evolution of Reusable Pad

- circa 2050 –
  - Phthalate free, even lighter weight F-PVC?
  - Alternate polymers beyond current offerings?
  - Higher performing components for >200 laundering cycles?
  - Alternative face and soaker component to improve per-use performance?
  - Recycling opportunities realized?