

## Appendix F. Benefits of Water-based Polyurethane

This appendix briefly describes the development of water-based Polyurethane dispersions for use in apparel and footwear products, along with the various benefits of transitioning to this technology.

### Solvent-based Polyurethane Drawbacks

Solvent-based Polyurethane (PU) production involves the use of volatile organic solvents with links to reproductive toxicological issues.

The harmful properties of these solvents make them the subject of regulatory action restricting their use and allowable concentrations in finished products. These substances are increasingly the target of various authorities.

Commonly used solvents in the production of PU, synthetic PU-leather, and PU coatings include *N,N*-dimethylformamide (DMF), Toluene, *N*-Methylpyrrolidone (NMP), Methyl Ethyl Ketone (MEK) and *N,N*-dimethylacetamide (DMAC).

Most AFIRM companies restrict these substances in finished products, and they are a regular cause of RSL failures due to improper drying/curing conditions during production. Improperly equipped and incorrectly configured factories regularly release these solvents into the ambient air, which harms factory workers directly and the environment generally. Residual amounts of these substances on finished products present consumer product safety issues for customers.

### Polyurethane-Waterborne NMP-free Dispersions

Water-based PU is not a new technology, but it has typically not been used in the apparel and footwear industry. New technology, however, has enabled the development of high-quality synthetic PU leather with minimal use of volatile organic solvents. This synthetic leather can be used in footwear, apparel, and accessories with minimal investments. A new foam generator is necessary, but traditional equipment such as a coating line and mixing units can usually be left unchanged.

Although water-based PU uses a dry process, it can be used in plants that currently use the wet process.

There are multiple benefits associated with transitioning to water-based PU, including:

- Dramatic reduction of toxic solvent use (worker/consumer/environmental safety)
- Reduced energy use (cost savings)
- Reduced use of solvents (cost saving as prices for solvents are expected to go up)
- Reduced greenhouse gas (GHG) emissions