

1. Executive Summary

Smart-Indigo™: Electricity instead of chemicals – The most sustainable way to dye denim

Summary with a description of the achievements:

The Smart-Indigo™ technology: Electricity instead of chemicals – The most sustainable way to dye denim. Smart-Indigo™ makes a difference in the denim world by using electricity instead of chemicals. This highly sustainable way to dye denim offers a liquid-indigo production where the only waste product is **oxygen!** The use of electricity instead of chemicals results in a process free of hazardous chemicals and emitting 90% less CO₂, consuming 70% less energy and 30% less water at different stages. This is a revolutionary technology that protects the environment, creates safer and healthier workplaces, and offers economical production.

Long-term ecological objectives:

By striving for a worldwide switch to the Smart-Indigo™ technology, Sedo Engineering wants to eliminate the use of harmful chemicals in the denim dyeing industry. As indigo is a powder that needs hazardous chemicals to make it water-soluble for the dyeing process. After dyeing, tons of wastewater containing these chemicals are discharged into the environment often without treatment. The excessive damages caused by those chemicals and heavy metals, like cadmium, chromium, mercury, lead, and copper are harmful to humans, animals, and the environment.

As a result, the industry will benefit from a process emitting less contaminated wastewater, 90% less CO₂, consuming 70% less energy and saves 30% water at different stages of the process. Equally important, is the achievement of safer and healthier working conditions in textile-producing countries.

Methodology of the technology:

“Smart-liquid-Indigo” is produced by an electrochemical process with a 3-dimensional carbon electrode technology consuming considerably fewer resources than existing methods. It uses only indigo pigment, caustic soda, water, and electricity to produce liquid-indigo. Within the 3-dimensional carbon electrode, the electricity takes over the indigo reduction reaction. Afterward, in a fully automated process, the produced clean liquid-Indigo is metered and fed directly into the dye bath. The Smart-Indigo™ solution is the most sustainable and independent way to dye denim.

Results of the use of the Smart-Indigo™ technology in the denim industry:

Planet. People. Profit.

Planet – massively reduced pollution:

- 0% hazardous chemicals
- 90% less CO₂ emission*
- 70% energy savings*
- 30% water savings*
- Massively reduced and cleaner wastewater load*
- 0km haul route, as indigo production on-site

People – healthier workplaces & fashion:

- No health risks - free of hazardous chemicals
- No fire hazards
- No toxic residues on denim garments

Profit – economical production:

- Zero costs for chemicals or pre-reduced liquid-indigo
- Lower costs for water, energy & wastewater treatment*
- Higher reproducibility through better color consistency*
- Fresh indigo on demand

*Measured under real production conditions by several denim producers