

Sustainable denim finishing using water recycling and renewable energies

GreenFactory SARTEX in Tunisia



The company SARTEX produces and finishes textiles in Tunisia. The project team designed a new “GreenFactory”, which includes sustainable production in the area of energy, water, wastewater and building cooling.

Energy

Tunisia is located between the Mediterranean Sea and the Sahara, which means that the Mediterranean and arid climates collide. Wind and sun offer the greatest potential for energy production in Tunisia. With more than 3,000 hours of sunshine per year, the good irradiation conditions offer excellent natural potential for the expansion of various solar plants (e.g. photovoltaic and parabolic trough collectors). Taking into account the average annual solar radiation of 1,850 kWh/m², a regenerative electricity production of up to 1,650 kWh/kWp is possible. Concentrated solar energy can also be used to generate heat in a sustainable way. Based on the high concentration factor of parabolic trough collectors, not only (high temperature) hot water but also

steam can be produced regeneratively. Furthermore, wind energy, due to its very good wind potential, also promises good yields for renewable and constant generation of electricity.

Within the concept of the “GreenFactory”, the electricity demand could be covered by photovoltaic modules and small wind turbines installed on the roof and in the outer walls. The required hot water used for various washing processes can be produced by flat-plate collectors. However, considering further processing steps, steam at a constantly high temperature and quality is also necessary. Due to the very good solar conditions, this can be generated sustainably by using parabolic trough collectors, which have the best conditions to cover the hot water and steam demand.



The “GREEN Production” concept not only generates sustainable energy, but also implements energy efficiency measures. LED lighting reduces electricity consumption and heat generation in buildings. The use of heat recovery also allows the washing processes to be optimised and steam requirements to be reduced.

(Waste)Water

In addition to the advantages for energy production using the solar potential, the climate in this area leads to a constant and growing water shortage. This is further intensified by an increasing water demand, which leads to an increase in saltwater intrusions in coastal areas. In this context, a sustainable use of water for textile production and finishing is one of the main objectives of the “Green-Factory”.



Sustainable use of water is based on two components: water saving and water reuse. Significant water savings have been achieved with the help of water-saving “washing recipes”. In this way, a reduction of water consumption of up to 50 % per pair of jeans can be achieved. Additionally, when using the new recipes the produced wastewater has a lower toxicity and a better biological and chemical degradability.

To reuse the washing water, the wastewater treatment system first had to be adapted to achieve better water quality. An optimised mechanical pre-treatment with subsequent biological treatment and membrane filtration (ultrafiltration) was proposed, as well as a low-pressure reverse osmosis, which could further minimise the salt content in the water to be reused, in order to promote reuse in production.



With the help of this developed concept proposal, the freshwater requirement could be reduced up to 60 to 90 %.

Building cooling

High solar radiation, the resulting constant and high temperatures (several months > 30°C), as well as heat-radiating machines for textile finishing within buildings require special attention to cooling. To reduce the amount of solar energy entering the outer walls and interior of the building, shading elements were installed in front of it. Furthermore, concepts for the cooling of the buildings were developed using groundwater that was pumped for the washing processes. The proposed concrete core activation and the active cooling of the fresh air provided a considerable reduction of the air and building mass temperature.

Project overview

PROJECT TITLE

GreenFactory SARTEX in Tunisia

PROJECT PERIOD

2018 – 2019

PROJECTPARTNERS

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