

## Client Case Study “Paper from Air”

### Background

GEN3 was asked to help a client reduce the amount of water used to make their paper products. Historically sanitary-hygienic tissue was produced using **1 ton of water** for every kilo of dry fiber. Water is needed for establishing hydrogen bonds between the molecules of the cellulose fibers contained in paper so wetting the fibers is a necessity.

Historically water has also been used to transport these fibers to the web used for paper forming. The liquid paper suspension, thus obtained, then had to be dried. First, it was necessary to wait until excess water would gravity flow off the web; then water was pressed from the wet paper web using special drums; and finally the paper web was heated on another set of drums to evaporate the last of the water.

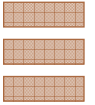
This process was a very time consuming, energy-intensive process that also had significant sustainability disadvantages because of the aggressive chemical additives added to the water. Paper manufactured by this method was too expensive to successfully compete in the marketplace.

### The Solution

GEN3 performed a Su-Field analysis, identifying the use of water in the transport of the fibers as detrimental. This analysis suggested that the key was to find another substance to perform the same function as the water, one without these harmful effects.

However, the second function performed by water, promoting adhesion of the cellulose fibers, could not be eliminated as it was critical to the hydrogen bonding process mentioned above. In subsequent testing GEN3 discovered that the adhesion function could be achieved with as little as **one kilogram of water in the form of steam** per kilogram of fibers – a 1000X reduction in water usage.

This discovery opened the door to testing an alternative material to perform the transport function. To arrange slightly wetted fibers as a thin layer, GEN3 subsequently developed a fundamentally new technology, a low-moisture forming method based on using **air instead of water** to transport the fibers to the forming web (see figure below).



A prototype system was built at the client's facility and worked as planned. Based on this technology, the client now manufactures very inexpensive disposable paper cloths, paper towels, tissue, and toilet paper which have a significant competitive advantage.

**Moreover, a reduction in energy consumption of almost 300% and a reduction in capital equipment costs by approximately 50% have enhanced their ability to compete successfully on price.**

