An innovative new portable salt refinery

An early patented salt washing system (U.S. patent 25th June 1963) can be seen in the black and white photos (following page), being used in a salt pond in South Africa. The hopper was on wheels, which means the device could be moved from one brine pond to another. The salt from the crystallizer pond would be shoveled into the hopper where it would be sieved, and brine would be pumped in to wash it. Thus, the action of the mixture of salt and brine would achieve two goals: transport and wash the salt, landing clean salt on dry land on a stockpile, where it would drain. This washing system was built from common steel, which meant it required thorough and regular (after every season) maintenance and service.

In 1976, a salt engineering company Saltec (Rome, Italy) designed and built a salt refinery which could be transported in small containers. The system, aptly called “The Compact”, consisted of three containers: the first, a washing and refining system; the second, for salt drying; and the third, a screening and packing machine. The benefit of this ingenious device was that it offered a turn-key solution for refining salt. The client would build the foundations, supply electricity, water, and brine, and the Compact could be plugged in upon delivery, ready for production. Saltec’s Compact washing and refining system (1st container) with a production capacity of 3 tons per hour, was custom built and delivered to a salt production enterprise in Mozambique. Unfortunately, as chance would have it, the container was washed away in the devastating floods that hit Mozambique in the 1990s, and any photographic evidence disappeared along with it.

Over the past 30–40 years, the salt industry has undergone a dramatic change. Taking Europe as an example, four decades ago there were far more small salt producers than there are today. As the market demand changed, only those who understood the changes and invested in new technology, survived. Another factor that led to the gradual demise of small producers was urban and industrial expansion. As the value of the land increased, many producers gave up land for financial gain. The universal salt iodization programs that began in the 1990s revolutionized the salt industry, with a profound impact on the small-scale, artisan salt farmers. In 2016, small-scale salt farmers continue to contribute a sizeable proportion of iodized salt in a number of countries to help sustain a high household coverage. In many cases, their enterprises support large families and entire communities.

As salt technology evolved in leaps and bounds, its application became more widespread and accessible. But as with any technology, its adoption depends largely on the economics: the initial financial cost and return on investment. Time equals money, and nowhere is this more apparent than in solar salt production, where the harvest is dependent on the season (not unlike agricultural crops), and achieving a high-quality product requires a lengthy process of scraping up salt crystals, piling the salt in heaps, and washing out the impurities using brine, before the salt can be moved out of the crystallizing pond onto dry land to drain. The more time-consuming this process is, the lower the overall return on investment. Therefore, shortening it could improve both yield over time and the profit, and this can be achieved using salt washing machinery.

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In 1976, a salt engineering company Saltec (Rome, Italy) designed and built an ingenious compact salt refinery in a container. The requirements have not changed since the days of the Compact: adequate technology must go hand in hand with affordability, low upfront investment and running cost, and mobility, so that farmers could share the benefits of a joint investment. As seen in the schematic, the Washinery consists of washing components that feed a centrifuge to reduce water content in the final stage of iodization. Thus, the salt exits at ca. 5% maximum moisture content. Salt loss during washing depends on the quality of the dirty salt and can vary from 12% to 18%. The brine used for washing can be recycled, so all losses are mostly recuperable. As the project develops and the Washinery becomes a reality, updates on this exciting development will be shared.

An early salt washing system patented in the U.S. in 1963, here being used in a salt pond in South Africa. The apparatus is mobile thanks to wheels, and the hopper can be moved from pond to pond. Salt is loaded and washed with brine, and it lands on stockpiles to dry.

This schematic depicts “The Washinery” developed by Shriram Engineering (India): a series of salt washing devices that feed into a centrifuge to reduce water content in the final stage of iodization.