

# Remote Islands: The Spruce Meets The Challenge

With models ranging from 6 to 20 tons of liquid Oxygen/Nitrogen per day, the Spruce range of air separation plants are specifically designed to meet the technical, infrastructural and environmental challenges of geographically or logistically remote locations. Recognizing this, a major Industrial gas provider in the South Pacific recently installed a Cosmodyne Spruce 7 to supply their new, state of the art cylinder filling facility. Another large company in the Caribbean has also seen the benefits of the Spruce for their island location and purchased a Spruce 7 Warm End Module to replace that of their older model GFED LIN/LO<sub>x</sub> generator.



Spruce 13 with tank farm and cylinder filling stations

These flagship “packaged” plants represent a new era for modular ASUs, combining traditional robust mobility with high efficiency and state of the art PLC control. “The Cosmodyne design & development team has dedicated a huge amount of time & energy into transforming the modular concept into a product that comprehensively meets the modern needs of these remote and/or emerging locations” says Bruce van Dongen, General Manager of Cosmodyne Packaged Plants. “Anywhere that is isolated logistically or that may have infrastructural or technical resource limitations will benefit. For example, Nigeria is a country with challenges that mirror those of island locations in many respects. The Spruce 13 commissioned there 3 years ago has been a great success”.

Mobility, reliability, safety and durability have always been important for this sector of Cosmodyne’s business, but the cost of energy and resources has now become a primary concern for all customers, as is the need for fast and inexpensive technical support. Innovative thinking and the advanced technology now available in the world of instrumentation and PLC control has been utilized to create a solution that represents a whole new platform of small ASU’s.

Packaged air separation plants were once viewed as a preliminary starting point for developing markets in uncharted or remote areas, somewhat unsustainable, or at least not very profitable, in the long term due to their low specific power relative to larger units. The revolutionary efficiency levels achieved by the Spruce plants has changed this situation drastically, and, if market demand increases, customers now have the option of adding modular capacity to their existing Spruce units rather than investing heavily in larger plants.

The efficiency gains were achieved by various changes to the conventional small plant design: utilizing oil free centrifugal compressors with low power consumption; improved turbo-expanders with advanced-technology bearing systems and the incorporation of a booster-compressor that utilizes the available energy from the expander. In addition, the heat exchanger design incorporates a highly efficient sub-cooler for liquid products, as well as the latest technology high performance fins, with close approaches resulting in high process efficiencies. These heat exchangers extract more energy



Spruce complete warm end being installed



Spruce complete warm end

from the process to reduce power consumption. The columns were re-engineered as well, with improved tray design for lower pressure drops and higher yield.

For the Spruce 13 and 20 models, a dual-compressor design (with separate Air compressor and Recycle compressor) was utilized to allow a significant reduction in adsorption and chiller power consumption.



Van Dongen adds “Cosmodyne’s many decades of experience with remote locations, whether oceanic islands or inland areas in undeveloped regions from Africa to Alaska, has highlighted a number of common issues which need to be considered in the design of ASU’s servicing these markets: small roads, limited or expensive (or poor quality) water supply; costly electricity, with frequent outages or voltage fluctuations; extremely hot and humid conditions as well as corrosive, salty air. In addition these areas are often very logistically isolated and travel for support technicians is expensive and time consuming. Delivery costs are likewise high”.

“So, apart from the improved efficiency and the durability of these units, they have specific structural and functional design features to overcome these challenges. For example, all the Spruce models are 100% air cooled. Water availability or cost is no longer even a *consideration*. The specialized bearings in the ACD turbo-expander provide excellent protection for rundown after power loss, whereas the hydrodynamic bearings common in other plants this size are very sensitive to oil loss after power failure.

All the Spruce models have full remote-control capacity, which means the support team can provide remote startup, monitoring, optimization and assistance, 24/7, regardless of the plant’s location. This is

extremely important for customers who need the assurance that *effective* support is only a phone-call or email away, particularly in the case of a new plant unfamiliar to the customer’s operators or maintenance technicians”.

Savvy customers are looking at the *overall investment*: not only purchase price but the cost of logistics, installation, commissioning and then maintenance and energy costs long-term. So reducing shipping, installation and commissioning costs is a primary design-consideration as well. These plants ship inside 3 standard, un-modified ISO containers, significantly reducing delivery cost whilst ensuring that the equipment arrives at site in good condition. The *overall installed cost* of a high quality, advanced-technology Spruce unit is not considerably more than that of most of the lower quality products of equivalent size on the market today.



Cosmodyne offers full cryogenic-production performance-testing at its manufacturing facility, with the buyer invited to observe this test-run before shipping.

This preliminary testing process, coupled with the minimal field piping and wiring requirements at final destination, assures that final commissioning will be simple, hassle-free and cost-effective. Customers’ technicians also have the option of specialized training in operation, maintenance and trouble-shooting during the initial commissioning at the Cosmodyne facility.

“The market is responding very positively to this range of ASUs and Cosmodyne is now offering a self-contained, skid-mounted product storage facility, complete with product lines, tanks, transfer pumps and high pressure cylinder filling pumps”.

The “tank-farm” control system is integrated with the Spruce: levels and pressures are monitored by the Spruce PLC and the plant will automatically shut down when the tanks are full. The PLC can be programmed to automatically restart the plant at a designated tank-level setting.

The overall design of the tank-farm takes into account the same challenges that have shaped the evolution of Cosmodyne’s packaged plants into the market-leading Spruce series.

For more information, go to [www.cosmodyne.com](http://www.cosmodyne.com).