

## Editor's Point – Skill, Engineering & Enterprise

In our pursuit to promote Engineering through STEM in USA, and Skill & Entrepreneurship development in India, it would be worth peeping into the historical background of some of the enterprises that started with a solo player, crossed over 5 to 15 decades and have grown as industry leaders in Manufacturing. There are numerous examples of success and failures that need to be part of the curriculum in our education. Air Products, Bosch, Corning, Eaton, GE, Honeywell, Kirloskar, Murgappa, L&T, Siemens, Tata etc. are just a few names that made history.

Leonard Parker Pool (1906-1975), the founder of Air Products and Chemicals Inc. was intelligent student but could not study beyond High School for family circumstances. He took to the job of oxy-acetylene gas welding, sold Pillsbury floor, gas cylinders and welding equipment.....and entered the business of manufacturing small Oxygen Generators in association with an ENGINEER. The duo an ENTREPRENEUR and ENGINEER made history. The company, a leading MNCs in Industrial Gases, Chemicals and Materials business is currently in its 75<sup>th</sup> year.

The point to ponder over here is the struggle that LEONARD faced in the initial years, converting every threat into opportunity, and competing with established players in the Industrial Gases segment. The later growth of the Company could be attributed to professional leadership, strategic acquisitions, focus on R&D, and HR policy.

## Company Profile – Air Products and Chemicals Inc.

Think of running shoes, flat-screen TVs, shrimp cocktail, bone scans, sports cars, and clean air – these are not the products of AIR PRODUCTS, but its expertise is built into these and thousands of other products. A glimpse of the range of products and services of the Company could be had from the following links –

[Products Overview](#)

[Gases](#)

[Chemicals](#)

[Equipment](#)

[Services and Solutions](#)

**Leonard Pool** started the company with the idea to distill oxygen at customer's site, saving high transportation cost of cylinders. He was only 22 when he recruited FRANK PAVLIS, a graduate of Michigan College of Mining and Technology and MS in Chemical Engineering from the University of Michigan at Ann Arbor. It is interesting to know how Pavlis with an offer from SHELL Oil in his pocket got lured to work with Leonard.

The first task was to get specifications of compressor for a 350 Cu Ft per hour oxygen gas plant. Pavlis had no idea of air separation plant to start with and he rushed back to his college at Ann Arbor to gather details for design. The two had no practical skill in soldering and brazing but could get hold of a French technician for the job. The team worked hard with dilapidated tools including a drill press and a grinder. After a year's labour, the plant successfully produced 359 Cu Ft per hour of 99.5 percent pure oxygen.

It was the summer of 1940 when Air Products Inc. was born. Whereas the conventional practice was to use water as lubricant that required several steps to remove moisture from oxygen, design developed by this new company used a compressor lubricated with liquid oxygen and graphite. The product was ready for marketing at a time when the American business climate was affected by a Great Depression.

The initial diversification led to addition of other gas products like Nitrogen, Helium and Hydrogen to the portfolio followed by manufacturing of gas handling implements, like - welding tools, anesthesia equipment and cryogenic systems to begin with. Entered chemicals business in 1960s with the purchase of a three specialty chemical companies. Strengthening the portfolio, it later acquired intermediates business of Britain's Imperial Chemical Industries; electronic chemicals business of Ashland Specialty Chemicals, supplemented with the purchase of Solkatronic Chemicals and the addition of a methylamines plant in Florida.

OPEC's oil embargo accelerated investment in joint venture for synthetic fuels; methane recovery plant; development of plant for garbage to steam and electricity; refuse - fired "cogeneration" technology; joint venture with Mitsubishi Heavy Industries to market flue gas "desulfurization" systems; methane gas reclamation business for landfills; Tyre recycling technology that reduced environmental and health hazards and offered cost savings for the production of rubberized asphalt, shoe soles, carpet underlays and many other products.

In 2002, Air Products acquired the home respiratory business of German rival Messer Griesheim. American Homecare Supply (AHS) was acquired in October 2002 and renamed Air Products Healthcare, as a leading private supplier of home medical equipment. With this, Air Products was supplying homecare services to more than 275,000 patients from more than 200 sites in 14 countries.

## Space Age Spurred New Interest

Leonard Pool profited in late 1950s from the supply of liquid Hydrogen for the launch of the first Soviet Sputnik. Around this time, a 12-year, \$281 million contract to supply liquid hydrogen for the space shuttle program of NASA bolstered its earnings. As a leader in HYDROGEN production, Air Products has set up more than **160 hydrogen fuelling stations** for cars, trucks, vans, buses, scooters, planes, cell towers, material handling equipment and even submarines.

**R&D** has been a major strength for developing performance materials. Air Products was engaged in joint ventures with Nanotechnologies Inc. of Texas and Europe's Nanogate to develop materials with new properties. **Electronics – INDUSTRY**, an important client for the high-purity gases, materials and delivery systems had been instrumental in evolving a synergy that perhaps led to diversification from gases to new materials.

**Human Resource Development** – established three golden rules of hiring professionals:

1. Hiring delegated to line managers, considered to be better judge of applicant's potential rather than depending on services of recruitment agencies.
2. The applicants selected are made to spend long periods in departments of their choice to decide, where their skills would be best employed.
3. As a policy measure engineers and chemists working in Air Products are exposed to managerial positions to make them capable for future success of the organisation.

**21st Century** - strengthened leadership in natural gas liquefaction; added expertise in surface science and acquisition of Tomah3 Products; became leading industrial gas supplier in Central Europe; secured largest ASU orders with Shaanxi Future Energy Chemical Co. (12,000 TPD oxygen) and Shanxi Lu'An Mining Co., (10,000 TPD oxygen), driven by the large-scale coal gasification and petroleum projects in China.

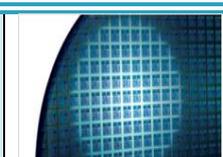
Acquired 50-50 interest in DuPont Nano Materials LLC, to serve semiconductor and wafer polishing industry; EPCO Carbon Dioxide Products, Inc. for catering to the food, beverage, chemicals, pharma, oil fields and metals fabrication markets; and controlling stake in INDURA, one of the largest industrial gas company in South America.

BPCL Kochi Refinery has outsourced entire industrial gas utility scope covering hydrogen, syngas ( mixture of hydrogen and CO), nitrogen and oxygen with the vendor providing for own power requirement, thereby creating a reliable utility island. The Air Product Utility Island is scheduled for a phased start up in early 2015. When complete, it would be the largest outsourced hydrogen project in India. Integration of power generation with hydrogen using steam methane reformers (SMRs) brings down the cost for both Air Products and BPCL (Bharat Petroleum Corporation Ltd).

This issue is dedicated to Leonard Parker Pool to suggest what it needs to be an ENTREPRENEUR. For details refer to website of company or "Out of the Thin Air" by Butrica, Andrew J: A History of Air Products and Chemicals, Inc., 1940–1990, New York: Praeger, 1990.

## The KNOWLEDGE Link(s)

- " Make Great Presentations" is the theme of Veerendra Jaitly's BLOG of the Month - [https://mail.google.com/mail/u/0/?ui=2&ik=4ea704962f&view=att&th=148fddaf82d0ff3d&attid=0.1&disp=inline&realattid=f\\_i125tlvt1&safe=1&zw](https://mail.google.com/mail/u/0/?ui=2&ik=4ea704962f&view=att&th=148fddaf82d0ff3d&attid=0.1&disp=inline&realattid=f_i125tlvt1&safe=1&zw)
- <http://www.airproducts.com/products/Gases/supply-options/onsite-gas-generation/hydrogen-gas-generation-systems.aspx>
- It is customary to project dropouts such as Steve Jobs, Bill Gates, and Mark Zuckerberg as successful entrepreneurs. But you don't need to be a dropout to succeed! .....Universities across world are focusing on creation of ENTREPRENEURS. California based Stanford University in the heart of Silicon Valley tops the list. <http://startupdigest.net/home/post/universities-creating-most-venture-capital-backed-entrepreneurs/618>

 <p>Links to Air Products</p>			<p><b>SOLAR Mission { लक्ष्य सौर ऊर्जा }</b></p> <p><b>Watch the video of First Solar Powered Car</b></p> <p><a href="http://techcrunch.com/video/stella-solar-powered-car/518430057/">http://techcrunch.com/video/stella-solar-powered-car/518430057/</a></p>
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