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PRADEEP RAO in Coimbatore

Boeing great guns

Success story: Athapa Manickam

designed the single-unit engine starter for the new generation 777 plane



Born in Palaypalayam village located in the dust bowl of Thiruchengodi, Tamil Nadu, where most farmers and their families were resigned to their fate, Athapa Gounder's youngest son found it a great learning experience. He did not want to become a farmer dependent on the fickle rain. The school-going kid resolved to become a scientist. If not anything he could seed the clouds to bring artificial rain to help the farmers, he dreamt.

Four decades later, Manickam, 47, has still not reached the stage where he can help seed clouds. But his resolve pushed him to develop a technology that today helps start jet planes, including Indian air force aircraft. Not a small feat considering that the technology is not only complex but available to only a handful of countries. His Coimbatore-based MAK Controls is one of the four companies in the world that make the Air Start Unit (ASU) for Boeing planes. The ASUs are diesel-powered units that generate a tremendous amount of air which is used to start the huge turbofan jet engines.

Success did not come easy to Manickam. Beginning from school, which involved a 3 km-trek one way, he surmounted several obstacles to reach college. Even as his two brothers dropped out of school at seventh and eighth grades, Manickam continued, egged on by his father who saw promise in his youngest. "I was always in the top five students in class," he said. After the village school he went to Bishop Hebbler College in Tiruchi for his pre-university course which he completed securing 428 out of the 500 marks. He joined the five-year engineering course at PSG College in 1968.

"I never had an idea which branch I would chose in the third year," he recounts. Unwittingly, his brilliant academic performance, he stood second in a class of 180 students in the third year, had made him one of the favourites of the college founder, G.R. Damodaran. Damodaran constantly gave him various projects that ate up his free time and Manickam lapped it all up, always eager to learn more. He was one of the few students chosen for the G.D. Naidu radio training course that was held in the city, he also went to ECIL, Hyderabad, and later to BEL and the Indian Telephone Industries, both in Bangalore.

In 1970 he helped senior IIT engineers design a new model of a telephone instrument dubbed Priyadarshini. Impressed, the engineers kept the boy in mind right till he completed his engineering and then promptly sent him an appointment letter. This appointment letter put him in a dilemma. Manickam had already decided that he would not work for anyone, but the letter, mailed to his permanent address, had reached his father.

While his father insisted that he take up the job, Manickam persisted with his wish to stay independent. Eventually, he won over his father and registered his company MAK Controls in 1973, choosing his nickname in college for the company as well. If Manickam did not tap the banks for finance, it wasn't because he was afraid they wouldn't give. He had complete faith in his abilities to churn out the right product with the available capital, Rs 15,000 that he had saved through college.

Manickam had been eyeing the numerous textile mills in the city, most of which banked on imported machinery. Was there a chance to build a cost-effective, improved version of any of those machines? He visited mills, met engineers and owners. During a visit to the South India Textiles Research Association (SITRA) the engineers sought his help to complete a design of a ring frame machine, used to produce yarn.

Armed with a soldering iron and a multimeter, he set out to complete the design and produce the new machine. Those days Manickam worked out of a small rented office near the Tiruchi Road and relied on small-time sheet metal manufacturers for the metal work. Within a short time he produced the ring frame machine. Not only was it faster but it turned out to be more economical for the mill owners.

His next venture also was for the textile industry. An engine cranker, basically a high current rectifier, that was used to start huge generators. His cranker, the first of its kind to be made in the country, phased out the many piles of imported lead acid batteries that were needed and the consequent troubles of charging and maintaining them. His rectifier was such a success that for many years he had a long waiting list of orders from textiles mills.

One day engineers from Ashok Leyland, Chennai, dropped in at his factory to check out his rectifier. Tired of wheeling out batteries to be recharged frequently they were scouting around for the kind of cranker that Manickam made to start their engines. MAK Control sold 36 units of its cranker that year to Leyland.

Manickam's turnover in the first year was Rs 3,800. But in five years time he had raked in handsome profits churning out these two products from his workshop that now sported welding, drilling and lathe machines managed by a staff of 36 employees.

In 1975, a group of visitors surprised Manickam in his office. They were from the military's Director-General of Technical Development and Procurement. They too had heard of the now famous MAK rectifiers. Theirs was a unique problem. The Navy was having a problem starting its Sea Harrier jets. The British starters were malfunctioning much too frequently. So the military decided to shop around within the country and came to Coimbatore after trying all known manufacturers of similar equipment. Manickam was equal to the task. He worked with the military team for six months and came up with a design in 1976. Those ASUs start the Naval Harrier jets even today.

Moving from the Navy to the Air Force, which had a large fleet of aircraft to be serviced, was only a matter of time for Manickam. Soon not only was MAK supplying ASUs but also Ground Power Units (GPU) for the entire range of MiG aircraft. His GPUs power even the latest entrant in the IAF fleet: the Sukhoi 31. Going from strength to strength, MAK Controls posted a turnover of Rs 6.8 crore last year.

Ironically, the crash of an A-320 in Bangalore in 1992 brought the GPU into national focus. "An inquiry committee headed by Air Marshal Ramdass (retd) found fault with the imported GPUs that were being used for the Airbus 320s," said Manickam. The GPU is used by engineers to provide the aircraft with power so that all systems can be switched on and tested. The GPU has to provide massive amounts of power with little variation in voltage.

No one else had the technology to build such sophisticated GPUs in the country. Who did Indian Airlines turn to? Manickam, naturally. And the man from Coimbatore delivered as usual. Soon his GPUs became standard equipment for all planes including Boeing 737s.

"There are only four companies in the world which have the technology to manufacture ASUs," said Manickam. "And a handful who can manufacture the GPUs." All of them are listed as original equipment suppliers with either the Boeing company in Seattle, the US, as MAK is, or the Airbus Industrie in France. "We have also sold our ASUs to Hainan Airlines, China, which operate Boeing 737s."

Ever looking for opportunities to expand his line of products MAK started production of the Main Deck Loader, a forklift-like vehicle that has a platform instead of the two forks. And, yes MAK is the only company to make the Main Deck Loaders in the country. The loaders are used to load containers on to huge cargo planes like the Boeing 747 cargo variant. He has already got happy customers in Blue Dart Aviation Ltd.

It was in 1995 that Manickam decided to go for the mother of all air starters: an ASU for one of the largest passenger liners, the Boeing 777. Boeing engineers at Seattle had tried out all ASUs but no single unit was powerful enough to start the huge jet engines like the GE-90 Trent on its own. Users like Nippon Airlines, who have received some of the first units of the 777, were using two ASUs to start the engine. Manickam flew to Seattle and spoke to Boeing. They remained unconvinced. How could an Indian based in an unknown city have the technology to develop something which the best brains in Europe and UK couldn't, they wondered.

Manickam returned only to go back with his design nine months later. The incredulous engineers at Boeing could hardly believe their eyes. The contract was his. Nowadays MAK engineers are working overtime at their Red Fields factory, Coimbatore, to ship the first lot of these powerful starters to Seattle.

His expertise at building something which has never been attempted before is legendary. No wonder the Kerala government contacted him to make the first indigenous aerobridges for the new Kochi international airport at Nedumbassery.

Americans Ron Schaming and Bob Bresnahan, an aviation consultant have tied up with MAK to induct technology to the US. Together they have started a factory in Memphis, Tennessee, to produce the same equipment for the world market. With a start like that it may not be long before Manickam actually gets down to being on top of the clouds rather than seeding them.

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How MAK Air-Starts Its Global Dreams

An order from Boeing allows A. Manickam to take off.



Manickam: "Quality can be generated by Indian technology too."

■ RAVI RAJAN

AS SURE AS E=MC², ATHAPA Manickam was born to fly. For over two decades now, the 48-year-old boffin has been gathering momentum, engineering his innovations and inventions into the Rs 18-crore MAK Group (MAK). Now, it's time to take off: come August, 1997, and the low-profile MAK Controls will start manufacturing the most powerful Air Start Units (ASUs) in the world for commercial aircraft—and will be the first to do so too.

Its power makes this ASU—the diesel-driven unit used to start up an aircraft's jet engines on the ground—unique. Different amounts of pneumatic power are required to fire different engines; for instance, the Airbus A-320's and the Boeing 747's Rolls-Royce and General Electric engines require ASUs that supply pneumatic power at the rate of 300 pounds per minute (ppm).

So far, two 300-ppm ASUs have been used in tandem to start the twin-jet Boeing 777's Rolls-Royce, General Electric, or

FACT FILE

NAME: Athapa Manickam
AGE: 48 years
EDUCATION: B.E. (Electronics & Communications), PSG College of Technology, Coimbatore, 1973
BUSINESSES: Aviation electronics, engineering, and textiles
COMPANIES: MAK Controls, MAK India, & MAK Engineers

Pratt & Whitney engines. But the 400-ppm ASU that Manickam has designed—confirms Dinesh Keskar, 42, president, Boeing India: "Boeing has approved the design"—can start them faster, and more efficiently. Says Manickam modestly: "Another advantage is that it will save space on the tarmac."

Actually, MAK Controls is only one of the four companies in the world—the other three being the UK's Auto Diesel and Devtech and Stewart & Stevens of the US—to design ASUs although it has managed to sell only four in the last three years. Pleased with the potential of his new ASU—which he plans to retail for

\$250,000 (Rs 0.90 crore) apiece—Manickam smiles: "We have never manufactured a product that existed in this country." And, sometimes, the planet.

But then, the electronics engineer from Coimbatore's PSG College of Technology has always been the wind beneath the group's wings. After graduating in 1973, Manickam decided to set up his own operations, much against his father's wishes that he stay in the family's agricultural business. Essentially, Manickam Jr won, with his father even lending him the seed money to start up MAK Controls.

Born in a textiles town, it was hardly surprising that Manickam chose this to target his first innovations at Coimbatore's mills. Starting off by designing small gadgets aimed at improving the efficiency of spinning mills, it was Manickam's invention of a dual-drive system for ring-frames that first spun him into the limelight in 1974. "This device improved the efficiency of ring frames by 20 per cent," he recalls.

WORK EXPERIENCE: None
INITIAL INVESTMENT: Rs 25,000
TRACK-RECORD: Group turnover has grown from Rs 25 lakh in 1973 to Rs 18 crore in 1996
NO. OF EMPLOYEES: 300
WORKSTYLE: Hands-on
MANAGEMENT PHILOSOPHY: Develop high-quality Indian products
HOBBY: Reading, Carnatic music

His next breakthrough came two years later, with the development of an engine cranker for testing diesel engines. Since large amounts of power were needed to start them up, the lead batteries then used would run down quickly. MAK's engine cranker, on the other hand, used an electrical power source to start them up. "We sold 72 of them in the first year to Ashok Leyland's Ennore facility alone," he says. In fact, the sales of this product continue to this day.

Still, Manickam's next venture was more down to earth. In 1980, he set up a spinning mill with 3,000 spindles, which has now gone up to 10,600. "In 1980, any-

body and anyone with money was setting up a textile mill. I too jumped onto the bandwagon," he shrugs. While this business did take much of his time during the 1980s, Manickam made sure that he didn't neglect his inventions.

That's also when his innovations started finding application in the defence sector. And it was this that got Manickam his big break in aviation. It all began, perhaps, with the tragic Airbus A-320 crash in Bangalore in 1991. Subsequently, the



Ramdas Committee, which probed the crash, cited the "lack of ground support systems" as one reason. So, Indian Airlines started scouting around for manufacturers who could supply additional ground support systems and, eventually, zeroed in on Manickam on the Indian Air Force's recommendation.

One of the first products that Manickam was asked to develop was a Ground Power Unit (GPU), a diesel-driven external source of power for aircraft which is used once the aircraft's engines are switched off. Of course, aircraft do have auxiliary power units, but they, like jet engines, run on aviation turbine fuel and, at Rs 9,000 per hour, are a costly proposition to operate. Ergo, the cost-effective GPU.

It took Manickam more than a year to design a GPU, with features like digital control systems, push-button controls, and a fault identification system. Moreover, with a little ingenuity, Manickam found that he could engineer them not only for Airbus aircraft, but also for Boeings. Between 1992 and 1996, therefore, MAK sold as many as 75 GPUs. Impressive, since each costs Rs 20 lakh.

Explains B.P. Baliga, 64, senior vice-president (technical), Jet Airways: "The

GPUs that we bought from MAK are primarily used by us at our base stations for maintenance activities during the night stops of our aircraft." It was after this breakthrough that Manickam decided to expand into the manufacture of ASUs, air-conditioning units (ACUS), and main deck loaders (MDLS).

Last year, for example, MAK sold five 5-tonne MDLS to Blue Dart for its cargo operations for Rs 24 lakh apiece versus Rs 1 crore for a 7-tonne import. Accepts Suresh Nair, 41, chief ground operations manager, Blue Dart: "MAK's MDLS are considerably cheaper than imported ones. However, we have to push it to the aircraft manually since it does not have a self-drive like the imported MDLS. But that's a small price to pay for such a big cost difference."

Not all of MAK's customers, however, are as easy to please. When Manickam approached Boeing with a prototype of his 400-ppm ASU, the Seattle-based giant was quite sceptical about product quality. So, MAK decided to set up an overseas subsidiary in Germany. The strategy: that company would ship kits out of India and assemble them in Germany, thereby earning the more acceptable Made-in-Germany tag. Setting up a subsidiary in Germany was, however, easier said than done.

Although MAK obtained the Reserve Bank of India's clearances to set up MAK GmbH, Manickam didn't reckon with the opposition that he would face in Germany. To begin with, he was allotted "premises at the eastern end of Germany (formerly East Germany), which had to be modified." Adds Manickam: "The workers out there didn't want to work. They were very inefficient. Although we spent a lot of money, nothing worked." In addition, Germany's banks were unwilling to lend to an Indian company.

But Manickam didn't give up. Eventually, he convinced the authorities to relocate his factory at the premises of a machine tool company, DEMA, at Dingles-tadt, near Kassel, in central Germany. But the episode still rankles in Manickam's mind, who has invested Rs 1.60 crore in the venture. Trembling with 400-ppm of righteous indignation, he swears to "teach the Germans that quality can be generated by Indian technology too." This local inventor is just starting up globally. ■