

Innovation through laser

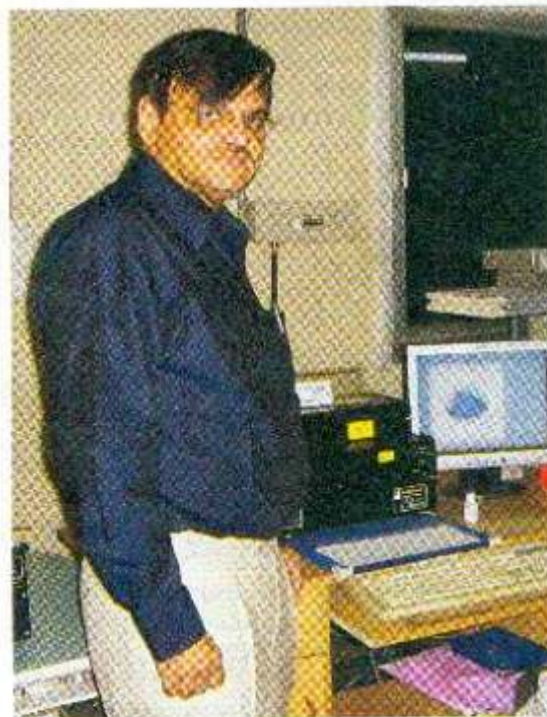
Laser technology has provided a cutting edge to the Surat diamond industry

Innovative use of laser technology is credited with revolutionising the diamond cutting and polishing industry of Surat, which accounts for 90 per cent of the Rs55,000 crore export of these precious stones from India. Over 2.5 lakh diamond cutting and polishing workers in Surat used to work on *ghanti* (similar to a potter's wheel) for 12-14 gruelling hours every day to process rough diamonds. Their productivity was still low and, hence, so were their wages, till a small entrepreneur and innovator from Ahmedabad introduced laser technology to the industry.

"I was always fascinated by the power of light; as a child, I used to play with a convex lens to burn paper by focussing the sunrays on a point," says Arvind Patel, managing director, Sahajanand Laser Technology Limited (SLTL), which manufactures highly sophisticated machines for sawing, planing, bruiting and polishing rough diamond, the hardest rock on the earth – all using laser technology. "It was much later, when I was working with the Space Applications Centre (SAC) as a technician, that I realised the potential of laser (light amplification by stimulated emission of radiation). Unlike the sunrays, a laser beam produces immense heat, capable of boring a hole in steel," he adds.

Though the art and craft of cutting and polishing diamonds was known to Indian craftsmen much before the rest of the world, it was Israel which first began using automatic machines based on laser technology to carry out the process of sawing and bruiting rough diamonds. A rough piece of diamond may contain more than one piece of the pure crystal, and hence needs to be sawed into two or more pieces. Once the rough diamond is cut into suitable number of pieces, the crystal area needs to be marked and cut further to remove the extra stone before doing the polishing.

Patel got the idea of introducing the laser technology into the diamond industry while he was marketing an infrared-ray-based gadget he had invented to automate the detection of breakage of yarn in power



Patel: fascinated by the power of light

looms. "My father was a textile worker, who faced the problem of detecting breakage of yarn on the looms. The gadget I made used infrared light to detect the breakage. It became an instant hit with the power looms," he recalls.

Most of my customers were power loom owners from Surat. In the late 1980s and beginning of the '90s, the textile industry was going through a crisis and several composite mills in Ahmedabad were closing down. The city was fast losing its position as the Manchester of India. It was in Surat that I saw the potential of introducing automation in the diamond industry," Patel recalls. He was among the first to import laser-powered

diamond cutting machines from Israel. "I made some modifications in the equipment to suit the Indian conditions. This was needed because the Indian units cut and polished only small-sized diamonds," he explains.

Initially, Patel imported three laser machines from Israel and carried out necessary modifications to suit the Indian conditions. "I made the software required to process small diamonds. But, the Israeli machines were quite expensive," he says. The machines from the SLTL cost Rs12-20 lakh, against Rs30-40 lakh for an Israeli machine.

Vast scope

Realising the potential of diamond cutting and polishing business and the advantage of laser technology with regard to its higher production capacity, Patel set up a unit in Surat to undertake job work for diamond processing houses. "But, I soon realised that there was a vast scope for introducing laser diamond cutting and polishing machines in India, than just taking up job work. So, I decided to undertake manufacturing of laser machines," says Patel.

He proved right in his assessment of the market potential of laser machines, as is evident from the number of machines he sold to diamond processing houses in Surat and Ahmedabad. "All major diamond processing houses have bought my laser machines," he claims. The company has so far sold over 4,000 laser machines in Surat and Ahmedabad.

India is the world's largest diamond processing (cutting and polishing) nation, with an estimated 1 million processors, handling over 57 per cent of the world's rough diamonds by value. According to industry estimates, 11 out of every 12 stones (diamonds) set in jewellery are cut and polished in India. Processing is done on rough diamonds in full range of sizes and qualities, including

stones larger than 10 carats. In terms of carat, India's share in this sector is about 80 per cent of the world market. Employing over 90 per cent of the global diamond industry workforce, India also accounts for 90 per cent of the volume of diamonds processed in the world.

"There has been a significant reduction in the wastage of diamonds after I started using the sawing, bruising and planer machines of SLTL," says Vachhraj, a leading diamond

crystal, mark its outline and cut out the surrounding waste material within a few minutes, as against a full day, when carried out manually.

"We first introduced laser sawing machines to cut the rough diamond, then the plainer to mark out the exact shape of the crystal and, later, the bruising machine to cut the diamond in its optimal shape," says Patel. While three separate machines are available to carry out these three different operations, the company

decided to help it out in these areas, besides providing additional funding to help it grow," says Vishnu Varshney, managing director, Gujarat Venture Finance Limited.

GVFL has not just invested in the company but is also helping out Patel in establishing accounting and marketing systems. "We are also helping the company in establishing business alliances with other companies, which require laser technology to carry out various processes," points out Varshney. SLTL has acquired six patents for the laser machinery it has designed and developed.

The company recently set up a diamond cutting and polishing unit in the gems & jewellery park in the Gongzhou Special Economic Zone in China to take advantage of the growing gems and jewellery business in that country. The company has also acquired a German laser source development company, ELS GmbH, at a consideration of € 200,000. "After the acquisition, we will now be able to cater to the European market," says Patel.

Having established a near monopoly in the diamond industry – with no Indian company manufacturing laser machines for the gems and jewellery industry, the company has now undertaken a research and development project involving solar energy. "The prototype solar heating equipment developed by us is in a testing stage and we hope to introduce it in the market in near future," says Patel, without divulging details due to confidentiality commitments. "The solar project will have a path-breaking impact in the field of non-conventional energy," concurs Varshney of GVFL, which is funding the project. "However, because of provisions of confidentiality, we are unable to divulge further details," he adds.

SLTL has also won the hearts of the people of the villages around Gandhinagar by employing young graduates from the local industrial training institutes and polytechnics. The company has its manufacturing plant in the industrial estate set up by the state government in Gandhinagar especially for electronic units.



Diamond cutting machines: innovative use of technology

processor from Bapunagar, Ahmedabad. "Earlier, when the rough diamonds were sawed and bruised manually, there used to be a sizeable wastage, on account of human error in judgement," he adds. With the help of laser sawing, planing and bruising machines, one gets not just higher yield from a rough diamond but also the optimum shape of the crystal.

"The use of laser machine in diamond cutting results in weight loss of hardly 2 per cent, as against 8-10 per cent in the manual process," points out Gurmeet Singh Bagga, the owner of a diamond processing house in Ahmedabad. A typical SLTL laser machine can process 8-10 carats of diamond per hour. With the help of a computer software programme, also developed in-house by the company, this machine scans a rough diamond to determine the exact shape of the

recently introduced a machine, brand named 'Gizmo' to carry out all the three operations.

Wider applications

Exploring avenues of wider applications of the laser technology (outside the diamond industry), Patel decided to make machines for engraving, marking and cutting sheet metals. These machines are used as precision tools for automobile parts manufacturing. "One of our main customers is Telco," says Patel. Among the other customers are Indian Pistons and a score of smaller auto parts manufacturing units in Pune, Chennai and Bangalore.

"Arvind Patel combines in him the skills of a technologist, the enterprising spirit of an entrepreneur and the acumen of a businessman. What the company lacked was organisational skill and marketing strategy. So, we