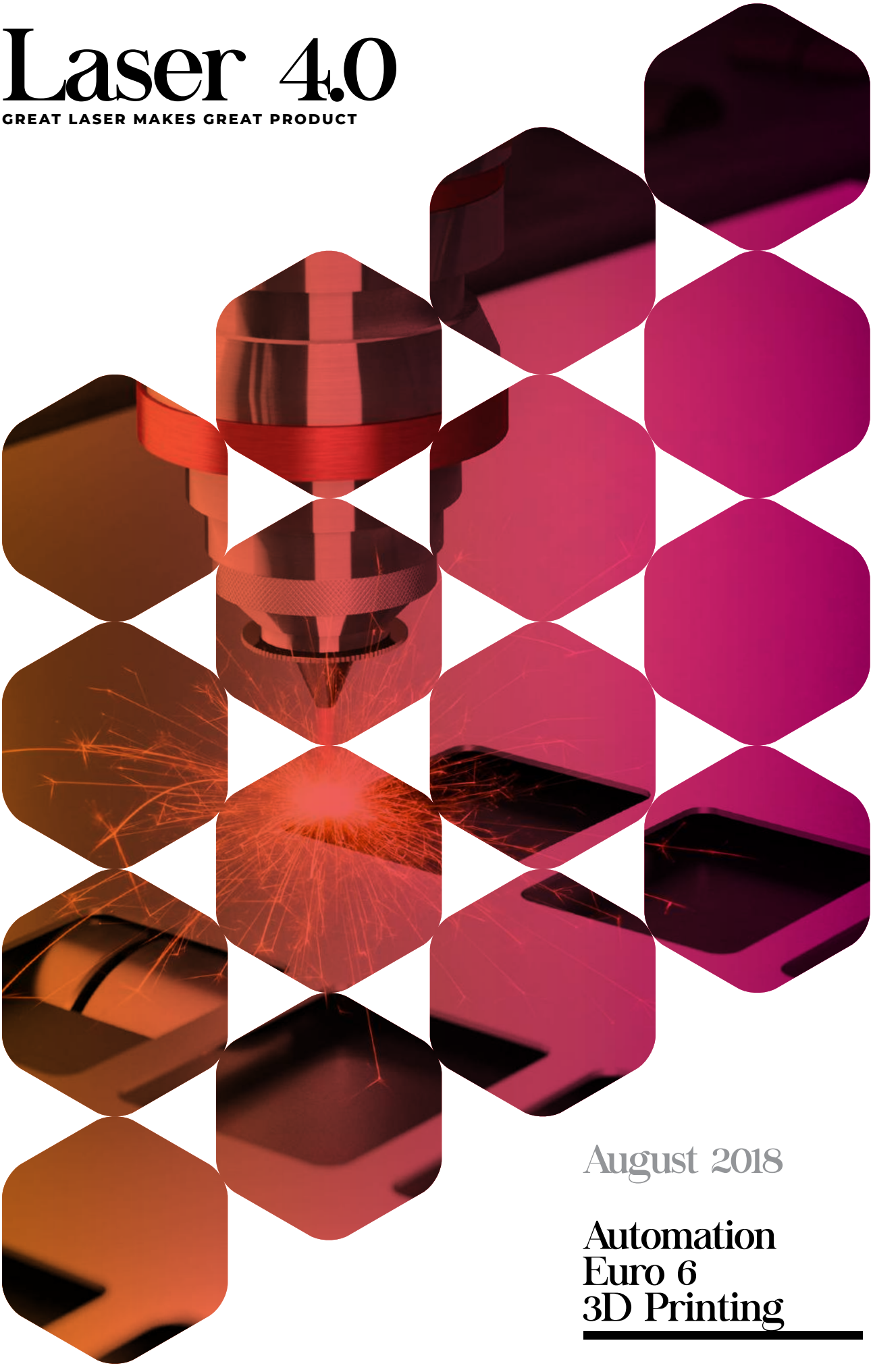
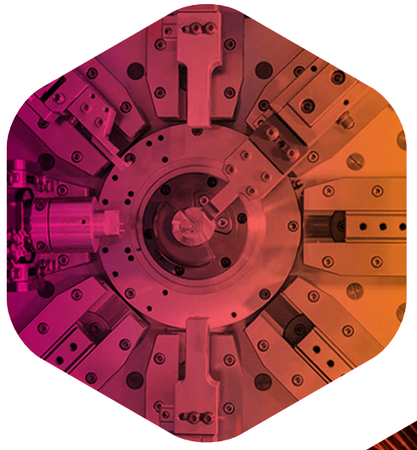
Laser 4.0

GREAT LASER MAKES GREAT PRODUCT



August 2018

Automation
Euro 6
3D Printing



Editor in chief

MITUL METAWALA

Sitting on total experience of over 10 years, my association with Scantech is now reaching at the milestone of 5 years and it is quite a journey.

I would not just consider as an experience added to my belt, but a joyful and thrillful ride in an effort by taking Scantech Brand to the next level. And this maiden issue of Scantecch celebrating 25 years, serves as the best example of our Future. So let's start this journey.

Introduction

This is our first issue where we are celebrating 25 years in the laser industry. In this issue we cover, who we are, how we got here and pieces of our shared history alongside most important interviews of industries experts. All this is kicked off with the Perspective shared by Mr. Nilesh Ramani (Director of Scantech Laser) on Industrial Automation.

One step ahead in our Expert Talk section, Mr. Jaywant Choure (Asst VP - Philips India) talks about the Theories & Principles of Automation, then Mr. Tarun Bhargav (AVP - Bajaj Motors) digs into the Euro 6 Driving Green methods to strengthen the country's backbone. Then to conclude our Expert Talk section, Dr. B. Shanmugarajan (Sr. Manager, WRI - BHEL) highlights the emergence, importance & the future of 3D Printing.

Furthermore we move from Expert Talk to Industry Insight, where 3 of the most important processes are on the verge of dominating and disrupting the Industrial Processes with the assistance of Laser Technology, namely Laser Sintering, Laser Cleaning & Laser Hardening. And this is where we take a breathe and celebrate our fabulous 25 years in the Laser Industry.

We promise to keep you abreast with the updates & innovations from Scantech Laser and touch important and exclusive aspects of Lasers in our next issue. Till then, enjoy reading our first 25 year celebration issue, and please do not forget to spread the word of Scantech Laser.

Last but not the least I would like to thank the exuberant team of Scantech Laser whose efforts have made this thing happen. I also extend my gratitude to all our clients who have supported us in getting this first issue of Scantech Laser out.

Please do let me know your unbiased opinions about the initiative by reaching me out at m.metawala@scantechlaser.com

defining the shapes of innovation

Scantech has been very creative and innovative over the long haul. We don't copy what others do; instead, we may use innovative ideas from others as a brain storming activity to come up with a unique application, product or process. We tend to distance ourselves from the competition rather than compete with them. We leverage our creativity and innovative capabilities to attain long-term success.

Table of Contents

Automation fourth industrial revolution

Automation in the industry is one of the top ten game changers of the fourth industrial revolution. Sophisticated automation available in capital equipment, such as material handeling and auto storage integrated with data matrix, it has the power to revolutionise manufacturing and organisational productivity to previously unknown levels.

The majority of manufacturing businesses have been slow to adopt this international trend that has come to be known as the fourth industrial revolution. The principal challenge is that most companies are labour-intensive and tend to assume that the cost of labour is cheaper than the cost of automation – which is not the case. Automation results in increased levels of productivity, significant reduction in cost per part, exponential financial returns, and organisational streamlining.

There are automated material handeling system specific to the processes that transport raw material to processing station. Scantech with its team, closely work with customers to execute solutions eliminating loading & unloading time which results in high productivity and better human safety. Automated or robotic automations not only produces consistently but also maintains the quality.

Europe has been using automation for more than two decades. In India, the adoption tends to be trending very aggresively. Although the adoption of new technology locally is steadily improving, overall it will continue to grow as it has proved the boost in productivity.

Most often, when jobs are phased out through the application of automation, the employee has invariably been redeployed and sometimes upscaled to a more suitable position as with automation, a manufacturing company becomes more efficient and tends to grow, and this growth creates more jobs.

Another advantage of automation is that it opens up the possibility of long, uninterrupted production runs. However, this option places the bonus on the maintenance function of an operation to ensure that all the preventive maintenance schedules have been timeously and effectively implemented. Production runs that have to be stopped for unscheduled maintenance will negatively affect the advantages of automation.

Automation will enable the indian industry to be more competitive on the global stage by improving production input costs, productivity rates and turnaround times. These crucial factors – together with being strategically very well placed on global sea-trade routes – will enable us to participate more successfully in the international sheet metal and/or steel industry.

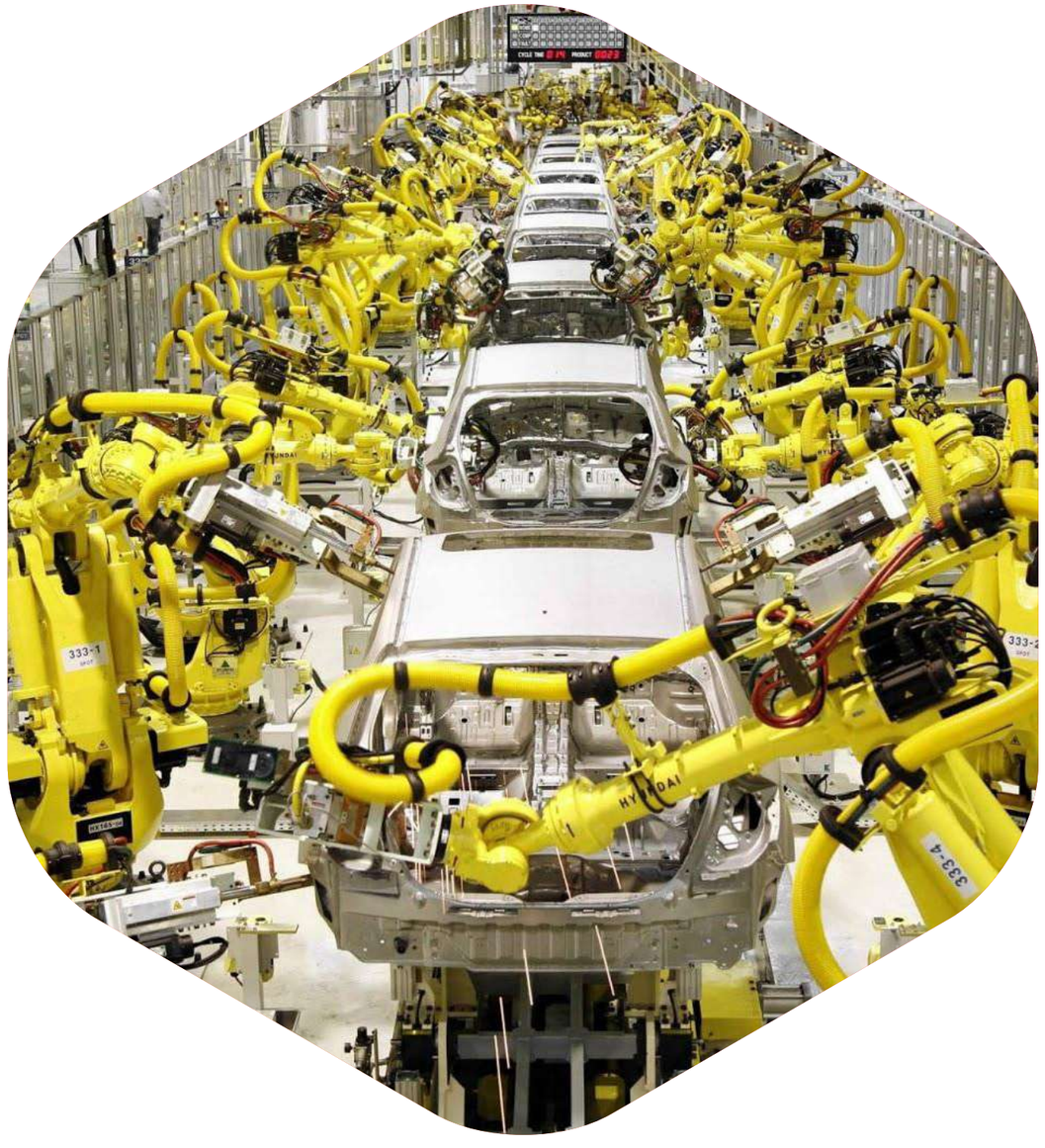
Expanding the Indian industry through automation will serve to boost other local industry sectors, which are either ancillary or associated with the major industry in some way. We have to move away from the thinking that we are a country with a depreciating currency and cheap labour, because that is not going to 'cut' it – either now or in the long term.

India is fast becoming one of the most lucrative options for manufacturing industry to prosper. India is on the threshold of major reforms and is poised to become the third-largest economy of the world by 2030.

AUTOMATED BOTTELING PLANT INSIGHT

FMCG has adopted automation at very early stage due to its high production requirement to keep healthy supply chain.

AUTOMOTIVE INDUSTRY



AUTOMATIC ASSEMBLY LINE

Automotive industry in Inida has taken a curve towards automating the assembly line to meet the Quality, Safety & Productivity.

Theory & Principles of Automation

MR. JAYWANT CHOURE

Assistant VP
Philips India

Automation, the application of machines to tasks performed by human beings or, to tasks that would otherwise be impossible. Although the term mechanization is often used to refer to the simple replacement of human labor by machines, automation generally implies the integration of machines into a self-governing system. Automation has revolutionized those areas in which it has been introduced, and there is barely an aspect of modern life that has been unaffected by it. The term automation was coined in the automobile industry about 1946 to describe the increased use of automatic devices and controls in mechanized production lines. The origin of the word is attributed to D.S. Harder, an engineering manager at the Ford Motor Company at the time.

History

The technology of automation has advanced from the related field of mechanization, which had its early stages in the Industrial Revolution. Mechanization refers to the replacement of human (or animal) power with mechanical power of some form. The driving force behind mechanization has been humankind's propensity to create tools and mechanical devices. Some of the important historical developments in mechanization and automation leading to modern automated systems are described here The first tools made of stone represented prehistoric man's attempts to direct his own physical strength under the control of human intelligence. Thousands of years were undoubtedly required for the development of simple mechanical devices and machines such as the wheel, the lever, and the pulley, by which the power of human muscle could be magnified. The next extension was the development of powered machines that did not require human strength to operate. Examples of these machines include waterwheels, windmills, and simple steam-driven devices. More than 2,000 years ago the Chinese developed trip-hammers powered by flowing water and waterwheels. The early Greeks experimented with simple reaction motors powered by steam. The mechanical clock, representing a rather complex assembly with its own built-in power source (a weight), was developed about 1335 in Europe. Windmills, with mechanisms for automatically turning the sails, were developed during the Middle Ages in Europe and the Middle East. The steam engine represented a major advance in the development of powered machines and marked the beginning of the Industrial Revolution. During the two centuries since the introduction of the Watt steam engine, powered engines and machines have been devised that obtain their energy from steam, electricity, and chemical, mechanical, and nuclear sources.

Each new development in the history of powered machines has brought with it an increased requirement for control devices to harness the power of the machine. The earliest steam engines required a person to open and close the valves, first to admit steam into the piston chamber and then to exhaust it. Later a slide valve mechanism was devised to automatically accomplish these functions. The only need of the human operator was then to regulate the amount of steam that controlled the engine's speed and power. This requirement for human attention in the operation of the steam engine was eliminated by the flying-ball governor. Invented by James Watt in England, this device consisted of a weighted ball on a hinged arm, mechanically coupled to the output shaft of the engine. As the rotational speed of the shaft increased, centrifugal force caused the weighted ball to be moved outward. This motion controlled a valve that reduced the steam being fed to the engine, thus slowing the engine. The flying-ball governor remains an elegant early example of a negative feedback control system, in which the increasing output of the system is used to decrease the activity of the system.

Negative feedback is widely used as a means of automatic control to achieve a constant operating level for a system. A common example of a feedback control system is the thermostat used in modern buildings to control room temperature. In this device, a decrease in room temperature causes an electrical switch to close, thus turning on the heating unit. As room temperature rises, the switch opens, and the heat supply is turned off. The thermostat can be set to turn on the heating unit at any particular set point.

Another important development in the history of automation was the Jacquard loom (see photograph), which demonstrated the concept of a programmable machine. About 1801 the French inventor Joseph-Marie Jacquard devised an automatic loom capable of producing complex patterns in textiles by controlling the motions of many shuttles of different colored threads. The selection of the different patterns was determined by a program contained in steel cards in which holes were punched. These cards were the ancestors of the paper cards and tapes that control modern automatic machines. The concept of programming a machine was further developed later in the 19th century when Charles Babbage, an English mathematician, proposed a complex, mechanical "analytical engine" that could perform arithmetic and data processing. Although Babbage was never able to complete it, this device was the precursor of the modern digital computer. See computers, history of.

Building Blocks of Automation

The developments in the long history of industrial revolution had have provided the three basic building blocks of automation: (1) a source of power to perform some action, (2) feedback controls, and (3) machine programming. Almost without exception, an automated system will exhibit all these elements.

Power Source

An automated system is designed to accomplish some useful action, and that action requires power. There are many sources of power available, but the most commonly used power in today's automated systems is electricity. Electrical power is the most versatile, because it can be readily generated from other sources (e.g., fossil fuel, hydroelectric, solar, and nuclear) and it can be readily converted into other types of power (e.g., mechanical, hydraulic, and pneumatic) to perform useful work. In addition, electrical energy can be stored in high-performance, long-life batteries.

Feedback Controls

The actions performed by automated systems are generally of two types: (1) processing and (2) transfer and positioning. In the first case, energy is applied to accomplish some processing operation on some entity. The process may involve the shaping of metal, the molding of plastic, the switching of electrical signals in a communication system, or the processing of data in a computerized information system. All these actions entail the use of energy to transform the entity (e.g., the metal, plastic, electrical signals, or data) from one state or condition into another more valuable state or condition. The second type of action—transfer and positioning—is most readily seen in automated manufacturing systems designed to perform work on a product. In these cases, the product must generally be moved (transferred) from one location to another during the series of processing steps. At each processing location, accurate positioning of the product is generally required. In automated communications and information systems, the terms transfer and positioning refer to the movement of data (or electrical signals) among various processing units and the delivery of information to output terminals (printers, video display units, etc.) for interpretation and use by humans.

Feedback controls are widely used in modern automated systems. A feedback control system consists of five basic components: (1) input, (2) process being controlled, (3) output, (4) sensing elements, and (5) controller and actuating devices. These five components are illustrated in Figure 1. The term closed-loop feedback control is often used to describe this kind of system.

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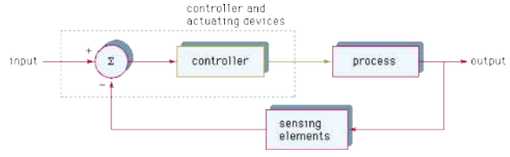
Figure 1: The components of a feedback control system and their relationships.



The input to the system is the reference value, or set point, for the

system output. This represents the desired operating value of the output. Using the previous example of the heating system as an illustration, the input is the desired temperature setting for a room. The process being controlled is the heater (e.g., furnace). In other feedback systems, the process might be a manufacturing operation, the rocket engines on a space shuttle, the automobile engine in cruise control, or any of a variety of other processes to which power is applied. The output is the variable of the process that is being measured and compared to the input; in the above example, it is room temperature.

The sensing elements are the measuring devices used in the feedback loop to monitor the value of the output variable. In the heating system example, this function is normally accomplished using a bimetallic strip. This device consists of two metal strips joined along their lengths. The two metals possess different thermal expansion coefficients; thus, when the temperature of the strip is raised, it flexes in direct proportion to the temperature change. As such, the bimetallic strip is capable of measuring temperature. There are many different kinds of sensors used in feedback control systems for automation.

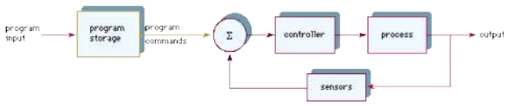
The purpose of the controller and actuating devices in the feedback system is to compare the measured output value with the reference input value and to reduce the difference between them. In general, the controller and actuator of the system are the mechanisms by which changes in the process are accomplished to influence the output variable. These mechanisms are usually designed specifically for the system and consist of devices such as motors, valves, solenoid switches, piston cylinders, gears, power screws, pulley systems, chain drives, and other mechanical and electrical components. The switch connected to the bimetallic strip of the thermostat is the controller and actuating device for the heating system. When the output (room temperature) is below the set point, the switch turns on the heater. When the temperature exceeds the set point, the heat is turned off.

The programmed instructions determine the set of actions that is to be accomplished automatically by the system. The program specifies what the automated system should do and how its various components must function in order to accomplish the desired result. The content of the program varies considerably from one system to the next. In relatively simple systems, the program consists of a limited number of well-defined actions that are performed continuously and repeatedly in the proper sequence with no deviation from one cycle to the next. In more complex systems, the number of commands could be quite large, and the level of detail in each command could be significantly greater. In relatively sophisticated systems, the program provides for the sequence of actions to be altered in response to variations in raw materials or other operating conditions.

Machine Programming

Programming commands are related to feedback control in an automated system in that the program establishes the sequence of values for the inputs (set points) of the various feedback control loops that make up the automated system. A given programming command may specify the set point for the feedback loop, which in turn controls some action that the system is to accomplish. In effect, the purpose of the feedback loop is to verify that the programmed step has been carried out. For example, in a robot controller, the program might specify that the arm is to move to a designated position, and the feedback control system is used to verify that the move has been correctly made. The relationship of program control and feedback control in an automated system is illustrated in Figure 2.

Figure 2: Relationship of program control and feedback control in an automated system.



Some of the programmed commands may be executed in a simple open-loop fashion—i.e., without the need for a feedback loop to verify that the command has been properly carried out. For example, a command to flip an electrical switch may not require feedback. The need for feedback control in an automated system might arise when there are variations in the raw materials being fed into a production process, and the system must take these variations into consideration by adjusting in its controlled actions. Without feedback, the system would be unable to exert enough control over the quality of the process output.

The programmed commands may be contained on mechanical devices (e.g., mechanical cams and linkages), punched paper tape, magnetic tape, magnetic disks, computer memory, or any of a variety of other media that have been developed over the years for particular applications. It is common today for automated equipment to use computer storage technology as the means for storing the programmed commands and converting them into controlled actions. One of the advantages of computer storage is that the program can be readily changed or improved. Altering a program that is contained on mechanical cams involves considerable work.

Programmable machines are often capable of making decisions during their operation. The decision-making capacity is contained in the control program in the form of logical instructions that govern the operation of such a system under varying circumstances. Under one set of circumstances, the system responds one way; under different circumstances, it responds in another way. There are several reasons for providing an automated system with decision-making capability, including (1) error detection and recovery, (2) safety monitoring, (3) interaction with humans, and (4) process optimization.

Error detection and recovery is concerned with decisions that must be made by the system in response to undesirable operating conditions. In the operation of any automated system, malfunctions and errors sometimes occur during the normal cycle of operations, for which some form of corrective action must be taken to restore the system. The usual response to a system malfunction has been to call for human assistance. There is a growing trend in automation and robotics to enable the system itself to sense these malfunctions and to correct for them in some manner without human intervention. This sensing and correction is referred to as error detection and recovery, and it requires that a decision-making capability be programmed into the system.

Safety monitoring is a special case of error detection and recovery in which the malfunction involves a safety hazard. Decisions are required when the automated system sensors detect that a safety condition has developed that would be hazardous to the equipment or humans in the vicinity of the equipment. The purpose of the safety-monitoring system is to detect the hazard and to take the most appropriate action to remove or reduce it. This may involve stopping the operation and alerting maintenance personnel to the condition, or it may involve a more complex set of actions to eliminate the safety problem.

Automated systems are usually required to interact with humans in some way. An automatic bank teller machine, for example, must receive instructions from customers and act accordingly. In some automated systems, a variety of different instructions from humans is possible, and the decision-making capability of the system must be quite sophisticated in order to deal with the array of possibilities.

A fourth reason for decision making in an automated system is to optimize the process. The need for optimization occurs most commonly in processes in which there is an economic performance criterion whose optimization is desirable. For example, minimizing cost is usually an important objective in manufacturing. The automated system might use adaptive control to receive appropriate sensor signals and other inputs and make decisions to drive the process toward the optimal state.

Impact on Society

Besides affecting individual workers, automation has an impact on society in general. Productivity is a fundamental economic issue that is influenced by automation. The productivity of a process is traditionally defined as the ratio of output units to the units of labor input. A properly justified automation project will increase productivity owing to increases in production rate and reductions in labor content. Over the years, productivity gains have led to reduced prices for products and increased prosperity for society. Several issues related to education and training have been raised by the increased use of automation, robotics, computer systems, and related technologies. As automation has increased, there has developed a shortage of technically trained personnel to implement these technologies competently. This shortage has had a direct influence on the rate at which automated systems can be introduced. The shortage of skilled staffing in automation technologies raises the need for vocational and technical training to develop the required work-force skills. Unfortunately, the educational system is also in need of technically qualified instructors to teach these subjects, and the laboratory equipment available in schools does not always represent the state-of-the-art technology typically used in industry.

AI & ROBOTICS

Artificial Intelligence is changing the way industy works. Machine learning is the new subject ahead of Industry 4.0

MR. TARUN BHARGAV

AVP
Bajaj Motors Ltd.

Euro 6 Driving Green

The Euro 6 emissions regulations are the most recent manifestation of the EU on the measure of destructive emission that can be transmitted by new Cars. Specifically, the directions focus on the measure of nitrogen oxide (NOx), hydrocarbons NMHC and THC and carbon monoxide (CO) that are delivered by both oil and diesel vehicles. Besides, they additionally concentrate around the particulate matter (PM) which these Cars emit into the climate and which can cause medical issues. By following these Standards, new Cars can limit their carbon impression helping the Environment with better air and nature quality. A special reward of consistence is that Cars can frequently accomplish better mileage, too.

On an individual level, the new directions shouldn't mean a dreadful part to the buyer – except if you possess a more established diesel vehicle. While new diesel models do agree to the controls and are nearly as nature friendly as their petroleum counterparts but some old models are still creating disturbing quantity of pollution.

In 1992, the industry was set up with Euro 0, preceding Euro I the year after, which managed exclusively with NOx, HC, and CO. It was in 1993 that the Euro I levels were presented, and these models were accomplished with little incremental changes. In 1996, Euro II saw the first acceptation of a PM limit and all motors were required to meet a similar utmost levels. Euro III came in 2001 and motors were currently required to meet emission levels the Environment. Euro V came three years after Euro IV, forcing further NOx and PM diminishment. Quick forward to 2014, and OEMs, Level 1, and Level 2 providers are constantly struggling with the consistently fixing emission regulations. Between Euro I and Euro VI, particulate issue (PM) levels have fallen 97%, and NOx has fallen 95%.

Then in 2014, Euro VI became effective with the most stringent emission levels up to now. To meet the standards, OEMs have turned to both SCR and EGR, with a Diesel Particulate Channel (DPF).

Countries outside of Europe, the United States and Japan have widely designed their emission policies on European Standards and the related commands for Clean, low-sulfur energizes. By integrating the Euro 6/VI vehicle emission regulations, these
nations can accomplish up to a 99 percent mitigation in the emission of hazardous materials like Particulate Matter which produces many non-curable diseases.

How Successfully these regulations are being incorporated and integrated in to Automotive Industry Mr. Tarun Bhargav, AVP at Bajaj Motors, Gurgaon explained

"Bajaj Motors is Precision parts maker; most parts are produced from Forging and casting. We specialize in critical engine parts and Chassis parts.

Euro 6 norms will result in change in design of most of the engines, most of the parts will be redesigned and the shape, material and tolerances will change. Product weight reduction will be an additional criterion to review design.

MAKE IN INDIA

It is time for India to take the lead and transform into a global design and manufacturing hub.The 'Make in India' initiative is positioned to do just that. It is a powerful call to action to domestic and multinational companies to manufacture in India and automotive industry is already on that direction moving rapidly.

The technological change in the injection system and other related assemblies requires additional capital inflow.

Saying all these points, the change will result in increase in the cost of production of the engine, an upward of 20-30%. India being a price sensitive market, any change in price results in change in market sentiments and drop in sales.

The balance between Technology & Price is the biggest challenge.
In Bajaj Motors, we have already started to review all our manufacturing processes to be ready to produce parts as per new and enhanced requirement of quality and reliability

We have upgraded our machines, processes, QMS to be more reliable in our commitment to quality. Most processes have reduced dependency on manual inputs, supported by Poka-yoke's on most probable causes.

BML is a learning and growing organization. Our philosophy is to continually improve to achieve excellence and to become world class organization."

3D Printing
A New Dimension

Dr. B. SHANMUGARAJAN

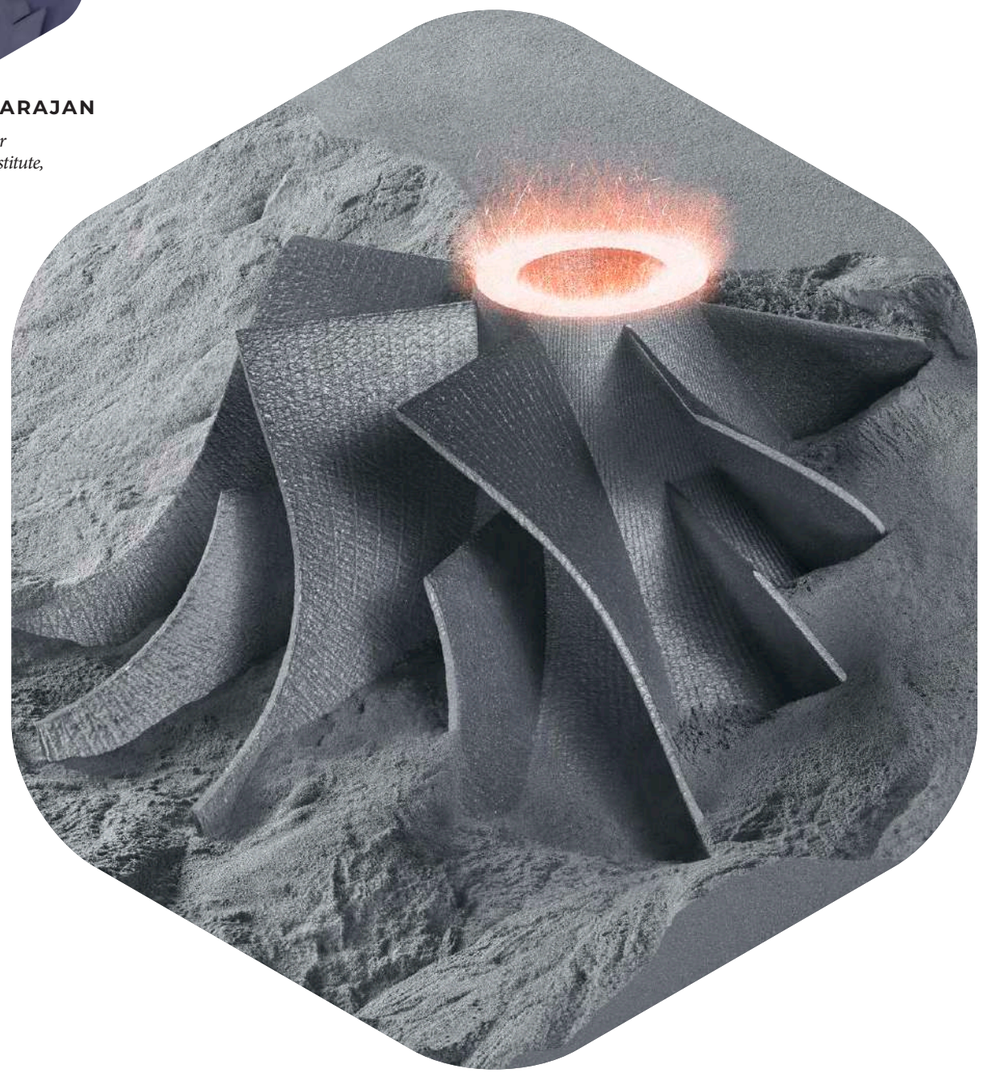
Senior Manager
Welding Research Institute,
BHEL

3D printing is facilitating rapid prototyping, rapid manufacturing and customization.

3D printing or Additive Manufacturing (AM) was first conceptualized in 1960s, but, the process became popular in late 1980s, when more applications were developed. However, the use of this technology has gained momentum in the recent days. 3D printing or Additive manufacturing technology is a method of fabrication or manufacturing, which is totally different from conventional method of fabrication, where in the components are produced by subtracting or removing materials sequentially by cutting, machining, welding, polishing, assembling, etc. In case of additive manufacturing, the component is fabricated by adding materials layer by layer from the data loaded to the printer. The design/drawing of the component can be loaded to the computer and by CNC control, any complex or intricate shapes can be built layer by layer in one go. The material can be added in wire or powder form depending on the process and any unused material can be recycled. The process has numerous unique benefits making it to standalone from the other manufacturing processes. Previously, due to lack of suitable technologies, AM process have been employed only for making the model in materials like plastics, etc. either to check the concept or for making dies for trivial applications

like jewelry design etc. However, the advent of better fabrication technologies coupled with the development of specialized consumables for 3D printing, the AM process is now much suited for making metallic components. Hence, Harvard School of Business terms this process as a "Classic Disruptive Technology", and is going to replace the conventional method of fabrication in parts on in whole in the near future. There is no surprise that 3D Printing is included in Industry 4.0.

Additive manufacturing, as a process is slow and takes longer lead time to complete the fabrication of a component compared to conventional methods. How come its facilitating rapid prototyping and rapid manufacturing? Is it a misnomer? The answer is NO. It is indeed perfect to be placed under rapid prototyping and manufacturing. The process gives the designers the much needed flexibility & freedom and helps him/her to wide open the wings of imagination. It helps to design the component to the requirement without worrying about the constraints for fabrication. The developed design concept can be visualized physically by 3D printing of the component. This gives the real feel of component compared to concluding based on virtual reality. The other major benefit the process brings in apart from the other technical benefits is, the materials which were manufacturer's foes so far have become friendly while adopting layer by layer manufacturing. This also adds to the flexibility in choosing the apt material for the application rather than settling with the available ones, which unnecessarily add to the complexity, weight and cost.



Currently, Metal AM can be performed by variety of techniques starting from conventional continuous wire electrode based arc welding technologies to power beam based processes, thanks to the rapid development in consumables suiting the AM process. The continuous wire based arc welding techniques like GMAW with its advancement such as Cold Metal Transfer (CMT) is in the forefront in this segment. However, the flexibility and quality gives the powder based metal AM processes like Direct Metal Laser Sintering (DMLS), Electron Beam Melting (EBM) and Direct Energy Deposition (DED) using blown powder methodology and wire based metal AM with power beam processes like laser or electron beam give an edge over the conventional process.

Availability of different processes coupled with the required consumables will make the AM process to expand its horizons rapidly in the near future. Hence with AM, **new dawn is there and the manufacturing industries will shine bright!.**

SELECTIVE LASER SINTERING

Laser Sintering is widely used and adopted in aviation aero space applications.

Disintegrated View

Jaguar E Type

insight on trending laser processes

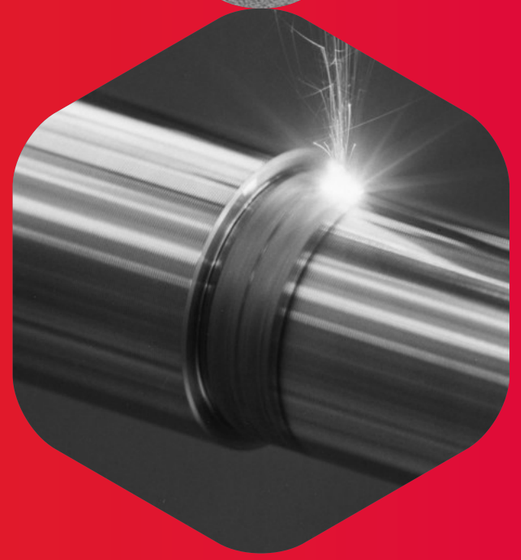
Material processing is now being precisely done through various laser processes, from new component advancement to high volume fabrication. For all laser forms, the vitality of a laser vertical connects with a material to change it somehow. Every laser process is controlled by correctly managing the wavelength, frequency control, it's cycle and redundancy rate of the laser ray. These laser processes are disrupting the industrial segments by providing precise outcome or even better.

ADDITIVE MANUFACTURING

The world is witnessing spurt in Additive Manufacturing where it is being pushed at a molecular limit and the revolution is led by Aerospace & Healthcare Industry.

LASER CLEANING

Free of abrasion, the laser cleaning process is clean and gentle on all materials due to it's short pulses and local heating. Contaminated layers are removed uniformly without leaving any residue.



LASER HARDENING

Laser Heat Treatment is a process used in many industries to improve the wear properties and extends the life of steel components like cutting tools, moulds & dies, shafts, gear teeth etc. Heat treatment is processed by heating the component and then rapid cooling which results in quenching of a part.

Additive Manufacturing Laser Sintering

In the current scenario industries are looking for the production of parts at a faster rate with flexibility in designing the parts, with effective and efficient method of producing manufacturing components particularly those with complex shape.

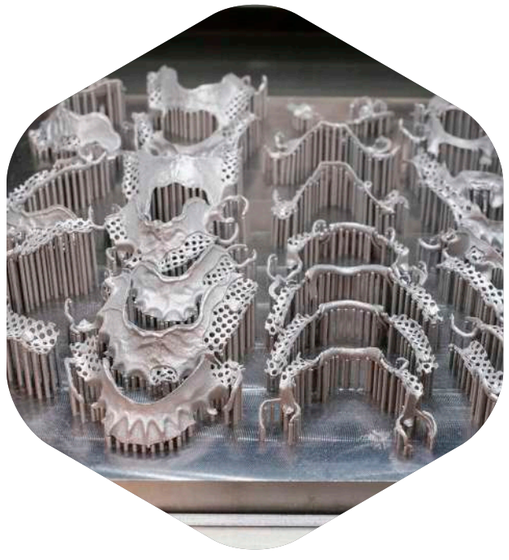
When combined with powerful and modern tools that optimize analysis and simulation process to generate an optimal design solution, such technologized tools are able to design tools which produce perfect, lightweight designs that are functionally accurate and optimized for production via. 3D printing or additive manufacturing. The resulting parts do not only take a reduced amount of time to design, but are also lighter and significantly stronger than part designs that are manufactured using conventional manufacturing methods.

Owing to these enhanced properties, 3D printing metal has abundant applications in the automotive, aerospace, construction, defense and medical industries. 3D Printing Metal market is anticipated to grow in all the industrial and manufacturing sectors owing to its growing applications in lightweight engineering products. The 3D Printing Metal market is estimated to grow since the regulatory authorities are pressing the manufacturers to use products which are more ecofriendly and use minimum amount of natural resources during the production process. 3D Printing Metal Market has a lot of scope in research and development division since the researchers and scientists are coming up with new metal and softwares which are more efficient and economical. Space constraint is becoming an important factor for the manufacturers now, they are opting for more light and spacious products, which in turn, is expected to fuel the growth of the 3D Printing Metals market in the consumer goods sector. The market for the 3D Printing Metal is anticipated to grow at a healthy CAGR in the coming future. Furthermore, the growing applications of the products manufactured by 3D printing in commercial and industrial sectors is expected to propel the growth of the overall 3D Printing Metal market in the near future.

Benefits of metal AM System

The main benefits of our metal additive manufacturing system is the high amount of possible complex geometries almost every thinkable complex structure can be built Examples are conformal cooling channels, aero turbine blades, surgical implants and special lattice structures. Even structure with other processing technology cannot be built are possible to build with our metal Additive manufacturing system. Another advantage is completely use of metal powder, as unprocessed powder can be sieved and used again for producing the next part. In contrast to subtractive manufacturing technology where usually the process starts with dense block and doing the process material taken away to create desired parts those creating a lots of waste material like turning. Additive manufacturing uses almost needed material for the parts and no wastage of material is created.

Additive manufacturing is rapid prototyping technology used to synthesis three dimensional objects of any shape or geometry can be produced in short time without using any special tooling. In thre processes of additive manufacturing technology the parts are produced layer by layer by using computer control to create an object to be produced. In additive manufacturing technology multiple layers are built in X-Y direction one on the top of the other generating in Z direction or third direction. As it has been seen in the convectional processes takes longer time to produce complex shape parts with special tooling requirement an more in amount of wastage of material. Additive manufacturing technology has potential to overcome the disadvantage of the conventional methods.



DENTAL IMPLANTS

HONEYCOMB STRUCTURE

cooling is required to get proper part. Hence, it is an inner passage which follows the shape or profile of the mould core and cavity. The difficulty in manufacturing inner passage of complex part AM has the potential to overcome this flexibility in design and manufacture the channels.

Automotive:

Complex intricate shapes of engine parts, to reduce engine weight higher in strength easy to manufacture, no special tooling for special complex parts, reduces material wastage, reduces cost of manufacturing, reduces time.

Aerospace:

Easy manufacturing of aerospace parts turbine blade, aero engine with lighter in weight and higher strength with special lattice structure to with stand thermal loads etc.

Research:

In laser material processing labs, college and industries for developing new materials developments, study of properties and optimizing new parameters for special lattices structures.

Material of metal AM system higly used

Stainless Steel	Aluminum Alloys
Titanium Alloys	Nickel alloys

Technology

Our Selective Laser Sintering System applies metal powder bed fusion technology in which 3D cad software is to construct component. The 3D cad designed part is mathematically sliced into number of layers. The thin powder layer is laid on the substrate the laser beam is used to melt the powder particles uniformly in X and Y direction according to 3D cad design and solidifies the process is repeated for each layer till the complete part is created and unmelted powder is removed from the process chamber which can be sieved used for processing another parts. The process chamber is consisting of proper exhaust system to remove fumes generated during processing without effecting processes part.

Industries Applications

Heath care medical and dental:

To easy in manufacture medical devices such as hearing heads dental crowns surgical implants with high level of customization available with metal AM system and well suited for custom fitting products to individual patients

Conformal Cooling channels:

In injection mould and blow moulding system where rapid uniform

HIGH STRENGTH LOW WEIGHT STRUCTURE

Surface Treatment Laser Cleaning

It is a process to remove rust, paint, oil and unwanted metal parts on material. There are the many conventional methods used to remove these all impurities, but laser cleaning technology is one of the fastest procedure for cleaning. Cleaning of rust on an old steel metal through chemicals or from other conventional procedures is very complicated and it would take longer time, but the laser technology provides the accurate results we require with lesser time.

Scantech provides the best solution for removing all these above impurities in a simplest way by using handheld laser system in which the laser beam will move through the scan head with suitable laser power and speed that will give better results with less efforts and less complexity. In a laser cleaning procedure whenever any impurity interacts with the laser beam it will show this effect on their molecular bonds, as every material will have different properties and different molecular structures with ablation threshold values. Due to the interaction of laser on that impurity the laser energy is transferred to its molecules and if this energy is equivalent to their ablation threshold only then these molecular bonds are broken and vaporized. Therefore every time it will ensure that transfer laser energy would be above the material ablation threshold value.

Laser ablation is a process by which material is removed from a surface. If the laser pulses don't have enough energy per pulse, they might simply evaporate the rusted residue, the laser is typically paired with a flow of gas which serves to remove the vapours from the area. An extremely brief laser pulse at high power is aimed at the surface to be cleaned. The laser energy applied ablates the surface. While part of the removed material is vaporised, some remains as particulate dust and will be collected in a filtration system. This process is repeated until the required depth and area has been reached. Laser surface cleaning is the removal of contaminants or impurities on the surface of a material by physically removing the upper layer of the substrate using laser irradiation.

There are two distinctly different laser cleaning processes.
- First which is the removal of a layer on the surface of a material,
- Second is the removal of the entire upper layer of a material.

The first, coating removal is characterised by the removal of a layer on the surface of a substrate. In this case, the chemical and physical composition of the layer to be removed differs significantly from that of the substrate. Examples include paint, rubber coatings and insulation. The laser light is absorbed by the organic material and the non-organic substrate is not affected. There is no mechanical, thermal or chemical strain on the substrate. The second cleaning process, laser surface decontamination, refers to the removal of impurities or contaminants deeply embedded within the surface of a material by physically removing the entire upper layer. Examples include the removal of radioactive concrete layers by laser 'scabbling'.

Laser cleaning procedure will give the best accuracy and speed depending on the laser power source and scan head. Scantech will provide laser cleaning on various types of materials with various laser sources of different wavelengths without any damage on the materials. Laser cleaning is the process by which contaminants, debris or impurities (e.g. carbon, silicon and rubber) are removed from the surface of a material by using laser irradiation. This is a low-cost and environmentally-friendly laser application technique, which is in widespread use throughout global industry. Laser

TYRE MOULD CLEANING

Using laser cleaning process for die & mould cleaning, it increases the mould life extensively as it only burns the residues only

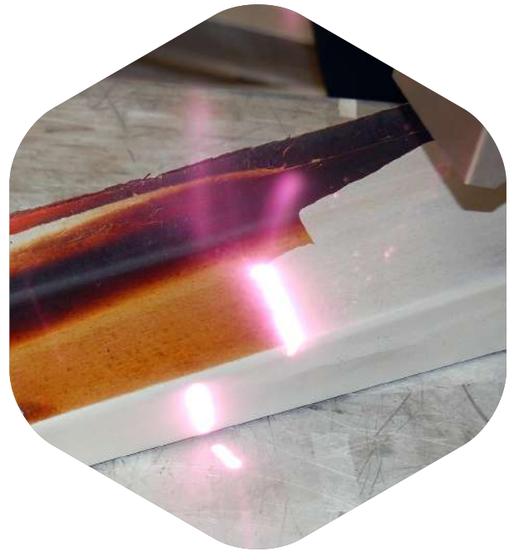
RUST REMOVAL

It is used to prepare surfaces for the next process like painting. Ship restoration industry is slowly adopting the process to cleanin the HUL

cleaning applications use no solvents or chemicals so it is much more environmentally friendly approach compared to many traditional approaches to cleaning. Laser cleaning offers so many benefits and advantages such as increased precision and improvements in process speed with disposal of additional materials. Laser cleaning is popular in a range of industries but especially in manufacturing where it is very often used to prepare surfaces for subsequent industrial processes such as painting and welding. It's also a valuable for processes where working with materials such as glass, ceramics, metals, concrete and plastics, etc. are involved. The process can also be applied to the cleaning of larger objects, e.g. rust removal on bridges or debris/ contaminants removal on the surface of aircraft and trains, etc. The laser ablation of electronic semiconductors and microprocessors is now being pioneered in the UK to keep electronic manufacturers designs confidential. The main reason is that it greatly reduces the risk of copying infringements. Processes are currently being developed to use laser ablation in the removal of thermal barrier coating on high-pressure gas turbine components. Due to the low heat input, TBC removal can be completed with minimal damage to the underlying metallic coatings and parent material.

Along with adding color to an aircraft, paint adds weight. For example, Airbus' double-deck, wide-body, four-engine jet airliner A380, which features a 4,400-square-meter exterior surface, requires three layers of paint that weigh a total of approximately 500 kg1. Traditionally, de-painting has been done with chemical paint strippers, water picks, dry media blasting and hand sanding, which now aviation industry is adopting to laser technology. It helps them reduce consumable and protect from toxic gas caused due to chemicals used. As laser generates no toxic gas, requires no consumables and clean process, it is environmental friendly.

Industrial Laser in India has a 5% share of more than $12 billion global laser market. With a compound annual growth rate (CAGR) of 11.6%, the global laser market is expected to cross $21 billion in the next five years and India will be the main contributor to this growth after 2012.
As a company that has seen the market evolve over the last decade, we believe that the demand for lasers is about to skyrocket in this country. The growth will be fuelled by economical fiber laser machines with the need for new cost effective and time saving technology while leaving behind traditional machines and other applications.



PAINT STRIPPING

Paint stripping is the most commonly used in the Aviation and Restoration Industy.

Surface Treatment Laser Hardening

A laser beam with a uniform high intensity distribution over a square for round spot to illuminate a work object. Laser beam is absorbed near the surface causing rapid heating at the irradiated spot in a thin layer. The bulk heat capacity of the material of this work object acts as a heat sink for quick extraction of the heat from the surface, enabling self-quenching.

There is a need in different industry sectors to improve the performance of material surface under wear corrosion environments, technological advancements thus resulting in low equipment costs which cannot be fulfilled by the conventional surface modifications and coatings. One example is tool steels, which are commonly used for manufacturing molds, dies and other components that are subjected to extremely high load in almost all industry sectors. These tools steels require high wear and corrosion resistance, either for cold work or hot work applications.

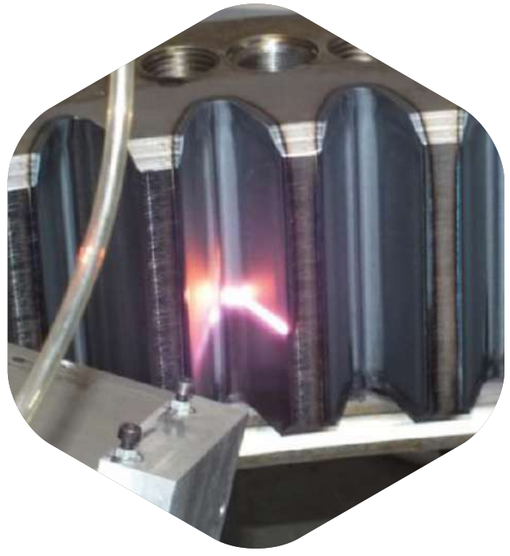
Another different case is the ultra-high strength steels used in automotive industry for body in- white applications. They help to improve car passenger safety while reducing the vehicle weight subsequently resulting in a fuel consumption and CO2 emission reduction. Nevertheless, they sometime present a formability problem which could be solved by local softening or hardening of some parts of the formed steel sheet. One way to improve the surface properties of materials is the laser surface engineering. Scantech can provide a better solution for all above conventional methods with application of laser hardening with a variant laser source. Scantech developed laser hardening system in India for surface hardening of Diesel Liners for DLW, Varanasi with very complex material achieving 66 HRC hardness scale.

The process of laser surface hardening performed on metal components reveals different types of responses like hardness, depth of hardness, and grain structures. The material with few chemical compositions including Carbon, Chromium, Manganese, and Molybdenum in process shows different responses. The suitable parameter for required results and material is a task for the designers and manufacturers. The material selection and its function with respect to laser hardening only bring the successful components.

Laser beams are used to perform hardening with almost zero deflection. The experimental study is to optimize the process parameters and selecting suitable material for manufacturing components working under critical loads. Continuous wave laser, pulsed laser and high power laser has been used in the experimental study. Power and scanning speed are the major influencing parameters in the hardening process. The results showed that reducing the scanning speed increases the hardness and depth due to increased interaction of beam with the work piece. Increasing the power starts melting the surface due to increase in energy thus improving the hardness and wear resistance as observed in specimens with higher carbon content.

Comparison of laser hardening with classical surface hardening processes:

	Flame Hardening	Induction Hardening	Laser Hardening
Hardening Depth	upto 40 mm	upto 10 mm	upto 2 mm
Reproducibility / Process Safety	Good	Very Good	Excellent
Distortion Behaviour (for identical geometry material)	Good	Good	Very Good & Consistent
Sequence of Operations in the complete product line	Can not be processed after machining.	Can not be processed after machining	It can be processed on machined part
Surface Condition	Component Surface Discolored resulting from oxidation	Component Surface Discolored resulting from oxidation	Blank component surface is possible
Post Processing	Mandatory	Mandatory	Not Required
Precision of the heat input	Medium	Good	Meets the Highest Standards



GEAR TEETH HARDENING

Blades cutting the stones into large blocks are hardened using laser. Blade teeth increses the life thrice as compared to non-hardened blades

To harden the work pieces, laser beam usually warms the outer surface to just under melting temperature (900-1400 degree Celsius). The hardening depth of the outer layer is typically from 0.1 to 1.5 millimeters. On some materials, it may be 2.5 millimeters or more.

The business case for laser hardening

- Ability to offer customer new tooling technology
- Precise control over case depth
- Rapid processing
- Minimal part distortion, no requirement for sub segment processing to restore dimensional accuracy
- Superior wear resistance due to a smaller grain structure from rapid quench.
- Increased fatigue strength due to the compressive stresses induced on the treated surface.
- Can be fully automated process.

Advantages in advanced technology:

- Highest level of process safety and reproducibility.
- Hardening of ready processed parts without post processing.
- Blank hardening with inert gas possible.
- Amount of heat input is comparatively low.
- Low distortion, so little to no finishing work required.
- Less hardness stress
- Low risk of cracking
- No media required for quenching.

Applications:

Laser hardening is particularly useful when the part has a specific limited surface area that needs to be hardened like top of gear teeth.

Laser hardening can also be applied to sintered parts widely as mentioned before. The use of this low distortion and locally applicable technology on sintered parts will lead to new applications due to its inherent advantages in near net shape manufacturing. Laser hardening technology is expected to be used for a wider variety of sintered material parts.

ROLLER STAMP DIE HARDENING

Highly moving dies gets worn quickly. Using laser local hardening can be done without post processing

Since 1991

about SCANTECH

Scantech is worldwide known for it's technical innovations in various fields of custom laser applications. We are very well known for our customer-centric approach, where our machines are tailor made as per client's specification for quality production & cost effectiveness. Apart from Custom Laser Machine Manufacturing we also offer wide range of machines like laser marking machines, laser welding machine, laser-drilling machine, laser cutting machine specific to clients requirement.

Being one of the reputed global laser machine manufacturing company, we helped in the growth of many industries including electrical, pharmaceutical, textile, jewellery, automobile and many other heavy engineering industries. Customers are guaranteed of getting highest quality laser products from us because of our experience, core competency and cost effectiveness. Scantech was established with the initiative of meeting the profile cutting demands of the sheet metal users and today we are serving the purpose all the major industrial sectors mentioned above including fabrication job shops. We use advanced laser technology and best sourced materials from world renowned companies to ensure durability, reliability and high efficiency of products.

25 YEARS OF INNOVATION

Company Overview

Our Vision

Scantech to be amongst the top 10 global companies, as the preferred laser solution provider for its customer worldwide.

Our Mission

Scantech's mission is to be the leading supplier of Laser Solutions worldwide through innovation & enhancement of customer productivity with systems & service solutions.

We Believe

We believe & understand that if technology takes effort & consumes time, its value is significantly reduced. Laser to us is not what you see, but what you don't see. Our solutions are subtle yet powerful, making a statement with its simplicity & comfort. Clients are often surprised by what is possible today. We realize that conventional machines can sometimes detract from your production & so we strive to blend technology in your production such that the integrity of your vision is maintained while delivering optimal performance. We strongly believe in offering the best solutions, ethical guidance, professional training & timely hassle-free service.

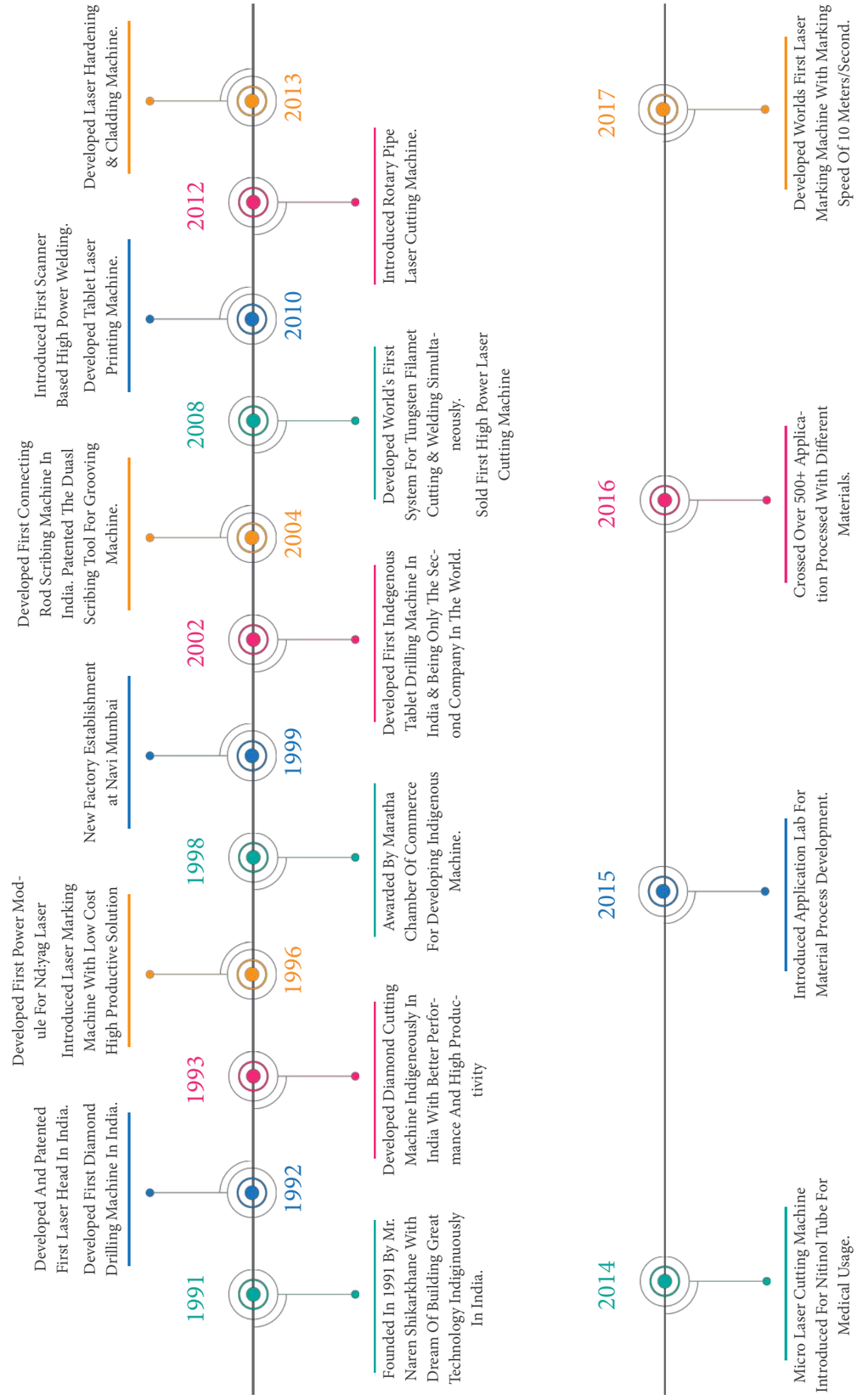
Our Services

We realize that since reporting, technical diagnostics & return procedures, servicing equipment may be very time consuming & could leave your equipment out of action for a number of weeks. Having identified these problems & understood the service demands of our product profile, we have built our support systems with a highly qualified team, specifically trained to help our customers overcome these problems almost instantaneously ensuring the maximum performance throughout the life of these equipment's. We sincerely believe that selling a product is just the beginning of a long-term relation with our Client & optimum service is the only key to success in our industry.

Material Processing Lab

Our state-of-the-art Material Processing Lab provides customers with a fully immersive space to introduce clients to laser processes & demonstrate the latest technology in a warmly inviting, functioing high-tech application environment.

Milestones



Company Overview

Why Us?

Experience
We have an experience of more than 200,000 hrs. in laser processing with more than +500 applications.

Expetise
We hold expertise in Industrial automation which is simpler to use & more productive with low cost solutions.

CSR
we support our communities through many environmental & social initiatives. We support education to poor & deprived section of the society, thus ensuring their growth socially & economically in the society.

Application Centre
Our application processing lab is equipped with all types of lasers & tools to process and make the samples as per need to ensure correct purchase of equipment.

Team
Our team has engineers from various fields like Laser PhD, Optical, Mechanical, Electrical, Electronics, Software, and Physicist.

Suppliers
Our suppliers are strategic partners and we foster ever-closer working relationships with them while staying true to our values which helps us understand new technology as well as to meet targets.

How We Work?

Sampling
We start right off the bat with sample testing, which helps our customer to comprehend the results from the process. Sample is prepared at our application lab in various parameters with different lasers to look over.

Concept
On endorsement of samples, we start with various idea illustrations that helps to understand the job processing easily. Concept inputs can always be customized to particular need.

Build
Drawings are quickly released for production with each stage inspection for quality. Post QC, it is than assembled at the assembly area with most care. Laser is the last assembled part of the equipment.

Test
Each component is checked and tested separately after assembly finishes. An engineer than check the electrical connections, laser alignment, optics and starts the testing of equipment for ceaselessly 48 hours.

Design
Once the concept is clear and wide, Final outlining of the equipment starts, where profoundly qualified specialists discuss about the design strategy, ergonomics and user friendly interface of the equipment.

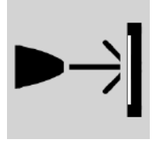
Prove
Our material preparing engineers begin trials on the sample provided by customer and fine tune the parameters. FAT is led in presence of customer to demonstrate each and every challange given.

Our Solutions

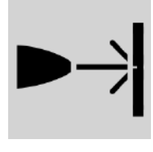
built to last years...

We hold expertise in the following laser processes

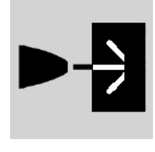
Laser Marking & Engraving
With our diverse set of industrial laser marking machines (Multi Position Large Size Laser Marking Machines to Portable Fiber Laser Marking Machines) we can provide the best-fit solution for laser marking, engraving or deep engraving depending on the application, material, composition and surface.



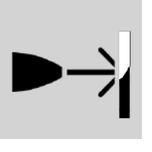
Laser Scribing
Scantech's laser scribing solution provides the manufacturers of semiconductors with an efficient alternative - laser-based Fiber Scribing Machine to mechanical processing. Our lasers offer high quality Ytterbium Fiber Laser Scribing system that specializes in scribing ceramic, silicon wafers and solar cells.



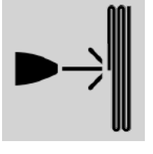
Laser Drilling
Scantech offers industry's best laser drilling machine - ProDrill to meet all your laser drilling needs from machining very small and precisely tapered shapes to the largest of holes. It works on a large number od solid materials like hardened steel, hard metal, ceramics and diamond by choosing the appropriate wavelength and power density of the laser beam.



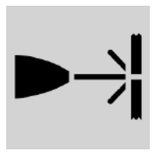
Laser Hardening
Laser hardening is used to produce a hard and wear resistant structure of the outer layer. It can be used for all materials which are subject to flame hardening and induction hardening. Scantech's Procarbo provide an excellent solution to process irregular 3-D work articles and reduce refinishing processes.



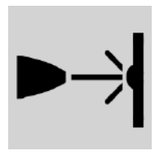
Laser Cladding
Scantech's state-of- the-art ProClad, laser cladding systems are perfectly suited for both new component or part manufacturing and piece repair. Pro Clad assures perfect metallurgical bonded and dense coatings. With Scantech's expertise we provide your business full support with the laser cladding application development, training and production ramp-up services.



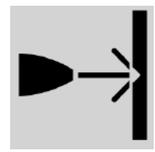
Laser Cutting
Scantech Laser cutters assist in taking your production to the next level. We use industrial grade components that result in faster movement, better precision and increased laser power. Thus, delivering precision levels and edge quality that are by far better than traditional cutting methods.



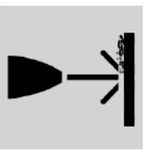
Laser Welding
Scantech Laser combines market requirement and technology and offers an engineered program of all-round smart solutions to processing and welding applications covering an entire gamut of industrial welding to fine jewelery welding.



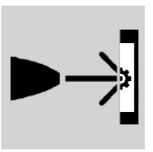
Laser Grooving
Scantech's ProGroove offers a variety of solutions, all of which guarantee a high-quality grooving process. It offers easy change of part variants with several sensors to detect Connecting Rod types or size. The simple switching of process heads ensures a flexible & hassle free production.



Laser Cleaning
With ProClean, Scantech offers you the best laser cleaning solution in the industry. Constructed using a modular design to enable optimal configuration and provide the right size laser for each application from 12W to 1kW, Pro Clean meets customers' specific requirement in all ranges from heavy-duty, production intensive applications to regular processes.



Laser Sintering
Selective Laser Sintering (SLS) is one of the most adaptable & versatile technologies used in 3D printing. With Scantech's ProSint you can build high quality functional and sturdy prototypes or a series of end-use components layer by layer. ProSint is thus, a suitable solution for producing interlocking parts, moving components or highly complex designs.



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