

SpecialFeature



Sheet metalworking Shaping up the future

Sheet metalworking is an important process in many industry segments. Today, its application is far and wide in the industry. The overall industrial growth in the recent past has given a new dimension to this sector. Fast growing industry segments like automotive have fuelled the growth opportunities of sheet metalworking. However, in other areas, sheet metalworking is still in its early stage...

Sudheer Vathiyath

Sheet metal industry is as generic as machining. This is a complementing manufacturing capability requirement in aerospace, automotive and other industrial sectors. Sheet metal is widely used in all applications due to aesthetics and sturdiness. Even the latest metro projects will be using a lot of

sheet metal in the trains and the stations and ticket collection areas. It is more predominantly used in aerospace and automotive sectors. In the automotive sector, body parts and fuel tanks of various vehicles are made from metal sheets that are formed into particular shapes and gauges for suitable applications.

In aerospace, body parts of aircraft are made using sheets of special metals like aluminium and steel formed into proper shapes. Sheet metals are also used to make storage tanks used in industries such as chemical & petrochemical, food & beverage, milk & dairy, etc.

What is sheet metalworking?

Sheet metalworking involves manufacturing articles from sheet metal or thin sheets. Sheet metal is simply metal formed into thin and flat pieces. It is one of the fundamental forms used in metalworking, and can be cut and bent into different shapes. Countless everyday objects are constructed of the material. Thickness can vary significantly, although those extremely thin are considered foil or leaf, and pieces thicker than 6 mm (0.25 in) are considered plate. Sheet metal is available as flat pieces or as coiled strip. The gauge of sheet metal ranges from 30 gauge to about 8 gauge. The higher the gauge, the thinner is the metal.

A large variety of metals in the form of sheets and plates used in sheet metalworking include black iron, galvanised iron, copper, brass, tin, aluminium, lead and zinc. The articles made of sheet metals are lighter in weight, and are less expensive. With properly designed shapes and structures, sheet metal articles are replacing castings and forgings in several engineering applications. Since sheet metalworking involves forming shapes from flat metal sheets, the 'development and drawing of shape of the article in actual size' on the sheet metal is the most important and prime operation of the work. The knowledge of geometry, mensuration and properties of metals is therefore most essential. Sheet metalworking also involves knowledge of various operations of joining metals like mechanical jointing or soldering and brazing etc.

Processes

The important sheet metalworking processes are cutting, punching, spinning, bending, press brake forming, roll

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general manager, QuEST Global Manufacturing

forming, rolling and stamping. There is a vast difference between the machining and general sheet metal fabrication. As Nagabhushana Junjappa, general manager, QuEST Global Manufacturing, observes, "There is very limited overlap between machining industry versus general fabrication industry. Fabrications that are required for industries like household industry are at the lower end of the capability and do not require the same level of precision and accuracy as the machining industry. Hence, sheet metal products manufactured for the general



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director, MetFab Machines (India) P Ltd

fabrication industry using CNC machines would be very expensive compared to other methods of producing the same pieces.”

Machines & technology

Development of new machines and applications plays a vital role in the growth of any industry. In sheet metalworking, various developments have taken place over the years, be it in cutting, bending, punching or forming. With the customer requirements on product quality and quantity increasing, many companies are gradually shifting to automated machines from conventional ones. However, those in the traditional fabrication field are still using the conventional machines.



Says Junjappa, “In India, sheet metalworking industry has remained more labour-oriented with regard to the general fabrication industry. With respect to the automotive industry, there is a high level of automation for cutting, pressing, forming and welding using automated hydraulic presses and robotics for welding. This increases productivity and reduces the chance of defects. In the Indian aerospace industry, sheet metalworking starts with simple fabrication like brake-forming and hydro-forming of aluminium and steel. By nature, aerospace sheet metalwork does not lend itself highly to automation.”

According to Jayesh Shah, director, MetFab Machines (India) P Ltd, new sheet metalworking technologies like punching and plasma/laser cutting are fast replacing/integrating the operations carried out on conventional machines for drilling, tapping, screwing (possible on punch press), threading (replaced by thread rolling), sawing, bevelling and milling (many applications replaced by plasma and laser).

Small firms are opting for automated machines despite the higher cost factor compared to conventional ones. In the long run, these automated machines deliver the best for them. These machines improve the accuracy of the process and enable to manufacture quality products.

“There is a plenty of scope for automation in sheet metal machines and it is available elsewhere in the world. Slowly, customers in India are realising the potential to automate due to quality improvement, safety in handling of sheet metal and fatigue of the operators etc,” says A V Srinivasan, CEO, Meiban Engineering Technologies Pvt Ltd.

Robotics plays a vital role in sheet metalworking. “Use of robot is becoming very popular and different kinds of robot mounting system for processes is the future. In India, one will see many of such applications for large welding system. Train, bus and shipbuilding industry will go for such solutions other than car makers,” says Sunil Raibagi, managing director, Güdel India Pvt Ltd. According to him, India is not

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behind and many automotive players have started using automation for production of sheet metal parts.

Güdel is an international name in the design, development and supply of precision handling solutions & robotics system. These systems are typically employed for high performance metalworking, assembly or manufacturing applications - in particular within automotive, aerospace machine tool, sheet metal, chemical, food packing, nuclear, electronics & process sectors.

“We offer solutions for press line like blank de-stacker, transfer system such as RoboSpeed and end-of-line racking system. Güdel press automations combine innovative mechanical elements with most advanced control and servo technology,” explains Raibagi.



Shah has a different view on the popularity of robots. “Sheet metalworking and shift towards use of sheet metal in products is getting increasingly popular. While niche shops have started automating their machines, bulk of the industry is yet to procure first level CNC machines, which will then increase the need of automated handling. Indian machine producers are too late in adding volumes and automation. Bulk of the market satisfies its requirements with imported machines.”

Trends in India

India, of course, is a fast growing country in today's industry scenario. The country has witnessed significant growth over the last few years with the manufacturing sector growing rapidly. Many global players have set up manufacturing facilities here. Industries such as automotive and infrastructure have led the growth. Machine tool sector being the facilitator of these industries in terms of machines and tools, also has witnessed a significant growth coupled with the growth of its user industry. The reflection of growth can also be seen in sheet metalworking.

Raibagi says, “I see a good growth. At least our share in this sector is growing. I see a change in trend to buy faster and accurate machines and improved process to reduce process time. This in turn is increasing the demand for high-end machinery and augmenting development of business in this sector.”

According to Junjappa, even in the western world there is between 30-50 per cent manual work done in aerospace, even to this date. This is where India would be attractive and cost-effective. “In addition to Indian companies like QuEST, there are foreign companies like Caparo who have set up shops in India for sheet metalworking in aerospace and automotive sectors. Hence, there is a growing market in India for sheet metalworking machines from companies like Hindustan Hydraulics (for shearing and press brake machines), John Shaw

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(for hydro form presses and rubber forming presses) and Bystronicks (for press brake machines),” points out Junjappa.

Most of the automotive industries are using press-loading system. Presses are of high capital investment. Manual loading can be 5-7 parts per minute, and by automation one is able to achieve 15-24 parts per minute approximately. This gives quick return on investment.

The tracks with robots are used to get the complex shapes to cut/weld bend parts. With this, set-up time is reduced, and improves quality, consistency and productivity.

India has now become a leading machine tool consumer in the world. However, in machine and machine tool manufacturing, the country has still a long way to go. Now, a major chunk of the new generation machines manufactured belongs to a few big national and multinational players. “We have started getting orders from South East Asia, and Güdel being an international brand, it is easier. But still it will take two to three years to get equal share as in domestic market. Presently, domestic demand is high,” opines Raibagi.

Shah observes, “Almost all large machinery manufacturing houses - textile machinery, plastic processing machines, printing machines, packaging machines, pharmaceutical machines, chemical plants, distilleries/breweries projects, etc are building main frames and majority parts from sheet metal. They are investing heavily in CNC sheet metalworking

machines. The market size has expanded 10 times in the past five years.”

As far as the exports are concerned Junjappa says, “The standalone Indian metalworking products as fabricated items are not evident. Such products are usually part of a finished assembly or sub-system. Hence, the Indian sheet metal product exports are more linked to the success of the export of finished products like vehicles (in automotive) or sub-assemblies/system (in aerospace). So, this is dependent on the end-product export potential.”

Srinivasan observes, “India is becoming an exporting country and the quality & delivery is fast catching up in the country. Many companies have started exporting to markets like the Middle East and Europe, due to the proximity of India to these markets. It is still not evident yet, but the future is bright for Indian exporters.”

Looking ahead

In machine manufacturing, India is far behind compared to countries like China and Taiwan. Major players in the automotive sector rely on imported machines for high quality processes in sheet metalworking. In India, there are very few companies manufacturing automated machines, but the requirement is far more. Taking these into account, the development of technically advanced machines in a cost-effective way is the need of the hour. This will help the small and medium firms to sustain their performance in a realistic way, thus improve the country’s overall performance in sheet metalworking.

“Sheet metal industry is always viewed as an additional in-house capability. As the industry matures and demand for sheet metal products increase, the capability for sheet metal forming will be acquired through various means like acquisitions, joint ventures, transfer of technology, training of professionals abroad, etc. In the case of the automotive industry, Indian products match world standards, while in the aerospace industry we are still in a nascent stage,” concludes Junjappa. **MMT**

