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# SNIPPETS

## FOR THE PAPER INDUSTRY

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### PAPER PRINTING TURNS 3D

3D Printing - also known as "additive manufacturing" - has been quoted in the *Financial Times* and by other sources as potentially being - "larger than the Internet". The McKinsey Global Institute report estimates a yearly economic impact (related to all 3D printing) valued at \$230 billion to \$550 billion by the year 2025. In this estimation, the largest source of impact is expected to come from consumer uses, with direct manufacturing taking second place, followed by use of the technology in creating tools and moulds.

Essentially, what all of the processes and technologies have in common is the manner in which production is carried out - layer by layer in an additive process - which is in contrast to traditional methods of production involving subtractive methods or moulding /casting processes.

3D printers have been with us for decades, routinely turning 3D computer designs into detailed physical objects for product design, education, architecture, healthcare, mapping, historic preservation and other applications. These devices create models in a range of materials, including plastic, plaster, photopolymers, metal and sometimes even food. Each of these materials brings inherent advantages and disadvantages, depending upon your application. There's one more to consider: PAPER

#### PAPER 3D Printing

Selective Deposition Lamination (SDL) or paper 3D printing was invented almost a decade back. Although 3D printer prices declined with time, the cost of their materials kept soaring. Research continued further to invent a 3D printer with an operating cost that would allow the technology would be accessible to everyone. Today, technology solution allows manufacturing monochrome and full-color 3D printers for 'paper' that cost a 'fraction' of any other 3D printing technology. While most technologies build models from expensive plastic or chemically infused powder, Paper 3D printers use ordinary, affordable and standard office paper as the build material.

#### Stages of Printing

1. The first sheet is manually attached to the build plate. The placement of the first sheet is not important, as the first couple of pages are attached as a base layer before the actual part cutting begins.
2. The first thing that happens is that a layer of adhesive is

applied on top of the first manually-placed sheet. The adhesive is applied selectively - hence the name SDL - "Selective." This means that a much higher density of adhesive is deposited in the area that will become the part, and a much lower density of adhesive is applied in the surrounding area that will serve as the support.

3. A new sheet of paper is fed into the printer from the paper feed mechanism and placed precisely on top of the freshly applied adhesive. The build plate is moved up to a heat plate and pressure is applied. This pressure ensures a positive bond between the two sheets of paper.
4. When the build plate returns to the build height, an adjustable Tungsten carbide blade cuts one sheet of paper at a time, tracing the object outline to create the edges of the part.
5. When this cutting sequence is complete, the machine starts to deposit the next layer of adhesive and the whole process continues until all the sheets of paper are stuck together and cut and the model is finished. After the last layer is complete, the part can be removed from the build chamber.
6. The main benefit of the SDL process becomes evident when the removal of the waste occurs. This process is called "weeding."
7. To aid ease of weeding, the support material is "diced" so that small portions of support material can be removed to ensure that delicate 3D models survive.

The paper '3D print' or 'object' is made of tightly compressed sheets of paper, and it essentially is a reconstituted wood.

#### Advantages

**Cost :** This technology uses ordinary sheets of business A4 and letter paper as the build material as a purposeful decision. Paper offers a tremendous affordability advantage over other materials. Paper is a omnipresent, stably-priced commodity, and modern 3D printers can consume previously used paper. Whether you choose new or used paper, the part costs are the lowest in the industry - approximately 5 percent of other technologies' costs. The total cost of complete system ownership over five years is one-fifth that of other competing technologies.

#### INDUSTRY NEWS

China Fibreboard capacity : 27 fibreboard plants were built in China in 2014 adding around 4.4 million cubic metres of new annual capacity to make the total capacity rise to 55 million cubic metres in 2015.

**Green Safe and Easy to Use :** Paper 3D printers are recommended to be used in non-industrial settings such as schools, medical labs and professional design offices. That means no toxic chemicals, fumes, or dust and no dangerous heat or light. Also the liquid materials used in the process - the adhesive and ink - are water-based and non-toxic. The final model is degradable and can simply be disposed off after usage.

#### Applications

**Manufacturing :** For manufacturers who need to develop better products faster, this concept prototypes help designers quickly and thoroughly refine new designs. Concept models also ferret out potential manufacturing issues before they get expensive. SDL is also ideal for investment and sand casting, FEA studies, living hinges, packaging development and more.

**Education :** Engineering / Architecture For educators, who want to safely and affordably improve learning in engineering, architecture, the arts and more, the technology makes 3D printing accessible at an affordable cost.

**Geospatial :** For rescue teams, law enforcement, developers and the military, detailed, colorful 3D maps make achieving objectives quicker and easier than with traditional paper maps.

**Entertainment :** For the entertainment industry, full-color 3D printing is a way to bring characters, settings and adventures into the third dimension for maximum impact.

**Marketing :** For salespeople and marketers who want to show customers and prospects new products before they hit



the market, realistic 3D printed prototypes are far more powerful than brochures. There's more understanding and more impact, when customers can hold a new product in their hands. Service teams can use 3D printing to make unique toys, jewelry, collectibles and other gifts and household products, in color and at a price point consumers will accept.

**Archaeology :** For preservationists, 3D printing offers a wide range of benefits for replicating, repairing and restoring priceless, one-of-a-kind artifacts.

**Medical :** For surgeons, dentists and other healthcare professionals, lifelike anatomical 3D models help deliver better outcomes by improving preparation for procedures and fabrication of medical appliances for the individual patients.

#### Conclusion

Paper is an eminently viable build material and offers distinct advantages in terms of enabling widely accessible, professional-quality 3D printing. There is no more affordable, safe or color-rich approach. Modern SDL technology is suitable for any office, school, healthcare laboratory or setting where people are learning, working or healing. This accessibility delivers what 3D printing has promised, yet struggled to deliver, for years - the ability for virtually everyone to improve their designs, shorten design cycles and win more business. 3D printing, overall, is promising to change the way people manufacture goods and do business. The 3D Print technology is finding mainstream support in the last two-three years in India now and people are viewing it with lot of interest.

<b>QUOTABLE QUOTE</b>	<b>The most sensible people to be met with in society are men of business and of the world, who argue from what they see and know, instead of spinning cobweb distinctions of what things ought to be. - William Hazlitt</b>		
<b>SCRABBLE</b> email answers by 20 <sup>th</sup> Dec '15	Rearrange the <b>letters</b> for <b>two new words</b> relating to the paper industry. ( Hint: <i>Paper finish</i> ) <b>FIVE HILL NUMS</b> First correct answer will win a Parker Vector Roller Pen (Maximum two prizes for one person in a year).		
<b>WINNER</b> NOV'15	<b>Mr. V V S N Sri Ganesh, Khammam-5-244/2, 3rd Street. Venkateswara Nagar. Bommuru. Rajahmundry- 533124 A.P.</b> <b>Answer : HARD SIZED</b>		
<b>?QUIZ</b> email answers by 20 <sup>th</sup> Dec '15	<b>Quiz: What are the two main components of TRS ( total reduced sulphur ) ?</b>		
<b>WINNER</b> NOV'15	<b>Mr. Saroja Kumar Swain, Asst. Manager (LAB &amp; QC) - M/s Emami Paper Mills, Balgopalpur, Dist. Balasore, Orissa</b> <b>Quiz: What greenhouse gas is emitted by paper in landfills?</b> <b>A) Pulp B) Carbon dioxide C) Methane D) Water vapor</b> <b>Answer : Methane</b>		
 <b>Prizes</b>	1. Best / first correct answer received will win one-year subscription to <b>IPPTA Journal</b> (Maximum one prize for one person in a year). 2. Best of the 12 monthly winners in a year will win one-year subscription to <b>Paper 360° Magazine, USA.</b>		
 <b>Fit</b>	Green tea can help lose weight.....only if u go to the mountain and pick it yourself.		
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