

# Mcor Technologies

## IRIS and Matrix 300+ 3D Printers



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### **Summary**

McOr Technologies 3D printers set the standard for truly accessible 3D printing with unprecedented affordability, ease-of-use, safety, and eco-friendliness. These 3D printers benefit customers from a variety of different fields, including manufacturing, architecture, civil engineering, medicine, education, fine arts and cultural preservation, entertainment, and consumer service bureaus.

### **Paper 3D Printing with Selective Deposition Lamination (SDL)**

The Mcor line of 3D printers utilize Selective Deposition Lamination (SDL) technology. In fact, SDL is a creation of Mcor Technologies. SDL monochrome and full-color 3D printers cost a fraction of any other 3D printing technology because the primary build material is standard office paper. Most competing technologies build models from expensive plastic or chemically infused powder. Mcor uses a blade for cutting and the 3D printer selectively deposits the eco-friendly water-based adhesive only where it's needed.

### **IRIS / Matrix 300+ Comparison**

The IRIS and Matrix 300+ models are identical with the notable exception that the IRIS includes full-color capabilities. It is important to note that Matrix 300+ can be easily upgraded to an IRIS in the future. For manufacturing and casting applications where color is not a requirement, the Matrix 300+ is the model of choice; for consumer modeling and fine arts, the IRIS is generally required. With the IRIS, we highly recommend the purchase of the optional stand, as it nicely houses the color printer (look in **Resources** for a picture with detailed dimensions). For color applications, color is paired with the model by utilizing Mcor *ColourIT* software. The pre-printed paper is then loaded into the 3D printer for color production. With both models, you can feed colored papers for various effects with the final product.

*Much of the information detailed in this review can be found under Resources (document titled HowPaperBased3DPrintingWorks.pdf). I highly encourage that individuals interested in 3D printing read this document. Another good resource is our list of informative product and company videos.*

### **Cost of Ownership**

- Uses affordable, ubiquitous standard office paper
- Cost per model is 10-20% of other technologies (\$.50-\$1 a cubic inch as opposed to \$6-\$8 a cubic inch for plastic printers)
- Ongoing cost is one-fifth of any other 3D printing technology
- Lower maintenance costs (no heating exotic plastics to a specific viscosity and jetting through narrow nozzles)

In order to be fully accessible, 3D printing must be affordable to use on an ongoing basis. Mcor's decision to use ordinary sheets of business A4 and letter paper as the build material was a careful, yet easy, decision. Paper offers a tremendous affordability advantage over other materials. Paper is a ubiquitous, stably-priced commodity, and Mcor printers can consume recycled paper. Whether you choose new or used paper, Mcor part costs are the lowest in the industry – approximately five percent of other technologies' costs. The total cost of Mcor IRIS ownership over five years is one-fifth that of competing technologies. A selection of Mcor printed models and their production costs can be found on page seven of the Resources document titled "HowPaperBased3DPrintingWorks.pdf."

### **Highest Quality**

- Realistic models with fine detail
- Tough, durable models; even ones that haven't been coated
- Models are tactile; not rough or heavy

Despite using low-tech paper as the build material, Mcor 3D printed models are professional grade, tough, and durable. They are cut to a precision of 0.00047in (0.012mm) and a dimensional accuracy of 0.004in (0.1mm).

### **Unmatched Color Capability of the IRIS**

- Only 3D printer to include an International Color Consortium (ICC) color map for unprecedented color accuracy
- Ink is designed for paper
- High color fidelity and realistic models (5760 x 1440 x 508 dpi)
- Consistent color from screen to model, model to model, and on undercuts and sidewalls
- Over a million colors - more than any other 3D printer
- No need to coat color models; even uncoated models are durable and possess a rich, vibrant color

The Mcor IRIS prints in more than one million colors simultaneously, delivering truly photorealistic 3D printed models. Mcor takes its unique color capability a major step forward by rendering rich, vibrant, and consistent color on all surfaces of the part. Colors on Mcor 3D printers are bolder and truer because the build material is paper, which is the intended medium for colored ink.

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### **Eco-Friendly, Safe & Easy to Use**

- Quiet, non-toxic, and safe
- Paper, water-based glue, and ink are fully recyclable
- Printer can use pre-used paper
- No chemicals needed to dissolve support material
- No toxic fumes to vent, messy powders to vacuum or dust
- Takes only minutes to remove a model from the supporting paper

Unlike other technologies, Mcor 3D printers do not require dipping of parts in toxic chemicals or sharp instruments to remove support structures. A Mcor model will not crumble or shatter. It emerges from the 3D printer as a tough, durable model. When you consider that it's made of tightly compressed sheets of paper, it is essentially reconstituted wood. As such, it generates a warm, tactile response that is uniquely pleasing to the touch. If you want to make parts that can be drilled, threaded, tapped, or water resistant, you can give them a quick dip and they're ready to go. The model also will accept a variety of optional common finishes to suit your application needs.

### **Green, Safe and Easy to Use**

Mcor 3D printers use adhesive and ink that are water based and non-toxic. They do not release any toxic chemicals, fumes, or dust; nor do they emit any dangerous heat or light. Such accessibility allows for use in non-industrial settings, such as schools, medical labs, and professional design buildings.

Other technologies use petroleum-based plastic (difficult to recycle), require cyanoacrylate infiltrants (glue) to prevent models from crumbling, or need chemicals to remove support materials. Mcor 3D printers require no infiltrants and its printing process is "green." When you're finished with the model, it can go directly into the paper recycling bin.

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## **Specifications**

### **IRIS (Color Printing)**

- The only 3D color printer with 360° HD color accuracy
- An ICC color map for the most accurate color in a 3D printer and 1 million+ colors (CYMK – 4 cartridges including black)
- 3D ink ensures high resolution color on all surfaces, including undercuts and on side wall features
- Color Resolution: x, y & z axis: 5760 x 1440 x 508dpi

### **IRIS and Matrix 300+**

- Machine Axis Resolution: x, y & z axis: 12µ, 12µ, 100µ / (0.0004in, 0.0004in, 0.004in)
- Build Size: A4 Paper: 256 x 169 x 150mm / Letter Paper: 9.39 x 6.89 x 5.9in
- Material Options: A4 Standard Office Paper 80gsm (160gsm ply color only) / US Letter Standard Paper 20lb (43lb ply color only)
- Layer Thickness: 0.1mm (0.004in) / 0.19mm (0.007in ply color only)

- File Formats for Printing: STL, OBJ, VRML, Collada
- Equipment Dimensions: 950 x 700 x 800mm (h)1 / (37.4 x 27.55 x 31.5in (h))
- Equipment Weight: 160kg (350lbs)
- Stand Dimensions: 1160 x 720 x 940 (h) / (45.6 x 28.3 x 37in (h))
- Stand Weight: 150kg (330lbs)
- Power Requirements: 350 W, 240 v 50 Hz or 120 v 60 Hz
- Hardware Requirements: 8GB memory, 100GB hard drive, 1GB graphics card, 2 network cards
- Operating System: 64 bit Windows XP, Windows 7, Windows 8
- Regulatory Compliance: CE

### How Paper-Based 3D Printing Works

3D printing starts with software. Mcor 3D printers support STL, the universal industry standard file format for 3D product designs, as well as OBJ and VRML (for color 3D printing). All mainstream, 3D computer-aided design (CAD), software products, including free programs such as *SketchUp*, produce STL files. Completed designs offered for download are typically presented in STL, as are files produced by scanning a physical object.

Mcor 3D printers include control software, called *SliceIT*. *SliceIT* reads the digital data and slices the computer model into printable layers equivalent in thickness to the paper. The software also enables you to position the part, or several parts, within the 3D printer's build chamber.

The IRIS also comes with an additional piece of software, called *ColourIT*, which is used in conjunction with *SliceIT* to apply color to the 3D digital files. Once the color has been applied, the model is exported as an WRL file which is then imported into *SliceIT* for building preparation.

Before any cutting begins, the Mcor IRIS pre-prints the color outline of the part on each page in the appropriate color combinations using a modified 2D color inkjet printer that sits in the IRIS stand. Mcor's patented water-based ink permeates the paper, preventing any white edges on the part. A barcode is also printed on each page to ensure the pages are in the right sequence. The pre-printed stack is then inserted into the 3D printer. If a page is missing, the IRIS will pause to let you print a replacement. This process also fully colors the undersides, overhangs, and sidewalls of models. Theoretically, you could create a full-scale replica of the ceiling and roof of the Sistine Chapel in a single build.

### The Mcor 3D Printing Process

Once the stock is loaded into the 3D printer and the device is activated, 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.

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. 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. 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, cut, and the model is finished. After the last layer is complete, the part can be removed from the build chamber.

### **Weeding the Object**

The main benefit of the SDL process becomes evident when the removal of the waste occurs. This process is called “weeding.” Because the adhesive is applied selectively, there is a greater bond between the layers of paper which constitute the model and less bond between the layers making the support material. Also, 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.

***Please reference “Videos” for a visual understanding of the Mcor 3D Printing and Weeding processes (Mcor 3D SDL Printing and Mcor Weeding of a 3D Printed Object).***

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### **Why Chose Mcor?**

Mcor Technologies is an innovative manufacturer of the world’s most affordable, full-color, safe, and eco-friendly 3D printers. They are the only 3D printers to use ordinary business-A4/letter paper as the build material, a choice that renders durable, stable and tactile models.

Mcor Technologies was formed by brothers Dr. Conor MacCormack and Fintan MacCormack in a bid to democratize “innovation,” by creating a set of accessible tools based on Selective Deposition Lamination (SDL) technology that would provide the freedom to innovate in an unlimited way. This journey started in 2005 with the vision of a future where everyone can easily turn their ideas into low-cost, full-color, safe, and eco-friendly 3D objects. Providing accessibility to a once niche technology is the driving force behind the company, with the Matrix and IRIS range of 3D printers the result of this vision.

Mcor’s mission with the Matrix and IRIS is to bring 3D printing to the masses and to make 3D printing as easy as printing on paper. Research and development initiatives in this company are co-funded by the European Regional Development Fund and Enterprise Ireland under the Border, Midland and Western Regional Operational Program of 2014-2020.

### **Why Choose Print & Finishing Solutions?**

Print & Finishing Solutions (PFS) is a well-established local print sales and support vendor. We have local technicians covering all of California, Arizona, and Nevada. With local service and over \$1.5m in inventory to support you, why would you go anywhere else? Have a bindery and finishing requirement? This is where PFS got started back in the early 1990’s. We are your source for print and finishing solutions in the 21<sup>st</sup> century. Call us today at (800) 398-5283, or visit one of our showrooms located in Orange County (Placentia), CA and Phoenix, AZ.

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competitiveness, so we have the very best pricing, guaranteed! We have the machines and supplies in local inventory, professionals to support you, and volume pricing to back it all up. We will not be undersold and we will be here for you for the long-run. PFS has made a major investment in facilities, people, training, and inventory. We have a solid balance sheet (\$2m LOC) and we want to be your valued vendor and business partner! Please contact us today!

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### **Additional Resources**

Please review our resources: "Sales Literature," "Video," "Technical," and "Resources." You should find everything you need to help aid in your selection and take advantage its full capabilities. For more information, please contact your PFS Equipment Consultant today about an Mcor 3D print solution: <http://www.pfsgraphics.com/contactus/index.html>

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All or most of the above is written internally at Print & Finishing Solutions (PFS) utilizing many resources. Some of our resources are the opinions of industry professionals, some are published and subject to change, etc. This is our best attempt to organize key aspects of the mentioned machinery to help you make the proper decisions for your business's long-term success. If any aspect of the above is critical to your decision making process, please ask your PFS equipment consultant to document in writing as part of your purchase contract.

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