

# The First Affordable Industrial 3D Printer arrives in Australia. It even prints Kevlar and Carbon Fiber.

Everyone has heard how 3d printing is going to change the way we manufacture almost everything. Then the question is asked "what can I make right now" which the 3D printer salesperson will answer "you can make rapid prototypes! That will help you bring your finished product to market much faster and cheaper than you have ever been able to do" which is a fantastic application and has saved many Australian companies hundreds of thousands of dollars. Although for the majority of small to medium businesses require more than rapid prototyping and are interested in what they can print and use right now. This is the question every 3D printer salesperson dreads unless their talking to a customer that has a lazy half a million dollars they answer with "you can make some cool toys!, do you want to see the Yoda I made"

This stops now as Aussie 3D is now the Distributor for Markforged 3D printer. Markforged is an American company that manufacturers the Mark two 3D printer which prints with Carbon Fiber, Onyx, Kevlar, High Temperature Fiberglass and Nylon.

This printer is a game changer as it allows its users the ability to start making products they can use. Now I can hear the extremely well informed saying holy crap this is great but for the rest us I'll go into some more detail around the more unusual materials and what they can be used for.

Onyx

has been engineered for engineers.

With the toughness of nylon, stiffness of a fiber reinforced plastic, and a heat deflection temperature of 145°C, Onyx is perfectly suited for all applications that demand a high-performance material. This material comes straight off the printer and ready to use in real world environments, no post processing it looks so sleek and sophisticated you will find it hard to believe your 3D printer produced it.

First, lets start with some history of the word. The name Onyx comes from a mineral with the same name. While the filament Onyx does not contain any of the mineral Onyx, the mineral is known for its surface finish. The mineral is a solid black gemstone with a hardness of 7/10 on the Moh's Hardness Scale – Diamond is a 10. Onyx (the mineral) also has indiscernible gemstone cleavage, which means that it cannot be easily split along defined plane surfaces. This is dependent upon a mineral's crystal structure – if the structure is planar, then it is easier to break along planes because the atomic bond is weaker. In the case of onyx (the mineral), it is difficult to split along planes, has a microscopic crystal structure, and as a result has a smooth polish and strong properties. The mineral is one of the most popular gemstones because of its surface finish, and the word onyx itself goes back to the Greek word for nail or claw – it's strong, sharp, and shiny.

Even though our Onyx filament contains none of the mineral, you may notice that some of these properties are valued in 3D printing as well: hardness, nice surface finish, and good adhesion so parts don't split along layer seams, and this is where Onyx (the filament) lives up to its name. Onyx (the filament) is not just another plastic material, it's actually a fusion of engineering nylon and chopped carbon fiber. This chopped carbon fiber filament adds stiffness to your 3D printed parts, not only providing micro-carbon reinforcement to keep parts true to their dimensions, but also giving parts a smooth, matte black finish.

Onyx is about 3.5 times stiffer than standard nylon because of the micro-carbon reinforcement. Because it also contains nylon, the engineering toughness and wear resistance is comparable as well, and the material has a heat deflection temperature of 145C. So already, it's a pretty great material, but the best part is, it doesn't stop there! You can use it with our high-strength fibers – carbon fiber, Kevlar, fiberglass, or HSHT fiberglass, to even further strengthen your parts. With Onyx and composite fibers, the strength of your 3D printed parts can reach staggering levels, which is awesome.

Kevlar

Has a high tensile strength to weight ratio, far exceeding steel and even specialist metal alloys, such as magnesium alloys, used in aerospace engineering.

For this reason it is used extensively in the manufacture of panels and wings for fighter jets, including the Eurofighter Typhoon. During the manufacture of Formula One racing cars, Kevlar is used for the bodywork and petrol tank. Kevlar has many other uses. You will find it being used in bulletproof vests, Tyers, fireproof clothing and even boots it's a fantastic material that until now has been out of reach to the vast majority because of the high price.

## HSHT Fiberglass

High Temperature (HSHT) Fiberglass! This new fiberglass is twice as strong as our standard fiberglass filament and has a 30% higher heat deflection temperature (HDT) at 150 C, while remaining a more affordable option than carbon fiber reinforcement. These high temperature materials properties open up incredible new possibilities and applications, especially to our customers in the aerospace and automotive industries, who now have the material they need to develop “under the hood” 3D printed parts and components for higher temperature environments.

## Carbon Fiber

Carbon fiber has the highest strength to weight as well as the highest thermal conductivity. Perfect for applications requiring the greatest possible stiffness and strength.

At Markforged head office Dan Topjian, Senior Application Engineer created a 3D printed fully functional carbon fiber hacksaw that he designed and printed on a Mark Two 3D printer.

His goal for designing and 3D printing the hacksaw was to print a very strong, functional, lightweight cutting tool that can be used in numerous applications.

The hacksaw is reinforced with a carbon fiber zebra pattern to provide optimal rigidity for its intended use. Unlike Kevlar, which provides some flexibility when in use, the carbon fiber is an ideal choice for this part and best meets this part's strength requirements.

These next generation 3D printer starts at \$9999 ex GST. If you would like more information please email [info@aussie3d.com](mailto:info@aussie3d.com) or call 0468417208.

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