



Bind all kinds of projects with this versatile fastener



Mayank Sharma

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Mayank is a Padawan maker with an irrational fear of drills. He likes to replicate electronics builds and gets a kick out of hacking everyday objects creatively

A

glue gun is one of those essential bits of kit that all makers should have safely stashed away in their toolbox.

The active ingredient in this all-purpose device is hot melt adhesive (HMA), more commonly known as hot glue. Initially fabricated to bond shoe soles, HMA is now the go-to glue for most crafters and is useful in a number of different hobbies. All kinds of makers use hot glue as a quick-assembly prototyping adhesive. You can use it to quickly glue up the test parts for your build, have them strong enough to hold together to make sure that everything fits and works, but it's all still weak enough that it can be easily taken apart again to make changes before final assembly. And while its primary purpose is to glue, if you look at it as a molten plastic dispenser, you start to see a lot more uses for it, in moulding and casting, sealing, and many other applications.

Hot glue is most commonly available as solid cylindrical sticks. They were introduced in the 1940s as an improvement to water-based adhesives that were prone to weakening when exposed to humidity. HMAs are applied to a

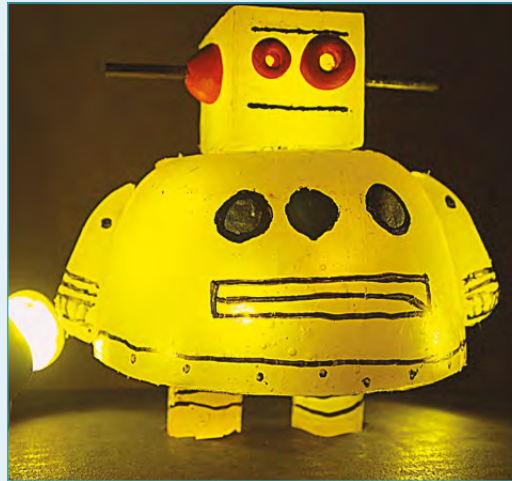
material in the molten (liquid) state by glue guns that have a heating element to melt the plastic glue. The glue sticks are pushed through a cavity at the end of the device either manually or by pulling a trigger, depending on the gun. When a second material is brought into contact, the glue cools down and solidifies very quickly.

Hot melt adhesives contain no water and no solvents of any kind. They are designed to set and form a bond by the loss of heat which translates into a very fast setting speed. HMAs can bond both similar and dissimilar materials. They vary in width and length and are generally made up of waxes, resins, and a variation of thermoplastic polymers. The polymers give them strength, the resins are responsible mainly for the adhesion, and the wax helps thin the adhesive for easier application. The chemical composition of HMAs varies depending on their use. The strength of the bond depends on several factors such as the temperature at which they are applied – a hotter adhesive takes longer to set and a cold one sets before the materials are bonded. Typically HMAs are waterproof and can withstand chemical treatments, but they are usually not suitable in high-temperature applications.

HOT GLUE CASTING

While it's a very good adhesive, hot glue can also be used for casting objects.

For a simple shape, you just make a plaster mould of the object you want to duplicate and then squirt hot glue into the negative space once the mould has hardened. Siddharth Jain applied this technique to create a hot glue cast of the Instructables Robot (that appears in the website's logo) which can double up as a geeky night lamp. He used cardboard to create the mould for the robot's head, a bowl for its belly, baking foil wrapped over a thick marker pen to mould its legs, and epoxy putty for its hands. He then filled the moulds with hot glue and inserted a couple of LEDs in the head and the legs as the glue cooled. Siddharth has shared assembly details and other nuances, with pictures of every step to make it easier to replicate his build. □



Project Maker
SIDDHARTH JAIN

Project Link
hsmag.cc/KXSCoh

Left ♦
It took eight 11-inch glue sticks to cast the robot: two each for the head and limbs, the rest for the body

Credit
instructables.com

GLUE STICK ROBOT

Project Maker
PAVEL MIHAYLOV

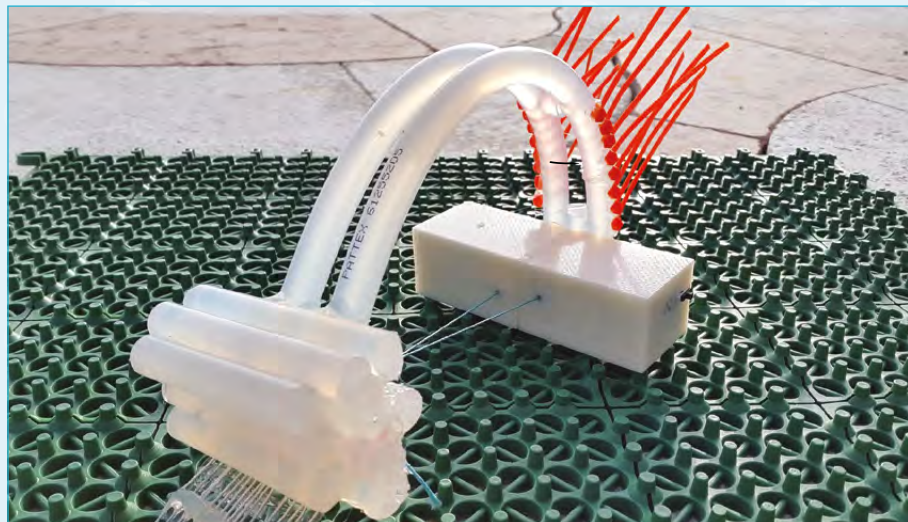
Project Link
hsmag.cc/mHYtGI

Below ♦
The friction-inducing spikes at the tail compliment the ones at the front and give it a personality

Credit
instructables.com

If you've handled hot glue sticks, you'll have noticed their spring-like nature when bent.

Pavel Mihaylov, an engineering student in the University of Edinburgh, decided to exploit this behaviour to make a neat little robotic toy that propels itself using glue sticks. Pavel's robot has a bunch of hot glue sticks between the front and the tail, along with a couple of strings. He uses Arduino-controlled servo motor actuators to pull the strings from the tail to the front, which also bends the glue sticks. The actuator then lets go and the bent glue sticks straighten and push the robot's front forward. Explaining the physics behind the movement, Pavel says the robot's tail has very little friction with the ground on one end and very high friction at the other end, which keeps it stuck to the ground as the glue sticks unfold. Pavel has also shared the simple code for controlling the servo. □



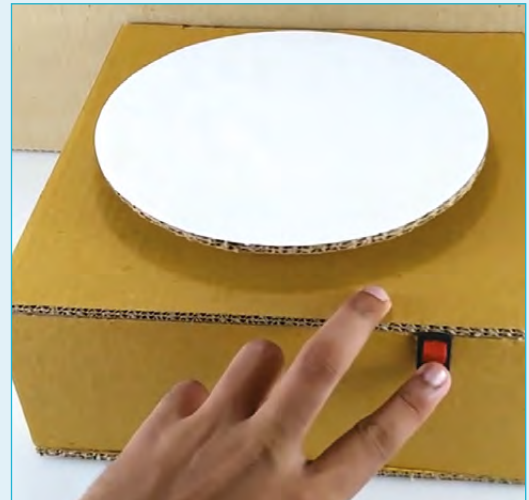
ROTATING PHOTOGRAPHY STAND

Project Maker
DIYATHOME

Project Link
hsmag.cc/aZZFpQ

The creative individual behind the DIYatHOME YouTube channel, who prefers to remain anonymous, hot glues some easily accessible knick-knacks and puts them to innovative uses.

Being a macro photographer, one of my favourite is the rotating photography stand that you can put together in a matter of minutes. Just hot glue the cap of a pen to a ball bearing and then glue a strip of cardboard around it and stick them to another piece of round cardboard. Next, splice a small DC motor along with an on/off switch to a USB cable.



Above ↕
Head to DIYatHOME's YouTube channel (hsmag.cc/bhfxmp) for more fun projects built with cardboard

Credit
youtube.com

Finally, put them together, while making sure the shaft of the motor is in contact with the circular cardboard. DIYatHOME's instructables page has brief but well illustrated step-by-step instructions to better understand the process. □

DIY COLOUR HOT GLUE STICK

Project Maker
KEN

Project Link
hsmag.cc/tojaac

Ken grew tired of the clear-coloured glue sticks. Instead of shelling out the premium for buying coloured hot glue sticks, he decided to make some of his own. Ken's written up the procedure on his blog and also made a video of the process after popular demand. The process is simple and wouldn't take much time, but is labour-intensive and not suitable for children because of the temperatures and smells involved. The key to this process is the Reynolds parchment paper, which is coated on both sides with silicone. Hot glue won't stick to parchment paper, which makes it an ideal material for a mould when wrapped inside a brass tube. Ken then heats up some glue sticks with a Crayola crayon and pours the mixture inside the mould that then solidifies in about half an hour. In the write-up, Ken has also shared some tips to ease the pouring process, including using a silicone funnel or one created with cardboard lined up with parchment paper. □



Above ↕
Ken says the wax from the crayon doesn't really change the bond strength of the hot glue

Credit
observationsblog.com

HOT GLUE HACKS

**A WATERTIGHT AND AIRTIGHT SEAL**

Hot glue is a handy little fix to seal small holes and will also work under water. Remember however that it won't take much abuse, so use it with caution.

**COVER EXPOSED WIRES**

Mixing hot glue and electronics isn't usually a good idea since electronics produce heat, but you can use hot glue to cover wires peeling out of earphones and USB cables.

**GIVE RUGS A NON-SLIP GRIP**

Rugs are pretty slippery, especially over smooth tiled or polished floors. Apply dollops of hot glue to the bottom to increase the friction and make them less slippery.

**ADD TEXTURE**

Create a design with hot glue on any surface—canvas, eggs, wood, bottles, vases, etc. Once dry, paint over it for more personality.

**HANG LIGHTS**

It can be tricky to hang lights on a brick wall. Save time by applying a small amount of glue to the wall and then paste the lights. Reheat the glue with a lighter to take them off.

**HOT GLUE MATCHSTICKS**

Poke a hole and pierce pieces of hot glue near the striking end of the match. In an emergency, light the match, let the flame heat the glue, and then spread the glue.

**TEMPORARY SOLES**

If you have worn out the soles of those comfortable pair of shoes, make them grip again with a coat of hot glue.

**BASKET FOR TRINKETS**

Use a brush to coat any kind of oil on the outside of a glass bowl. Then draw lines on it in the form of a spider web and peel it off once it dries.

GLUE GUN SANDALS

When Brooke's dog chewed up one of her slippers, like any good maker she decided to fabricate a set of her own.

She recalled seeing a video of a hot glue DIY for a pair of flip-flops and decided to build upon the process. Brooke's process is fairly straightforward and easy to replicate. She makes a stencil out of cardboard, then places a sheet of parchment paper over it and applies a layer of hot glue. A similar process is used to fabricate the bands. She then trims the base to make them prettier and glues them together. Brooke writes that her hot glue sandals will not let moisture, rocks, and dirt come through and the noise they make initially will eventually die down. The first time she attempted the sandals though she used aluminium foil instead of parchment paper: "Once I glued all the parts and let them dry, I attached the pieces of the sandals together with the aluminium still on, so that I could peel it off as a final reveal. When I finished, I gathered everyone around to watch me peel off the foil, except that it didn't come off, and there was no reveal. My family had a great time laughing about my silver shoes for the next few weeks." □

Project Maker
BROOKE

Project Link
hsmag.cc/FqKmtl

Below ▣
Make sure you don't apply a lot of glue to one spot – it'll layer up and feel uncomfortable

Credit
instructables.com

