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The 10 Myths about Cyanoacrylate ADHESIVES

Cyanoacrylate adhesives (CAs) — also known as "superglue" or instant adhesives — are a popular adhesive choice for many applications, both industrially and domestically.

They are easy to use adhesives that cure quickly, offer good throughput and are suitable for bonding a range of substrates including metals, plastics, elastomers, ceramics and porous materials. In fact, they are the only fast bonding adhesives which are single component, and cure in ambient conditions without requiring any external energy source. No wonder they are used widely! But they are not perfect. Because of their unusual properties and quirks, there are several myths around their use. Here we bust some cyanoacrylate adhesive myths.

At the molecular level, cyanoacrylates are composed of acrylic monomers stabilised by a weak acid. Cure is initiated when the acidic stabiliser is neutralised by a weak base, typically water, resulting in polymerisation into a long chain polymer. CAs can be based on various monomers but are most commonly formed from ethyl cyanoacrylate (ECA) or methoxyethyl cyanoacrylate (MECA) monomers.

"...they are the only fast bonding adhesives which are single component, and cure in ambient conditions without requiring any external energy source."

MYTH
1

All CAs are the same

While it is possible to walk into your local hardware store and purchase a consumer CA, these are not indicative of the capabilities of all CA materials. Newer entries to the market aimed at industrial and technical markets have been formulated to overcome some of the historic challenges and broaden the applications in which CAs are used.

Cyanoacrylates are produced in a variety of formulations, each exhibiting distinctive attributes of viscosity, thixotropy, cure time, bond strength, and more. There are materials available for everything from hobbyist woodworkers to electronics manufacturing to medical-grade skin bonding materials for wound closure.

MYTH
2

Two strips of wood bonded together using a flexible cyanoacrylate adhesive

They are brittle

While CAs are generically brittle, some, like the **Born2Bond Ultra** range, are less brittle than conventional products. Rubber toughened formulations can offer better impact resistance. ***adhere* ADH9480 Cyanoacrylate Adhesive**, for example, when compared with other grades, offers improved shock resistance and peel strength and has a longer setting time than other grades, while being specially formulated to achieve the strongest possible bond between well-mated, non-porous surfaces. Alternatively, ***adhere* ADH9105** offers higher impact, humidity, and temperature resistance than similar materials, resulting in a more flexible bond.

Recent innovations have seen the launch of CAs that are inherently flexible. For example, **Born2Bond™ Flex** offers >200% elongation, absorbs impact and vibration and copes with bonding substrates with different thermal expansion coefficients.

They have a maximum operating temperature of 80°C

While 80°C is the maximum recommended operating temperature for a lot of CAs, there are several products available that offer improved temperature resistance. **Born2Bond Structural**, for example, can withstand temperatures up to 120°C, while ***adhere* ADH9480** can withstand up to 125°C.

MYTH
4

They always cause blooming

A side effect of CA's volatility, blooming is the name given to the chalky white residue that appears on the surface of the part. While it does not affect bond integrity, blooming can be aesthetically undesirable. Because CAs based on MECA monomers are less volatile than ECA products, they are less susceptible to blooming; manufacturers looking for a low bloom material could consider ***adhere*** **ADH9408, ADH9640** or **ADH9403**.

Recent advances have seen the introduction of low blooming MECA materials with fewer compromises, for example **Born2Bond Light Lock**, which has an additional light curing mechanism, or **Born2Bond Ultra**, which combines the fast curing associated with ECA-based CAs with the low-blooming characteristics of MECA-based ones.

MYTH
5

They have an unpleasant odour

Almost anyone who has used “superglue” at home will have noticed its distinct smell. When working with traditional CAs, it is important to work in a well-ventilated area and with the correct protective equipment. A suitable dispensing methodology can reduce the need for handling and improve health and safety.

However, not all CAs smell — low bloom formulations are also low odour. **Born2Bond Ultra**, for example has inherently low volatility, which means less odour, less irritation and no CLP hazard symbols on the label.

MYTH
6

They must be dispensed manually

There is no requirement to apply a CA directly from the tube or bottle. Depending on the level of accuracy and repeatability required, as well as the throughput of the application, CAs can be dispensed as part of a manual, semi-automated or fully automated process.

For example, you can combine a pressure pot or reservoir with a suitable diaphragm dispensing valve for a semi-automated, precise dispensing technique. Mounting this equipment onto a robot to automate fully will result in a methodology that requires very little operator intervention.

The trick to establishing a successful dispensing methodology is finding an adhesives supplier that is also experienced with the relevant dispensing and automation equipment.

MYTH
7

They aren't gap filling

Most cyanoacrylate adhesives are inherently of a low, runny viscosity, which means they don't work well when there are gaps to be filled, if the parts are porous, or if the bondline orientation means that the adhesive would drip or run out.

However, CAs are now available in a range of different viscosities for gap filling. **Born2Bond Repair, Structural**, **Flex** and **Ultra** all offer high-viscosity formulations for gap filling. The high viscosity ***adhere* ADH9454 CA gel**, for example, prevents running on inclined or vertical surfaces during its 3 to 60 second fixture time, enables gap filling up to 0.5 mm, and minimises the absorption of adhesive into porous substrates to ensure a good bond.

They have poor moisture and solvent resistance

MYTH 8

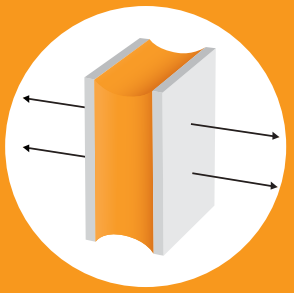
This is generally true, and in the past this has limited their use in many industrial applications. Actually, CAs have better resistance to non-polar solvents like IPA; it doesn't seem logical, but cyanoacrylate adhesives have more chemical resistance to petrol than they do to water.

However, advances like the hybrid chemistry of **Born2Bond Structural** now give superior moisture resistance, showing a very small reduction in adhesive strength after 1000 hours immersion in water, and much improved compatibility with polar solvents.

% of Initial Strength vs. Exposure Time (hours) and vs. Type of Contaminant

Testing on GBMS		%of Initial Strength		
ENVIRONMENT	TEMP	100H	500H	1000H
Motor Oil	40°C (104°F)	119	118	109
Ethanol	23°C (73.4°F)	105	71	59
Gasoline	23°C (73.4°F)	104	94	94
IPA	23°C (73.4°F)	112	100	97
Water	23°C (73.4°F)	105	95	94

They are not structural adhesives



To date, CA bond strength has been readily compromised by temperature and moisture/humidity, which has limited their use for load-bearing applications. However, **Born2Bond Structural** has very high impact resistance (27 KJ/m^2 steel after 24h), and toughness. It develops structural bonding performance to steel, ABS, PVC, phenolic and polycarbonate, amongst other substrates, and features particularly good adhesion to aluminium (lap shear strength 12 MPa). With higher temperature, moisture and solvent resistance, it is a good candidate to test for a structural industrial application.

MYTH
10

They stick your fingers together forever!

More people than would care to admit have accidentally stuck their fingers together with “superglue” — the moisture in our skin is ideal to initiate curing. Luckily, soaking your hands in soap and warm water will loosen the adhesive enough for you to slowly peel your fingers apart. If this doesn’t work, an acetone-based nail varnish remover should finish the job. If you left the CA untreated, eventually the fats and oils in your skin would remove the glue and unstick your fingers, but we don’t recommend you test this out.

About INTERTRONICS

INTERTRONICS supplies adhesives, coatings, sealants and equipment to customers with high technology, high performance assembly applications. Our customers are manufacturers in industries such as electronics, medical devices, plastics, optical, automotive, energy, defence and aerospace.

We specialise in adhesives and adhesive systems, namely bonding, coating, sealing, encapsulating, potting, masking and gasketing products, together with the most appropriate equipment and accessories for surface preparation, mixing, application, dispensing, and curing them. The provision of insightful technical and applications guidance is a cornerstone of our business. We help you fi nd the optimal materials and processes for the manufacture, assembly or repair of your products, safeguarding and enhancing performance and integrity and, in turn, your profi tability and reputation.

Ever since being established in 1979, when our main market was the printed circuit board assembly industry, we have enjoyed a reputation for customer focus, excellent service and post-sales support. We now supply over 3,000 regular customers, including multinational manufacturers, production facilities, specialist design and development businesses, universities, training organisations and government establishments.

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