

Adhesive Joint Design

Modern epoxies and cyanoacrylates are very strong adhesives that can be utilized with poor joint design. These materials can be used in a tension application somewhat successfully. Traditional adhesives and especially ceramic adhesives have good compressive strength and very poor tensile or flexural strength. Thus adhesive joints should be designed so that a large part of the joint line is in compression when typical loads are applied to the part.

Butt joints where a part is simply resting on another puts the entire joint line in tension when a tipping force is applied, making it a poor design for a ceramic adhesive. Looking to typical wood joinery is a good reference for good ceramic adhesive joint design. The use of tongue in a groove, a mortise and tenon, and the joint having a dowel pin can be used to direct the forces into compression when force is applied to the joint. Once again it is best if the materials have a similar coefficient of expansion and the dowel pins if used should be made of the same material as the majority of the joint material. Another tactic is to make a part (splint), which surrounds the joint and can then be further enhanced by pinning to the main parts. The dowel pins and splints are very useful when repairing an existing part that has broken. Placing small splints and dowel pinning them to the main part will result in a robust repair.

Some repairs will be best made by using the most ancient method of wrapping the area in the high temperature cloth or ceramic paper and causing a "cast" to be formed around the part. The ceramic adhesive is used to solidify the wrapping into a solid hard mass.