



# Industrial Technology Virtual Learning

**9-12/Advanced Metals : Adhesive bonding of metal**

**April 27, 2020**



Lesson: April 27, 2020

**Objective/Learning Target:**

Students will identify advantages of using adhesives to join metal .



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## Objective/Learning Target:

Students will explain uses of adhesives in joining metal.

# *Adhesive Bonding of Metals*

- Process of fastening parts of metal products together permanently with non-metallic materials.*
- Often used as an alternative to mechanical fasteners.*
- When using adhesives, the entire joint must be given even more consideration than when using mechanical fasteners.*
  - Unlike a bolt or rivet, an adhesive's properties may change depending on where it is used.*
- Light-gauge materials are often good candidates for adhesive bonding.*

# *Advantages of Using Adhesives to Join Metals*

- Many adhesives easily join dissimilar materials if proper surface treatments are used.*
- Adhesively joined structures and products are inherently smooth.*
  - Exposed surfaces are not defaced, and contours are not disturbed as with other types of fastening systems.*
  - This is important both to function and appearance.*
- Adhesives are sometimes used with mechanical fasteners for sealing flange joints or holding the parts together while the bond forms.*
- Thin or fragile metal parts can be bonded. Adhesives do not usually impose heavy loads on materials, such as in riveting, or localized heating, such as in soldering or welding.*

# Cyanoacrylates (*superglue*)

- *Adhesives developed for production situations requiring instant bonds and immediate handling strength, particularly when bonding rubber, metals and plastics.*
- *These adhesives are especially well-suited for trim attachment and light assembly.*
- *Cure through reaction with moisture held on the surface to be bonded.*
- *Good environmental resistance; therefore, they offer excellent resistance to weathering and aging.*

# *Epoxies*

- *Synthetic adhesive made of two components, a liquid resin and the hardener to convert the liquid resin into a solid.*
- *Create superior bonds for a wide variety of materials including metals, rubber, and plastics.*
- *Widely used in the automotive industry.*
  - *Many cars and light- and heavy-duty trucks feature body panels bonded with epoxy adhesives.*
- *Excellent environmental and chemical resistance.*
  - *They resist the effects of dilute acids, alkalis, solvents, greases, oils, moisture, sunlight and weathering.*
- *Flexible cure rates.*
  - *Allow great versatility in formulation since amount of hardener can be adjusted to increase work time or decrease set time.*
- *Low shrinkage and good creep properties.*

# *Urethanes*

- Primerless adhesive that is ideal for prepared metals, rubber and fiber reinforced plastics.*
- Create strong flexible bonds that bring excellent structural integrity to assemblies made of plastic, metal, foams and elastomers.*



# *Anaerobics*

- Specialty adhesives designed to cure on metals in the absence of oxygen.*
- Primarily used to anchor threaded joints and shafts against breaking free due to vibration.*
- Can eliminate the need for lock washers and press fitted metal joints.*
- Often known as "locking compounds."*
- Based on synthetic acrylic resins.*

## Review Questions

- 1.) what joining process is readily used to join non metallic materials with metal parts?
- 2.) true or false; the properties of an adhesive may change depending on where it is used.
- 3.) what is a commonly used name for Cyanoacrylates?
- 4.) What are the 2 components of an epoxy?
- 5.) What is a Primerless adhesive, that is ideal for prepared metals, rubber and fiber reinforced plastics?