EFI POLYMERS

FORMULATED SOLUTIONS WORLDWIDE

PRODUCTS AND SERVICES FOR TRANSFORMERS AND ELECTRIC GRID

platinum REGISTRATION, INC.
ISO 9001:2015 CERTIFIED

ANAB ACCREDITED
ISO/IEC 17021
MANAGEMENT SYSTEMS CERTIFICATION BODY

ABOUT US

01. EFI Polymers was founded in 1993

02. Privately owned and positioned for multi-generational ownership

03. ISO 9001:2015 Certified since 2018

04. Average 7MM lbs of formulated material sold per year

05. Over 100,000 sq ft of Office, R&D, Manufacturing and Warehouse space in Denver, CO

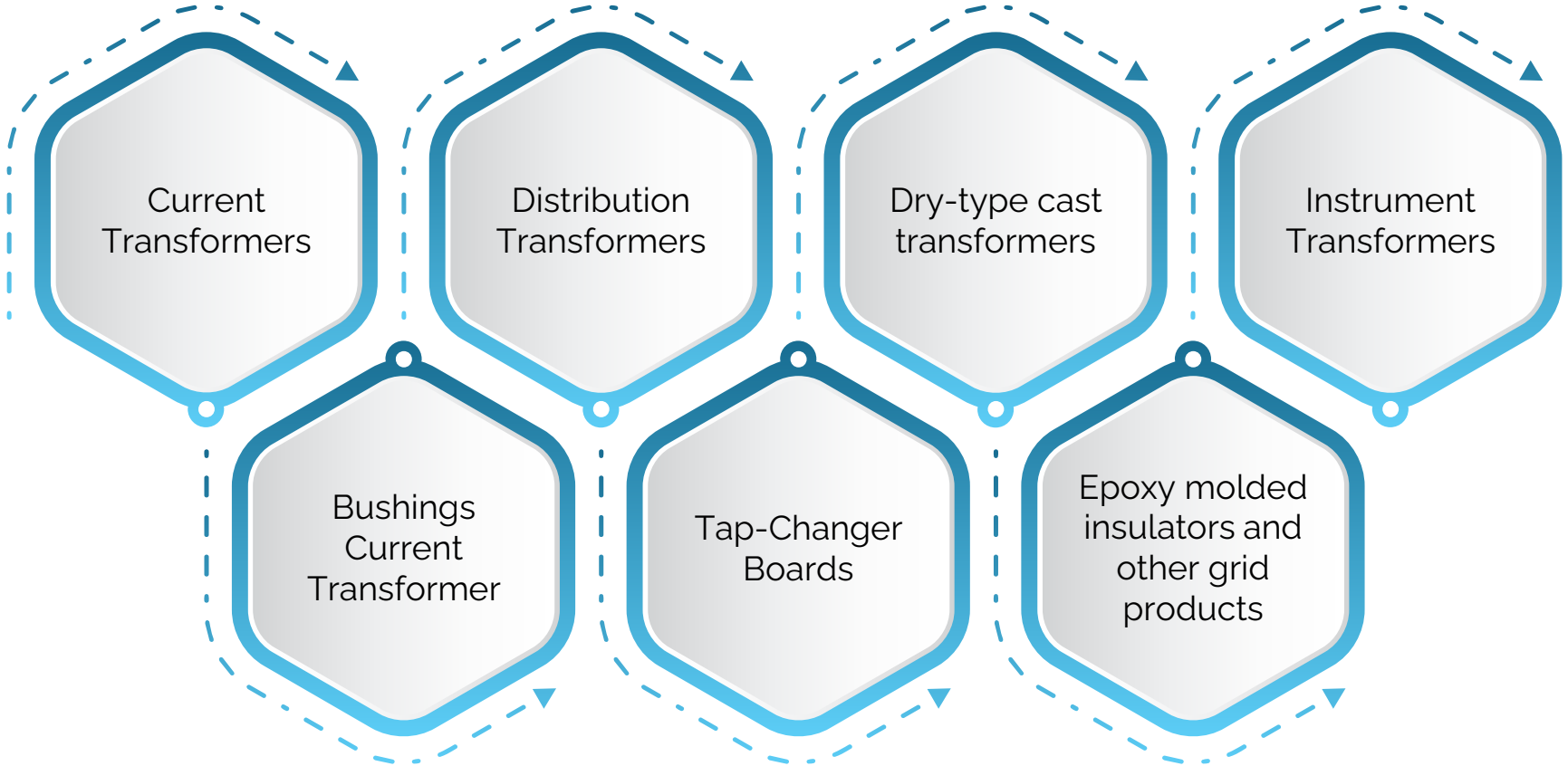
06. Experts in Epoxy and Urethane Chemistries

07. Long relationships with all major raw material suppliers

EFI POLYMERS

GRID FOCUS

Deep experience in formulating and providing to the market place epoxy and urethane products for use in low, medium and high voltage variants of the following:



EFI POLYMERS

CHEMISTRY

We are experts in the specific chemistries used in these applications:

- Bisphenol A Epoxies for indoor duty transformers
- Hydrophobic Cycloaliphatic Epoxies (HCEP) for outdoor use in harsh environments
- Anhydride curing agents for use in large pours, high Tg, and exceptional toughness
- Heavily filled, low viscosity, long gel time products that excel in void-free encapsulations
- Filled polyurethane chemistries for medium voltage and bushing transformers

EFI POLYMERS

CHEMISTRY

We are experts in the specific chemistries used in these applications:

- **Epoxy resins** for indoor use
  - Aromatic epoxy resins – typically Bisphenol-A based
  - Excellent chemical, electrical and mechanical properties
  - Not UV stable outdoors – polymer degradation
  - Lower cost than cycloaliphatic epoxy resins
  - Low to medium viscosity: typically 800 – 15,000 cps

- **Epoxy resins** for outdoor use
  - Cycloaliphatic epoxy resins
  - Excellent chemical, electrical and mechanical properties
  - Excellent UV resistance
  - Significantly higher cost than aromatic epoxy resins
  - Low to very low viscosity: 200 – 900 cps

- Hydrophobic Cycloaliphatic Epoxies (HCEP) for outdoor use in **humid** environments
  - Modified for hydrophobicity – water-repelling surface
  - Excellent chemical, electrical and mechanical properties
  - Excellent UV resistance
  - Higher cost than cycloaliphatic epoxy resins due to high cost of modifiers

EFI POLYMERS

CHEMISTRY

We are experts in the specific chemistries used in these applications:

- **Anhydride curing agents** for use with epoxy resins
  - Excellent chemical, electrical and mechanical properties
  - Resistant to very high voltages at high temperatures – high Tg
  - Cure at temperatures as low as 80˚C and rapid cures at 121˚C
  - Allow for very large pours – work-life based on process temperature and catalyst

  - Indoor use
    - Lower cost than cycloaliphatic (outdoor) anhydrides
    - Not UV stable outdoors – polymer degradation
    - Darker in color
    - Very low viscosity: 40-300 cps

  - Outdoor use – cycloaliphatic anhydrides
    - Higher cost
    - Excellent UV resistance
    - Water-white color
    - Either very low viscosity (< 100 cps) or solid at ambient temperature
      - Solid anhydride is lower cost

EFI POLYMERS

CHEMISTRY

We are experts in the specific chemistries used in these applications:

- **Fillers** used in epoxy resins
  (+) Lowers system cost
  Improves chemical/electrical/mechanical/thermal properties

  (-) High viscosity – requires high resin pre-heat temperatures
  Filler settling during transport and storage – requires homogenizing prior to use, to maintain mix ratio and system properties.

  - Standard, non-surface treated
    - Lower cost than surface treated
    - Very good supply chain
    - May not perform as well as surface-treated fillers in humid environments

  - Surface-treated
    - Higher cost than non-treated
    - Tight supply chain – not readily available in the USA
    - Reported to maintain system properties in humid environments

EFI POLYMERS

MATERIAL PROCESSING

01.

Advanced, high performance materials are only valuable if you can use them

02.

EFI Polymers takes a hands-on approach to trials and process development

03.

Deep experience with all major meter mix dispense equipment providers

04.

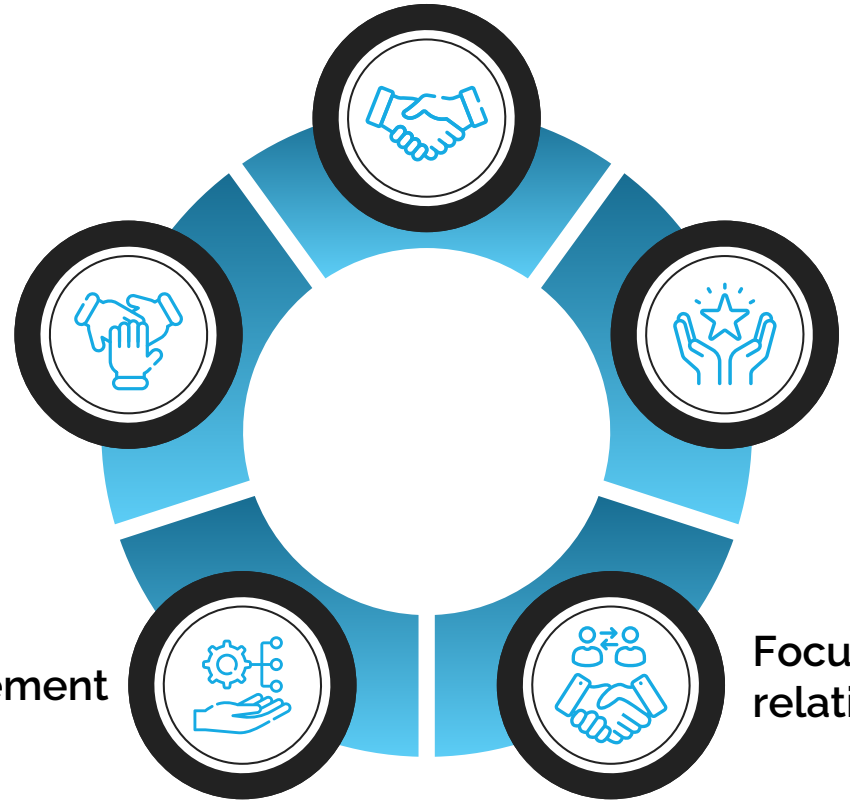
Technical team has decades of experience trouble shooting and providing expertise for mixing, pouring, vacuuming and cure cycles

EFI POLYMERS

PARTNERSHIP PHILOSOPHY

Close Partnership with customers

Hand in hand attitude between technical teams



Close Partnership with Suppliers

Access to top management

Focus on building long-term relationships

EFI POLYMERS