TECH-BOND GLOBAL

TECH-BOND

TECHNICAL DICTIONARY

Polymer Bonding, Molecular Integration & Permanent Repair Terminology

A public-language reference for customers, technicians, engineers, researchers, educators, and industry partners.

THE PROCESS	**Polymer Bonding Process™**
THE PHENOMENON	**Molecular Integration™**
THE PRACTICE	**Engineered Interfaces™**
THE DISCIPLINE	**Intelligent Interface Engineering™**

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Language for a new way of joining materials

Tech-Bond technology changes the interface from an overlooked boundary into an engineered part of the structure. That requires a precise vocabulary. This dictionary gives customers, technicians, engineers, researchers, and partners a shared public language for the Process, the materials, the failure modes, and the results.

The definitions are intentionally practical. Some describe established engineering concepts; others define Tech-Bond technologies and product language. Together they explain why preparation, chemistry, heat, pressure, geometry, and verification must be treated as one system.

How the technology fits together

1	**Polymer Bonding Process™**	The complete engineered process used to create permanent polymer-to-polymer connections.
2	**Molecular Integration™**	The name for the integrated bond-forming phenomenon at interfaces involving non-polymer surfaces.
3	**Engineered Interfaces™**	The practice of designing an interface to prevent moisture intrusion, creep, and delamination.
4	**Intelligent Interface Engineering™**	The emerging discipline that treats interfaces as primary engineering systems capable of enabling new material combinations.
5	**Permanent Repair & Restoration**	The application platform that turns these technologies into patches, wraps, fills, barriers, and complete repair systems.

The central idea

Normally, the interface is the weak link. Tech-Bond technologies are built around the opposite idea: engineer the interface so it becomes an integrated, protected, load-transferring part of the solution.

Scope of this edition

- Public-safe definitions: no proprietary formulations, confidential chemistry, or unpublished processing recipes.
- Current terminology for Tech-Bond technologies, products, materials, preparation, testing, and repair design.
- Plain-language distinctions between conventional adhesion and integrated interface formation.
- Responsible claim language: every result remains tied to the tested material, geometry, environment, and procedure.

Use the current work instruction

This dictionary explains terminology. It does not replace product instructions, training, a safety data sheet, an engineering assessment, or the current installation procedure for a specific repair.

Four distinctions that prevent confusion

PRODUCT vs. PROCESS

A Bonding Agent is a product. The Polymer Bonding Process is the complete sequence that makes the product perform as intended.

ROUGHNESS vs. PREPARATION

Visible scratches are not the goal. Preparation must expose sound material, remove the weak boundary zone, and create the required chemical and physical surface state.

ADHESION vs. INTEGRATION

Adhesion holds at a boundary. Tech-Bond processes are designed so cross-links or molecular interaction extend through the interface and create an integrated region.

MATERIAL STRENGTH vs. INTERFACE STRENGTH

A successful interface can exceed the strength of the surrounding substrate. The bulk material may then become the limiting factor.

The public process sequence

STEP	CONTROL	PURPOSE
1	**Diagnose**	Identify the substrate, damage, load, exposure, and credible failure mode.
2	**Condition**	Clean and abrade to expose sound material below sheen, oxidation, and contamination.
3	**Prepare**	Use Poly Prep where required for polymer surfaces; use the specified non-polymer preparation for MI.
4	**Activate**	Apply the Catalyst / Activator-Accelerator according to the current

STEP	CONTROL	PURPOSE
		procedure.
5	**Bond**	Select and apply the appropriate Bonding Agent, filler, patch, wrap, or reinforcement.
6	**Control**	Maintain the required pressure, geometry, timing, and managed heat.
7	**Verify**	Confirm process compliance and test the completed work within the defined repair envelope.

Alphabetical dictionary

Terms are arranged alphabetically. “Tech-Bond usage” notes distinguish the company's intended public meaning from a general engineering definition.

A

A-Patch

A Tech-Bond repair patch made from PTFE-coated E-glass fabric and configured for localized restoration. The patch becomes part of the completed repair structure when installed with the specified Tech-Bond process.

Abrasion Preparation

Controlled mechanical roughening used to remove sheen, oxidation, weak boundary material, and contamination while creating a sound surface profile. The objective is a clean, stable substrate - not merely visible scratches.

> ***TECH-BOND USAGE*** *For molded plastic tanks and similar parts, preparation must reach sound material below the surface sheen and any degraded or contaminated boundary zone.*

Accelerated Aging

A laboratory method that uses elevated temperature, moisture, chemicals, cycling, or other controlled stress to estimate how a material or interface may change over time. It shortens the test period; it does not reproduce every service condition.

Activator/Accelerator

A Tech-Bond performance tool used to create a temporarily reactive surface state and accelerate the bond-forming reaction. It helps the Bonding Agent develop cross-links rapidly and consistently.

> ***TECH-BOND USAGE*** *Also called the Catalyst in Tech-Bond process language. Product instructions govern where and how it is applied.*

Adhesion

The attraction or attachment between unlike surfaces. Conventional adhesion is often concentrated at a distinct boundary and may depend on wetting, mechanical interlock, or secondary molecular forces.

> ***TECH-BOND USAGE*** *Tech-Bond distinguishes ordinary adhesion from a Process-built interface in which cross-links extend through the interface.*

Adhesive (Legacy Adhesive)

A material placed between two surfaces to hold them together, usually as a separate bond-line layer. In legacy systems, that layer may become the weakest part of the assembly.

TECH-BOND USAGE *Tech-Bond Bonding Agents participate in an engineered process; performance should not be evaluated as though the liquid product alone were a complete adhesive system.*

Adhesive Failure

Separation at the boundary between a bonding material and a substrate. The bond-line material may remain intact while releasing from one surface.

Aramid Fiber

A high-strength aromatic polyamide reinforcement known for low weight, toughness, and resistance to tensile loading. Aramid is often used where strength must be added without excessive bulk.

TECH-BOND USAGE *Successful bonding to aramid-based structures can enable repair and reinforcement concepts that conventional surface attachment cannot support reliably.*

Asset Life Extension

The restoration or protection of an in-service component so that it can continue performing safely and economically beyond the point at which replacement would otherwise be considered.

ASTM B117 Salt Spray Test

A standardized practice for exposing specimens to a controlled salt-fog environment. It is used to compare corrosion protection and interface durability under aggressive moisture and chloride exposure.

TECH-BOND USAGE *Tech-Bond validation language reporting no delamination, no rust, and no creep describes the observed condition during the stated test and must be read with the test duration and specimen configuration.*

B

Bond

The completed connection between substrates. In Tech-Bond usage, the term may refer to the integrated structure created by preparation, chemistry, controlled heat, and pressure - not merely to cured liquid between two parts.

Bond Line

The narrow region where two prepared surfaces meet. In a conventional adhesive joint, this is often a discrete layer. In the Polymer Bonding Process, cross-links are designed to extend through the interface so the region performs as an integrated connection.

Bonding Agent

A specially selected Tech-Bond liquid formulation that participates in the bond-forming reaction after the surfaces have been correctly prepared and activated. Available formulations provide different viscosities and handling characteristics.

TECH-BOND USAGE *The Bonding Agent is one part of the Polymer Bonding Process, not a stand-alone substitute for surface preparation, catalyst, controlled heat, and pressure.*

Bonding System

The complete combination of substrates, surface condition, preparation chemistry, Bonding Agent, catalyst, assembly pressure, thermal control, geometry, and verification used to create a connection.

Boundary Layer

The outermost zone of a substrate. Mold-release residue, oxidation, absorbed contaminants, weathering, polishing, and low-molecular-weight material can make this zone weaker or less receptive than the bulk material.

C

CA

Abbreviation for cyanoacrylate, a fast-reacting family of bonding chemistries. Tech-Bond uses selected CA-based Bonding Agents as controlled components within broader engineered processes.

Capillary Action

The movement of a liquid through a narrow gap or porous path caused by surface tension and wetting forces. Low-viscosity Bonding Agents can use capillary action to reach close-fitting interfaces and hairline cracks.

Catalyst

The Tech-Bond Activator/Accelerator used to initiate or accelerate the reaction at a prepared interface. In Molecular Integration, catalyst and controlled heat are central process elements for non-polymer surfaces.

Catalytic Activation

The controlled use of the Catalyst to create a short-lived reactive condition at the surface and accelerate cross-link formation. Timing and coverage are process variables.

Chemical Resistance

The ability of a material, repair, or interface to retain function when exposed to specified fuels, solvents, acids, bases, salts, or other chemicals. Resistance is always chemical-, concentration-, temperature-, and time-dependent.

Cohesive Failure

Fracture within a substrate or within the body of a bond-line material rather than release at the interface. Cohesive substrate failure can indicate that the interface exceeded the strength of the surrounding material.

Composite

A structure made from two or more distinct materials whose combined properties are more useful than those of the constituents alone. Fiber-reinforced polymers, PTFE-coated glass fabrics, and elastomer-mediated interfaces are examples relevant to Tech-Bond systems.

Compression Joint

A joint in which clamping or compressive force maintains contact between components. Bridge bearing and sliding assemblies may use PTFE-to-steel compression concepts; Intelligent Interface Engineering seeks to improve such connections by designing the interface itself.

Controlled Heat

Heat applied within a defined process window to improve molecular mobility, reaction consistency, wetting, or thermal conformance without damaging the substrate or Bonding Agent.

Controlled Pressure

Deliberately applied assembly force that holds prepared surfaces in intimate contact, manages bond-line geometry, and supports uniform reaction through the interface. More pressure is not automatically better; the correct pressure depends on the assembly.

Creep

Slow, time-dependent movement or deformation under a sustained load. Creep can open moisture pathways, shift joint geometry, and progressively weaken conventional interfaces.

TECH-BOND USAGE *Engineered Interfaces are designed specifically to prevent the conditions that allow interface creep to begin and propagate.*

Cross-Bonding

A Tech-Bond term for joining polymer surfaces through a controlled process that creates cross-links across the meeting boundary. It describes a structural connection rather than simple surface tack.

Cross-Linking

The formation of chemical connections between molecular chains or reactive structures. In the Polymer Bonding Process, the intended cross-links extend through the interface, connecting the prepared surfaces into a unified bond region.

D

Debonder

A Tech-Bond service product formulated to help release cured cyanoacrylate from tools, skin, or selected surfaces. Compatibility must be checked because a debonder can affect plastics, finishes, and completed bonds.

Delamination

Separation of bonded layers or plies along an interface. It often begins at an edge, defect, void, moisture pathway, or region of poor surface preparation and then grows under stress or cycling.

TECH-BOND USAGE *Preventing delamination is a defining objective of Engineered Interfaces.*

Dissimilar Materials

Materials with different chemistry, surface energy, stiffness, thermal expansion, permeability, or environmental response. Joining them requires the interface to accommodate those differences rather than ignore them.

E

E-Glass

A widely used electrical-grade glass fiber reinforcement valued for strength, dimensional stability, chemical resistance, and cost effectiveness. Tech-Bond patch and wrap constructions may use PTFE-coated E-glass fabric.

Elastomer

A polymer capable of substantial reversible deformation. Elastomers are often treated as interface problems because of movement, low surface energy, additives, and stress concentration.

TECH-BOND USAGE *In Intelligent Interface Engineering, an elastomer can become part of the solution - an engineered intermediate that manages movement and connects otherwise difficult materials.*

Elastomer Integration

The intentional use of a bondable elastomer within a multi-material interface so that flexibility, sealing, stress distribution, or thermal accommodation becomes a designed function.

Engineered Interface™

An interface whose materials, surface states, chemistry, geometry, heat, pressure, and load path are intentionally designed as a system. Its purpose is to prevent moisture intrusion, creep, and delamination while transferring loads reliably.

Exothermic Reaction

A reaction that releases heat. A controlled temperature rise can be evidence that a bond-forming reaction is occurring, but uncontrolled heat can damage the substrate or chemistry and is not a substitute for process control.

F

Failure Mode

The specific way a component or joint stops performing, such as adhesive release, cohesive fracture, substrate yielding, peel, creep, corrosion, leakage, or delamination. Good interface design starts by identifying credible failure modes.

Filled PTFE

PTFE modified with fillers such as glass, carbon, bronze, or other materials to change wear, stiffness, creep, or thermal properties. Filled PTFE can be bonded with the Polymer Bonding Process, but its bulk tensile behavior may remain the limiting factor.

Filler

A Tech-Bond gap-management material used with a Bonding Agent to build, bridge, reinforce, or restore missing geometry. The selected filler and Bonding Agent must suit the substrate, gap, load, and environment.

Flexibility

The ability to bend or deform without fracture. Flexibility can reduce peak stress, but a flexible material must be deliberately integrated so that movement does not create peel, creep, or moisture paths.

Fluorosilicone (FVMQ)

A fluorinated silicone elastomer that combines elastic movement with improved resistance to fuels, oils, and many chemicals compared with conventional silicone.

> ***TECH-BOND USAGE*** *In the IIE steel-FVMQ-PTFE concept, FVMQ is an engineered intermediate: Molecular Integration joins steel to FVMQ, and polymer bonding joins FVMQ to PTFE.*

Fuel Resistance

The ability of a material or repair to retain integrity after exposure to a specified fuel and service temperature. A fuel-resistant bond also requires fuel-resistant substrates, repair geometry, and barrier paths.

H

HDPE

High-density polyethylene, a tough thermoplastic widely used for tanks, pipe, containers, liners, and rotationally molded parts. Its low surface energy makes conventional bonding difficult.

> ***TECH-BOND USAGE*** *HDPE is a core application for Poly Prep and the Polymer Bonding Process.*

HDPE Pipe Pressure Test

A Tech-Bond validation reference in which a repaired HDPE pipe assembly was reported to hold 1,800 psi for more than 100 hours during testing conducted by Borouge Company in Abu Dhabi.

> ***TECH-BOND USAGE*** *Use the original test conditions, specimen geometry, and report context when presenting this result; it is evidence for the tested assembly, not a universal pressure rating.*

Heat Activation

The controlled application of heat to support wetting, reaction, molecular mobility, or conformance at a prepared interface. Required temperature and duration depend on the material system and current work instruction.

I

Independent Validation

Testing performed by an outside organization or customer rather than solely by Tech-Bond. Independent results are strongest when the specimen, procedure, duration, environment, and acceptance criteria are stated clearly.

Industrial Repair

A repair intended for production equipment, infrastructure, transportation, energy, process systems, or other service-critical assets. It must be evaluated as an engineered system, not merely as a product application.

Intelligent Interface Engineering™ (IIE)

Tech-Bond's proposed engineering discipline dedicated to understanding, designing, building, and validating interfaces. IIE combines materials science, surface engineering, chemistry, mechanics, geometry, thermal behavior, and process control.

> ***TECH-BOND USAGE*** *IIE has the potential to change existing industries and enable new ones because previously unjoinable materials can become functional material systems. The discipline is emerging and has been implemented only in limited applications to date.*

Interface

The boundary where two materials, parts, coatings, layers, or phases meet and interact. Many apparent material failures begin as interface failures.

Interface Engineering

The practice of controlling the physical, chemical, mechanical, and geometric conditions at a material boundary. It includes surface preparation, material selection, stress management, environmental protection, and process verification.

Interface Failure

Loss of function that originates at a material boundary. Examples include separation, leakage, corrosion under a bond, creep, edge lifting, and delamination.

Interface Integrity

The ability of an interface to remain continuous, sealed, and load-bearing under its intended mechanical, thermal, chemical, and environmental conditions.

Interface Layer Elimination

A design objective in which the connection is not dependent on a weak, separate adhesive layer. Cross-links, molecular interaction, and controlled geometry make the interface behave as an integrated region.

Interface Transformation

A change from an untreated, weak, contaminated, or low-energy boundary into a prepared and reactive bond-forming region. The transformation results from the complete process, not from roughness alone.

Interphase

The finite region around an interface whose structure and properties differ from those of the untouched bulk materials. In Tech-Bond language, the interphase is the integrated zone through which bond-forming connections extend.

ISM

The independent testing source identified in Tech-Bond validation materials. When ISM results are presented, the source should be named prominently and the test method, specimen, duration, and measured outcome should accompany the claim.

K

Kevlar / Aramid Fabric

A high-strength aramid reinforcement used in protective, aerospace, transportation, and industrial composites. Its chemically resistant surface and fabric architecture can make reliable repair and joining difficult.

TECH-BOND USAGE *Tech-Bond testing with aramid fabric is significant because successful interface formation can open broader repair, reinforcement, and composite-manufacturing applications.*

L

LDPE

Low-density polyethylene, a flexible thermoplastic used in films, containers, liners, and molded parts. Like HDPE, it has low surface energy and generally requires purposeful surface conditioning for durable bonding.

Low-Surface-Energy Material

A material whose surface does not readily allow liquids to spread and wet. Polyethylene, polypropylene, PTFE, many TPOs, and some elastomers are common examples.

TECH-BOND USAGE *Low surface energy is a surface condition to be engineered - not proof that the material cannot be bonded.*

M

Mechanical Interlock

Physical anchoring caused when a bonding material flows into pores, texture, or undercuts and hardens. It can contribute to strength but is not the same as cross-linking or Molecular Integration.

Moisture Intrusion

The entry of water or water vapor into an interface through edges, pores, cracks, voids, or permeable materials. Moisture can reduce bond strength, support corrosion, freeze and expand, or drive delamination.

TECH-BOND USAGE *Preventing moisture intrusion is a primary purpose of Engineered Interfaces and Poly Shield.*

Moisture Pathway

A connected route through which liquid water or vapor can reach or travel along an interface. Eliminating gaps and protecting edges are central to pathway control.

Molecular Integration™ (MI)

The Tech-Bond name for what occurs at prepared interfaces involving one or more non-polymer surfaces. Catalyst, Bonding Agent, controlled heat, and pressure create a highly integrated connection without requiring Poly Prep on the non-polymer surface.

TECH-BOND USAGE *MI is used for metals, glass, ceramics, fibers, composites, and other non-polymer surfaces. The exact preparation and process window remain material-specific.*

N

Nylon / PA

A family of polyamide thermoplastics known for strength and wear resistance. Nylon absorbs moisture, and its surface condition can change with formulation, reinforcement, and environmental exposure.

P

Peel Stress

A load that concentrates force at the edge of a bond and progressively lifts one surface from another. Peel can be far more damaging than the same total load applied in shear or compression.

Permanent Bond

A connection engineered to remain functional for the intended service life of the assembly under defined loads and environments. The term does not mean indestructible or independent of design limits.

Permanent Repair

A restoration designed to return an asset to continuing service without planned replacement by a temporary patch. Permanence depends on correct diagnosis, preparation, geometry, materials, process control, and service conditions.

Poly Fill™

A Tech-Bond repair material used to rebuild, bridge, reinforce, seal, or restore geometry as part of a complete repair design. It is applied with compatible Bonding Agents and the specified process.

Poly Prep™

Tech-Bond's proprietary surface-conditioning product for difficult polymer surfaces, including low-surface-energy materials such as polyethylene, polypropylene, and PTFE. It prepares the polymer boundary for the bond-forming process.

> ***TECH-BOND USAGE*** *Poly Prep is not simply a cleaner and is not used as the preparation step for a non-polymer surface in Molecular Integration.*

Poly Shield™

The final cross-linked polymer barrier formed through successive, controlled Bonding Agent applications. It is designed as a structural, integral barrier rather than a paint-like coating.

> ***TECH-BOND USAGE*** *Poly Shield is used to resist moisture intrusion and reduce the conditions that promote creep, delamination, cracking, and fatigue.*

Polymer

A material made from long molecular chains or networks of repeating units. Thermoplastics, thermosets, elastomers, fibers, and many coatings are polymeric, but their surface and bulk behavior vary widely.

Polymer Bonding Process™

Tech-Bond's complete engineered method for bonding polymer surfaces. It combines controlled surface preparation, Poly Prep where required, catalytic activation, Bonding Agent application, pressure, and managed heat.

> ***TECH-BOND USAGE*** *The defining concept is that bond-forming cross-links extend through the interface. The Process must be treated as a sequence; no individual product replaces the complete method.*

Polypropylene (PP)

A low-density, chemically resistant thermoplastic used in tanks, pipe, automotive parts, packaging, and appliances. Its low surface energy makes untreated PP difficult to bond.

Pressure Application

The controlled delivery of force during assembly by clamping, wrapping, fixturing, rolling, or other means. The goal is intimate, stable contact across the intended bond area.

PTFE

Polytetrafluoroethylene, a fluoropolymer known for very low friction, chemical resistance, temperature capability, and extremely low surface energy. PTFE is bondable with the Polymer Bonding Process when properly prepared with Poly Prep.

PTFE-Coated E-Glass Fabric

A flexible composite fabric in which woven E-glass provides reinforcement and a PTFE surface provides chemical and environmental resistance. It is a foundational material in TPRS patches and wraps.

PVC

Polyvinyl chloride, a thermoplastic available in rigid and flexible formulations. Plasticizers, stabilizers, weathering, and chemical exposure can strongly affect its surface condition and bondability.

R

Repair Envelope

The defined range of material, damage size, geometry, load, temperature, chemical exposure, pressure, and service conditions within which a repair design has been evaluated.

Rotational Molding

A manufacturing process that heats polymer powder inside a rotating mold to create hollow parts such as tanks. Wall thickness, porosity, molded-in stress, and the inner and outer surface histories can differ.

S

Salt-Fog Exposure

Continuous or cyclic exposure to atomized saline solution in a controlled chamber. It is used to challenge edge sealing, corrosion protection, and interface continuity.

Shear Stress

Force acting parallel to an interface. Well-designed bonded joints generally distribute shear over area more effectively than they resist concentrated peel or cleavage.

SI Black

A higher-viscosity Tech-Bond Bonding Agent that provides greater placement control and gap management than thin formulations. Selection depends on joint geometry and process requirements.

SI Blue

Tech-Bond's standard thin-to-medium viscosity Bonding Agent for a broad range of close-fitting and general bonding applications.

SI Gel

A thixotropic Tech-Bond Bonding Agent designed to remain where placed, bridge larger gaps, and support vertical or overhead application.

SI Green

Tech-Bond's ultra-low-viscosity Bonding Agent for capillary wicking into hairline cracks and very close-fitting interfaces.

Stress Concentration

A localized increase in stress caused by an edge, notch, stiffness change, void, abrupt geometry, or load-path discontinuity. Interface geometry and compliant intermediates can reduce concentration.

Structural Bond

A bond designed to transfer meaningful service loads as part of the component or assembly. Structural performance must be tied to joint geometry, load mode, environment, and verification.

Substrate

The underlying material or component surface being prepared, bonded, coated, or repaired.

Surface Conditioning

The combination of cleaning, abrasion, chemical preparation, drying, and handling used to create a stable, bond-ready surface. The correct sequence depends on the substrate and its exposure history.

Surface Contamination

Any unwanted material that blocks wetting or reaction, including oils, fuels, mold release, silicone, plasticizer, oxidation products, dust, water, and handling residue.

Surface Energy

A measure related to how strongly a solid surface interacts with liquids and other materials. Higher-energy surfaces generally wet more readily; low-energy polymers require intentional surface engineering.

Surface Oxidation

Chemical change at the outer surface caused by oxygen, heat, ultraviolet exposure, plasma, flame, chemical treatment, or aging. Oxidation can improve or impair bonding depending on its uniformity, stability, and contamination.

Surface Preparation

All actions taken before joining to expose sound material and establish the required physical and chemical surface state. Roughness alone is not proof of adequate preparation.

T

Tech Patch

A preconfigured or field-cut repair reinforcement used with the Tech-Bond Permanent Repair and Restoration Platform. Patch design must account for overlap, edge protection, load path, and service environment.

Tech Wrap

A flexible reinforcement wrapped around a pipe, hose, fitting, structural member, or other component to create distributed coverage and load transfer as part of a Tech-Bond repair.

Tensile Stress

Force acting to pull a material or joint apart. The bulk tensile strength of a substrate can limit an assembly even when the interface remains intact.

Thermal Conformance™

The ability of a completed interface or repair to remain continuous while the joined materials expand, contract, and change stiffness with temperature. Conformance is achieved through material choice, geometry, and controlled processing.

Thermal Cycling

Repeated movement between higher and lower temperatures. Cycling can generate differential expansion, contraction, fatigue, condensation, and interface stress.

Thermal Initiation

The planned use of heat to start or advance the bond-forming reaction after the prepared surfaces are assembled. Temperature is a controlled process variable, not an informal heating step.

Thermoplastic Polymer

A polymer that softens when heated and hardens when cooled. The cycle can generally be repeated. HDPE, LDPE, PP, PTFE, PVC, nylon, TPO, and TPU are thermoplastics.

Thermoset Polymer

A polymer that forms a permanently cross-linked network during cure and does not remelt like a thermoplastic. Epoxy, many polyesters, and phenolic materials are common thermosets.

TPO

Thermoplastic polyolefin, a family of flexible blends commonly based on polypropylene and elastomeric components. TPO surfaces can be low-energy and formulation-dependent.

TPRS™

Tech-Patch Repair System: a permanent-repair architecture that combines PTFE-coated E-glass fabric, prescribed surface preparation, Tech-Bond chemistry, Catalyst, controlled heat, pressure, and repair geometry.

> ***TECH-BOND USAGE*** *TPRS is a system, not just a patch. Its performance depends on the full installation sequence and the defined repair envelope.*

TPU

Thermoplastic polyurethane, an elastic thermoplastic used in hose, seals, belting, films, and protective components. Formulation, hardness, additives, and surface condition affect bonding behavior.

Tribology

The study of friction, wear, and lubrication between interacting surfaces. It is important when bonded or integrated interfaces also slide, bear, flex, or resist abrasion.

U

UHMWPE

Ultra-high-molecular-weight polyethylene, a highly wear-resistant, low-friction thermoplastic with extremely low surface energy. It is among the most difficult polymers to join by conventional methods.

Unified Structure

An assembly in which the joined components and interface transfer load together without depending on a weak, separable bond-line layer.

V

Vapor Migration

Movement of gas or vapor through a material, edge, crack, void, or interface. A repair may stop liquid leakage yet still require a design that controls vapor transmission.

Verification

The inspection, measurement, test, or documented process check used to confirm that preparation and assembly met requirements. Verification can include visual criteria, fit, pressure or leak testing, witness samples, or destructive testing of representative specimens.

Virgin PTFE

PTFE produced without reinforcing filler. Compared with many mechanically filled PTFE grades, virgin PTFE generally preserves greater elongation and molecular continuity.

> ***TECH-BOND USAGE*** *Both virgin and filled PTFE can be bonded with the Polymer Bonding Process. The bulk PTFE grade - not the interface - may determine the final tensile limit.*

Viscosity

A liquid's resistance to flow. Lower-viscosity Bonding Agents wick into close gaps; higher-viscosity and gel formulations provide placement control and bridge larger spaces.

W

Wetting / Wet-Out

The spreading and intimate contact of a liquid over a solid surface or through a fabric reinforcement. Good wetting is necessary, but by itself does not prove durable interface formation.

Materials quick reference

Material identity is the starting point, not the final answer. Grade, filler, additives, weathering, chemical exposure, surface history, geometry, and load determine the correct preparation and repair design.

MATERIAL	SURFACE CHARACTER	COMMON USES	TECH-BOND STARTING POINT
HDPE / LDPE	Low-energy polyolefin	Tanks, pipe, containers, liners	Poly Prep + complete Polymer Bonding Process
PP / TPO	Low-energy polyolefin system	Automotive, tanks, appliances, membranes	Identify formulation; Poly Prep normally required
UHMWPE	Extremely low energy; wear resistant	Wear strips, liners, guides	Strict preparation and geometry control
PTFE	Extremely low energy; chemically resistant	Seals, bearings, fabrics, liners	Poly Prep required; bulk grade may limit strength
FVMQ	Fuel-resistant elastomer	Seals, flexible intermediates	Can become an IIE stress-managing interface component
Nylon / TPU / PVC	Formulation- and moisture-dependent	Hose, films, molded components	Identify grade, additives, and exposure history
Metals	Higher-energy non-polymer surfaces	Steel, aluminum, alloys	Molecular Integration sequence; no Poly Prep on metal
Glass / Ceramic	Rigid non-polymer surfaces	Panels, insulators, equipment	Molecular Integration with controlled stress geometry

MATERIAL	SURFACE CHARACTER	COMMON USES	TECH-BOND STARTING POINT
Fiber Composites	Multi-phase, anisotropic structures	Aramid, glass, carbon systems	Prepare without cutting critical reinforcement

PTFE: the material-strength distinction

Virgin PTFE and mechanically filled PTFE are both bondable with the Polymer Bonding Process when properly prepared. They are not mechanically identical. Filled grades may separate or fracture under tensile loading at stresses below the capacity of a properly created interface. A failure in the PTFE body should not automatically be described as a bond failure.

Elastomers: from interface problem to part of the solution

Elastomers are normally difficult interface materials because they move, contain additives, and concentrate stress. With Intelligent Interface Engineering, those same characteristics can be deliberately used to absorb movement, seal a path, or bridge mismatched materials. The steel-FVMQ-PTFE concept illustrates the principle: the elastomer is not an accidental weak layer; it is a designed intermediate supported by two different, compatible joining mechanisms.

Failure-prevention quick reference

FAILURE MODE	COMMON DRIVERS	INTERFACE-ENGINEERING RESPONSE
Moisture intrusion	Open edge, void, crack, permeable path, weak wetting	Continuous interface, protected edges, Poly Shield where specified
Creep	Sustained stress, heat, weak boundary layer, flexible bond line	Sound substrate, distributed load, geometry and material control
Delamination	Poor preparation, contamination, peel, moisture, thermal mismatch	Integrated interphase, edge control, thermal conformance
Corrosion under bond	Moisture and oxygen trapped at metal interface	Clean metal, continuous MI region, sealed pathways
Peel / edge lift	Load concentrated at an abrupt edge	Tapered transition, greater overlap, compression or shear load path
Substrate fracture	Bulk material weaker than the completed interface	Reinforcement, larger repair area, load redistribution
Leak recurrence	Damage extends beyond visible crack; vapor or fuel path remains	Define full damage zone and repair envelope; verify after installation

Surface preparation: “below the sheen”

The phrase does not mean “scuff until the surface looks dull.” It means remove enough of the outer boundary zone to expose sound, stable material. On a plastic tank, the inner and outer surfaces have different exposure histories, but the outside can still contain mold-release residue, oxidation, weathering, fuel or vapor contamination, absorbed material, and low-strength surface polymer. The preparation criterion is the condition of the surface - not a universal sanding depth.

Technician check

A prepared surface should be uniformly conditioned, clean, dry, and free of glossy islands, smears, residue, loose polymer, or polished high spots. Stop and reassess if the substrate becomes overheated, gouged, thinned, or visibly damaged.

Validation and claim language

Tech-Bond testing has produced superior results across pressure, corrosion, thermal, tensile, composite, and environmental evaluations. The strongest public presentation pairs the result with the source and the exact test context.

PRESSURE	**1,800 psi for more than 100 hours**	HDPE pipe test reported by Borouge Company, Abu Dhabi.
SALT SPRAY	**No delamination. No rust. No creep.**	Observed during the stated ASTM B117 test configuration and duration.
THERMAL	**Performance through controlled temperature exposure**	State the temperature range, dwell, cycles, specimen, and acceptance criterion.
ARAMID	**Interface performance with aramid fiber**	A strategically important result because it can enable new composite repair and reinforcement concepts.
ISM	**Source identified prominently**	Every ISM graphic should name ISM and state the measured result without enlarging the claim beyond the test.

Responsible wording

PREFER	“The tested assembly showed no delamination after the stated exposure.”
AVOID	“It can never delaminate.”
PREFER	“The repaired HDPE pipe held 1,800 psi for more than 100 hours under the reported test conditions.”
AVOID	“Every HDPE repair is rated to 1,800 psi.”
PREFER	“The interface exceeded the strength of the tested substrate.”
AVOID	“The bond cannot fail.”

Abbreviations

ASTM	ASTM International, a standards-development organization
CA	Cyanoacrylate
FVMQ	Fluorosilicone elastomer
HDPE	High-density polyethylene
IIE	Intelligent Interface Engineering
LDPE	Low-density polyethylene
MI	Molecular Integration
PA	Polyamide / nylon
PE	Polyethylene
PP	Polypropylene
PTFE	Polytetrafluoroethylene
PVC	Polyvinyl chloride
TPO	Thermoplastic polyolefin
TPRS	Tech-Patch Repair System

TPU	Thermoplastic polyurethane
UHMWPE	Ultra-high-molecular-weight polyethylene

Editorial conventions

Process: Capitalized when it refers specifically to the complete Polymer Bonding Process.

Interface: The material boundary; interphase is the integrated region around that boundary.

Permanent: A design objective tied to service conditions and the repair envelope - not a claim of indestructibility.

No failure: Replace with the observed failure location and the tested conditions whenever possible.

System: Use when several controlled products, materials, and steps work together.

A living technical language

Tech-Bond's terminology will continue to develop as new material combinations, repair systems, independent tests, and Intelligent Interface Engineering applications are validated. Future editions should add terms only when the definition is technically clear, public-safe, and consistent with the technology architecture in this edition.

> **Engineering the Interfaces That Enable Innovation.**
>
> The Polymer Bonding Process creates the connection. Molecular Integration explains what happens at non-polymer interfaces. Engineered Interfaces prevent moisture intrusion, creep, and delamination. Intelligent Interface Engineering turns those capabilities into a new discipline for combining materials.

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Important notice

This dictionary is an educational and communications reference. It does not replace the current Tech-Bond product instructions, safety data, training, design review, code requirements, or qualified engineering judgment. Test results apply to the stated specimens and conditions. Users are responsible for confirming material compatibility and suitability for the intended service.

Polymer Bonding Process™, Molecular Integration™, Engineered Interfaces™, Intelligent Interface Engineering™, TPRS™, Poly Prep™, Poly Fill™, and Poly Shield™ are Tech-Bond terminology and/or marks.