

CoExcel Capability Definitions

Comprehensive reference guide defining distinct capabilities across defense and aerospace sectors. Use this document to understand the scope and technical requirements of each capability when evaluating supplier growth partnership Tier selection for discrete capabilities.

Primary Categories

Capability	Definition	Category
Electronics and Electrical Systems	Design, integration, manufacturing, and testing of electrical and electronic components and assemblies including power distribution, wiring, control electronics, and circuit-based systems.	Electronics and Electrical Systems
Optics, Sensors and Photonics	Development and production of optical systems, sensor technologies, imaging devices, laser systems, and photonic components used in aerospace and defense applications.	Optics, Sensors and Photonics
Test, Calibration and Standards	Testing, inspection, and calibration services to verify performance and ensure compliance with aerospace, defense, and industry standards.	Test, Calibration and Standards
Machining and Metal Fabrication	Precision machining and fabrication of metal components using CNC processes, cutting, forming, welding, and assembly to tight tolerances.	Machining and Metal Fabrication
Space and Strategic Systems	Manufacturing and integration support for satellite systems, missile defense, launch platforms, and other high-reliability national security systems.	Space and Strategic Systems
Materials and Special Process	Controlled material treatments and specialty processes such as heat treatment, coatings, plating, finishing, and chemical processing to enhance performance and durability.	Materials and Special Process
Advanced Materials and Composites	Manufacturing and integration of high-performance composite materials and engineered materials designed for lightweight strength and extreme environments.	Advanced Materials and Composites
Joining, Welding and Bonding	Certified welding, brazing, adhesive bonding, and advanced joining processes used for structural and high-stress assemblies.	Joining, Welding and Bonding
Sustainment and Depot Support	Maintenance, repair, overhaul, refurbishment, and lifecycle support services for aerospace and defense systems.	Sustainment and Depot Support
Power and Energy Systems	Design and manufacturing of power generation, storage, conversion, and management systems including batteries and power electronics.	Power and Energy Systems
Software and Digital Engineering	Embedded software development, systems integration, modeling, simulation, and digital engineering for mission-critical platforms.	Software and Digital Engineering
Forging and Castings	Production of forged and cast metal components engineered for strength, durability, and aerospace-grade performance.	Forging and Castings

Discrete Capability Tier Application and Selection

Tier 1: One supplier selected per capability

Tier 2: Three Suppliers selected per capability

Tier 3: Unlimited number of suppliers selected per capability

Discrete Capabilities

Capability	Definition	Category
Printed Circuit Board Assembly (PCBA)	Assembly of electronic components onto printed circuit boards using surface mount technology (SMT), through-hole, or mixed technology processes. Includes component placement, soldering, inspection, and functional testing.	Electronics and Electrical Manufacturing
Rigid-Flex PCB Assembly	Assembly combining both rigid and flexible PCB sections in a single assembly. Provides structural rigidity where needed while allowing flexibility in specific areas for dynamic applications.	Electronics and Electrical Manufacturing
Cable Assembly	Manufacturing of complete cable assemblies including wire preparation, connector attachment, shielding, jacketing, and testing. Includes power, signal, and data cables.	Electronics and Electrical Manufacturing
Wire Harness Manufacturing	Fabrication of organized wire and cable bundles with connectors, terminals, and protective coverings. Used to route electrical signals and power throughout systems.	Electronics and Electrical Manufacturing
Fiber-Optic Cable Assembly	Assembly and termination of fiber-optic cables including cleaving, polishing, connector attachment, and optical performance testing. Used for high-speed data transmission.	Electronics and Electrical Manufacturing
Electro-Mechanical Assembly (Box Build / LRU)	Complete system-level integration combining electronic assemblies with mechanical components, enclosures, and interconnections. Line Replaceable Units (LRU) ready for installation in larger systems.	Electronics and Electrical Manufacturing
Avionics Assembly and Integration	Assembly and integration of aviation electronics systems including flight control, navigation, communication, and display systems meeting aerospace qualification standards.	Electronics and Electrical Manufacturing

Power Electronics Assembly	Assembly of power conversion and conditioning electronics including inverters, converters, motor drives, and power management systems for high-power applications.	Electronics and Electrical Manufacturing
Sensor Assembly and Integration	Assembly and integration of electronic sensing devices including environmental sensors, position sensors, inertial measurement units, and specialized detection systems.	Electronics and Electrical Manufacturing
Conformal Coating and Encapsulation	Application of protective polymer coatings or complete encapsulation of electronic assemblies to protect against moisture, chemicals, temperature extremes, and mechanical stress.	Electronics and Electrical Manufacturing
RF / Microwave PCB Assembly	Specialized assembly of printed circuit boards designed for radio frequency and microwave applications requiring controlled impedance, low loss, and precision RF performance.	RF, Microwave and Electronic Warfare
RF Module and Subassembly Manufacturing	Production of complete RF modules including amplifiers, mixers, filters, and other components integrated into shielded, tested subassemblies for radio frequency systems.	RF, Microwave and Electronic Warfare
RF Power and Low-Noise Amplifier Manufacturing	Manufacturing of radio frequency power and low-noise amplifiers for transmit and receive applications including solid-state and vacuum tube designs for communications, radar, and electronic warfare systems.	RF, Microwave and Electronic Warfare
RF Filter and Diplexer Manufacturing	Manufacturing of passive RF components including filters, diplexers, and combiners for frequency selection and signal routing in communications and radar systems.	RF, Microwave and Electronic Warfare
Antenna Manufacturing	Fabrication of antennas for military and aerospace applications including patch, dipole, horn, spiral, and specialized antenna types across HF through millimeter-wave frequencies.	RF, Microwave and Electronic Warfare
Phased Array Subassembly Manufacturing	Manufacturing of phased array antenna subassemblies including transmit/receive modules, beam steering networks, and thermal management for advanced radar and communications systems.	RF, Microwave and Electronic Warfare
EMI / EMC Compliance Testing	Electromagnetic interference (EMI) and electromagnetic compatibility (EMC) testing to verify compliance with MIL-STD-461 and other military standards for emissions and susceptibility.	RF, Microwave and Electronic Warfare

Precision CNC Machining – Specialty Metals	Computer numerical control machining of specialty aerospace metals including titanium, Inconel, stainless steel, and aluminum alloys to tight tolerances for	Machining and Metal Fabrication
Swiss-Type Precision Machining	Ultra-precision machining on Swiss-type turning centers for small diameter, complex parts requiring extremely tight tolerances and excellent surface finishes.	Machining and Metal Fabrication
Hard-Metal and Exotic Alloy Machining	Machining of difficult-to-cut materials including hardened steels, superalloys (Inconel, Hastelloy, Waspaloy), and other exotic alloys requiring specialized tooling and expertise.	Machining and Metal Fabrication
Precision Sheet Metal Fabrication	Fabrication of precision sheet metal parts using laser cutting, punching, forming, and welding to aerospace tolerances for enclosures, brackets, and structural components.	Sheet Metal and Structural Fabrication
Aerospace Sheet Metal Forming	Forming of aerospace sheet metal components using brake press, hydroforming, or stretch forming techniques to create complex curved and angular structures.	Sheet Metal and Structural Fabrication
Formed and Welded Aerospace Structures	Fabrication of complex aerospace structural assemblies combining formed sheet metal components with precision welding to create airframe sections, bulkheads, and support structures.	Sheet Metal and Structural Fabrication
Tube Bending and Tubular Assemblies	Precision bending of metal tubing for hydraulic lines, fuel lines, structural tubes, and cooling systems with controlled bend radii and wall thickness.	Sheet Metal and Structural Fabrication
Sheet Metal Enclosures and Chassis Manufacturing	Manufacturing of electronic equipment enclosures and chassis from sheet metal including EMI shielding, thermal management features, and mounting provisions.	Sheet Metal and Structural Fabrication
Flash and Friction Stir Welding	Resistance welding process using electrical flash to join metal parts, typically for joining similar or dissimilar metals in aerospace structural applications. Solid-state joining process using frictional heat and mechanical stirring to weld aluminum and other metals without melting, producing high-strength, low-distortion joints.	Joining, Welding and Bonding
Laser Beam Welding	High-precision welding using focused laser energy for minimal distortion, deep penetration, and excellent weld quality on aerospace metals and assemblies.	Joining, Welding and Bonding

Aluminum Forging	Hot or cold forging of aluminum alloys to create high-strength aerospace components with improved mechanical properties and grain flow orientation.	Forging and Primary Metal Forming
Titanium Forging	Hot forging of titanium alloys under controlled temperature and atmosphere to produce aerospace structural components, engine parts, and landing gear components.	Forging and Primary Metal Forming
Closed-Die Precision Forging	Forging process using closed dies to create near-net-shape components with tight tolerances, reducing machining requirements and material waste.	Forging and Primary Metal Forming
Isothermal Forging	Precision forging process maintaining constant temperature in dies and workpiece to produce complex shapes in difficult-to-forge materials like titanium and superalloys.	Forging and Primary Metal Forming
Ring Rolling	Metal forming process to create seamless rings for aerospace applications including engine cases, bearing races, and structural rings through controlled rolling.	Forging and Primary Metal Forming
Aluminum and Specialty Alloy Extrusion	Forging heated aluminum or specialty alloys through shaped dies to create complex constant cross-section profiles for aerospace structures and components.	Forging and Primary Metal Forming
Heat Treatment	Controlled heating and cooling of metals to achieve desired mechanical properties including hardening, tempering, annealing, and stress relieving per aerospace specifications.	Materials and Special Processes
Chemical finishes and Platings	Controlled chemical/electrochemical surface treatments	Materials and Special Processes
Applied Coatings (Spray/paint/film)	Material layers applied over the surface—like primer/topcoat paint systems, dry-film lubricants, and thermal-spray coatings.	Materials and Special Processes
Anti-Corrosion Marine Coatings	Application of specialized protective coatings for naval and marine applications providing superior corrosion resistance in harsh saltwater environments.	Materials and Special Processes
EMI / RFI Shielding Treatments	Application of conductive coatings, gaskets, and shielding materials to provide electromagnetic interference (EMI) and radio frequency interference (RFI) protection.	Materials and Special Processes
Selective Masking and Precision Coating	Precision masking techniques to selectively coat or protect specific areas of components during surface treatment, plating, or coating operations.	Materials and Special Processes

Electronic Potting and Encapsulation	Complete encapsulation of electronic assemblies in protective compounds (epoxy, polyurethane, silicone) for environmental protection and shock/vibration resistance.	Materials and Special Processes
Carbon Fiber Composite Manufacturing	Fabrication of carbon fiber reinforced polymer components using hand layup, prepreg, vacuum bagging, or autoclave curing for high-strength, lightweight structures.	Composites and Advanced Materials
Glass Fiber Composite Manufacturing	Manufacturing of fiberglass reinforced polymer components for aerospace radomes, fairings, and non-structural applications using various molding and curing processes.	Composites and Advanced Materials
Kevlar Composite Manufacturing	Fabrication of aramid (Kevlar) fiber composite components providing high tensile strength and impact resistance for ballistic protection and structural applications.	Composites and Advanced Materials
High-Temperature / Ablative Composite Manufacturing	Manufacturing of composite materials capable of withstanding extreme temperatures or providing ablative protection for reentry vehicles and rocket nozzles.	Composites and Advanced Materials
Ceramic Matrix Composite Manufacturing	Production of ceramic matrix composite (CMC) components for ultra-high temperature applications in gas turbine engines and hypersonic systems.	Composites and Advanced Materials
Composite Tooling and Mold Manufacturing	Design and fabrication of molds, mandrels, and tooling for composite part production including temperature-resistant tooling for autoclave processing.	Composites and Advanced Materials
Metal Additive Manufacturing	Layer-by-layer fabrication of metal components using powder bed fusion (DMLS, SLM), directed energy deposition, or binder jetting for complex geometries and rapid prototyping.	Additive Manufacturing
Polymer Additive Manufacturing	3D printing of polymer components using FDM, SLA, SLS, or other processes for prototypes, tooling, and production parts in various engineering plastics.	Additive Manufacturing
Additive Tooling, Jigs and Fixtures	Rapid production of manufacturing aids including assembly fixtures, inspection gauges, and tooling using additive manufacturing for reduced lead time and cost.	Additive Manufacturing

Additive Manufacturing for Obsolete Part Replacement	Reverse engineering and additive manufacturing of obsolete components to maintain legacy systems without original tooling or suppliers.	Additive Manufacturing
Additive Manufacturing for Field / Depot Repair	On-demand additive manufacturing capabilities at field locations or depot facilities for rapid replacement part production and repair operations.	Additive Manufacturing
Power Supply Manufacturing	Design and manufacturing of AC-DC and DC-DC power supplies for aerospace and defense electronics with MIL-STD compliance and environmental qualification.	Power and Energy Systems Manufacturing
Ruggedized Military Power Supplies	Manufacturing of environmentally hardened power supplies meeting MIL-STD-810 for shock, vibration, temperature, and EMI requirements in military applications.	Power and Energy Systems Manufacturing
DC Converter Manufacturing	Production of DC-DC power converters for voltage regulation and power distribution in aerospace and military electronic systems.	Power and Energy Systems Manufacturing
Power Conditioning and EMI Filtering Units	Production of power line conditioning equipment and EMI filters to protect sensitive electronics from voltage transients and electromagnetic interference.	Power and Energy Systems Manufacturing
Energy Storage Module Assembly	Assembly of battery packs and energy storage systems including cell integration, battery management systems, thermal management, and protective enclosures.	Power and Energy Systems Manufacturing
Circuit Breaker Manufacturing	Manufacturing of circuit protection devices including thermal, magnetic, and solid-state circuit breakers for aerospace electrical distribution systems.	Power and Energy Systems Manufacturing
UAS / Aerospace Battery Manufacturing	Production of specialized batteries for unmanned aerial systems and aerospace applications with high energy density, lightweight design, and flight qualification.	Power and Energy Systems Manufacturing
Environmental Qualification Testing (MIL-STD-810)	Comprehensive environmental testing per MIL-STD-810 including temperature, humidity, altitude, shock, vibration, rain, sand/dust, and other environmental stresses.	Test and Qualification Capabilities
Thermal Vacuum Testing	Testing of aerospace components and systems under combined thermal cycling and vacuum conditions to simulate space environment and verify performance.	Test and Qualification Capabilities
Vibration and Shock Testing	Dynamic testing using vibration tables and shock test machines to verify component and system survivability under operational mechanical environments.	Test and Qualification Capabilities

Automated Test Equipment Design	Design and development of custom automated test equipment (ATE) for production testing, troubleshooting, and qualification of electronic systems.	Test and Qualification Capabilities
Custom Test Fixture Manufacturing	Fabrication of specialized test fixtures, interface adapters, and functional test hardware to support product testing and qualification.	Test and Qualification Capabilities
Test Software Development	Development of automated test software, test sequences, data acquisition, and analysis tools for production and qualification testing.	Test and Qualification Capabilities
Embedded Software Development	Development of embedded software for microcontrollers and processors in aerospace and defense systems including firmware, device drivers, and control algorithms.	Software and Digital Engineering
Real-Time Operating System Integration	Integration and configuration of real-time operating systems (RTOS) for deterministic, time-critical aerospace and defense applications.	Software and Digital Engineering
Safety-Critical Software Development	Development of software for safety-critical applications meeting DO-178C (avionics) or equivalent standards with rigorous verification and validation processes.	Software and Digital Engineering
DSP / Signal Processing Software	Development of digital signal processing algorithms and software for radar, communications, electronic warfare, and sensor data processing applications.	Software and Digital Engineering
Modeling and Simulation Software	Development of physics-based models and simulation software for system analysis, mission planning, training, and hardware-in-the-loop testing.	Software and Digital Engineering
Digital Twin and Model-Based Engineering	Creation of digital twin representations and model-based systems engineering implementations for virtual testing, lifecycle management, and predictive maintenance.	Software and Digital Engineering
Warhead Subassembly Manufacturing	Manufacturing of warhead components and subassemblies including casings, liners, booster charges, and fuzing interfaces for guided weapons.	Energetics and Munitions Manufacturing
Fuze and Safe-and-Arm Device Manufacturing	Production of precision fuzing systems and safe-and-arm devices ensuring reliable arming and detonation with appropriate safety interlocks.	Energetics and Munitions Manufacturing
Propulsion Grain Casting	Casting of solid rocket propellant grains into motor cases with precise geometry and composition control for predictable thrust profiles.	Energetics and Munitions Manufacturing

Hypersonic Thermal Protection System Manufacturing	Manufacturing of thermal protection systems capable of withstanding extreme aerodynamic heating during hypersonic flight above Mach 5.	Hypersonic Manufacturing
Ultra-High-Temperature Ceramic Manufacturing	Production of ultra-high-temperature ceramic (UHTC) components capable of operating above 2000°C for hypersonic vehicle leading edges and control surfaces.	Hypersonic Manufacturing
Carbon-Carbon Composite Manufacturing	Manufacturing of carbon-carbon composite materials with exceptional thermal and structural properties for hypersonic vehicle hot structures and reentry systems.	Hypersonic Manufacturing
Hypersonic Leading-Edge and Nose-Cone Manufacturing	Fabrication of sharp leading edges and nose cones for hypersonic vehicles requiring materials and manufacturing processes capable of extreme thermal loading.	Hypersonic Manufacturing
Precision Optical Manufacturing (Lenses and Mirrors)	Precision grinding, polishing, and figuring of optical elements including lenses, mirrors, and prisms to sub-wavelength surface quality for aerospace optical systems.	Optics, EO/IR and Photonics Manufacturing
Optical Coating and Thin-Film Deposition	Vacuum deposition of multi-layer optical coatings including anti-reflection, dichroic, and reflective coatings with precise spectral characteristics.	Optics, EO/IR and Photonics Manufacturing
EO/IR Sensor Assembly and Integration	Assembly and integration of electro-optical and infrared sensor systems including detectors, optics, readout electronics, and cryogenic cooling systems.	Optics, EO/IR and Photonics Manufacturing
Laser Assembly and Alignment	Precision assembly and optical alignment of laser systems including solid-state, fiber, and diode lasers for range finding, targeting, and communications.	Optics, EO/IR and Photonics Manufacturing
Fiber-Optic Transceiver Manufacturing	Manufacturing of high-speed fiber-optic transmitters and receivers for aerospace data communication systems with MIL-STD environmental qualification.	Optics, EO/IR and Photonics Manufacturing
Investment Casting (Aerospace / Defense)	Precision investment casting (lost wax) of complex aerospace components in various alloys with thin walls, intricate geometries, and excellent surface finish.	Foundry and Casting
Sand Casting (Structural / Vehicle)	Sand casting of larger structural and vehicle components in aluminum, steel, and other alloys for military ground vehicles and support equipment.	Foundry and Casting
Permanent Mold Casting	Casting using reusable metal molds for higher production volumes and improved dimensional consistency in aluminum and magnesium aerospace components.	Foundry and Casting

Metal Powder Production (Additive and Energetics)	Production of spherical metal powders for additive manufacturing and specialized energetic applications using atomization or other powder metallurgy processes.	Foundry and Casting
Space-Qualified Electronics Assembly	Assembly of electronics meeting NASA or military space qualification standards including outgassing limits, thermal cycling, and radiation tolerance requirements.	Space and Strategic Systems Manufacturing
Radiation-Hardened Electronics Manufacturing	Manufacturing of electronics designed and tested to withstand ionizing radiation in space, nuclear, or strategic applications using rad-hard components and design practices.	Space and Strategic Systems Manufacturing
Vacuum-Compatible Assembly	Assembly of components and systems using low-outgassing materials and processes compatible with high-vacuum space environments.	Space and Strategic Systems Manufacturing
Space Mechanisms and Deployment Systems Manufacturing	Manufacturing of precision mechanical systems for satellite deployment, antenna unfurling, solar array extension, and other space mechanism applications.	Space and Strategic Systems Manufacturing
Pressure Hull Component Manufacturing	Fabrication of submarine and underwater vehicle pressure hull components requiring precision welding, forming, and non-destructive testing to withstand deep ocean pressures.	Naval and Undersea Systems Manufacturing
Sonar Transducer Manufacturing	Manufacturing of piezoelectric and other acoustic transducers for submarine and surface ship sonar systems including active and passive arrays.	Naval and Undersea Systems Manufacturing
Acoustic Signature-Controlled Manufacturing	Manufacturing processes and techniques to minimize acoustic signatures in naval components through vibration isolation, material selection, and precision balancing.	Naval and Undersea Systems Manufacturing
EMP / HPM Hardening Manufacturing	Manufacturing of components and systems with electromagnetic pulse (EMP) and high-power microwave (HPM) protection through shielding, filtering, and transient protection.	Survivability and Hardening
Ballistic and Blast-Resistant Manufacturing	Manufacturing of armor and protective structures designed to defeat ballistic threats and blast overpressure through material selection and structural design.	Survivability and Hardening
Extreme Environment Ruggedization	Design and manufacturing for operation in extreme temperature, pressure, shock, vibration, and chemical environments beyond standard military specifications.	Survivability and Hardening
Radar Absorbing Coatings (RAM)	Application of radar absorbing materials and structural RAM to reduce radar cross-	Survivability and Hardening

	section for low-observable aircraft and vehicles.	
Low-Observable Coating Repair and Sustainment	Repair, restoration, and maintenance of stealth coatings and treatments on low-observable platforms to maintain signature reduction performance.	Survivability and Hardening
Infrared Signature Reduction Coatings	Application of specialized coatings to reduce infrared signatures from hot components and surfaces for reduced detectability.	Survivability and Hardening
Multispectral Signature Control Coatings	Application of coatings designed to reduce signatures across multiple spectral bands including visible, infrared, and radar frequencies simultaneously.	Survivability and Hardening
Tactical Communications System Integration	Integration of tactical radio systems, data links, and communications equipment into vehicles, aircraft, and ground stations with antenna integration and testing.	C4ISR and Communications Integration
SATCOM Terminal Integration	Integration of satellite communication terminals including antenna systems, modems, and network equipment for beyond-line-of-sight communications.	C4ISR and Communications Integration
Networked C4ISR Hardware Integration	Integration of command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) hardware systems with network infrastructure.	C4ISR and Communications Integration
Crypto-Enabled Hardware Integration (Unclassified Side)	Integration of cryptographic hardware including Type 1 encryption devices, key management systems, and secure communications interfaces (unclassified aspects only).	C4ISR and Communications Integration
Legacy System Sustainment Manufacturing	Manufacturing of replacement parts and assemblies for legacy defense systems no longer in production, including reverse engineering and requalification.	Sustainment and Depot Support
Battle Damage Repair and Rapid Refurbishment	Rapid repair and refurbishment of battle-damaged equipment including structural repair, component replacement, and functional restoration.	Sustainment and Depot Support
Expeditionary Manufacturing and Repair	Mobile or forward-deployed manufacturing and repair capabilities for supporting expeditionary operations and remote locations.	Sustainment and Depot Support