ENGINEERING AND TECHNOLOGY GROUP

The Engineering and Technology Group (ETG) is a nationally recognized space systems and technology resource. Containing approximately half of The Aerospace Corporation's technical talent, ETG consists of seven specialty organizations equipped with state-of-the-art computing, testing, diagnostic, research, simulation, and laboratory facilities as well as unique databases that have evolved since the beginning of the space era.

Information Systems and Cyber Division

The Information Systems and Cyber Division (ISCD) is the premier provider of current and future state-of-the-art secure information systems expertise for the space enterprise and beyond. ISCD staff couple the latest in information system technologies, such as cloud computing, artificial intelligence (AI), cybersecurity, and augmented/virtual reality, with modern computer and software engineering methods to deliver responsive and timely engineering products of the highest quality to a variety of customers.

CYBERSECURITY AND ADVANCED PLATFORM

› Cybersecurity resiliency assessments and risk management
› Cybersecurity situational awareness
› Cybersecurity vulnerability and penetration testing
› Enterprise and architecture cybersecurity engineering
› Information assurance certification and accreditation
› Program protection planning
› Software vulnerability analysis and reverse engineering
› Space enterprise cyber operations, wargames, and strategy
› Space enterprise cybersecurity
› Wireless and mobile cybersecurity

INTEGRATED DATA AND APPLICATIONS

› Applied data science
› Artificial intelligence (AI) and machine-learning (ML) research
› Cloud software development and migration
› Computer-aided design and rapid prototyping
› Data platform architectures and analytics pipelines
› Engineering software tool development
› Ground systems concepts design, engineering, and transitions
› Machine-learning engineering
› Operationally relevant engineering solutions
› Orbit analysis and space environment applications
› Software systems engineering and assurance
› Telemetry systems engineering/processing
› Utility and performance modeling and simulation
› Visualization and immersive technology

SOFTWARE ENGINEERING

› Agile and DevOps methodologies
› Enterprise engineering and integration
› Flight software and realtime embedded systems
› Model-based software engineering
› Software architecture evaluation and reconstruction
› Software code analysis and assessment
› Software lifecycle standards, processes, and methodologies
› Software measurements and metrics
› Software process modeling and simulation
› Software prototyping and integration
› Software systems acquisition
› System performance forecasting

Mission Payloads Division

The Mission Payloads Division (MPD) drives innovation in space electronics and payloads, delivering integrated solutions that enhance mission resilience and performance. By addressing the demands of contested environments, proliferated constellations, and diverse customer needs, MPD ensures the seamless integration of commercial and government systems. Leveraging expertise in radar; optical communications; positioning, navigation, and timing (PNT); and mission data processing, along with emerging AI/ML applications, the division develops actionable solutions tailored to cost, schedule, and risk constraints. Supported by world-class laboratories and advanced prototyping, MPD fosters cross-domain collaboration, empowers multidisciplinary teams, and advances Aerospace's mission to provide trusted technical leadership and enable mission success across the space enterprise.

COMMUNICATION AND NETWORK ARCHITECTURES
› Communication analysis and simulation
› Networking testbeds, protocols and modeling
› Resilient communications and waveforms
› Signal processing design and analysis
› Spectrum management
› Waveform design
› Wireless communications

COMM SYSTEMS AND AGILE PROCESSING
› Digital communication prototypes
› Jamming and scintillation mitigation
› ML for digital communications
› PNT/EW/SIGINT/cislunar testbed and laboratories

› RF and microwave subsystems
› Software defined radios

ELECTRONICS ENGINEERING
› Analog and power systems
› Electromagnetic effects
› Digital and integrated circuits
› Measurement, analysis, and simulation
› Nuclear hardness and survivability
› Parts, materials, processes

REMOTE SENSING SIGNALS AND ANALYTICS
› AI/ML for mission data
› Electro-optical devices
› EO/HSI sensor design
› Image and signal processing
› SAR/radar sensor design

RF AND OPTICAL COMMUNICATIONS
› Antennas, phased arrays, and terminals
› RF electronics and components
› Hardware performance assessment
› Telemetry and command
› Time and frequency standards
› TWTAs and amplifiers

SENSOR SYSTEMS
› Focal plane array laboratories
› Image and signal detection
› ML for remote sensing data
› Optical and electro-optical design
› RF/Radar/Microwave design and analysis
› Sensor prototyping

Physical Sciences Laboratories

Physical Sciences Laboratories (PSL) supports the effective and timely development and operation of national security systems through scientific research and the application of advanced technologies. PSL has more than 150 specialized laboratories used to test, analyze, and troubleshoot virtually every aspect of rocket and satellite system design, development, construction, deployment, and operation. The diverse expertise of the laboratories' technical staff allows PSL to stay abreast of new technological developments and program support issues associated with rapidly evolving space systems.

ELECTRONICS AND PHOTONICS
› Atomic clocks and other applications of atomic physics
› Integrated and RF photonics design and fabrication
› Laser remote sensing and on-orbit sensor
› Laser technology and optical communications calibration
› Micro and nano analysis
› Microelectronics device performance, reliability, and anomaly resolution
› Optical signal processing, compressive sensing
› Optoelectronic material and device physics
› Radiation-hard microelectronics
› Solar cells and arrays

› Spacecraft and launch vehicle batteries and fundamental electrochemistry

SPACE MATERIALS
› Advanced manufacturing
› Advanced material characterization
› Contamination
› Electrical and chemical propulsion science
› Nondestructive evaluation of materials
› Optical thin films
› Space environmental effects
› Space use of metals, composites, and polymers
› Tribology and bearing mechanics

SPACE SCIENCE APPLICATIONS
› Atmospheric and ionospheric effects
› Calibration and validation of on-orbit sensors
› Environmental modeling and chemistry
› Hyperspectral data applications and algorithms
› Hyperspectral sensor design and fabrication
› IR and UV target and background signatures
› Single-event effects testing
› Space environment measurements and modeling
› Space weather

Systems Engineering Division

The Systems Engineering Division (SED) is the corporate focal point for system-level modeling and analysis of the design, performance, and programmatic feasibility of national space systems. SED provides unmatched experience in systems engineering to the U.S. government and to numerous public and private agencies, universities, nonprofit organizations, consortia, and commercial companies involved in the advanced application of space technology. SED exploits a incredibly broad array of engineering and business disciplines against a diverse and dynamic portfolio of programs and national challenges.

ACQUISITION AND ECONOMICS PLANNING AND ANALYSIS
› Acquisition expertise
› Cost, schedule, and risk analysis
› Data centric acquisition and systems engineering
› Decision science and analytics
› Economic and market analysis
› Industrial base and supply chain assessments

### MISSION ASSURANCE
› Ground facilities infrastructure development and engineering
› Mission assurance planning, application, and verification management
› Product and process assurance and manufacturing engineering
› Reliability engineering, failure modes, and effects analysis

› Risk planning, assessment, and management
› Satellite constellation replenishment analysis
› Statistical modeling and analysis

SYSTEMS REALIZATION
› Digital engineering
› Model-based systems engineering
› Space and ground system design
› System integration, test, operations and test-like-you-fly assessments
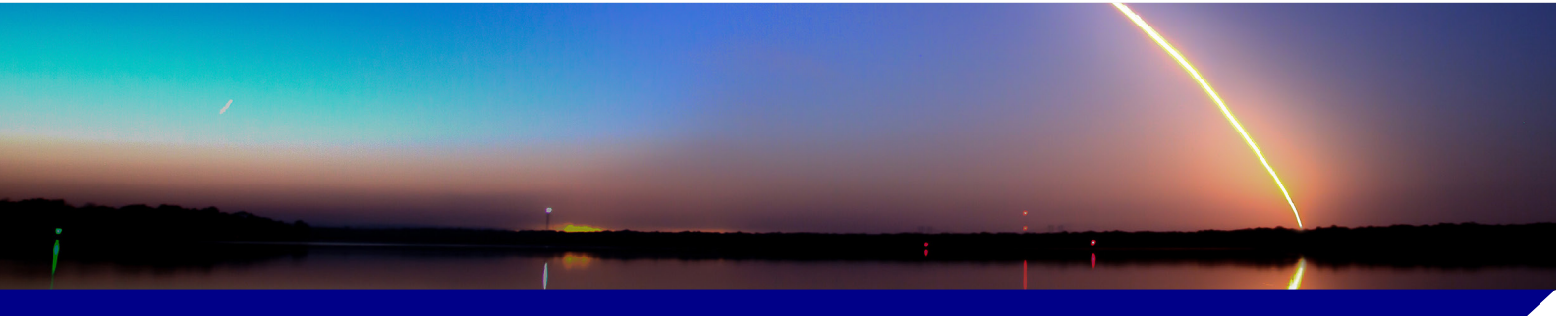
Vehicle Systems Division

The Vehicle Systems Division (VSD) provides engineering solutions to the nation's vehicle system challenges when and where they are needed. VSD's work spans innovative research and development; technical evaluations during the acquisition process; conceptual and detailed design; assembly, integration, and testing; and operational support to launch and space vehicles. Composed primarily of highly trained mechanical and aerospace engineers, VSD provides national expertise in a broad array of fields.

GUIDANCE AND CONTROL
› Attitude determination and control
› Collaborative robotics
› Control system fault management and safe mode evaluation
› Embedded system applications
› Flight control and guidance performance
› Hardware-in-the-loop, Software-in-the-loop simulation
› Hardware testing
› Inertial sensors (gyros, star trackers)
› Interceptor and conventional strike capability assessment
› Jitter, line-of-sight stability and vibration isolation
› Navigation and GPS applications
› Payload line-of-sight pointing and estimation
› Precision pointing systems
› Servomechanism analysis and design

STRUCTURAL MECHANICS
› Advanced structural technologies and materials
› Electronic component structural analysis

› Flexible system separation analysis and testing
› Independent coupled loads analysis
› Mechanical systems, mechanisms, and bearings
› Mode survey testing and time series data analysis
› Ordnance device analysis and applications
› Separation and deployment analysis and testing
› Shock, vibration, and acoustic testing
› Space and launch vehicle structural analysis
› Spacecraft and launch vehicle dynamics
› Structural integrity assessment and testing
› Thermostructural technologies

VEHICLE ENGINEERING
› Anomaly investigation and mitigation
› Assembly, integration, and test
› End-to-end system analysis
› Fault management and vehicle safing
› Integrated advanced autonomy
› Interface requirements (hardware-to-hardware and hardware-to-software)
› Mass properties
› Payload integration and support

› Small satellite simulation and integration
› System to architecture scale simulation framework
› Vehicle simulation
› Vehicle software systems

VEHICLE PERFORMANCE
› Aerodynamics and CFD applications
› Aerodynamics, hypersonics, and CFD applications
› Engine technology
› Engineering visualization
› Fluid systems and component analysis
› Launch and reentry vehicle thermal analysis
› Liquid propulsion
› Satellite propulsion
› Solid propulsion
› Spacecraft thermal design
› Thermal control technology
› Thermal systems engineering

Enterprise Effects Division

The Enterprise Effects Division (EED) focuses on bridging gaps across customers, platforms, and domains to deliver integrated solutions that optimize mission outcomes. Leveraging enterprise design, integrated performance, and mission operations expertise, it develops architectures that enhance resiliency across all space capabilities, including PNT; mission warning; tracking and defense; communication; weather; space domain awareness; intelligence, surveillance, and reconnaissance; and space control. Acting as a hub for cross-agency challenges, the division employs agile project management and collaboration with government, industry, and federally funded research and development partners to drive mission success and foster holistic solutions across all domains.

ENTERPRISE DESIGN
› Concepts and architectures
› Design trades and optimization
› Mission engineering
› Portfolio decisions
› Problem framing

ENTERPRISE INTEGRATION SOLUTIONS
› Agile PM for enterprise integration challenges
› Development of enterprise integration capacity expertise

› Enterprise integration and cross-agency orchestration
› Integration of corporate and partner technical expertise

INTEGRATED PERFORMANCE
› Data transport architecture analysis
› Mission and enterprise analysis
› Portfolio/effect-chain analysis
› Space campaign analysis
› Tracking and multi-INT analysis

MISSION OPERATIONS
› Astrodynamics and trajectory analysis
› Cislunar mission design
› Orchestration and C2 of space capabilities
› Risk from threats and hazardous space environment
› Spaceflight safety and traffic coordination

Digital Innovation Division

The Digital Innovation Division (DID) is leading Aerospace's digital transformation. This transformation reflects a corporate-wide foundational effort aimed at supporting both internal and external objectives. Internally, DID seeks to (1) forge stronger, enduring connections between all stakeholders across the space enterprise, (2) significantly enhance our workforce's ability to manage complexity, and (3) enable more rapid, data-driven decisionmaking at every level. Externally, the goal is to cultivate the necessary knowledge, experience, and legitimacy to effectively advise government customers with their own digital transformations. To achieve these objectives, DID has established four foundational pillars below. In addition to these pillars, DID also provides education and training resources to both the Aerospace workforce and government customers.

ARTIFICIAL INTELLIGENCE INTEGRATION
› AI apps and generative AI tools
› AI-augmented decisionmaking
› AI-augmented software development
› Enhanced data analytics and insights
› Knowledge integration
› Polices and governance

CAPABILITY TRANSFORMATION
› Cloud migration of applications

› Digital twins
› End-to-end kill chains
› Interoperable enterprise analysis
› Reusable code modules
› Streamlined workflows

DATA AND SOFTWARE OPERATIONS
› Application management (SaaS)
› Centralized data management platform
› Cloud onboarding

› Integrated digital storefront
› Policies and governance
› Software factory

MISSION INFORMATION TECHNOLOGY
› Cross-domain solutions (including SAP)
› Data sharing across customers
› Enterprise tool licensing
› On-demand infrastructure and platform services (IaaS and PaaS)

The Aerospace Corporation

The Aerospace Corporation is a leading architect for the nation's space programs, advancing capabilities that outpace threats to the country's national security while nurturing innovative technologies to further a new era of space commercialization and exploration. Aerospace's national workforce of more than 4,600 employees provides objective technical expertise and thought leadership to solve the hardest problems in space and assure mission success for space systems and space vehicles. For more information, visit www.aerospace.org.