APPENDIX D – FESC USER FACILITIES

#	User Facility	Location
1	Southeast National Marine Renewable Energy Center	Florida Atlantic University - Boca Raton
2	Aeropropulsion, Mechatronics and Energy Building (Coming Soon)	Florida State University, Tallahassee FL
3	Center for Advanced Power Systems (CAPS)	Florida State University, Tallahassee FL
4	Institute for Energy Systems, Economics and Sustainability (IESES)	Florida State University, Tallahassee FL
5	Future Fuels Institute (Coming Soon)	Florida State University, Tallahassee FL
6	High Magnetic Field Laboratory	Florida State University, Tallahassee FL
7	Photovoltaic – Module Testing and Certification	Florida Solar Energy Center, Cocoa FL
8	Photovoltaic Materials Laboratory	Florida Solar Energy Center, Cocoa FL
9	Solar Thermal Collection Test Laboratory	Florida Solar Energy Center, Cocoa FL
10	Solar Thermal Systems Test Laboratory	Florida Solar Energy Center, Cocoa FL
11	Advanced Energy Research Division (AERD) Labs	Florida Solar Energy Center, Cocoa FL
12	Manufactured House Laboratory	Florida Solar Energy Center, Cocoa FL
13	Building Science Laboratory	Florida Solar Energy Center, Cocoa FL
14	Flexible Roof Facility	Florida Solar Energy Center, Cocoa FL
15	Flexible Residential Test Structures	Florida Solar Energy Center, Cocoa FL
16	Climate-Controlled A/C Laboratory	Florida Solar Energy Center, Cocoa FL
17	Materials Characterization Facility	University of Central Florida, Orlando FL
18	Advanced Microfabrication Facility	University of Central Florida, Orlando FL
19	NanoScience Technology Center (NSTC)	University of Central Florida, Orlando FL
20	CREOL – The College of Optics and Photonics	University of Central Florida, Orlando FL
21	Florida Institute for Sustainable Energy - Energy Tech Incubator	University of Florida, Gainesville FL
22	UF Biofuel Pilot Plant	University of Florida, Perry FL
23	UF Biofuel Pilot Plant, Perry FL	University of Florida, Perry FL
24	Nanoscience Institute for Medical & Engineering Technologies and Nanoscale Research Facility	University of Florida, Gainesville FL
25	Wayne K. and Lyla L. Masur HVAC Laboratory	University of Florida, Gainesville FL
26	Major Analytical Instrumentation Center	University of Florida, Gainesville FL
27	Particle Engineering Research Center (PERC)	University of Florida, Gainesville FL
28	USF Thin Film Pilot Line (Coming Soon)	University of South Florida, Tampa FL
29	USF Nanotechnology Research and Education Center (NREC)	University of South Florida, Tampa FL
30	Oak Ridge Associated Universities (ORAU)	Florida Institute of Technology
31	Institute for Energy Systems (IES)	Florida Institute of Technology
32	Harris Institute for Assured Information (HIAI)	Florida Institute of Technology
33	Institute for Research on Global Climate Change	Florida Institute of Technology
34	Center for Remote Sensing (CRS)	Florida Institute of Technology
35	National Center for Hydrogen Research (NCHR)	Florida Institute of Technology
36	Collaborative International Research Centre for	Florida Institute of Technology

	Universal Access (CIRCUA)	
37	*Center for High Resolution Microscopy and Imaging (CHRMI)*	*Florida Institute of Technology*
38	*Center for Ferrate Excellence (COFE)*	*Florida Institute of Technology*
39	*Center for Corrosion and Biofouling Control (CCBC)*	*Florida Institute of Technology*
40	*Federal Aviation Administration Center of Excellence for Commercial Space Transportation*	*Florida Institute of Technology*
41	*Center for Entrepreneurship and New Business Development (CENBD)*	*Florida Institute of Technology*
42	*Wireless Center of Excellence (WICE)*	*Florida Institute of Technology*
43	*Florida Center for Automotive Research (FCAR)*	*Florida Institute of Technology*
44	*College of Engineering Center for Space Commercialization*	*Florida Institute of Technology*
45	*Microelectronics Laboratory*	*Florida Institute of Technology*
46	*Laser, Optics and Instrumentation Laboratory (LOIL)*	*Florida Institute of Technology*
47	*Wind and Hurricane Impacts Research Laboratory (WHIRL)*	*Florida Institute of Technology*
48	*Dynamic Systems and Controls Laboratory (DSCL)*	*Florida Institute of Technology*
49	*Robotics and Spatial Systems Laboratory (RASSL)*	*Florida Institute of Technology*
50	*Ralph S. Evinrude Marine Operations Center*	*Florida Institute of Technology*
51	*Applied Chemistry Laboratory*	*NASA KSC - Space Life Sciences Laboratory*
52	*Chemical Analysis and Sampling Laboratory*	*NASA KSC - Component Refurbishment and Chemical Analysis Facility*
53	*Chemical Test and Analysis Laboratory*	*NASA KSC - Operations and Checkout Bldg.*
54	*Analytical Chemistry Core Laboratory*	*NASA KSC - Space Life Sciences Laboratory*
55	*Polymer Science and Technology Laboratory*	*NASA KSC - Space Life Sciences Laboratory, Operations and Checkout Bldg., and "Cone Shack"*
56	*Instrumentation Systems Development Laboratory*	*NASA KSC - Engineering Development Laboratory*
57	*Corrosion Technology Laboratory*	*NASA KSC - Space Life Sciences Laboratory*
58	*Applied Physics Laboratory*	*NASA KSC - Operations and Checkout Bldg.*
59	*Cryogenics Test Laboratory*	*NASA KSC - Cryogenics Test Laboratory*
60	*Power Systems Laboratory*	*NASA KSC - Engineering Development Laboratory*
61	*Advanced Electronics and Technology Development Laboratory*	*NASA KSC - Engineering Development Laboratory*
62	*Controls Laboratory*	*NASA KSC - Engineering Development Laboratory*

63	*Electronic Development and Test Laboratory*	*NASA KSC - Engineering Development Laboratory*
64	*Electrical/Electronics Failure Analysis Laboratory*	*NASA KSC - Operations and Checkout Bldg.*
65	*Experiment Support Laboratories*	*NASA KSC - Space Life Sciences Laboratory*
66	*Advanced Technology Development Center*	*NASA KSC - Space Launch Complex*
67	*Prototype Development Laboratory*	*NASA KSC - Prototype Shop*
68	*Mechanical, Structural, and Controls Development Laboratory*	*NASA KSC - Launch Equipment Test Facility*
69	*Design Visualization Laboratory*	*NASA KSC - Operations and Checkout Bldg.*
70	*Materials Failure Analysis Laboratory*	*NASA KSC - Operations and Checkout*
71	*Physical Test and Analysis Laboratory*	*NASA KSC - Operations and Checkout*
72	*Nondestructive Evaluation (NDE) Laboratory*	*NASA KSC - Converter/Compressor Operations Bldg.*
73	*Metrology Laboratory*	*NASA KSC - Operations and Checkout Bldg.*
74	*Standards and Calibration Laboratory*	*NASA KSC - Physical Calibrations: KSC, Central Instrumentation Facility ;Electrical Calibrations: Patrick Air Force Base*
75	*Experimental Imaging Laboratory*	*NASA KSC - Engineering Development Laboratory*
76	*Fiber Optics and Communications Laboratory*	*NASA KSC - Engineering Development Laboratory*
77	*Light Testbed*	*NASA KSC - Space Life Sciences Laboratory*
78	*Controlled Environment Laboratory (CEL)*	*NASA KSC - Space Life Sciences Laboratory*
79	*Advanced Range and Systems Health Laboratory*	*NASA KSC - Engineering Development Laboratory*
80	*Advanced Network Development Laboratory*	*NASA KSC - Engineering Development Laboratory*
81	*Flight Experiment Development Laboratory*	*NASA KSC - Space Life Sciences Laboratory*
82	*Earth Systems Modeling and Data Management Laboratory*	*NASA KSC - Operations and Checkout Bldg.*
83	*Applied Meteorology Unit (AMU)*	*NASA KSC - Range Operations Control Center Bldg. at Cape Canaveral Air Force Station*

Florida Atlantic University

Southeast National Marine Renewable Energy Center

Web Site Link: *http://snmrec.fau.edu*

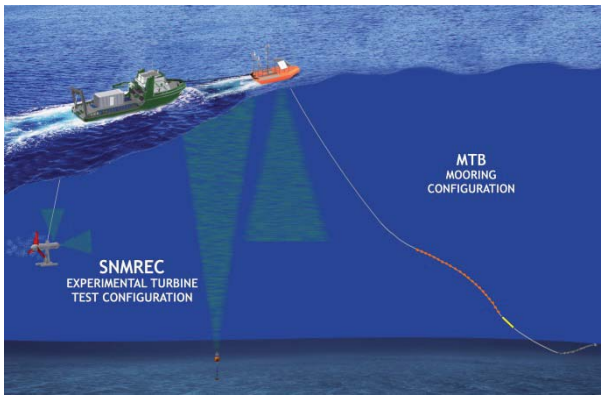
Director: Sue Skemp

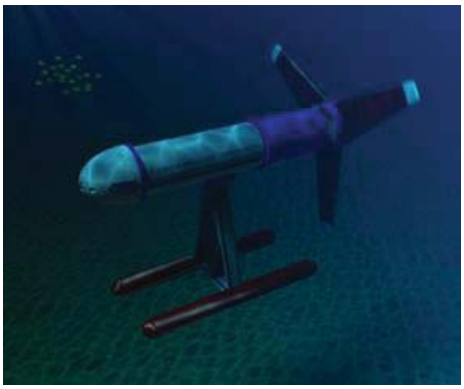
Contact Information
Email: snmrec@fau.edu Phone: 561-297-0956

Description
The Southeast National Marine Renewable Energy Center (SNMREC) at Florida Atlantic University is investigating the challenge of harnessing the power of the Gulf Stream for the generation of base load electricity, a unique contribution to a broadly diversified portfolio of renewable energy for the nation's future. Working in a systematic fashion toward the implementation of a full-scale, at-sea testing facility for industrial prototypes, current work includes developing testing infrastructure and protocols for components and complete generating systems and, in the process, fielding critical environmental monitoring systems so that the nature and sensitivity of the resource itself can be understood and effects of single-system deployments can be examined before commercial-scale arrays are designed. The SNMREC's strategy to accelerate commercial development of Marine & Hydrokinetic (MHK) projects includes technology R&D, testing, environmental research and measurement, policy, regulatory, and economic research, and education and outreach.

Lab Capabilities: In-lab technology testing is underway with scaled generator dynamometer capabilities which not only provide a platform to test offshore electrical systems before use, but also simulate offshore grids. Corrosion and bio-fouling facilities allow for investigation of new materials and coatings which will be necessary to ensure the efficacy of long term commercial device array deployments, and a recirculating flume tank is used to determine early-stage proof-of-concept and to test mooring and device dynamics before greater expense and risk is incurred testing offshore at larger scales.

Open Water Capabilities: An offshore scaled device test berth (approximately 12 nm offshore of Ft. Lauderdale, FL) is under construction and will be installed for up to 100kW max instantaneous power production and/or 7m rotor diameter turbine testing. This initial group of industrial devices will provide insight into individual device extraction methods, dynamics, and basic system operability. A generic 20kW experimental research turbine is also under construction which will allow for subsystem or component testing and development. In addition, it will provide methodology and support infrastructure available for commercial 1:20 scale prototype device testing.





Fee Schedule

Facility use is negotiated on a per-proposal basis and can include analysis and test design/planning services.

Florida State University

Aeropropulsion, Mechatronics and Energy Building

Web Site Link: http://www.eng.fsu.edu/me/research/ame.html

Contact Information
Dr. Chiang Shih, Chair
Email: shih@eng.fsu.edu *Phone:* (850)410-6321 Fax: (850)410-6337

Description
This 60,000-square-foot state-of-the-art facility supports advanced research in aerospace and aviation, mechatronics (robotics) and sustainable energy engineering. The Aero-Propulsion, Mechatronics and Energy Building houses laboratories, equipment, offices and other infrastructure necessary to carry out the university's research mission in several key areas seen as crucial to the economic development of the state and nation.

Among the organizations that is housed in this $23 million facility are Florida State's Energy and Sustainability Center (ESE) which features an energy material processing lab, dry room for battery assembly; Institute for Energy Systems, Economics and Sustainability (IESES); the university's Center for Intelligent Systems, Control and Robotics (CISCOR); and the Florida Center for Advanced Aero-Propulsion (FCAAP), a State University System Center of Excellence that is headquartered at FSU.

As its name indicates, the research that take place within the Aero-Propulsion, Mechatronics and Energy Building focuses on three key areas:

- **Aero-propulsion**: The discipline of aero-propulsion deals with transportation systems and other objects that move through air, influencing the design and fabrication of aircraft, spacecraft, automotive transport, and all manner of vehicles in motion. The relevant research areas cover fundamental science topics such as aerodynamics, fluid mechanics, acoustics, thermal physics and turbulence, as well as practical applications such as combustion improvement, active control of flow separation, supersonic jet noise suppression, lift/thrust enhancement and drag reduction.
- **Mechatronics**: The term mechatronics, a combination of mechanics and electronics, was first used in Japan in the 1960s. From a technical perspective, it is the synergistic integration of mechanical, electrical, control and computer systems to create functional products. Mechatronics has become the enabling technology responsible for industrial innovations in numerous economic sectors, including automobiles, alternative energy, aerospace, electronics and defense. The field of mechatronics generally covers topics such as robotics, micro-electro-mechanical-systems (MEMS), intelligent systems, automated guided vehicles and smart materials.
- **Energy**: Seeking new energy resource that are more efficient and cost-effective and that minimize effects on the environment is among the most critical issues that the world will have to grapple with in the 21st century. The Aero-Propulsion, Mechatronics and Energy Building houses research labs for organizations that are focused on exploring reliable, affordable, safe and clean energy technologies, including projects such as Florida State's Off-Grid, Zero-Emission Building; solar-thermal systems; a photo bioreactor for algae growth; and fuel-cell and advanced battery technologies.

Fee Schedule:
TBD

Center for Advanced Power Systems (CAPS)

Web Site Link: *http://www.caps.fsu.edu/*

Director: Dr. Steiner Dale

Contact Information
Steve McClellan
Email: mcclellan@caps.fsu.edu Phone: (850) 645-2157 Fax: 850-644-7456

Description

The 34,000 sq. ft. CAPS research, development, test and demonstration facility is located in Innovation Park in Tallahassee, Florida. CAPS is a multidisciplinary research center organized to perform basic and applied research to advance the field of power systems technology and provides a secure infrastructure and environment for all types of sensitive research. CAPS emphasis is on application to electric utility, defense, and transportation, as well as, developing an education program to train the next generation of power systems engineers. The research focuses on electric power systems modeling and simulation, power electronics and machines, control systems, thermal management, high temperature superconductor characterization and electrical insulation research. FSU also has The Energy and Sustainability Center which addresses challenging alternative energy issues through innovative solutions for consumers and industry. The Center promotes industry, government, and academia collaboration and participation in critical research activities moving beyond the stage of initial demonstration to commercialization.

Fee Schedule:
Facility use is negotiated on a per-proposal basis.

Institute for Energy Systems, Economics and Sustainability

Web Site Link: *http://www.ieses.fsu.edu/*

Director: Dr. David Cartes

Contact Information
Email: sims@ieses.fsu.edu Phone: 850-645-9232

Description
The *Institute* is a public resource to carry out scholarly basic research and analysis in engineering, science, infrastructure, governance and the related social dimensions all designed to further a sustainable energy economy. The *Institute* unites researchers from the disciplines of engineering, natural sciences, law, urban and regional planning, geography, and economics to address sustainability and alternative power issues in the context of global climate change. IESES offers administrative and program support to researchers, partners and collaborators.

Grant Proposal and Administration Support: Proposal development, preparation and submission; grants management; requisition and authorization of payments of purchased items; reconciling ledgers, monthly financial reports, re-budgeting and budget amendments; office space, hiring staff and managing travel.

Program Services: Public and private sector resource identification and partnership development; interdepartmental and state-university wide resource development; promotion of our research partners and collaborators in print, electronic media and through participation in statewide, national and international conferences.

Fee Schedule:
Negotiated on a per-proposal basis.

Future Fuels Institute

Web Site Link: *www.Research.fsu.edu/ffi*

Director: Dr. Chang Samuel Hsu

Contact Information
Dr. Chang Samuel Hsu
Email: hsu@magnet.fsu.edu *Phone:* (850) 644-9861

Address: 1800 E. Paul Dirac Dr. Tallahassee, FL 32310

Description
Future Fuels Institute, established at Florida State University is a global center of excellence working with renewable and difficult-to-refine oils for the production of fuels and chemicals. It is supported by sponsoring companies and collaborative entities (instrument companies, universities and research institutes) to develop advance and novel techniques for research applications and problem solving.

Fee Schedule:
TBD

National High Magnetic Field Laboratory (NHMFL)

Web Site Link: *http://www.magnet.fsu.edu/about/* *and* *https://users.magnet.fsu.edu/*

Director: Dr. Greg Boebinger

Contact Information
NHMFL has 7 user programs. The contact information for each user program is listed below.

Magnet Lab User Facilities			
Facility	**Location**	**Director**	**Help With Requests**
Advanced MRI and Spectroscopy	Gainesville	Joanna Long	Joanna Long
DC Field	Tallahassee	Eric Palm	Eric Palm
Electron Magnetic	Tallahassee	Stephen Hill	Jurek Krzystek

Resonance			Andrew Ozarowski
High B/T	Gainesville	Neil Sullivan	Neil Sullivan
Ion Cyclotron Resonance	Tallahassee	Alan Marshall	Amy McKenna Colleen Davis
Nuclear Magnetic Resonance	Tallahassee	Bill Brey Tim Cross	Riqiang Fu Zhehong Gan Ashley Blue
Pulsed Field	Los Alamos	Chuck Mielke, Facility Director Jonathan Betts, Head of the Pulsed Field User Program, Contact person to help with requests	Chuck Mielke Jonathan Betts

Description

The **National High Magnetic Field Laboratory** offers the highest magnetic fields for use by the international community of scientific visitors. Many of the magnets and experimental techniques are highly specialized, yet broadly applicable to research in physics, materials science, chemistry, biochemistry, biology and even biomedicine. Every year over 1100 scientists and engineers use the National High Magnetic Field Lab facilities. Graduate students and Nobel laureates, researchers from academia and the corporate world, they travel from across the globe for a chance to work with the unique instruments and experienced staff at our three locations. First and foremost, the Mag Lab exists for these users and the cutting-edge research they conduct here as they seek to expand the boundaries of scientific knowledge. The Users Hub is dedicated to them and their needs. It is divided into two sections: User Programs and User Services.

Fee Schedule

Access to NHMFL magnets is open to all qualified scientists and engineers via a competitive proposal process. If a proposal is approved, facility usage is free of charge provided the researcher intends to publish the results in open literature. Proprietary research done at the Magnet Lab must enter into a cost sharing arrangement. All user facilities accept proposals throughout the year. The online system for submitting a proposal and requesting magnet time is located at https://users.magnet.fsu.edu/.

Florida Solar Energy Center

http://www.fsec.ucf.edu/en/

Photovoltaic – Module Testing and Certification

Web Site Link: http://www.fsec.ucf.edu/en/certification-testing/PVmodules/index.htm

Contact Information

Stephen Barkaszi

Email: barkaszi@fsec.ucf.edu or pvmodule@fsec.ucf.edu Phone: 321-638-1473

Description

The Florida Solar Energy Center is required by Section 377.705 of the Florida Statutes to develop standards and certify all solar energy equipment manufactured or sold in Florida. To meet the requirements of the Florida Statutes, FSEC has developed a PV Module and PV System Certification program that protects the public interest and advances the use of renewable technologies. The objectives of the program are to:

- Provide Florida residents with reliable, safe and high quality PV system designs.
- Provide a means for consumers to obtain a summary of their certified PV system design including the installer's name, address, telephone number and Florida contractor's license number.
- Provide Florida consumers and/or agency officials with the expected power output of certified PV systems using accurate PV module performance ratings.
- Provide a PV system design approval certificate with a checklist that list the items that require compliance with National Electrical Code. The certificate and checklist can be used by local building officials for both the issuing of permits and the inspection of installed PV systems.

To satisfy these objectives, FSEC has developed a PV Module and System Certification processes. These certification processes are intended to be simple and straightforward.

Fee Schedule:
Requested

Photovoltaic Materials Laboratory

Web Site Link: http://www.fsec.ucf.edu/en/about/facilities/pv_mat_lab.htm

Contact Information
Neelkanth Dhere
Email: ndhere@fsec.ucf.edu *Phone:* 321-638-1442

Description
Photovoltaic Materials Laboratory performs research in the areas of thin film solar cells for terrestrial & space application; Photoelectrochemical Water Splitting for Hydrogen Generation; High Voltage Bias Testing of Thin Film PV Modules; and Tribological coatings. The research details are given at the web site.

Fee Schedule:

Requested

Solar Thermal Collection Test Laboratory

Web Site Link: http://www.fsec.ucf.edu/en/certification-testing/STcollectors/index.htm

Contact Information
Email: thermal@fsec.ucf.edu *Phone:* 321-638-1426

Description
The FSEC testing program evaluates solar collectors to determine that they meet the certification standards. Testing and certification of both glazed (hot water) and unglazed (pool heating) collectors is a State of Florida-mandated activity. All collectors and systems sold or manufactured in Florida must be certified by FSEC. The details are given at the web site.

Fee Schedule

Testing fee information can be found at: http://www.fsec.ucf.edu/en/publications/pdf/FSEC_Thermal_Test_Fees_2010_Final_17-May-10.pdf

Solar Thermal Systems Test Laboratory

Web Site Link: http://www.fsec.ucf.edu/en/certification-testing/STsystems/index.htm

Contact Information
Email: thermal@fsec.ucf.edu *Phone:* 321-638-1426

Description
The FSEC testing program evaluates ICS (Batch solar water heater) and Thermosiphon systems to determine that they meet the certification standards. The Florida Solar Energy Center (FSEC) is responsible for approving all solar water heaters that are sold or manufactured in Florida. The system approval process was mandated by the Florida State Legislature as part of the Solar Energy Standards Act which required that beginning in 1980 all solar energy systems manufactured or sold in Florida meet standards established by FSEC.

The FSEC standards program has been designed to meet the intent of the legislation while also helping the Florida solar industry to develop quality products, aiding building departments in product approval, and instilling confidence in the consumer who chooses to use solar energy in their residence or business. The details are given at the web site.

Fee Schedule
Testing fee information can be found at: http://www.fsec.ucf.edu/en/publications/pdf/FSEC_Thermal_Test_Fees_2010_Final_17-May-10.pdf

Advanced Energy Research Division (AERD) Labs

Web Site Link: http://www.fsec.ucf.edu/en/about/facilities/hydrogen_fuelcell_lab.htm

Director: Dr. Ali Raissi

Contact Information
Dr. Ali Raissi
Email: ali@fsec.ucf.edu *Phone:* 321-638-1407

Description
Research activities of the FSEC's Advanced Energy Research Division (AERD) are carried out within three fully equipped laboratories (Class B & C – total of 5,000 square foot), and a 1,500 square foot field facility. These laboratories are:

- Alternative Fuel Lab
- Instrumentation Lab
- Fuel Cell Lab

These laboratories and the field facility meet and/or exceed the design and safety requirements imposed by the Florida State Fire Marshall and all the state and federal codes (NFPA 45 Standard on Fire Protection for Laboratories Using Chemicals, NFPA 50A Standard for Gaseous Hydrogen Systems at Consumer Sites,

and NFPA 70 National Electric Code) for handling large volumes of hazardous and flammable gases and chemicals including both gaseous and liquid hydrogen. The field facility is fitted with explosion proof electrical systems and meets NFPA 50B Code "Liquefied Hydrogen Systems at Consumer Sites."

AERD labs are equipped with the state-of-the-art analytical instruments including: a JEOL GCmate-II GC/MS-MS for determining elemental compositions, unit's special features include: linked-scan MS/MS for structure determination, high-resolution selected ion monitoring (SIM), programmable temperature heated direct insertion probe with separate ion source chambers for EI and CI operation and for analysis of volatile solid samples, and link to NIST library search routines; two SRI 8810 gas chromatographs (GC) equipped with TCD, FID & FPD; a Shimadzu GC equipped with TCD & FID; a Perkin-Elmer (PE) GC equipped with TCD & FPD; a Varian refinery GC; a Buck Scientific GC; and a Dionex DX 500 Gradient Ion Chromatograph/ HPLC with AD20 absorbance detector; an Altamira AMI 200 catalyst characterization instrument capable of TPD-MS, TPR-MS, TPO-MS, and TPRx-MS; a Perkin-Elmer Spectrum 100 FTIR with Universal ATR Accessory (UATR); an Autoclave Engineers BTRS-jr lab reactor system; a CDS Analytical pyroprobe 1000 with three modes of operation; a PE Diamond Differential Scanning Calorimeter (DSC) equipped with Hyper DSCTM technology for automated unattended operation over the temperature range of -170°C to 300°C and fast heating and cooling rates (as high as 500°C/min); a PE Diamond TG/DTA-MS system equipped with ThermoStar bench-top quadrupole MS with closed ion source for mass range of 1-300 amu and a detection limit of less than 1 ppm.

Labs also house a Shimadzu UV/VIS scanning spectrophotometer; a Hach UV/VIS; an IR spectrophotometer; a PMI BET surface area analyzer; several PEM electrolyzers, three complete, fully automated (operating from LabView environment) thermovolumetric analyzers (ranging in size from 160 mL to 2 L); a Hiden Isochema HTP1-V volumetric sorption analyzer capable of operating at 100 bar and 500^{o}C; a Hitachi TM3000 tabletop SEM; Ranson Digital Sonifier 450 W sonicator Model No. 450, EDP: 100-214-239; two 1 kW Newport solar simulators Model No. 91190-1000 (equipped with AM1.5 global, AM1.0 & 0.0 filters); two glove-boxes equipped with purification systems for reducing moisture and oxygen to the ppm level and vacuum systems with Schlenk glassware for handling materials under inert conditions; two Carver hot presses; a SPEX CertiPrep 8000M high-energy ball mill; and two Retsch ball mill units; two PARSTAT® 2273 potentiostats controlled by the PowerSuite software (Princeton Applied Research); complete electrochemical test equipment; assortment of computerized data acquisition and control systems; an induction furnace and a collection of ovens, autoclaves, AC and DC power supplies and assortment of pumps and balances.

The fuel cell lab is equipped with devices ranging from that needed for the MEA fabrication to complete in-situ electrochemical diagnostic systems. There are four Scribner Associates test stands, several potentiostats and frequency response analyzers, and a one of a kind MEA Durability Test System, (MEADS) that allows long term testing of eight fuel cells, simultaneously. The in-situ electrochemical diagnostics facility includes a test stand, a load box and a frequency response analyzer – constituting a complete FC test station capable of using either 5 or 25 cm^2 single cell hardware. AERD's field facility houses the pilot-scale biomass gasification/Fischer-Tropsch synthesis plant.

AERD's computational and modeling capabilities include: Gaussian '03, GaussView^{TM}, CAChe, AspenPlus^{TM} CPS, FACTSage, FLUENT CFD platform and GE's GateCycle^{TM} program.

The list of equipment in each lab is given below.

Alternative Fuel Lab (AERD Lab Room 101)	Instrumentation Lab (AERD Lab Room 103)
SRI 8610 C GC and	Retsch Ball Mill (2)
SRI 8610 A GC	Shimadzu UV-VIS
Denton Vacuum System	PE Diamond DSC
Ziess Microscope	Hach UV-VIS
Minolta CR-10 Colorimeter	Altamira AMI 200 TPD-MS
Varian GC-TCD/FID	PE Diamond TG/DTA-MS
PE Sulfur GC-FID/FPD	PMI BET
Shimadzu Refinery GC-FID	Dionex DX-500 IC-HPLC
Buck Scientific GC	Jeol GCmate-II GC-MS/MS
Varian 3400 GC-TCD/FID	PE Spectrum 100 FTIR
Chemiluminescence Analyzer	Hiden Isochema HTP1-V Volumetric Sorption Analyzer
Environics Multi-Gas Calibrator	Varian GC-MS (ion selective)
Glove box (2)	CDS Analytical Pyro-probe 1000
Spex Certi Prep Ball Mill	Autoclave Engineers BTRS-jr Lab Reactor
Fluent CFD Platform	Potentiostat Parstat 2273
Fuel Cell Lab (AERD Lab Room 109)	Newport Solar Simulator (2)
8-Channel FC MEA Durability Test System (MEADS)	Cryocooler & Accessories
Potentiostat (2)	Carver hot press (2)
Scribner Associates 850C Fuel Cell Test Stand (4)	Electrolyzers (3)
Teledyne Medusa	Ranson Digital Sonifier 450 W Model 450
	MEA Prep Unit
	Hitachi TM3000 Tabletop SEM

Fee Schedule
A mini proposal is requested from each applicant describing the service(s) needed. The fee will be determined based on the service needs. The proposal will be submitted to Dr. Ali Raissi at: ali@fsec.ucf.edu.

Manufactured House Laboratory

Web Site Link: http://www.fsec.ucf.edu/en/about/facilities/mhl.htm

Director: Rob Vieira

Contact Information
Rob Vieira
Email: robin@fsec.ucf.edu *Phone:* 321-638-1404

Description
The Manufactured Housing Laboratory (MH Lab) is a 1600 ft2 ENERGY STAR® manufactured home that will serve as a training center and building science laboratory.

It features two completely separate space conditioning systems, an in-the-attic duct system with a package

unit heat pump, and a floor-mounted duct system with a split system heat pump. An interior duct system was also recently installed. The MH Lab is a real-world training and research center used to conduct system-level residential research and to demonstrate building problems and solutions. Researchers and students investigate topics such as airflow and pressure measurement, moisture control, methods of duct leakage testing and repair, ventilation strategies, and analysis and correction of indoor air quality source control problems.

Fee Schedule:
Facility use is negotiated on a per-proposal basis.

Building Science Laboratory

Web Site Link: http://www.fsec.ucf.edu/en/about/facilities/bldg_sci_lab.htm

Director: Rob Vieira

Contact Information
Rob Vieira
Email: robin@fsec.ucf.edu *Phone:* 321-638-1404

Description

The Building Science Lab is unique in its ability to vary the building airtightness, air leakage and thermal boundary parameters in a controlled fashion and evaluate their interactions with both conventional and advanced HVAC systems. Its purpose is to advance the understanding of building science and proper application of HVAC equipment through research and training. The design of this building is based upon recent developments in building science and has the flexibility to address a wide range of issues. It has the ability to mechanically adjust infiltration rates with custom ventilation fans and it also has a modular wall on the west façade for testing solar heat gain. The Building Science Lab is ideally suited to hands-on building science and HVAC systems training. In addition to housing the training, it serves as a live training model. Trainees see in real time the pressure and air flow response of the building as air flow rates, barriers to flow and pathways to flow are changed at the turn of a switch.

Fee Schedule:
Facility use is negotiated on a per-proposal basis.

Flexible Roof Facility

Web Site Link: http://www.fsec.ucf.edu/en/about/facilities/frf.htm
Director: Rob Vieira
Contact Information
Rob Vieira
Email: robin@fsec.ucf.edu *Phone:* 321-638-1404

Description

The Flexible Roof Facility (FRF) is an FSEC Buildings Research division test facility in Cocoa, Florida designed to compare the performance of different residential roofing systems. The facility can evaluate five roofing systems at a time against a control roof with a vented attic and dark shingles.

The intent of the testing is to evaluate how roofing systems impact summer residential cooling energy use and peak demand. To make these evaluations, each of the 6 separate attic "cells" is heavily instrumented with sensors measuring temperatures of the shingles, roof deck, and attic space and ceiling plane. Data are collected throughout the summer each year and then analyzed. The details are given at the web site.

Reserving a Test Cell
While FSEC uses several cells each year for ongoing research, there are typically two or more cells available for use by outside companies or organizations desiring to have a roof system or product tested. For more information on reserving an FRF test cell, click here to contact Danny Parker: *http://www.fsec.ucf.edu/contact.php?id=95*

Fee Schedule

Our standard research contract for one cell of the Flexible Roof Facility is $14,973. This price includes use of the cell, standard instrumentation and our standard report which will (at a minimum) compare the cell to a reference vented attic with a dark shingle roof and a reference vented attic with a white metal roof (see the 2003 FRF report at http://fsec.ucf.edu/en/publications/pdf/FSEC-CR-1475-04.pdf as an example). Tear off of the existing roof and installation of the new roof is not included in this price. Tear off and installation are the responsibility of the individual, organization or company reserving the test cell(s), and all roof work must be done by a licensed and insured contractor.

Flexible Residential Test Structures

Web Site Link: http://blog.floridaenergycenter.org/echronicle/tag/flexible-residential-test-facility/

Director: Rob Vieira

Contact Information

Rob Vieira
Email: robin@fsec.ucf.edu *Phone:* 321-638-1404

Description

Construction of the flexible residential test structures was completed in December 2011. The purpose of the two side-by-side test houses is to conduct side-by-side testing of varying residential energy efficiency strategies and/or systems and to have a base house in which to compare the measured results. A preliminary measurement of temperature during passive load conditions indicates the buildings track each other well. A number of DOE staff toured the facility when they visited the Florida Solar Energy Center in January 2011, after FSEC had been awarded a four year research contract in which the facility will play a significant role.

Completed flexible residential test structures on FSEC campus.

Fee Schedule:
Facility use is negotiated on a per-proposal basis.

Climate-Controlled A/C Laboratory

Web Site Link: http://www.fsec.ucf.edu/en/about/facilities/cc_ac_lab.htm

Director: Rob Vieira

Contact Information
Rob Vieira
Email: robin@fsec.ucf.edu *Phone:* 321-638-1404

Description
FSEC's on-site environmental facilities are capable of testing air-conditioners and heat pumps with cooling/heating capacities up to 3.5 tons. The facility *(photo right)* is made up of an indoor chamber, an outdoor chamber, and a computerized control room. The environmental chamber's indoor and outdoor conditions are maintained automatically with a laboratory grade data acquisition and control system. Full automation allows complete flexibility for parametric testing. The control room houses a data acquisition and control system and is responsible for monitoring instrumentation output, controlling psychrometric chamber temperature and humidity conditions, and controlling compressor, indoor fan, and outdoor fan speeds.

Fee Schedule:
Facility use is negotiated on a per-proposal basis.

University of Central Florida

Materials Characterization Facility (MCF) - Advanced Materials Processing and Analysis Center (AMPAC)

Web Site Link: http://www.ampac.ucf.edu/facilities/MCF.php
Available equipment techniques are listed at the web site.

Director: Dr. Sudipta Seal

Contact Information
Email: ampacmcf@ucf.edu Phone: 407-882-1500 Fax: 407-882-1502
Address: 12443 Research Parkway, Suite 304, Orlando, FL 32826

Description
The Materials Characterization Facility (MCF) is dedicated to providing researchers and industrial partners a place to perform characterization and analysis to advance research; classroom education and hands-on training in the use of state-of-the-art characterization equipment; user-friendly support services with expert advice and data interpretation; and to enhance competitiveness of industrial partners and boost economic development of the Central Florida region.
MCF occupies about 7,000 sq. ft. of space and is supported by 3 full-time research engineers and a full-time facilities coordinator. Collaboration with other Universities is encouraged.
AMPAC is an interdisciplinary research and education center for materials science and engineering located at the University of Central Florida (UCF). Our work intersects with research areas including biology, medicine, energy, microelectronics, and nanotechnology. Materials science and engineering (MSE) is an interdisciplinary field that impacts almost every application area. Finding or developing a material with the right properties, or with affordable fabrication costs, or appropriately characterizing the material composition and/or structure to enable development of specific material properties, is often the limiting factor and enabling technology in most applications.
AMPAC faculty, affiliated faculty, and graduate students conduct in-depth research in materials science and engineering to address the requirements of several applications including energy, microelectronics, nanotechnology, green energy, life sciences, optics, aerospace, and bioengineering with the goals of enhancing scientific understanding and promoting industrial development and economic growth. With research expenditures totaling more than $3.6M per year, the UCF materials science and engineering research efforts are supported by a number of government agencies, including national laboratories, as well as private industries. The nine AMPAC faculty and 71 students alone author over 80 refereed publications and 100 presentations per year at national and international conferences.

Fee Schedule:
Requested

Advanced Microfabrication Facility - Advanced Materials Processing and Analysis Center (AMPAC)

Web Site Link: http://www.ampac.ucf.edu/facilities/AMF.php
Available equipment techniques are listed at the web site

Director: Dr. Sudipta Seal

Contact Information
Karen Glidewell
Email: Karen.Glidewell@ucf.edu Phone: 407-882-1500

Description
The Advanced Microfabrication Facility (AMF) is a multi-user cleanroom facility dedicated to provide university researchers and industrial and government partners the capabilities to perform cutting edge research, and training and education of students in the use of the available equipment for fabrication and testing of microdevices. AMF consists of a 600 sq. ft. class 100 facility and a 2500 sq. ft. class 1000 facility.

The AMF is supported by a research associate, a graduate student assistant, and a facilities coordinator to assist all users in use of and training on the AMF equipment. Collaboration of UCF researchers with other universities, government agencies, and industrial companies is strongly encouraged.

Fee Schedule:
Requested

NanoScience Technology Center (NSTC)

Web Site Link: http://www.nanoscience.ucf.edu/index.php and
http://www.nanoscience.ucf.edu/equipment/

Director: Dr. Sudipta Seal

Contact Information
Email: nano@ucf.edu Phone: 407-882-1578 Fax: 407-882-2819
Address: 12424 Research Parkway Suite 400 Orlando, FL 32826 (Research Pavilion 4th Floor)

Description

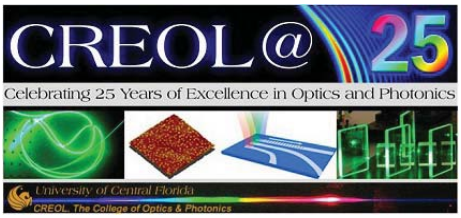
The NanoScience Technology Center (NSTC) was formed in 2005. The NanoScience Technology Center occupies the entire 4th floor of the Research Pavilion building in UCF's Research Park. It contains over 20,000 sq. ft. of advanced chemical, materials development, and biological laboratories in support of a wide range of multidisciplinary research projects.

The common goal and purpose of this center is to strongly promote interdisciplinary research. Research opportunities in areas as diverse as Green Energy, Functional Nanomaterials, Computer/Mathematical Simulations, Assistive Robotics, Quantum Dynamics, Bioimaging, NanoElectronics & NanoPhysics, Integrated Device Development and Advanced Materials have been explored.
The equipment list is given at: *http://www.nanoscience.ucf.edu/equipment/*

Fee Schedule:
Requested

CREOL – The College of Optics and Photonics

Web Site Link: *http://www.creol.ucf.edu/Research/Facilities.aspx*



Director: Dr. Bahaa Saleh, Dean

Contact Information
Dr. Bahaa Saleh, Dean
Email: *besaleh@creol.ucf.edu* *Phone: 407-823-6800*

Description
The research activities of College of Optics and Photonics (COP) faculty span the spectrum from basic science and physics of optics, photonics, and related phenomena, to prototype development and demonstration of feasibility in applications. The faculty vigorously pursues joint research projects with industry, academia, and government laboratories. The main facilities of the COP are housed in a state-of-the-art 96,000 sq. ft. building dedicated to optics and photonics research and education. The list of laboratories in this facility is given at the web site.

Fee Schedule:
Requested

University of Florida

Florida Institute for Sustainable Energy - Energy Tech Incubator

Web Site Link: *http://www.energy.ufl.edu/index.php?src=technology_incubator*

Contact Information
Dr. Luisa **Amelia** Dempere, *Director*
Major Analytical Instrumentation Center (MAIC) & FISE Technology Incubator
Associate Engineer, Research Service Centers, College of Engineering, University of Florida
Email: *ademp@mse.ufl.edu* *Phone:* (352) 392-6985 *Fax: (352) 392-0390*

Description
Florida Institute for Sustainable Energy (FISE) at UF brings together the broad research capabilities of UF under one umbrella to develop energy efficient technologies, sustainable practices, policy analyses, and provide energy education to assist the government, utility and energy companies. FISE Energy Technology Incubator is the commercialization arm of the institute. It is established with $4.5 million Center of Excellence award from the State of Florida. This energy technology incubator is used to transition energy research to commercial products and processes. The FISE Energy Technology Incubator includes a Prototype Development & Demonstration Laboratory and Biofuel Pilot Plant.

Fee Schedule:
Facility use is negotiated on a per-proposal basis.

UF Biofuel Pilot Plant, Gainesville FL
Web Site Link: http://fcrc.ifas.ufl.edu/pilotplant/

Contact Information
Dr. Shelia Gomez
Email: spgomez@ufl.edu Phone: (352) 392-0237 Fax: (352)392-5922
Address: Bldg. 981 Museum Road, Gainesville FL, 32611-0700

Description
The Biofuel Pilot Plant serves as a platform to accelerate successful commercialization of bioethanol. The pilot plant is used to develop and improve production processes, test production feasibility from various plant substrates and residues available in Florida, and demonstrate all unit operations needed for commercialization. It is a 4,000 sqft facility with state of the art equipment including biomass processing equipment, biomass reactor, fermenters, centrifuge, distillation column, testing equipment.

The pilot plant is a testimony of the more than two decades of research efforts done at the Florida Center for Renewable Chemicals and Fuels to convert biomass such as bagasse, forestry and wood wastes, and other organic materials to ethanol. The technology used in the conversion process uses genetically engineered E. coli bacteria that target the sugars in the cellulosic component of the biomass materials.
Fee Schedule:
Facility use is negotiated on a per-proposal basis.

UF Biofuel Pilot Plant, Perry FL (COMING SOON)

Web Site Link: Coming Soon

Contact Information
Dr. Shelia Gomez
Email: spgomez@ufl.edu Phone: (352) 392-0237 Fax: (352)392-5922

State funded ($20M) Research/Demonstration pilot plant to provide a platform for research and improvements and for design engineering to construct full scale plants of 20-50 million gallons of ethanol per year is in construction phase in Perry FL. Energy crops, agricultural residues and forestry residues, and municipal green waste could support over 200 such plants in Florida, creating employment, improving the environment, and ensuring that Florida is doing its part to promote energy independence.

Fee Schedule:
TBD

Nanoscience Institute for Medical & Engineering Technologies (NIMET) and Nanoscale Research Facility (NRF)

Web Site Link: http://nimet.ufl.edu/ and http://nrf.aux.eng.ufl.edu/

Contact Information
Email: info@nimet.ufl.edu Phone: (352) 846 - 2626 Fax: (352) 846 - 2877

Address: UF-NIMET 100 Center Drive, Gainesville, FL 32611

Description

Nanoscience Institute for Medical and Engineering Technologies (NIMET) and the Nanoscale Research Facility (NRF) at UF provide support for major research center initiatives in the areas of nano-and-micro-scale science and technology (NMS&T). Facility is open to all faculty, staff, and collaborators. It provides state-of-the-art equipment for research, education, nanofabrication, and prototype development of nano-materials, MEMS and NEMS devices, and sensors in NMS&T.

NIMET was created to focus and coordinate research and educational activities at the University of Florida in the fields of nanoscale science and nanotechnology (NS&T). Research in nanoscience and related fields at UF has developed in several colleges and now involves the research of over eighty faculty and staff in physics, chemistry, biology, medicine, engineering, and materials science.
The NRF is a two story building with seven functional areas:

- A Class 100-1000 cleanroom facility for nanofabrication and bio processing
- Advanced electron, optical, and surface imaging laboratories
- Core research laboratories for synthesis, processing, characterization, assembly, and testing of nanoscale materials, devices and sensors
- General laboratory space for interdisciplinary research collaborations
- Offices for faculty, staff and users
- Interactive spaces for conferences, informal gatherings, user administration, and surroundings conducive to multidisciplinary interactions
- Building support and utility handling areas.

The NRF resource and equipment list is given at : https://nrf.aux.eng.ufl.edu/resources/default.asp

Fee Schedule:
Facility use is negotiated on a per-proposal basis.

Wayne K. and Lyla L. Masur HVAC Laboratory

Web Site Link: http://plaza.ufl.edu/sasherif/HVACLaboratory.htm

Contact Information
Email: sasherif@ufl.edu Phone: (352) 392-7821 Fax (352) 392-1071
Dr. S.A. Sherif, Professor of Mechanical and Aerospace Engineering,
Founding Director Wayne K. and Lyla L. Masur HVAC Laboratory,
Director Industrial Assessment Center,
Co-Director Southeastern Center for Industrial Energy Intensity Reduction (SECIEIR)
Department of Mechanical and Aerospace Engineering,
University of Florida,
232 MAE Bldg. B, P.O. Box 116300,
Gainesville, Florida 32611-6300, U.S.A.
http://www.mae.ufl.edu/facultylist/ShowData.php?ID=57

Description

The Wayne K. and Lyla L. Masur HVAC Laboratory was inaugurated in February 1995 in a ceremony attended by dignitaries from the University of Florida and the local, regional, and national American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) community. The Laboratory was founded by Dr. S.A.Sherif, Professor of Mechanical and Aerospace Engineering, employing a significant cash donation from the Masur family. Wayne Masur is a successful alumnus of the Mechanical Engineering Department at UF. The Laboratory serves both an instructional and a research mission. Among its research capabilities is a unique experimental facility designed to study frost and ice formation on industrial freezer coils under ice foggy conditions. The Laboratory also includes an air-conditioning demonstration facility, a cooling tower simulator, an air-water heat pump system, and a chilled-water system with an artificial load simulator. Currently there is an effort to install a system with multi-air handling units and variable flow control capability for air conditioning applications. Most recently, experimental research was completed for the US Air Force to develop deployable heat pump units employing rotary vane expanders. Over 50 different investigations have been conducted in the Laboratory and hundreds of students have taken part in different instructional and research activities since its creation in 1995. The Laboratory is housed in Room 110 of the Mechanical and Aerospace Engineering Building B on Gayle Lemerand Drive. For laboratory tours contact Dr. Sherif at (352) 392-7821.

Fee Schedule:
Negotiated on a case-by-case basis (project based).

Major Analytical Instrumentation Center

Web Site Link: https://maic.aux.eng.ufl.edu/about.asp

Contact Information
Dr. Luisa **Amelia** Dempere, *Director*
Major Analytical Instrumentation Center (MAIC) & FISE Technology Incubator
Associate Engineer, Research Service Centers, College of Engineering, University of Florida

Email: ademp@mse.ufl.edu *Phone:* (352) 392-6985 *Fax: (352) 392-0390*

Description
The Major Analytical Instrumentation Center (MAIC) is a materials characterization and analysis facility established to provide analytical support for Florida's scientific and engineering community in meeting the challenge of technology development. MAIC is a user oriented facility that provides service to the university system and the industrial & commercial community.

The equipment list includes Scanning Electron Microscope, Auger Spectroscopy, Electron Probe Microanalysis, Direct Write (nScrypt), Electron Probe Microanalysis, ESCA/XPS, Focused Ion Beam, Mass Spectrometer, X-Ray Diffraction, Screen Printer, Spin Coater, Surface Metrology, Tape Caster, furnaces, wire bonder, viscometer, and Potentiostat & FRA. The complete list is given at https://maic.aux.eng.ufl.edu/resources/default.asp.

MAIC offers Membership Program that is intended to provide a more complete and efficient service to industrial and commercial users of the facilities at the MAIC. This program allows companies and industry to obtain preferred use-rates, priority in use of MAIC facilities, data analysis and interpretation, priority/lower rates or free registration for MAIC short courses and workshops, instrumentation appointments through the internet, access to remote operation of MAIC electron microscopes, current information regarding MAIC activities, new services, instrumentation and techniques, the MAIC Newsletter, and recognition as a MAIC affiliate in MAIC publications, brochures, and presentations.

Fee Schedule:
The facility user rates are posted at https://maic.aux.eng.ufl.edu/exsetup.asp

Particle Engineering Research Center (PERC)

Web Site Link: http://perc.ufl.edu/sc/about.asp

Contact Information
Gary Scheiffele *at Phone: 352-846-1733*
Kevin Powers at 1-352-846-3554
Email: percsc@perc.ufl.edu Fax:
Reach PERCby filling out the Inquiry Form at: https://perc.ufl.edu/ccb/sc/inquiry.asp?id=new

Description
PERC at UF is an integral part of the Particle Engineering Research Center at the University of Florida. It includes state-of-the-art instrumentation for particle characterization and analysis. The 17,000 square foot space includes six analytical laboratories, two processing labs, and a 5000 square foot testbed with a high bay area, a two-ton crane, a loading dock, compressed air, and other necessities required to conduct pilot scale experiments. The testbed and laboratories house equipment for assisting research groups with routine measurements as well as validation and demonstration of process and product ideas developed by research

teams and the PERC's Industrial Partners. The Research & Development Facility creates the centerpiece of a world-class operation in particle science and technology.

Fee Schedule
Inquiry form is requested from each applicant describing the service(s) needed. The fee will be determined based on the service needs.

University of South Florida

USF Thin Film Solar PV Pilot Line (COMING SOON)

Web Site Link: Not available yet

Contact Information
Email: TBD *Phone: TBD*

Description

Thin Film Solar PV Pilot Line at the University of South Florida, Tampa, is a $2M state funded 2500 ft2 facility. It is adjacent to the USF Incubator Building to foster the genesis of university/industry partnerships. The facility will enable the complete fabrication and evaluation of thin film solar modules.

Fee Schedule
TBD

USF Nanotechnology Research and Education Center (NREC)

Web Site Link: http://www.nrec.usf.edu/

Director: Ashok Kumar

Contact Information
Robert Warner, Assistant Director
Email: tufts@usf.edu *Phone: 813.974.5274*

Description
The Nanotechnology Research and Education Center (NREC) housed in the 15,000 square foot Nanotech I building at the University of South Florida has five laboratories available for user access. A Class 1000, 1800 square foot Cleanroom, Thin Film Lab, Metrology Suite, Electrical Test/Packing Lab, and Wet Chemistry Lab. In addition, there are 4 full-time technical staff and one office staff to run the Nanotech1facility.

Thin Film Laboratory: The laboratory contains an aluminum thermal evaporator, a four pocket Ebeam evaporator, a rapid thermal anneal tool, and a multi-chambered sputter tool. Various metals are available in either pellet or sputter target form.

Metrology Suite: This suite of rooms contains a FEI TF20 Transmission Electron Microscope with STEM, EDS and Gatan digital imaging options, a Digital Instruments Atomic Force Microscope, a Panalytical XPert Pro Materials Research Diffractometer, a Field Emission Hitachi S800 Scanning Electron Microscope with EDS capabilities, a Hitachi SU-70 Ultra High Resolution Scanning Electron Microscope Schottky FE-SEM with nanolithography capabilities, EDS and Gas Injection, and a FEI Quanta 3D Dual Beam Focused Ion Beam. Various optical microscopes and material preparation table top tools are also available to support the sample preparation aspect of the major equipment.

Electrical Test/Package Laboratory: This laboratory contains Models 6200/6000 Micromanipulator probe stations, a HP 4280A 1, MHz C Meter & C-V Plotter, a HP4145B Semiconductor Parameter Analyzer, a HP 4284A Precision LCR Meter, a HP 4294A Precision Impedance Analyzer a Dektak Profilometer, and a K&S 4123 Wire Bond station.

Wet Chemistry Laboratory: This laboratory contains a solvent and an acid/base wet bench to support chemical processes such as nickel and gold electroplating. The lab also contains a MA 1006 Micro Automation wafer dicing saw, a tape mounter, a Buehler saw, wire saw, and polisher for material preparations.

Device Fabrication Laboratory/Cleanroom: This laboratory contains equipment to support optical contact lithography, wet chemical cleaning/etching, film thickness/profile measurement, furnace oxide growth, doping, contact anneals, low pressure chemical vapor deposition, plasma dry etching, deep reactive ion etching, plasma enhanced chemical vapor deposition and other more specific research techniques and processes. Photomask fabrication is also available for most designs with features larger than 2 microns.

Cleanroom Process/Equipment Capability Detail:

- Three Wet benches – Chemically clean samples and substrates; chemically etch films and substrates, general chemical processes. Services: Exhausted bench with deionized water guns and dump rinsers, nitrogen blow guns, process timers, and plenum flush.
- Develop & Spinner Hoods – Develop photoresists, photoresist stripping, general solvent cleaning. Services: Deionized water gun and dump rinser, nitrogen blow guns, and process timers.
- Soft/Hard bake ovens and hot plates
- Karl Suss Masker Aligner – Align mask sets for patterning waters. Capable of handling 2, 3, and 4" wafers. Supports down to 1 micron technology.
- Quintel Mask Aligner
- Two Photoresist Spinners – Laurel Technologies Spinner – capable of spinning fragment samples up to 8" wafers. Integrated Technologies Spinner - Capable of spinning fragment samples up to 6" wafers. For photoresists, spin on dopants, spin on glasses and polymers.
- Mititoyo Ultraplan FS-110 microscope – Long working distance microscope with video still picture capture and onscreen critical dimension measurement capability. Contains bright and dark field, polarized light, Nomarski, and reflected and transmitted illumination capabilities together with extra-long working distance objectives and fraction of a micron resolution.
- Rudolph Ellipsometer – Capable of measuring film thickness and index of refraction on many different types of films.
- Nanospec 210 film thickness tool for patterned structures.
- Veeco Dektak 150 State of the art profilometer with film stress option.
- Sopra Spectroscopic Ellipsometer

- Veeco Wyco D9100 Optical Profilometer
- Alphastep Profilometer – Capable of measuring film or substrate surface features with nanometer resolution.
- BTI Furnaces (Two banks, 8 Tubes) – Four inch wafer capable tubes. Each tube has three heating zones. Computer controlled recipe storage and process controller. Spin on and solid source dopants n and p types, contact anneal, dry and pyrogenic oxidations. LPCVD undoped polysilicon films.
- Plasma Therm 700 – PECVD and Plasma Etcher – Plasma etcher used for ashing, nitride etching, SiC etching. PECVD α-Silicon, SiO_2, and Si_xN_y films.
- Four point probe station for measurement of sheet resistivity.
- AMS 100 Deep Reactive Ion Etcher – Capable of high aspect ratio etching of glass, quartz, silicon dioxide, silicon and silicon carbide films and substrates.
- GCA 3600F Pattern Generator capable of producing 5x5 inch chrome on glass photo masks or reticules
- GCA 3696 Photorepeater
- Denton Gold & Chrome thermal evaporator

Fee Schedule
TBD

Florida Institute of Technology

Oak Ridge Associated Universities (ORAU)

Web Site Link: http://www.orau.org/

Contact Information
T. Dwayne McCay, Florida Tech Executive Vice President and Chief Operating Officer, ORAU Councilor at (321) 674-8889
or Monnie E. Champion, ORAU Corporate Secretary, at (865) 576-3306 or (865) 576-3306
or online at www.orau.org.

Description

Since 1989, students and faculty of Florida Tech have benefited from its membership in Oak Ridge Associated Universities (ORAU). ORAU is a consortium of 98 colleges and universities, and a contractor for the U.S. Department of Energy (DOE) located in Oak Ridge, Tennessee. ORAU works with its member institutions to help their students and faculty gain access to federal research facilities throughout the country; to keep its members informed about opportunities for fellowship, scholarship and research appointments; and to organize research alliances among its members. Through the Oak Ridge Institute for Science and Education (ORISE), the DOE facility that ORAU operates, undergraduates, graduates and postgraduates, as well as faculty enjoy access to a multitude of opportunities for study and research. Students can participate in programs covering a wide variety of disciplines including business, earth sciences, epidemiology, engineering, physics, geological sciences, pharmacology, ocean sciences, biomedical sciences, nuclear chemistry and mathematics.

Appointment and program length range from one month to four years. A comprehensive listing of these programs and other opportunities, their disciplines and details on locations and benefits, can be found in the

ORISE Catalog of Education and Training Programs, which is available at www.orau.gov/orise/educ.htm or by calling either of the contacts below. ORAU's Office of Partnership Development seeks opportunities for partnerships and alliances among ORAU's members, private industry and major federal facilities. Activities include faculty development programs such as the Ralph E. Powe Junior Faculty Enhancement Awards, the Visiting Industrial Scholars Program, consortium research funding initiatives, faculty research and support programs and services to chief research officers.

Fee Schedule
Facility use is negotiated on a per-proposal basis.

Institute for Materials Science and Nanotechnology (IMSN)

Director: Gordon L. Nelson, Ph.D., Vice President for Academic Affairs and Professor, Chemistry, Interim Director.

Contact Information
Email: nelson@fit.edu *Phone: (321)674-8480*
Description

The IMSN mission is to enhance and expand materials research and outreach at Florida Tech and advance nanotechnology research and outreach by promoting joint multi-investigator research, encouraging interdisciplinary and trans-disciplinary research, coordinating shared faculty infrastructure, recruiting scholars and students, coordinating presentation of materials- and nanotechnology related activities to external governmental and non-governmental agencies, foundations and industry, and promoting collegiality and cohesiveness within the university in the area of materials and nanotechnology. The 21-institute faculty come from diverse engineering and science disciplines. Current research funding of participating faculty is approximately $4 million, including research, instrumentation and participation in multi-investigator projects.

Fee Schedule
Facility use is negotiated on a per-proposal basis.

Institute for Energy Systems (IES)

Director: Y.I. Sharaf-Eldeen, Ph.D., P.E., Associate Professor, Mechanical and Aerospace Engineering, and Stephane Bucaille, Ph.D., Assistant Professor, Electrical Engineering, Co-Directors.

Contact Information
Email: eldeen@fit.edu or sbucaille@fit.edu *Phone: (321)674-8124 or (321)674-8425*

Description
The mission of the IES is to provide an intellectually stimulating environment for faculty and students to conduct funded research in areas of national need. National energy policy identifies these needs to be: (1) increasing domestic energy supplies; (2) increasing America's use of renewable and alternative energy; (3) increasing energy conservation and efficiency; (4) developing a comprehensive delivery system; (5) enhancing national energy security and international relationships; and (6) sustaining the nation's health and environment.

Fee Schedule
Facility use is negotiated on a per-proposal basis.

Harris Institute for Assured Information (HIAI)

Director: Richard A. Ford, Ph.D., Harris Professor for Computer Science in Assured Information, Director.

Contact Information
Email: rford@cs.fit.edu *Phone: (321)674-8590*

Description
The mission of the Harris Institute for Assured Information is to promote interdisciplinary approaches to computer security and trustworthy computing through education, research and outreach by providing a single point of contact for students, faculty, funding agencies and businesses, and by crossing traditional academic disciplines to promote innovation. Information assurance is the discipline dedicated to providing users with trustworthy data. As such, the institute focuses on new technologies for protecting people and organizations from vulnerabilities that can lead to theft of information, malicious code infection or data destruction.

Fee Schedule
Facility use is negotiated on a per-proposal basis.

Institute for Research on Global Climate Change

Director: Robert Van Woesik, Ph.D., Professor, Biological Sciences

Contact Information
Email: rvw@fit.edu *Phone: (321)674-7475*

Description
Over the next century, the Earth's average surface temperature is predicted to rise above temperatures that have not been experienced for over 400,000 years. Such a change in climate will consequently increase the risk of drought, erratic weather, sea-level rise, ocean warming and wildlife diseases. The mission of the institute is to: (1) foster climate-change research that will lead to improved decision-making, from local to international levels; (2) provide world-class research opportunities for undergraduate and graduate researchers; and (3) promote interdisciplinary collaborations leading to new understandings of climate change and adaptation. Since the end of 2009 when the institute was initiated, researchers have published over 60 scholarly articles on climate change in international journals.

Fee Schedule
Facility use is negotiated on a per-proposal basis.

Center for Remote Sensing (CRS)

Director: Charles R. Bostater Jr., Ph.D., Associate Professor, Environmental Sciences and Physical Oceanography

Contact Information
Email: bostater@fit.edu *Phone: (321)674-7113 or (321)674-7278*

Description
The center's purpose is to encourage excellence in the development and application of remote sensing science and technology. It is organized as a collaborative center among and between faculty within the College of Engineering, College of Science and College of Aeronautics. Under the authority of the Space Grant Act of 1988, Florida Tech is a member of the Southeastern Space Consortium and the Florida Space Grant Colleges Consortium. The center has consulted and provided services to defense contractors, NASA centers and contractors, the Department of Energy and its subcontractors, state of Florida water management agencies, the Department of State and U.S. Department of Education, and is affiliated with foreign institutions and organizations. Facilities for remote sensing teaching and research include the ERDAS Image Analysis System, Evans Library, the Geographical Information Systems Laboratory, the Marine and Environmental Optics Laboratory and the Synoptic Meteorological Laboratory. Various laboratories and facilities in academic and research computing; computer science; aerospace, computer, electrical and mechanical engineering; physics and space sciences; and space systems are also available. Field studies can be conducted through the College of Aeronautics' fleet of aircraft. The university operates several small boats and charters a well-equipped vessel for offshore, estuarine and river work. Center faculty offer a wide variety of courses at the graduate and undergraduate level, including environmental satellite systems and data, hydroacoustics, digital image processing, and environmental optics for remote sensing.

Fee Schedule
Facility use is negotiated on a per-proposal basis.

National Center for Hydrogen Research (NCHR)

Web Site Link: http://research.fit.edu/nhc/

Director: *Mary H. McCay, Ph.D., Research Professor, Mechanical and Aerospace Engineering*

Contact Information
Email: mmccay@fit.edu *Phone:* 321- 674-8803
Description
The NCHR was established with funding from NASA to perform research and development concerning the application of hydrogen as a fuel for airborne platforms. It is currently pursuing the development of an interdisciplinary hydrogen and fuel cell technology academic program under the sponsorship of Department of Energy (DOE). The objectives of this program are to develop undergraduate modules, enquiry-based laboratory experiments and a graduate area of specialization academic program that will enable the growth of research and development in the arena of hydrogen and fuel cell technology. Faculty associated with the center are currently conducting research in computational modeling of fuel cells, fiber-optic sensors suitable for safety applications and systems monitoring, hydrogen storage mediums, the interaction of hydrogen with materials and hydrogen purification techniques.

Fee Schedule
Facility use is negotiated on a per-proposal basis.

Collaborative International Research Centre for Universal Access (CIRCUA)

Web Site Link: http://circua.fit.edu/

Director: Gisela Susanne Bahr, Ph.D., Associate Professor, Industrial/ Organizational Psychology, Executive Head

Contact Information
Email: gbahr@fit.edu *Phone: (321)674-7613*

Description
The Collaborative International Research Centre for Universal Access (CIRCUA) is an international research center with worldwide membership that promotes universal access and e-inclusion. CIRCUA's motto calls for removing barriers to modern technology in the information society. CIRCUA's objectives are: (1) advancing research and development for an inclusive information society; (2) leading the systematic growth of interaction science by drawing on expertise in cognitive and computer sciences; (3) creating global partnerships that result in international collaborations and products; and (4) networking and fusing multidisciplinary expertise globally. CIRCUA's international center head is Florida Tech's Dr. Bahr. CIRCUA's European center head is Dr. Ray Adams, University of Middlesex, London, and Churchill College, Cambridge, both in England.

Fee Schedule
Facility use is negotiated on a per-proposal basis.

Center for High Resolution Microscopy and Imaging (CHRMI)

Director: *Michael Grace, Ph.D., Associate Dean, College of Science and Associate Professor, Biological Sciences, Director.*

Contact Information
Email: mgrace@fit.edu *Phone: (321)674-8194*

Description
The Center for High Resolution Microscopy and Imaging is a multidisciplinary laboratory providing state-of-the art light and fluorescence microscopy, transmission electron microscopy, scanning electron microscopy, scanning probe microscopy and x-ray microanalysis of natural and artificial materials. The CHRMI contains necessary equipment and expertise to prepare almost any kind of sample for microscopic evaluation, to image sample surfaces and cross-sections at very high resolutions and to analyze elemental compositions of materials. Support staff maintains instrumentation and trains users in sample preparation and analyses of microstructure and microchemistry. Image collection is both film-based and digital. Support platforms provide detailed image analysis capabilities.

Fee Schedule
Facility use is negotiated on a per-proposal basis.

Center for Ferrate Excellence (COFE)

Web Site Link: http://research.fit.edu/cofe/

Director: *Virender K. Sharma, Ph.D., Professor, Chemistry*

Contact Information
Email: vsharma@fit.edu *Phone: (321)674-7310*

Description
In recent years, the higher oxidation states of iron (ferrates) have become of interest because they can safely and efficiently clean polluted water without harmful byproducts. The ferrate compound may be used as an oxidant, disinfectant, coagulant and for industrial green purposes. Ferrate has thus become advantageous over other commonly used chemicals in the wastewater industry. Applications of ferrate include treatment of common pollutants and emerging contaminants such as arsenic, estrogens and pharmaceuticals. The ferrate compound has also attracted interest for applications in green chemistry because the byproducts of its use, iron oxides, are environmentally friendly. Recently, the technology developed at Florida Tech has made a breakthrough in synthesizing liquid ferrate, which, unlike competing products, is stable for at least two weeks. This liquid product will open new opportunities for novel applications of ferrate. The intellectual property on the ferrate technology is being developed for licensing to bring it to the marketplace. This center offers technology, production and application as well as on-site engineering, testing and analysis.

Fee Schedule
Facility use is negotiated on a per-proposal basis.

Center for Corrosion and Biofouling Control (CCBC)

Web Site Link: http://research.fit.edu/ccbc/

Director: Geoffrey W.J. Swain, Ph.D., Professor, Oceanography and Ocean Engineering

Contact Information
Email: swain@fit.edu *Phone: (321)674-7129*

Description
The mission of the center is to understand the processes of biofouling and corrosion, and to develop and apply innovative solutions for control and prevention. Its objectives are to advance the state-of-the-art in corrosion and biofouling control; to establish mutually beneficial collaborative relationships with local, national and international university, government and industrial partners; and to provide graduate and undergraduate students a world-class research and educational experience that prepares them for both academic and industrial professional opportunities. Current research activities include testing and evaluation of antifouling systems; investigation of hydrodynamic performance of ship hull coatings; the development of autonomous underwater hull cleaning systems; investigating the mechanisms of adhesion and release of fouling to novel biocide-free coating systems; and monitoring the performance of antifouling coatings through dry dock inspections.

Fee Schedule
Facility use is negotiated on a per-proposal basis.

Federal Aviation Administration Center of Excellence for Commercial Space Transportation

Director: Samuel T. Durrance, Ph.D. Professor, Physics and Space Sciences, and Daniel R. Kirk, Ph.D., Associate Professor, Mechanical and Aerospace Engineering, Co-Directors

Contact Information
Email: sdurranc@fit.edu *Phone: (321)674-7313*

Description
The center is a partnership of academia, government and private industry addressing the current and future challenges for commercial space transportation. The center encompasses four primary research areas: (1) space traffic management and operations; (2) space transportation operations, technologies and payloads; (3) human spaceflight; and (4) space transportation industry promotion.

Fee Schedule
Facility use is negotiated on a per-proposal basis.

Center for Entrepreneurship and New Business Development (CENBD)

Director: S. Ann Becker, Ph.D., Dean, Nathan M. Bisk College of Business

Contact Information
Email: abecker@fit.edu *Phone: (321)674-7327*

Description
The Center for Entrepreneurship and New Business Development integrates entrepreneurial education, training and research in pursuit of enterprise creation, sustainability and growth. The center fosters partnerships among students, faculty, community members and entrepreneurs. These partnerships support an educational environment bridging theory and practice in pursuit of early-stage innovation, business leadership and new business ventures. The center encompasses the Women's Business Center (WBC) and the Entrepreneurial Training Services (ETS) program. The WBC is funded by a cooperative agreement with the U.S. Small Business Administration, offering technical assistance for nascent entrepreneurs and small businesses. The ETS program offers entrepreneurs intensive training on business development, supported by business faculty, community leaders and business area experts.

Fee Schedule
Facility use is negotiated on a per-proposal basis.

Wireless Center of Excellence (WICE)

Web Site Link: http://research.fit.edu/wice/
Director: Ivica Kostanic, Ph.D., Associate Professor, Electrical and Computer Engineering
Contact Information
Email: kostanic@fit.edu *Phone: (321)674-7189*

Description
WICE is devoted to creating a new generation of wireless engineering professionals through education and research. Driven by its academic program, WICE considers wireless to be any system or device that relies

on electromagnetic-wave propagation to perform one or more of its functions. This context includes such diverse applications as radar, global positioning, location and sensing, as well as the broader class of communications systems such as satellites, point-to-point/multipoint, WLAN and wireless WAN. In partnership with industry, WICE offers the opportunity for faculty, and undergraduate and graduate students to engage in research and to study wireless concepts in a variety of courses. Research areas include propagation modeling, wireless systems engineering, personal communications systems, wireless sensors and multimedia communications, while also supporting simulation, fabrication and measurement of wireless communications and other systems and components. Laboratory test equipment includes Grayson's Spectrum Tracker, and spectrum and vector network analyzers, oscilloscopes, microwave amplifiers, oscillators and mixers, signal generators and associated active and passive RF devices. The laboratory performs experimental investigation using the anechoic chamber and screen room facilities. WICE is supported by significant laboratory facilities as described under "Electrical Engineering" in the Degree Programs section.

Fee Schedule
Facility use is negotiated on a per-proposal basis.

Florida Center for Automotive Research (FCAR)

Director: *Pei-feng Hsu, Ph.D. Professor and Head, Mechanical and Aerospace Engineering, Interim Director*

Contact Information
Email: phsu@fit.edu *Phone: (321)674-8092*

Description
The mission of the Florida Center for Automotive Research is to develop an automotive engineering program with both research and educational components in order to leverage its engineering research capability in the development of highly fuel-efficient hybrid or conventional vehicles. The center will provide the academic research capability to support hybrid vehicle production. The center will also provide solutions to challenging technical problems encountered in design and manufacturing, enhance Florida's reputation for automotive research and attract automotive supplier/original equipment manufacturer (OEM) operations to Florida.

Fee Schedule
Facility use is negotiated on a per-proposal basis.

College of Engineering Center for Space Commercialization

Director: Daniel R. Kirk, Ph.D., Associate Professor, Mechanical and Aerospace Engineering, Interim Director

Contact Information
Email: dkirk@fit.edu *Phone: (321)674-7622*

Description
The mission of the College of Engineering Center for Space Commercialization is to identify, promote and support the use of space to provide goods or services of commercial value, and to support U.S. aerospace

industries and NASA needs toward a profitable commercialization of space. The center seeks to foster multidisciplinary collaboration among researchers from highly diversified scientific, engineering and business communities including universities, businesses and government entities.

Fee Schedule
Facility use is negotiated on a per-proposal basis.

Vero Beach Marine Laboratory (VBML)

Web Site Link: http://research.fit.edu/vbml/

Director: Junda Lin, Ph.D., Professor, Biological Sciences

Contact Information
Email: jlin@fit.edu *Phone: (321)674-7587*

Description
VBML is located on four acres of oceanfront property in nearby Vero Beach. This facility serves as a field station for the university in support of research and teaching in the marine sciences. The beachfront location of VBML provides ready access to field study sites for work on the biology of coastal organisms and for studies of physical and geological processes of the coastal zone. Major research efforts at the laboratory are related to mariculture and marine biology/ecology. A two-story building, equipped with seawater tables and a flow-through system, supports research on mariculture and ecology of marine organisms. Several greenhouses and large tank systems are available for studying aquaculture, behavior and ecology of marine animals. Classrooms, offices and dry laboratory facilities are provided in the main laboratory building.

Fee Schedule
Facility use is negotiated on a per-proposal basis.

Microelectronics Laboratory

Director: Susan K. Earles, Associate Professor, Electrical and Computer Engineering

Contact Information
Email: earles@fit.edu *Phone: (321)394-2171*

Description

This microelectronics facility is designed to be a teaching laboratory as well as an advanced research laboratory. A microelectronics fabrication course is taught to graduate and undergraduate students. In this course, students complete, fabricate and test a variety of electronic devices such as photovoltaic devices and hydrogen sensors. Research conducted in the facility includes polymer-based and silicon-based electronic and optoelectronic devices. The 3,800-sq.-ft. facility has all support services needed for modern semiconductor research including a 3,000-sq.-ft. clean room and areas dedicated to circuit testing and equipment maintenance. Equipment in the laboratory includes ultraviolet photolithography, diffusion furnaces, a thin-film evaporator, wet chemistry benches, and measurement and inspection equipment. The

advanced research laboratory presently features a scanning probe microscope, plasma enhanced deposition and lasers for teaching and research.

Fee Schedule
Facility use is negotiated on a per-proposal basis.

Laser, Optics and Instrumentation Laboratory (LOIL)

Web Site Link: http://research.fit.edu/loil/

Director: Kunal Mitra, Ph.D., Professor, Mechanical Engineering and Chelakara Subramanian, Ph.D., P.Eng (UK), Professor, Aerospace Engineering, Co-Directors.

Contact Information
Email: kmitra@fit.edu *Phone: (321)674-7131*

Description
LOIL exploits current technologies in continuous wave and short-pulse lasers and optics to develop new techniques for measuring and characterizing material properties. Faculty and graduate students are involved in analyzing the interaction of these lasers with different materials for various applications. Biomedical applications focus on detecting and irradiating cancer/tumors and in homogeneities in tissues. Material characterization/processing applications involve detection of defects in materials such as debonding of thermal protection tile systems and thermal response of materials subjected to high-energy radiation. Remote sensing applications focus on lightning detection in cloud media and landmines in shallow waters. The challenge of integrating laser sources, system optics, instrumentation, measurement schemes and data acquisition provides students with new learning experiences in these areas. Major equipment currently in use includes mode-locked short-pulse laser, Q-switched pulsed laser, short pulse diode laser, high-power continuous wave lasers, ultrafast photodetectors, sampling head oscilloscope, streak camera, miscellaneous optics and optical accessories, thermal camera and an image processing system.

Fee Schedule
Facility use is negotiated on a per-proposal basis.

Wind and Hurricane Impacts Research Laboratory (WHIRL)

Web Site Link: http://research.fit.edu/whirl/

Director: Jean-Paul Pinelli, Ph.D., P.E., Professor, Civil Engineering

Contact Information
Email: pinelli@fit.edu *Phone: (321)674-8085*

Description
WHIRL is dedicated to the study of the effects and impacts of windstorms including hurricanes, tornadoes and thunderstorms, and other related meteorological hazards (e.g., flooding and tidal surges) on the natural environment and manmade structures. The laboratory involves a multidisciplinary team of engineers, scientists and business experts. It takes advantage of a geographic location in the heart of Florida's Space

Coast to serve the needs of industry, government and the public in wind hazard mitigation. The laboratory's activities include research on mitigation of losses of life, property and the environment; education of the public through dissemination of information; and the development of a multidisciplinary program of study focused on wind engineering and wind-related socioeconomic studies and analyses. Research topics in the laboratory include action of strong winds and storm surges on structures; evaluation of codes, standards and retrofitting techniques for buildings and infrastructure systems; risk assessment for existing structures, coastal erosion, sediment transport and environmental damage due to storm surges and floods; development of remote sensing tools for assessing and monitoring hurricane damage, wind speed and flood levels; fundamental wind and meteorological research; wind tunnel modeling and testing; and statistical studies, analysis of economic impacts and development of potential damage maps for hurricane hazards in Florida.

Fee Schedule
Facility use is negotiated on a per-proposal basis.

Dynamic Systems and Controls Laboratory (DSCL)

Web Site Link: http://coe.fit.edu/mae/labs/sys.php

Director: Hector Gutierrez, Ph.D., P.E., Associate Professor, Mechanical Engineering and Y.I. Sharaf-Eldeen, Ph.D., P.E., Associate Professor, Mechanical Engineering, Co-Directors

Contact Information
Email: hgutier@fit.edu *Phone: (321)674-7321*

Description
DSCL supports a variety of research activities in dynamic systems for mechanical and aerospace applications: (1) real-time monitoring and control of the flexible dynamics in launch vehicles including design, characterization and system integration of distributed actuators such as cold gas thrusters; (2) use of Fiber Bragg grating arrays to monitor and control in real-time multi-modal vibrations in aerospace structures; (3) in electrical machinery, the design, analysis, characterization and testing of novel machine topologies such as dual armature generators; (4) characterization of the liquid slosh dynamics in upper stage propellant tanks; and (5) magnetic suspension technology, computer-based instrumentation and mechatronics. Current and past research activities include: (1) realtime control of structural vibrations based on magneto-rheological (MR) dampers; (2) magnetic suspension systems for high-precision positioning applications; (3) characterization of surface tension and contact angle in novel propellants; (4) rotating machinery monitoring and fault diagnosis, online vibration and angular motion measurements; (5)analyses to develop condition monitoring; (6) maintenance information systems for power generation, transmission systems and components in rotating machinery.

Fee Schedule
Facility use is negotiated on a per-proposal basis.

Robotics and Spatial Systems Laboratory (RASSL)

Web Site Link: http://research.fit.edu/rassl/

Director: Pierre M. Larochelle, Ph.D., Assistant Dean, College of Engineering and Professor, Mechanical Engineering

Contact Information
Email: pierrel@fit.edu *Phone: (321)674-7274*

Description
RASSL is dedicated to the development of robotic mechanical systems that generate spatial (i.e., 3-dimensional) motion and force transmission. RASSL seeks to advance the design methodologies for these challenging systems as well as techniques for their use in industrial and consumer applications. Equipment includes a Motoman SV3 XRC robot, an Adept/Mobile Robotics PowerBOT and several systems developed by RASSL.

Fee Schedule
Facility use is negotiated on a per-proposal basis.

Ralph S. Evinrude Marine Operations Center

Director: Captain Timothy Fletcher, Manager

Contact Information
Email: tfletcher@fit.edu *Phone: (321)727-7930*

Description

The center houses small outboard-powered craft and medium-sized workboats. These vessels are available to graduate students and faculty for teaching and research use in the tributaries and the Indian River Lagoon (IRL). The facility has a variety of other resources available and is located on Crane Creek in Melbourne, approx. 1.5 mile from the main campus. The IRL is a national estuary and is the most biodiverse estuary system in North America. The Florida Tech national champion crew team, champion concrete canoe team, Sailing Club and scientific diving program safety office are also housed at the center.

Fee Schedule
Facility use is negotiated on a per-proposal basis.

NASA Kennedy Space Center User Facilities

Applied Chemistry Laboratory

Laboratory Operator & POCs:
NASA – Janis Palin, Mail Stop: KT-D, KSC, FL 32899
Janis.E.Palin@nasa.gov (321) 867-4183
Contractor – Dr. Steve Trigwell, Mail Stop: ASRC-24, KSC, FL 32899
Steven.Trigwell-1@nasa.gov (321) 867-1222
Location: Space Life Sciences Laboratory (Bldg. M6-025)

Description

The Applied Chemistry Laboratory develops technology for toxic-vapor detection, chemical scrubbers for toxic wastes, in situ resource utilization processes, micro encapsulation of materials for space applications, hypergolic-fuel dosimetry, hydrogen detection, self-healing wire insulation, minimally intrusive repair methods for electrical wiring, and environmental remediation.

Laboratory staff employs expert skills in polymer chemistry, analytical chemistry, physical chemistry, fluorescence, organic synthesis, electrochemistry, capacitance, transport phenomena, analytical-instrument development and testing, sensors, fabrication, and machining.

Other laboratory projects include the development of new polyimide-based powder coating systems, production of oxygen from carbon dioxide by electrolysis in ionic liquids, and development of new composite conductors. Work has also been performed on the production of a nontoxic, non-global-warming, non-ozone-depleting fire-extinguishing agent. The laboratory provides research and evaluation for environmental remediation, especially groundwater remediation technologies (permeable reactive barriers and emulsion-based cleanup technologies).

Laboratory Services

- Generation of hypergolic vapors from 10 ppb to 500 ppm
- Chemical problem solving
- Analytical services, including GC/MS, ion chromatography, ultraviolet-visible spectroscopy, Fourier transform infrared spectroscopy, fluorescence spectroscopy, and thermal analysis
- Electrochemistry: direct current/alternating current electrochemical experimentation and analysis
- Coulometric analysis of vapor samples
- Environmental test development and evaluation
- Instrumentation development

Fee Schedule

Facility use is negotiated on a per-proposal basis.

Chemical Analysis and Sampling Laboratory

Laboratory Operator & POC:
Contractor – Steve Williamson
Mail Stop: WT, KSC, FL 32899
Stephen.S.Williamson@nasa.gov (321) 861-2454
Location: Component Refurbishment and Chemical Analysis Facility(Bldg. K6-1696)

Description

The Chemical Analysis and Sampling Laboratory provides sampling and analytical support for NASA, the U.S. Air Force, and their contractors at KSC and Cape Canaveral Air Force Station. A variety of sample matrices, including high-pressure gases, hypergolic fluids and oxidizers, cryogens, assorted fluids, and environmental samples, are collected and analyzed to various NASA and military procurement and usage specifications and to Environmental Protection Agency (EPA) requirements. Housed in a state-of-the-art facility, the laboratory occupies approximately 30,000 square feet comprising several separate analytical areas, including gas, gas chromatography/mass spectrometry (GC/MS), metals, fuel, oxidizer, nonvolatile residue (NVR), particulate, and wet laboratories. Wide-ranging services are performed through the Toxic Vapor Detection (TVD) Laboratory, involving instrument calibrations and repairs and material compatibility and permeation testing. The capabilities for mercury spill support and in-place/onsite analysis of certain gases and fluids are also maintained. The laboratory complies with ISO 9000:2000, ISO 14001, AS 9100, and the National Aerospace and Defense Contractors Accreditation Program. In addition, the laboratory maintains State of Florida Department of Health / National Environmental Laboratory Accreditation Conference certification for sampling and analysis of environmental samples for EPA requirements and hazardous waste determinations.

Laboratory Services

- Sampling and analysis: high-pressure gases and residual gas; hypergolic fuels and oxidizer;
- cryogenic substances; commodity fluids; environmental media
- Analytical procedure/methodology development
- TVD calibration/maintenance
- NVR/particulate determination
- Material compatibility/permeation studies
- Onsite sampling/analytical support
- Mercury spill support
- TVD acceptance and calibration protocols

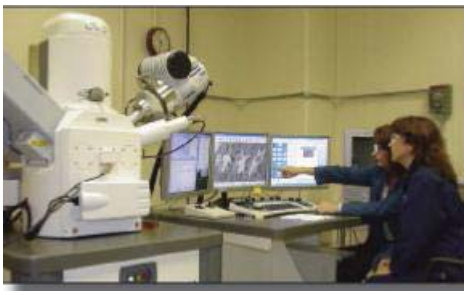
Fee Schedule

Facility use is negotiated on a per-proposal basis.

Chemical Test and Analysis Laboratory

Laboratory Operator & POC:
NASA – Dionne Jackson, Mail Stop: NE-L2-C, KSC, FL 32899
Dionne.B.Jackson@nasa.gov, (321) 867-9409
Location: Operations and Checkout Bldg. (M7-355)

Description



The Chemical Test and Analysis Laboratory performs chemical identification of all states of matter (gas, liquid, and solid) in quantities down to micrometer-sized samples. These investigations are necessary to understand and solve chemical problems associated with the selection and application of materials for flight hardware, ground support equipment (GSE), and facility systems. The laboratory has collaborated with KSC and other NASA Centers in the following research and development efforts:

- Tile waterproofing
- Orbiter reinforced carbon-carbon leading-edge pinhole study
- Shuttle materials, such as alloys and soft goods
- Environmental effects of launch operations
- GSE materials, such as hypergolic scrubber fluids and launch structure components
- Contamination of the Orbiter ammonia boiler system
- Orbiter wiring insulation degradation
- Pre/post-flight molecular contamination
- Environmental analysis
- Crawler Transporter shoes

The Chemical Test and Analysis Laboratory supports all KSC facilities, other NASA Centers, and other Government agencies in the analysis of samples for major and trace components; elemental, molecular, and surface composition; development of new methods of environmental testing; specialized analyses; and short-term chemical research and development.

Laboratory Services

- Identify metal alloys, polymers, contaminants, lubricants, gases, and other materials of unknown composition
- Identify metals and metal alloys
- Identify organic, inorganic, and mixtures of contamination
- Characterize trace-level impurities
- Identify solid, liquid, or gaseous unknowns
- Sample gas and headspace by headspace and solid phase microextraction
- Conduct surface analysis of thin films and trace contaminants
- Determine carbon, sulfur, hydrogen, nitrogen, and oxygen contents in metal alloys
- Characterize nonvolatile residue

Fee Schedule

Facility use is negotiated on a per-proposal basis.

Analytical Chemistry Core Laboratory

Laboratory Operator & POCs:
NASA – Howard Levine, Mail Stop: KT-B-1, KSC, FL 32899
Howard.G.Levine@nasa.gov, (321) 861-3502
Contractor – Dr. Lanfang Levine, Mail Stop: DYN-3, KSC, FL 32899
Lanfang.H.Levine@nasa.gov, (321) 861-2931
Location: Space Life Sciences Laboratory (Bldg. M6-1025)

Description

The Analytical Chemistry Core Laboratory resides in three rooms of the Space Life Sciences Lab (SLSL) and occupies a total of 2,000 ft2 of floor space. It is equipped with a full spectrum of state-of-the-art analytical instruments for both qualitative and quantitative analyses of nonvolatile organics, volatile organics, elements, and ions to meet diverse operational and research needs. The lab has three primary missions: (1) Service: Provide technical expertise and maintenance of analytical systems; (2) Technology Development: Develop instrumental applications, metabolomics, and small sensors; and (3) Research: Conduct and promote cross-disciplinary collaborative research.

Laboratory Services

- Train students, technicians, and researchers on the operation of advanced instruments
- Provide consultations on the application of advanced analytical techniques to solve specific questions
- Coordinate the use of laboratory resources
- See http://www.lssc.nasa.gov/als/chemistry/ for more information

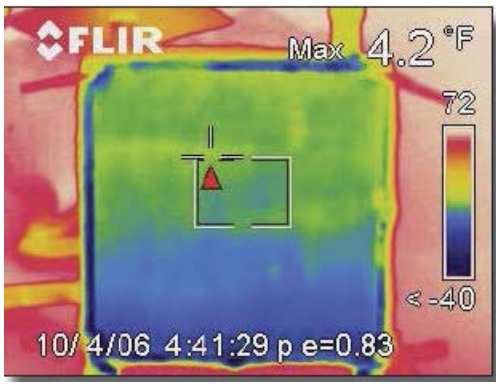
Fee Schedule

Facility use is negotiated on a per-proposal basis.

Polymer Science and Technology Laboratory

Laboratory Operator & POC:
NASA – Dr. Martha K. Williams, Mail Stop: KT-E-3, KSC, FL 32899
Martha.K.Williams@nasa.gov, (321) 867-4554
Locations: Space Life Sciences Laboratory (Bldg. M6-1025) Operations and Checkout Bldg. (M7-355) "Cone Shack" (Bldg. M6-1509)

Description



The Polymer Science and Technology (PSAT) Laboratory provides real-time problem solving and polymer materials development, testing, and support to multiple NASA and KSC programs. The PSAT team has a diverse background and expertise in foam and insulation systems, low-temperature composites, carbon nanotube technology, conducting-polymer systems, fire and polymers, and coating systems (including

icephobic coatings, chemical sensor technology and polymer processing techniques), along with polymer and materials degradation mechanisms. With its trained personnel and diverse expertise, the PSAT team has supported several NASA and KSC initiatives, such as Shuttle, External Tank (ET), and the Launch Services Program on foam concerns, and the NASA Engineering Safety Center (NESC) efforts to use spray-on foam insulation (SOFI) to eliminate ice on the ET bracket and bellows for the Space Shuttle's return-to-flight. The team also collaborates with other laboratories within KSC and NASA, such as KSC's Cryogenics Laboratory, Applied Chemistry Laboratory, Electrostatics and Surface Physics Laboratory, Applied Physics Laboratory, and Corrosion Test Laboratory, as well as the Structures and Materials Branch at Langley Research Center.

Laboratory Services

- Polymer and materials science expertise and consultation
- Characterization of polymer systems, including mechanical and thermal analysis
- Polymer synthesis and design, including conductive systems
- Insulation systems development and testing
- Polymer materials for low-temperature applications
- Fire properties of polymers
- Coating development
- High-performance material development

Fee Schedule

Facility use is negotiated on a per-proposal basis.

Instrumentation Systems Development Laboratory

Laboratory Operator & POCs:
NASA – Zachary Cline, Mail Stop: NE-E8, KSC, FL 32899
Zachary.K.Cline@nasa.gov, (321) 867-3723
Contractor – Tony Eckhoff, Mail Stop: ASRC-48,KSC, FL 32899
Anthony.J.Eckhoff@nasa.gov, (321) 867-6751
Location: Engineering Development Laboratory (Bldg. M7-409)

Description

The expertise of the Instrumentation Systems Development Laboratory focuses on Hazardous Gas Detection and Control Systems. The Hazardous Gas Detection group develops instruments using a mass spectrometer (MS) and other advanced analytical technologies to detect cryogenic propellant leakage in the Shuttle and other launch vehicles. In addition, the Transducer Development group develops and tests unique sensor-based measurement systems and evaluates commercially available sensors for compliance with strict Shuttle, International Space Station (ISS), Payloads, and KSC-specific design and performance requirements.

Laboratory Services

- Mass Spectrometer design and testing
- Gas sampling/detection system/analytical instrumentation design and testing

- Sensor and transducer based instrumentation system design (temperature, pressure, flow, strain, hydrogen gas detection, and hydrogen flame detection)
- Electromagnetic interference/compliance (EMI/EMC) testing
- Advanced computer-aided design (CAD), specifically for electrical sensor-based instrumentation system design

Fee Schedule
Facility use is negotiated on a per-proposal basis.

Corrosion Technology Laboratory

Laboratory Operator & POCs:
NASA – Dr. Luz Marina Calle, Mail Stop: KT-E-3,KSC, FL 32899
Luz.M.Calle@nasa.gov, (321) 867-3278
Contractor – Dr. Steve Trigwell, Mail Stop: ASRC-24, KSC, FL 32899
Steven.Trigwell-1@nasa.gov, (321) 867-1222
Location: Space Life Sciences Laboratory (Bldg. M6-1025)

Description
The Corrosion Technology Laboratory provides corrosion expertise to NASA, its partners in other Government entities, private industry, and academia. The Corrosion Technology Laboratory has operated for over 35 years developing corrosion control techniques and detection methods; evaluating materials, coatings, and corrosion control methods; investigating material behavior; analyzing corrosion failures; and recommending approaches to mediate corrosion activity. These capabilities, along with an extensive historical database to support collected data, have served the space program, private industry, the Department of Transportation, and the U.S. military. The laboratory's uniqueness lies in the availability and combinations of extensive specialized services, trained personnel, and testing facilities. The laboratory consists of an atmospheric Beach Corrosion Test Site, an Electrochemistry Laboratory, a General Corrosion Laboratory, an Environmental Testing Laboratory, a Photo documentation Laboratory, a Seawater Immersion Facility, and a complete weather station to support data analysis. The laboratory also has complete network connectivity for real-time data acquisition and Internet video.

Laboratory Services

- Electrochemistry; DC electrochemical experimentation and analysis (direct current methods and electrochemical impedance spectroscopy); Coating application, evaluation, inspection, and testing; sample preparation; and paint staging
- Field-emission scanning electron microscopy, energy-dispersive spectroscopy, and automated image analysis
- Experiment staging; real-time and accelerated corrosion testing
- Reinforced-concrete testing and analysis
- Accelerated corrosion and salt fog testing
- Seawater immersion
- Analysis of impingement and erosion corrosion, cavitation, and other velocity effects
- Metallurgical failure analysis, microchemical analysis, and material testing and valuation
- Cathodic protection measurement/analysis
- Corrosion potential mapping
- Remote corrosion data acquisition/delivery
- Weather data acquisition/delivery

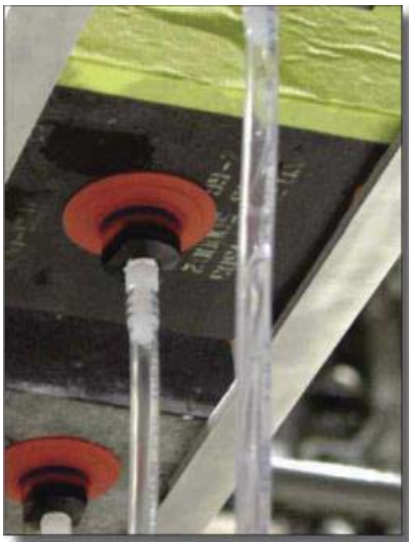
Fee Schedule

Facility use is negotiated on a per-proposal basis.

Applied Physics Laboratory

Laboratory Operator & POC:
NASA – Dr. Robert C. Youngquist
Mail Stop: KT-D-1, KSC, FL 32899
Robert.C.Youngquist@nasa.gov (321) 867-1829
Location: Operations and Checkout Bldg. (M7-355)

Description



The Applied Physics Laboratory specializes in technology response with applied physics. The laboratory responds to problems from the Shuttle, Expendable Launch Vehicle, International Space Station/Payloads, Crew Exploration Vehicle, In Situ Resource Utilization, and future programs and works to solve them using concepts at technology readiness levels 3 and 4. Laboratory personnel take demonstrated concepts that can solve a problem and ultimately turn them into field-worthy hardware. Primary areas of expertise are electromagnetic radiation (mainly ultraviolet, optical, infrared, and millimeter), ultrasonics, sensor development, and mechanical system design. Work focuses on advanced sensors and systems for measurement and leak visualization and detection, nondestructive evaluation of flight hardware and ground support equipment, flight hardware positioning systems, and cryogenics. The Applied Physics Laboratory works closely with several contractor-operated laboratories that help make demonstrated concepts into operational hardware.

Laboratory Services

- Applying physics technology and concepts, scientific investigation, engineering, electronics, mechanics, and modeling to solve specific flight hardware processing problems
- Developing technology for future programs
- Routing technical issues throughout the KSC engineering and scientific communities to seek solutions to spaceport problems
- Technically reviewing concepts in support of future and current spaceport upgrades

Fee Schedule

Facility use is negotiated on a per-proposal basis.

Cryogenics Test Laboratory

Laboratory Operator & POCs:
NASA – James Fesmire, Mail Stop: KT-E, KSC, FL 32899
James.E.Fesmire@nasa.gov, (321) 867-7557
Contractor – Walt Hatfield
Mail Stop: ASRC-45, KSC, FL 32899
Walter.H.Hatfield@nasa.gov, (321) 867-9433
Location: Cryogenics Test Laboratory (Bldg. M7-557)

Description

The Cryogenics Test Laboratory provides comprehensive cryogenic expertise that serves the research and development and applied technology needs of both NASA and its commercial partners. Technology focus areas include thermal insulation systems; cryogenic component design, development, test, and evaluation; cryogenic pump design, development, test, and evaluation; low temperature applications; and propellant servicing systems design, development, test, and evaluation. The objectives of the laboratory are to develop materials, produce new technology, integrate technology into new applications, and promote engineering services for energy-efficient storage, transfer, and use of cryogens and cryogenic propellants on Earth and in space. A cornerstone of the Cryogenics Test Laboratory is thermal insulation systems, which includes a family of research test cryostats. The laboratory also serves as a resource for innovative and timely solutions for our operational customers, as well as for the application of cross-cutting technologies to meet the needs of industry, other Federal agencies, and research institutions.

Laboratory Services

• Thermal insulation systems
  - Research of new composite insulation materials
  - Development of high-performance insulation systems

- Thermal performance testing under actual-use cryogenic-vacuum conditions

• Cryogenic components
  - Mechanical components design and development expertise
  - Sealing technology design expertise
  - Cryogenic pump design, testing, and evaluation
  - Cryogenic and gas quick disconnects
  - Operational use experience
  - Performance testing capabilities for valves, pumps, and sensors
• Low-temperature applications
  - Aerospace and industry applications
  - Energy applications for power transmission
  - Medical and biology applications
  - Integration of cryocoolers and refrigeration systems
• Propellant servicing systems
  - Energy-efficient propellant storage and transfer system design and development
  - Martian and lunar surface operations
  - Zero-boiloff technology
  - Subcooled propellants
  - Autonomous control
  - Hydrogen economy applications
  - Advanced energy technology
  - Solar thermal systems design, fabrication, and testing

Fee Schedule

Facility use is negotiated on a per-proposal basis.

Power Systems Laboratory

Laboratory Operator & POC:
NASA – Lashanda Slaiman, Mail Stop: NE-E7, KSC, FL 32899
Lashanda.G.Slaiman@nasa.gov, (321) 867-5594
Location: Engineering Development Laboratory (Bldg. M7-409)

Description

The Power Systems Laboratory supports the design and development of new ground support equipment (GSE) power systems, including equipment rack/subsystem power, DC power systems, vehicle special power, and battery-based systems. The laboratory provides single-shift coverage with personnel who have a broad base of experience with electric power systems and power electronics.

Laboratory Services

- Frequency response analysis: Impedance measurements and stability testing
- AC three-phase power analysis: Frequency; Power factor; Voltage; Current; Phase angles; Power (real, apparent, reactive)
- High potential (HIPOT) testing for single conductor: Dielectric breakdown test; Dielectric withstanding test; Insulation resistance test; Transient DC power supply analysis
- Steady-state DC power supply analysis
- GSP design and development for vehicle and GSE

Fee Schedule

Facility use is negotiated on a per-proposal basis.

Advanced Electronics and Technology Development Laboratory

Laboratory Operator & POCs:
NASA – Erik C. Denson, Mail Stop: NE-E7, KSC, FL 32899
Erik.C.Denson@nasa.gov, (321) 867-6537
NASA – Zachary Cline, Mail Stop: NE-E8, KSC, FL 32899
Zachary.K.Cline@nasa.gov, (321) 861-3723
Contractor – Dr. Carlos T. Mata, Mail Stop: ASRC-25, KSC,FL 32899
Carlos.T.Mata@nasa.gov, (321) 867-6964
Location: Engineering Development Laboratory (Bldg. M7-409)

Description


The Advanced Electronics and Technology Development (AETD) Laboratory designs and develops instrumentation systems used for a broad spectrum of applications. These systems range from flight sensors to shop aids and include many systems used as ground support equipment (GSE). The collective staff expertise encompasses lightning research; analog, digital, and mixed-signal design; digital signal processing (DSP); advanced imaging; and mathematical modeling. The AETD Laboratory turns ideas into realities, even on short notice, developing electronic systems from conception through prototyping and often culminating in small scale production. The emphasis on applied research has produced numerous patents covering a wide range of technical fields. The standards and dedication of the lab's personnel consistently result in meeting delivery schedules, fast responses to customer requests, and on-target costs.

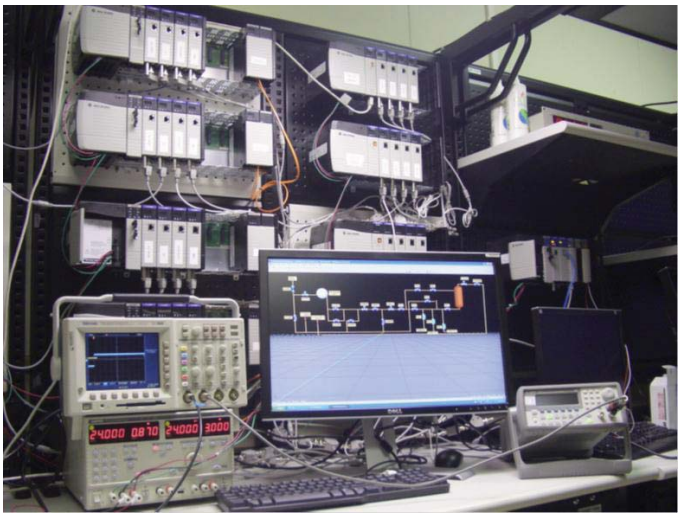
Laboratory Services
• Data acquisition systems design
• DSP algorithm and methodology development
• Lightning and electromagnetic measurement, data acquisition, analysis, and research
• Mathematical modeling and computer simulation
• Design of analog, digital, and mixed-signal electronic circuitry
• Electronics assembly (through-hole and fine-pitch surface-mount)
• Printed circuit board design, assembly, and testing
• Schematic capture
• Surface-mount and through-hole circuit board assembly
• Special instrumentation development

Fee Schedule
Facility use is negotiated on a per-proposal basis.

Controls Laboratory

Laboratory Operator & POC:
NASA – Tushar Patel, Mail Stop: NE-E8, KSC, FL 32899
Tushar.B.Patel@nasa.gov, (321) 867-6679
Location: Engineering Development Laboratory (Bldg. M7-409)

Description



The Controls Laboratory develops, designs, prototypes, tests, and validates automated programmable logic control (PLC) systems for the Constellation ground support equipment (GSE). It provides PLC software and Supervisory Control and Data Acquisition (SCADA) applications for system monitoring and control. In particular, the Controls Laboratory has expertise and infrastructure for developing and testing PLC-based systems.

Laboratory Services
- Provide the specialized skills required to design, develop, prototype, test, and validate automation control and monitoring systems and electrical/electronic control systems
- Design and develop associated embedded software specifically for support equipment
- C, C++, Ladder Logic, Function Block Diagram, Sequential Function Chart, SCADA
- Circuit Design

Fee Schedule: Facility use is negotiated on a per-proposal basis.

Electronic Development and Test Laboratory

Laboratory Operator & POC:
NASA – Michael Kromann, Mail Stop: NE-E7,KSC, FL 32899
Michael.J.Kromann@nasa.gov, (321) 867-6690
Location: Engineering Development Laboratory (Bldg. M7-409)

Description

The Electronic Development and Test Laboratory (ED&T) provides development, test, and troubleshooting capability for digital and analog electrical and electronic systems, including access to a wide range of state-of-the-art test equipment. The lab provides computer aided design (CAD) software, including AutoCAD, AutoCAD Electrical, LabVIEW, and Pro/ENGINEER, as well as wide-format color and black and white (B&W) printing and scanning capability. These capabilities are used across multiple CTC labs.

Laboratory Services

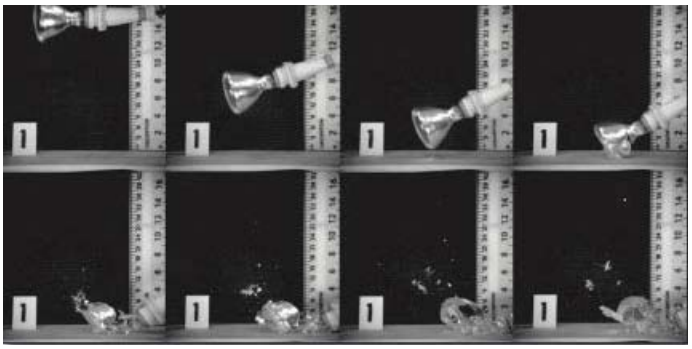
- Provide lab area for development activities with access to test equipment and fabrication/rework capability
- Provide computers, printers, support software, and network connections to CAD/CAE servers
- Provide an area that supports collaboration among the design engineers
- Develop, test, and troubleshoot custom or Commercial Off-The-Shelf (COTS) systems or subsystems

Fee Schedule
Facility use is negotiated on a per-proposal basis.

Electrical/Electronics Failure Analysis Laboratory

Laboratory Operator & POC:
NASA – Lawrence Ludwig
Mail Stop: NE-L1-E, KSC, FL 32899
Lawrence.L.Ludwig@nasa.gov, (321) 867-7049
Location: Operations and Checkout Bldg. (M7-355)

Description



The Electrical/Electronics Failure Analysis Laboratory performs independent, unbiased failure analysis investigations to determine the root cause of ground support equipment (GSE) and flight hardware electrical and component failures. This analysis service involves both

nondestructive parametric evaluations (NPE) and destructive physical analysis (DPA). To support its investigations, the laboratory maintains a real-time radiography system, digital photography and microscopy documentation capability, and infrared (IR) and standard and high-speed videography to document both field conditions and laboratory assessments of the failed components.

Laboratory Services

- Failure analysis of electrical/electronic components, power components, cable assemblies, and subsystems (DPA, NPE, and real-time radiography and thermography)
- Low-magnification digital microscopy with macro/microphotography
- Advanced digital photo documentation and videography
- Analog, digital, and mixed-signal component testing
- High-voltage facility power and high-frequency electrical and DC power system testing
- Low-voltage, nonintrusive simulation testing to field parameters
- Field analysis and data acquisition instrumentation/techniques

Fee Schedule

Facility use is negotiated on a per-proposal basis.

Experiment Support Laboratories

Laboratory Operator & POCs:
NASA – David Cox, Mail Stop: KT-B, KSC, FL 32899
David.R.Cox@nasa.gov, (321) 867-6051
Contractor – Ramona Bober, Mail Stop: BIO-3, KSC, FL 32899
Ramona.Bober-1@nasa.gov, (321) 861-2199
Location: Space Life Sciences Laboratory (Bldg. M6-1025)

Description

The Experiment Support Laboratories are a group of labs that support experimental ground-based studies and testing, ground control activities, flight hardware buildup and development, and postflight activities for experiments returning from orbit, and conduct ongoing resident research in the Space Life Sciences Lab. The labs provide a basis for principal investigators to conduct preflight science activities and science-to-hardware integration in preparation for the installation of payloads into the Space Shuttle. Designed for maximum flexibility, the labs can be configured in various ways to accommodate science experiment disciplines that include cell culture science, plant physiology, and protein crystal growth to name a few. The labs have successfully supported numerous Space Hab, Mars, and SpaceLab missions, and payloads for the Space Shuttle, the Mir Space Station, and the International Space Station. The lab group includes science and hardware integration laboratories, a central services room, shared-equipment rooms, and a walk-in cold room.

Laboratory Services

- Configure, outfit, and close out laboratories; calibrate equipment; and dispose of bio hazardous, chemical, and radioactive waste
- Provide specimen and hardware support: receiving, condition verification, preparation, transportation,
- Post-flight recovery, and import/export
- Simulate experiments, verify/refine scientific protocols and timelines, and support preparation of ground control experiments
- Provide animal husbandry for specimens and provide/coordinate Bio-specimen Sharing Program
- Obtain all necessary approvals (Institutional Review Board – human subjects, Institutional Animal Care and Use Committee – animal subjects)
- Coordinate science and hardware turnover to NASA for Orbiter installation
- Provide training and assistance in aseptic operations
- Monitor laboratory environments
- Provide steam/ethylene oxide sterilization with quality control

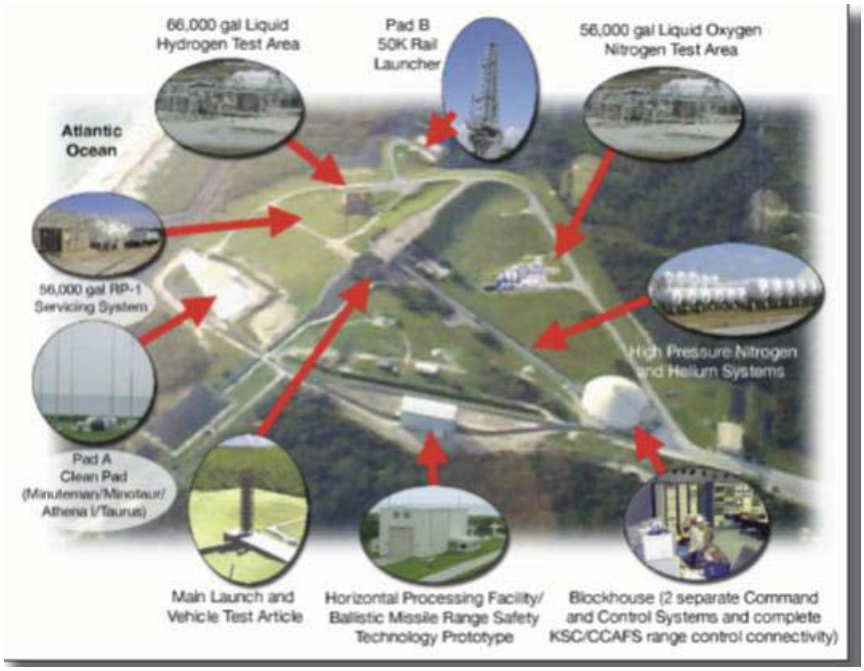
Fee Schedule

Facility use is negotiated on a per-proposal basis.

Advanced Technology Development Center

Laboratory Operator & POCs:
NASA – Steve Kyramarios, Mail Stop: KT-A1, KSC, FL 32899
Steve.N.Kyramarios@nasa.gov, (321) 861-9172
Contractor – Mike Dunkel, Michael.B.Dunkel@nasa.gov, (321) 759-5028
Location: Space Launch Complex (SLC 20), Cape Canaveral Air Force Station

Description



Kennedy Space Center has embarked upon the creation of a "Spaceport of the Future" test facility, the Advanced Technology Development Center (ATDC). ATDC will provide a national proving ground for the development, integration, demonstration, testing, and qualification of spaceport and range technologies. It can be thought of as a prototype spaceport where industry, Government, and academia can work together to improve the technology and safety of future space initiatives. ATDC hopes to provide a cost-effective, highly flexible, and capable testbed for a broad

scope of activities ranging from development and testing of individual components to integration and testing of a wide variety of high-fidelity "iron birds" equipped with prototype systems that function as a complete flight system and can simulate various operational scenarios. ATDC will also concentrate on proving new processing technologies that will reduce the operations cost of launch processing activities.

ATDC will address the technology development arm of the up-front planning so it will improve the chances that a program will meet its goals within projected cost targets. The more we know about an advanced technology, the more we raise its individual technology readiness level and the more successfully we will apply that technology to a new project. That increased knowledge also promotes our ability to assess a technology's integration readiness level, which indicates the relative maturity of a technology to the subsystem to which it applies and helps decrease the technology risk for the program.

Much of the previous planning for the next-generation launch technologies has focused on the development of individual technologies that enable or enhance the next-generation launch architecture. Although not forgotten, planning and budgeting for the development of integrated systems has been deficient. To ensure program risks are minimized, integrated systems relating directly to the next-generation launch architecture must be developed, tested, certified, and validated. Thus, the concept of an integrated systems test facility (ISTF), like ATDC, that can provide an operationally responsive and relevant environment for the spaceport of the future is born. An ISTF can demonstrate, within ever-increasing maturity of integrated subsystems and systems, all future technologies required to support the spaceport of the future while maintaining the ability to adapt quickly and efficiently to new technologies. Everyday goals of enhanced reliability, availability, supportability, adaptability, scalability, maintainability, and safety are to be improved and demonstrated in an ISTF. Operability, fast turnaround time, and low cost are the desired results for the next-generation launch architecture and will be the product of an ISTF like the ATDC.

Located at Space Launch Complex (SLC) 20 at Cape Canaveral Air Force Air Force Station, ATDC can conduct safe, secure operations with gaseous nitrogen, liquid nitrogen, and liquid oxygen. Capabilities will be added later to support a full spectrum of "Spaceport of the Future" technologies and processes, including rapid-fill cryogenics, autocoupler technology, range resource development, and evolutionary launch vehicle processing.

Fee Schedule
Facility use is negotiated on a per-proposal basis.

Prototype Development Laboratory

Laboratory Operator & POCs:
NASA – Todd Steinrock
Mail Stop: NE-L3, KSC, FL 32899
Todd.A.Steinrock@nasa.gov, (321) 867-4945
NASA – Harold McAmis
Mail Stop: NE-L3, KSC, FL 32899
Harold.R.McAmis@nasa.gov, (321) 867-1890
Location: Prototype Shop (Bldg. M7-581)

Description
The Prototype Development Laboratory performs quick-turnaround prototype development (often for solutions to one-of-a-kind problems), hardware fabrication and modifications, and component testing of

ground support equipment (GSE) and flight hardware, and provides support to failure analyses performed by other NASA laboratories. The laboratory responds quickly to failures that occur during projects and launch/payload processing operations, with effective and timely design solutions and modifications. Laboratory personnel are highly skilled engineers and technicians trained in the latest computer-aided design (CAD) tools and machining processes, sheet metal fabrication, welding, cryogenics, high-pressure pneumatics testing, and electrical/electronics development.

Laboratory Services

- Design
  - GSE and flight hardware design
  - CAD modeling (Pro/ENGINEER)
  - Engineering analysis
  - Prototype design (full-size and scale mechanisms)
- Development and Fabrication
  - GSE and flight hardware fabrication
  - CAD/manufacturing (CAM)
  - Welding (including structural, high-pressure, and cryogenic systems)
  - Rapid prototyping (fluid deposition modeling) and concept verification of hardware and components
  - Fluid and thermal systems (pneumatics, hydraulics)
  - Power and electrical systems
  - Digital and analog electronic systems
- Testing and Support
  - Data acquisition and instrumentation
  - Software programming (LabVIEW, Fortran)
  - Component testing

Fee Schedule

Facility use is negotiated on a per-proposal basis.

Mechanical, Structural, and Controls Development Laboratory

Laboratory Operator & POCs:
NASA – Eric Ernst
Mail Stop: NE-D1, KSC, FL 32899
Eric.W.Ernst@nasa.gov, (321) 867-2732
Contractor – Rick Van Gilder
Mail Stop: ASRC-3, KSC, FL 32899
Richard.M.Vangilder@nasa.gov, (321) 867-2526
Location: Launch Equipment Test Facility (Bldg. M7-505)

Description

The Mechanical, Structural, and Controls Development Laboratory supports a wide spectrum of testing and development activities. This capability was established in the 1970s to provide full-scale qualification of Space Shuttle umbilicals and T-0 release mechanisms. Located at the Launch Equipment Test Facility (LETF), the

laboratory has leveraged these unique test capabilities into a versatile test and development complex that supports a wide range of operational programs at KSC. Ground support equipment (GSE) is tested and certified in a large outdoor area surrounded by test support facilities. These support functions include comprehensive mechanical and electrical fabrication and environmentally controlled assembly and development. The lab's combination of unique test systems and its experienced technical staff make it a "one-stop shop" for performing difficult and hazardous testing.

Laboratory Services

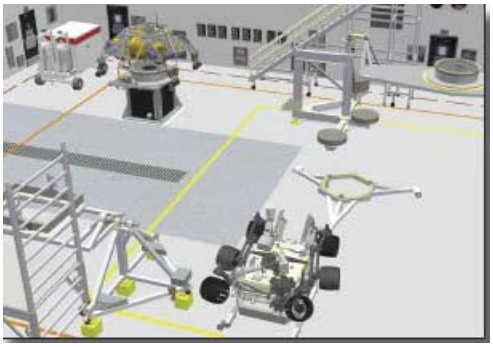
- Complete machining and fabrication services, including computer numerically controlled (CNC) vertical mills, lathes, and 5-axis-wire electrical discharge machining, tube bending, flaring, and orbital welding up to 2 inches in diameter. Welding services include sheet metal, structural, power piping, and tubing using various materials and processes.
- Proof-load testing – Vertical: up to 600 tons, system envelope 27' 8" H × 18' 8" W; Horizontal: up to 220 tons, system envelope 54', can accommodate up to 66 feet with adapters.
- Water flow testing with two independent loops.
- Fabrication, assembly, and qualification testing of umbilicals using a liquid hydrogen (LH2)/liquid nitrogen (LN2) system adjacent to a liftoff simulator and random motion simulator.
- Rapid prototyping of tool profiles from computer aided design (CAD) files.
- Expertise in Pro/ENGINEER, Micro Station, and other CAD programs; failure effects analysis; and computational fluid dynamics analysis.
- Data acquisition design, installation, and analysis capabilities.
- Fabrication, assembly, and test capabilities for component-level qualification of a wide variety of equipment.

Fee Schedule

Facility use is negotiated on a per-proposal basis.

Design Visualization Laboratory

Laboratory Operator & POCs:
NASA – Matthew Verdier
Mail Stop: IT-C1, KSC, FL 32899
Matthew.J.Verdier@nasa.gov, (321) 867-7608
Contractor – Bob Humeniuk
Mail Stop: 7210-C385, KSC, FL 32899
Robert.P.Humeniuk@nasa.gov, (321) 867-2012
Location: Operations and Checkout Bldg. (M7-355)



Description

Visualization is the process of taking complex objects and systems and representing them in simpler formats to aid in their understanding and analysis. The Design Visualization Laboratory has developed a variety of visualization products over the years. One of the most common uses of the laboratory capability is that of virtual design review. This entails producing three-dimensional (3D) models and simulations of proposed designs and design changes for our customer organizations. These designs can be reviewed by the design team in the laboratory to determine their suitability early in the design process when it is still easy to

change should there be difficulties or interferences. The Design Visualization Laboratory has a strong history of completing projects as expected, on time, and within budget in environments known for program restructures and the resultant effects on schedules
and available resources.

Laboratory Services

- Reverse engineering via noncontact 3D digitization
- 3D model generation
- Simulation environment development
- Simulation tool development
- Simulation operation
- Simulation infrastructure maintenance (configuration management, database, hardware, software, etc.)
- Conversion of real-time simulation on high-end computer systems to an archived form for playback on desktop computers via the Distributed Observer Network (DON) tool.

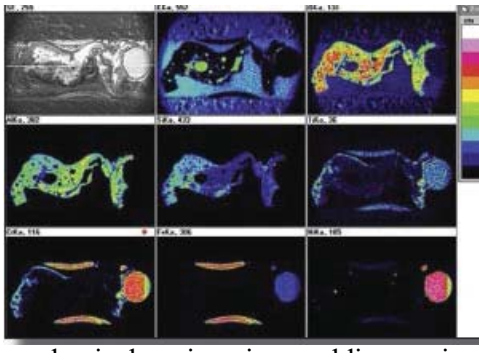
Fee Schedule

Facility use is negotiated on a per-proposal basis.

Materials Failure Analysis Laboratory

Laboratory Operator & POC:
NASA – Steve McDanels, Mail Stop: NE-L1, KSC, FL 32899
Steve.McDanels@nasa.gov, (321) 861-8969
Location: Operations and Checkout Bldg. (M7-355)

Description



The Materials Failure Analysis Laboratory provides failure analysis, forensic and accident investigation, and materials testing and evaluation services for metallic and nonmetallic materials and mechanical components used in aerospace flight hardware, ground support equipment (GSE), and facilities. Laboratory personnel also provide materials and processes (M&P) engineering consultation services (e.g., ASNT Level III radiography review and materials selection). Laboratory personnel have degrees in the following disciplines: metallurgical engineering, materials science and engineering, mechanical engineering, welding engineering, chemical engineering, and aerospace engineering.

Laboratory Services

• Metallic and nonmetallic materials failure and forensic analysis
• Accident and mishap investigation
• Scanning electron microscopy (SEM) and fractography
• NDE-ASNT Level III radiography certified
• Photo documentation
• Corrosion evaluation, analysis, and prevention

• Visual, macroscopic, and stereomicroscopic examination
• Fractography
• Metallography
• Hardness testing (in the laboratory and field)
• Micro hardness testing
• Conductivity testing
• Thermal analysis
• Pneumatic testing and simulation
• Metallurgical, polymeric, glass, and composite materials analysis
• Precision dissection and sectioning

Fee Schedule
Facility use is negotiated on a per-proposal basis.

Physical Test and Analysis Laboratory

Laboratory Operator & POC:
NASA – Rick Johnston, Mail Stop: NE-L2, KSC, FL 32899
Rick.Johnston@nasa.gov, (321) 867-1431
Location: Operations and Checkout Bldg. (M7-355)

Description

The Physical Test and Analysis Laboratory provides a range of physical testing of materials and includes several laboratory areas. The Environmental Testing Laboratory provides chambers and equipment to simulate a range of temperature, vacuum, and humidity conditions for testing flight hardware under space conditions, vacuum drying materials, and performing outgassing conditioning of materials to be used in space. The Materials Testing and Data Collection Laboratory performs flammability, materials compatibility, and electrostatics testing to support the KSC Ground Operations Safety Plan. The Physical Properties Laboratory performs material, mechanical, physical, and environmental testing of ground support equipment and flight hardware. Tests include tensile, compression, fatigue, flammability, electrostatic discharge, materials compatibility, and thermal vacuum chamber testing (including bake-outs of flight hardware to control outgassing). The Vibration Analysis Laboratory offers vibration and shock testing with two shaker tables and high-speed photography.

Laboratory Services
• Tensile, compression, and fatigue testing
• Flammability, electrostatic discharge, and hypergol compatibility material evaluation
• Thermal vacuum and environmental chamber testing
• Vibration and shock testing
• Lubricant testing

• Hydraulic testing
• Materials evaluation

Fee Schedule
Facility use is negotiated on a per-proposal basis.

Nondestructive Evaluation (NDE) Laboratory

Laboratory Operator & POC:
Contractor – Kenneth Walla
Mail Stop: ISC 6200, KSC, FL 32899
Kenneth.C.Walla@nasa.gov, (321) 861-0620
Location: Converter/Compressor Operations Bldg. (K7-569)

Description

The Nondestructive Evaluation (NDE) Laboratory supports the aerospace community by performing nondestructive testing (NDT) on numerous flight hardware and ground support equipment (GSE) components. Since the 1960s, the NDE Laboratory has performed the majority of the NDE tasks at KSC, as well as supported numerous task requirements for Cape Canaveral Air Force Station and Patrick Air Force Base. The laboratory provides two-shift coverage with personnel who have a broad base of NDE experience that includes offshore construction platforms, pipelines, and nuclear/chemical power plants. NDE Laboratory customers receive immediate response and support from a technical staff with wide and diverse fields of expertise.

Laboratory Services
• Magnetic particle inspection: visible and fluorescent particles, including dry and wet methods
• Dye penetrant inspections: visible and fluorescent methods
• Leak detection: bubble check, mass spectrometer, and ultrasonic
• Computed tomography
• Radiography (gamma and X-ray)
• Ultrasonic inspection: flaw, high-resolution thickness, bond integrity, and bolt torque elongation
• Infrared: qualitative and quantitative
• Eddy current inspection: flaw detection, coating thickness, and conductivity measurements
• Microfocus real-time radiography
• American Welding Society-certified weld inspections
• American Society of Nondestructive Testing (ASNT)-certified NDE Level III engineering consulting
• Thermal insulation system development and testing
• Prototype component design, fabrication, and testing
• Cryogenic system and instrumentation design and testing
• Propellant systems planning and integration
• High-vacuum measurement and leak detection
• Low-temperature applications

Fee Schedule: Facility use is negotiated on a per-proposal basis.

Metrology Laboratory

Laboratory Operator & POC:
NASA – Roy King, Mail Stop: NE-L1-R, KSC, FL 32899
Roystan.J.King@nasa.gov, (321) 867-8014
Location: Operations and Checkout Bldg. (M7-355

Description

The Metrology Laboratory provides rapid metrological analyses for critical measurements of flight hardware and ground support equipment (GSE) and in support of failure analyses performed by other NASA/KSC laboratories. In-house metrology allows independent verification of quality, alignment, fit, and finish of critical flight hardware and GSE upon their arrival at KSC, as well as dimensional analyses of anomalies (e.g., scratches on sealing surfaces, leaks, high running torques, and mechanical malfunctions) encountered during flight hardware processing.

Laboratory Services
- Precision measurement and dimensional analysis
- Alignment and threaded-fastener gauging
- Mold impressions of scratches, cracks, and defects
- Contractual and specification compliance measurements

Fee Schedule
Facility use is negotiated on a per-proposal basis.

Standards and Calibration Laboratory

Laboratory Operator & POC:
Contractor – Perry King, Mail Stop: ISC 6175,
KSC, FL 32899, Perry.C.King@nasa.gov, (321) 494-2504
Location: Physical Calibrations: KSC, Central Instrumentation Facility (Bldg. M6-342)
Electrical Calibrations: Patrick Air Force Base (Bldg. 981)

Description

The Standards and Calibration Laboratory provides metrology services to NASA KSC and contractor organizations. The Reference Standards Laboratory maintains the most accurate measurement standards within NASA KSC and provides traceability to the National Institute of Standards and Technology (NIST) to ensure consistency of measurement and test results. The Reference Standards Laboratory also pivots various NASA measurement assurance programs (MAPs), sharing traceability among Centers and

thereby reducing costs. The Calibration Laboratory calibrates and repairs a wide variety of measuring and test instrumentation. Laboratory personnel are highly skilled measurement scientists and calibration technicians with in-depth knowledge of how measuring devices work, what error sources affect them, and how to perform accurate measurements.

Laboratory Services

- Calibration of reference and working standards
- Metrology engineering services
- Calibration and repair of measuring and test equipment
- Precision cleaning and oxygen certification of pressure and flow gauges
- Development, operation, and maintenance of Metrology Information System and automated calibration processes
- In-place calibration of immovable equipment and systems
- Identification and validation of offsite calibration service providers
- Support of traceability for all seven fundamental SI units

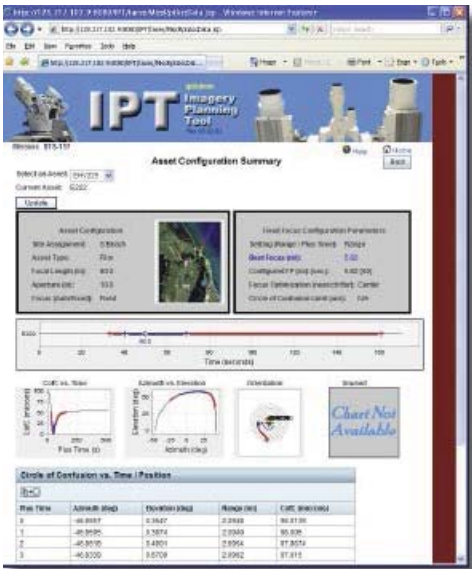
Fee Schedule

Facility use is negotiated on a per-proposal basis.

Experimental Imaging Laboratory

Laboratory Operator & POCs:
NASA – Robert W. Page, Mail Stop: MK-SIO, KSC, FL 32899
Robert.W.Page@nasa.gov, (321) 867-8516
Contractors – Todd Lamb, Mail Stop: ASRC-18, KSC, FL 32899
Todd.A.Lamb@nasa.gov, (321) 867-5795, and
Tom Kelly, Mail Stop: ASRC-18, KSC, FL 32899
Thomas.J.Kelly-2@nasa.gov, (321) 867-8216
Location: Engineering Development Laboratory (Bldg. M7-409)

Description



The Experimental Imaging Laboratory explores current and emerging imaging technologies and characterizes camera, lens, recorder, and tracking methods. The lab is a dynamic mixture of field-deployable imaging assets and fixed-location test equipment. Lab engineers perform experiments in a controlled environment and compare performance with a field setting. The lab staff reflects a mixture of expert backgrounds in image analysis, comprehensive data collection, video engineering, and complex system integration to apply imaging capabilities to tracking and network systems. Rapidly evolving, high speed imaging systems require an extended understanding when attempting to evaluate end-to-end configurations. In addition, recording methods that take advantage of various image compression codecs need to be studied and compared for full-

system compatibility and performance. The Experimental Imaging Lab provides a testbed for benchmarking those technologies to what is currently available. This valuable service offers direction on practical and cost-effective choices for imaging hardware of all varieties (high definition, high speed, nonvisible spectrum) and on choosing the most capable methods to deploy these devices and to acquire the best available images for current and future programs.

Laboratory Services

- Test imaging and optics systems, equipment, and devices for performance, conformance, and interoperability
- Analyze imagery, launch/lift-off debris
- Characterize the temperature of events, objects, and debris
- Assess recording devices and codecs
- Assess best methodologies to time-tag, synchronize, and transfer images and large image files
- Develop methods to quickly and easily archive and retrieve volumes of imaging data
- Apply modern acquisition methods to evaluate the performance of tracking systems
- Develop equipment specifications and test plans
- Configure tracking mounts for optimal performance
- Develop theoretical programs to assist imaging and tracker positioning
- Maintain familiarity with emerging imaging technologies and applications
- Collaborate with the imaging community for next-generation imaging sensors
- Maintain expert knowledge of digital video technology and transmission systems
- Use computer tools specifically developed to provide predictive data for best performance of lenses, cameras, and trackers on a launch-by-launch basis

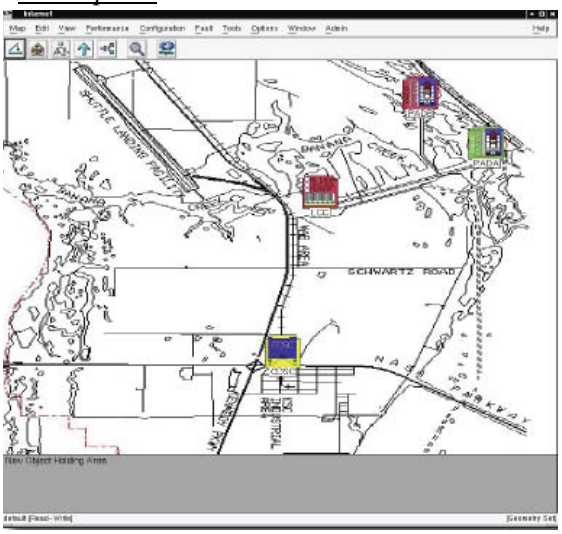
Fee Schedule

Facility use is negotiated on a per-proposal basis.

Fiber Optics and Communications Laboratory

Laboratory Operator & POCs:
NASA - James Shaver, Mail Stop: NE-D1, KSC, FL 32899
James.M.Shaver@nasa.gov, (321) 867-9883
Contractor – Robert Swindle, Mail Stop: ASRC-29, KSC, FL 32899
Robert.W.Swindle@nasa.gov, (321) 867-6942
Location: Engineering Development Laboratory (Bldg. M7-409)

Description



The Fiber Optics and Communications Laboratory leads the research, analysis, design, development, and deployment of all fiber-optic-based cabling systems used for communications at KSC, including the conversion, integration, and deployment of digital video systems for the KSC Operational Television (OTV) and Broadband Communications Distribution System (BCDS) television systems and nearly every fiber-optic-based cable installed at KSC. The laboratory provides a testbed and technical

expertise enabling maximum efficiency from current investment in fiber optics and video systems. The laboratory can support research and analysis in virtually any fiber-optic and video technology, including wavelength division multiplexing techniques, cabling technology, free-space optical systems, and high-definition and other digital video systems. The Fiber Optics and Communications Laboratory has a history of meeting defined schedules and budgets while responding to the dynamics and uncertainties of new technologies.

Laboratory Services

- Performance, conformance, and interoperability testing of telecommunications systems equipment and devices
- Fiber-optic cable deployment, termination, and analysis equipment and devices
- Custom software development (real-time, embedded, and general-purpose computing)
- Troubleshooting of telecommunications equipment and fiber-optic cabling
- Commercial off-the-shelf (COTS) software integration and implementation with custom designs
- Equipment specification and test plan development
- Telecommunications system specification, design, analysis, testing, and acquisition
- System integration
- Network management and monitoring systems
- Digital video technology and fiber-optic transmission systems

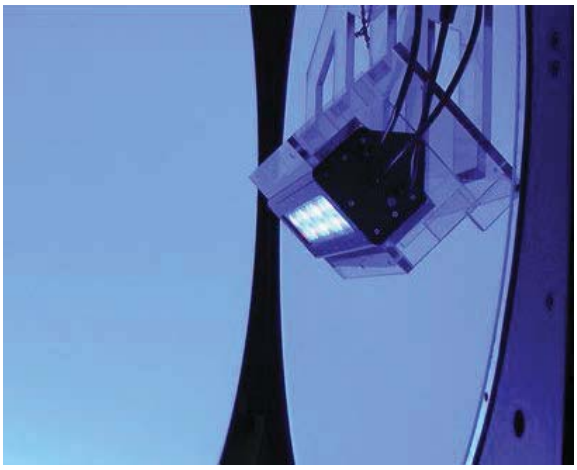
Fee Schedule

Facility use is negotiated on a per-proposal basis.

Light Testbed

Laboratory Operators & POCs
NASA – Dr. Raymond M. Wheeler, Mail Code KT-B-1, KSC, FL 32899
Raymond.M.Wheeler@nasa.gov, (321) 861-2950
Contractors – Robert Soler, Mail Code BIO-3, KSC, FL 32899
Robert.R.Soler@nasa.gov, (321) 861-3047
Dr. Gary Stutte, Mail Code DYN-3, KSC, FL 32899
Gary.W.Stutte@nasa.gov, (321) 861-3493
Location: Space Life Sciences Laboratory (Bldg. M6-1025)

Description



The Light Testbed is a fully functional photometric test lab capable of meeting all of our clients' light measurement needs. Light Testbed capabilities include total photopic luminous flux, total scotopic luminous flux, color rendering index (CRI), correlated color temperature (CCT), radiant efficiency, luminous efficacy, and color coordinates in Tristimulus, CIE 1931, CIE 1960, and CIE 1976 color spaces. Plant responses capabilities include determining total photosynthetic active radiation (PAR), photosynthetic photon flux

(PPF), and phytochrome photostationary state. Intensity distribution profiles are also determined using our two-axis goniometer. Light-emitting diode (LED)-specific characterization includes dominate wavelength, purity, and full-width half-max (FWHM), as well as full intensity distribution using our LED goniometer.

Laboratory Services

- Spectroradiometric analysis of any luminaire, including CCT, color coordinates, CRI, and power spectrum distribution
- Measurement of total photopic and scotopic luminous output of any luminaire 1 m or less in maximum dimension
- Complete LED analysis, including CCT, CRI, and intensity distribution profiles
- LED characteristics such as CRI, CCT, and intensity with respect to angle
- Full photometric data report generation for luminaires with maximum diameter less than 30 centimeters
- Near-field photometric data report generation for luminaires with maximum diameter greater than 30 centimeters
- Controlled environment laboratory setup for lighting analysis of different environment conditions

Fee Schedule

Facility use is negotiated on a per-proposal basis.

Controlled Environment Laboratory (CEL)

Laboratory Operator & POCs:
NASA – Dr. Raymond M. Wheeler, Mail Stop: KT-B-1, KSC, FL 32899
Raymond.M.Wheeler@nasa.gov, (321) 861-2950
Contractor – Neil Yorio, Mail Stop: DYN-3, KSC, FL 32899
Neil.C.Yorio@nasa.gov, (321) 861-2947
Location: Space Life Sciences Laboratory (Bldg. M6-1025)

Description

The Controlled Environment Laboratory (CEL) consists of a state-of-the-art controlled environment chamber (CEC) facility and associated laboratories to conduct basic and applied research with emphasis on the support of both ground and space applications. Controlled environmental parameters include air temperature, relative humidity (RH), spectral quality and quantity, and carbon dioxide (CO_2) concentration, and are readily modified to support a wide range of user-defined environmental control requirements. A Low Pressure Testbed (LPTB) capability was recently added and provides a unique chamber to study hypobaric conditions. In addition, the laboratory maintains the technical expertise to facilitate research requiring the use of CECs. The laboratory also develops and maintains a centralized Command, Monitoring, and Data System (CMDS) with an associated database that has the capability to send an alarm when the instruments go beyond the specified ranges. CEC calibration and maintenance are provided, as well as orientation and training for researchers. The CEL is used to

support the requirements of a variety of scientific research areas, including NASA, private industry, and academia.

Laboratory Services

- Controlled environment experiment design, setup, and maintenance
- Physical, chemical, and biological measurements (volatile organic compounds [VOCs], photosynthesis, etc.)
- Materials processing (drying, grinding, freeze drying, etc.)
- Spectral quality research (light-emitting diodes [LEDs], high-intensity discharge, fluorescent, concentrated solar light)
- Environmental measurements (ultra-low RH, photosynthetic photon flux, spectral quality, hypobaric, etc.)
- Computer control, monitoring, and alarming of chambers and experiments (OPTO-22, CMDS, etc.)

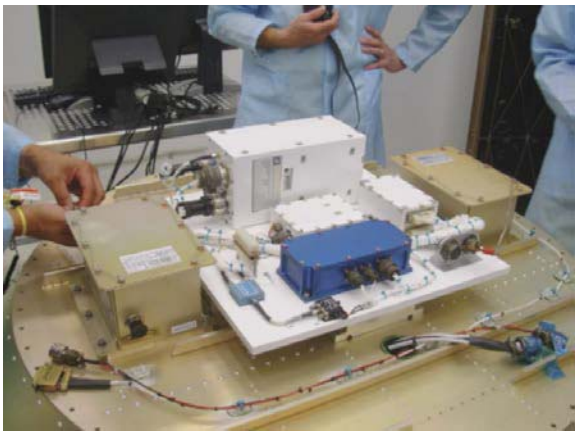
Fee Schedule

Facility use is negotiated on a per-proposal basis.

Advanced Range and Systems Health Laboratory

Laboratory Operator & POCs
NASA - José Perotti, Mail Stop: KT-C, KSC, FL, 32899
Jose.M.Perotti@nasa.gov, (321) 867-6746
Contractor – Jay Amburgey, Mail Stop: ASRC-48
Ottis.J.Amburgey@nasa.gov, (321) 867-3809
Location: Engineering Development Laboratory (Bldg. M7-409)

Description



The Advanced Range and Systems Health Laboratory is composed of Range Technologies Development, Advanced Communications, Ground Systems Health and Diagnostics, and Intelligent Devices. The laboratory designs, develops, and implements electronic systems for a broad spectrum of applications. The laboratory develops technologies related to range operations, communication systems, ground and vehicle processes and systems health management, and specialized instrumentation systems.

In the range technologies discipline, the laboratory develops and implements technologies that support safe and efficient range operations, such as Space Based Range (SBR) and the Autonomous Flight Safety System (AFSS). It is also involved in tracking, surveillance, and telemetry. The laboratory presently supports calibration and certification of the Space Shuttle approach and landing aids using Global Positioning System (GPS) technology as a benchmark.

In the communication discipline, the laboratory evaluates and tests emerging communication technologies

to address next-generation range and spaceport needs. It also works with electromagnetic wave propagation, free-space optics communication, millimeter wave communication, electromagnetic interference control and photonic band gap and ultra-wide band technologies.

In the ground and vehicle health management discipline, the laboratory designs architecture, and develops and implements hardware and software systems and software algorithms in support of fault detection, solation, and recovery (FDIR) operations.

The Advanced Range and Systems Health Laboratory also designs and develops intelligent devices (sensors and actuators with embedded intelligence for FDIR), as well as develops plug-and-play capabilities for the intelligent devices. These devices are designed to continuously assess their operation for failure or degradation.

The laboratory has complete custom electronics design, development, prototyping, and test capabilities, as well as extensive software development and modeling capabilities.

Laboratories Services

- Develop technologies in support of Space Based Range
- Develop and test next-generation range instrumentation using GPS satellite simulators and tracking and modeling software
- Develop technologies in support of Autonomous Flight Safety System
- Develop and test next-generation lightning detection and ranging systems
- Develop, test, and install autonomous GPS-based landing systems
- Develop and demonstrate communication systems for range applications
- Develop Iridium satellite and Tracking and Data Relay Satellite (TDRS) communication links
- Field-test laser communications and laser target designator systems
- Apply GPS navigational signals to the calibration of landing aid systems and navigation
- Develop advanced RF and range communication systems
- Test and analyze tracking and visualization systems
- Evaluate and test early-stage communication exemplars for future spaceport, range, and launch vehicle use
- Develop FDIR algorithms using TEAMS, SHINE, IMS, and MatLab tools
- Develop digital signal processing (DSP) algorithms and methodology
- Develop mathematical models and computer simulation
- Design analog, digital, and mixed-signal electronic circuitry
- Develop special instrumentation

Fee Schedule

Facility use is negotiated on a per-proposal basis.

Advanced Network Development Laboratory

Laboratory Operator & POCs:
NASA – James Shaver, Mail Stop: NE-D1, KSC, FL 32899
James.M.Shaver@nasa.gov, (321) 867-9883
Contractor – Gregory Nelson
Mail Stop: ASRC-18, KSC, FL 32899

Gregory.S.Nelson@nasa.gov, (321) 867-6320
Location: Engineering Development Laboratory (Bldg. M7-409)

Description

For nearly 20 years the Advanced Network Development (AND) Laboratory has led the research, analysis, design, development, and deployment of all next-generation telecommunications transmission systems for KSC. The laboratory provides a testbed consisting of past, current, and next-generation systems combined with technical expertise, thus enabling research, analysis, and development activities directed at obtaining maximum efficiency from KSC's current communications investment, while providing the appropriate and optimal level of technology infusion. Laboratory personnel can support research and analysis in virtually any communications environment, including Ethernet, T-Carriers, synchronous optical network (SONET), and asynchronous transfer mode (ATM). The AND Laboratory is the only development resource at KSC with the skills and resources necessary to identify technology and to investigate and manage the resulting deployment of large, complex communications systems. This laboratory is uniquely suited for testing and evaluating industry products for use at KSC in a testbed that accurately reflects the KSC operating environment and eliminates costs associated with the late identification of incompatibilities.

Laboratory Services

- Performance, conformance, and interoperability testing of telecommunications systems equipment and devices
- Network design and analysis
- Custom software development
- Troubleshooting of telecommunications equipment and fiber-optic cabling
- Commercial off-the-shelf (COTS) software integration and implementation with custom designs
- Equipment specification and test plan development
- Telecommunications system specification, design. analysis, testing, and acquisition
- System integration
- Network management and monitoring systems
- Digital video technology over networked systems
- Software development (real-time, embedded, and general-purpose computing)
- Network architectures and protocols (e.g., Voice over Internet Protocol [VoIP], Internet Protocol [IP], Generalized Multiprotocol Label Switching [GMPLS])

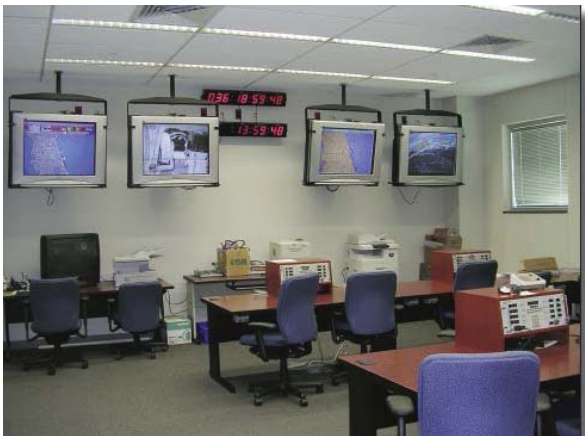
Fee Schedule
Facility use is negotiated on a per-proposal basis.

Flight Experiment Development Laboratory

Laboratory Operator & POCs:
NASA – Dan Shultz, Mail Stop: KT-B, KSC, FL 32899
Daniel.C.Shultz@nasa.gov, (321) 861-2896

Contractor – Bill Wells, Mail Stop: BIO-3, KSC, FL 32899
Howard.W.Wells@nasa.gov, (321) 861-3044
Location: Space Life Sciences Laboratory (Bldg. M6-1025)

Description
The Flight Experiment Development Laboratory helps scientists develop their experiments into Space Shuttle and/or International Space Station (ISS) payloads. Its primary areas of responsibility are payload mission management and payload engineering. Payload mission management responsibilities include planning, integration, and operation of the payload, including safety analysis, astronaut training, and in-flight mission monitoring. Payload engineering responsibilities include the design, fabrication, testing, certification, and sustaining engineering of the payload flight hardware. The laboratory has three primary facility resources: the experiments monitoring area (EMA), the Orbiter Environmental Simulator (OES), and the bonded storage area. The EMA provides real-time communication support for flight experiments; the OES mimics space flight temperature, humidity, and carbon dioxide environment; and the bonded storage area is available both pre and post-flight. The Flight Experiment Development Laboratory has successfully developed and integrated more than 40 flight experiments.



Laboratory Services
- Experiment ground controls (OES)
- Payload communications (EMA provides communication links with launch pads, Launch Control Center, Mission Control Center, and Marshall Space Flight Center)

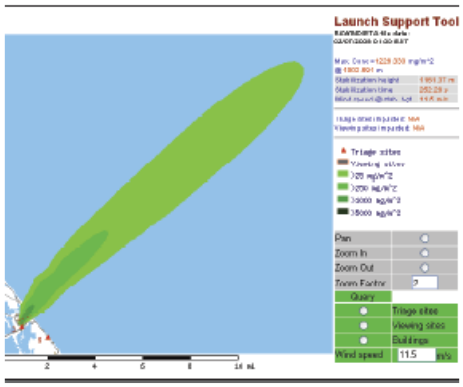
Fee Schedule
Facility use is negotiated on a per-proposal basis.

Earth Systems Modeling and Data Management Laboratory

Laboratory Operator & POCs:
NASA – Steve Brisbin, Mail Stop: TA-C, KSC, FL 32899
Steven.Brisbin-1@nasa.gov, (321) 867-6133
Contractors – Mark J. Provancha
Mail Stop: DYN-6, KSC, FL 32899
Mark.J.Provancha@nasa.gov, (321) 867-8989
William V. Payne, Mail Stop: DYN-6, KSC, FL 32899
William.V.Payne@nasa.gov, (321) 867-8769
Location: Operations and Checkout Bldg. (M7-355)

Description

The Earth Systems Modeling and Data Management (ESM & DM) Laboratory uses emerging technologies to logically warehouse, analyze, synthesize, and visualize data to interpret ecological processes and advance ecological research and environmental management at Kennedy Space Center. The ESM & DM Laboratory



provides expertise in graphical information systems (GIS), image processing, Global Positioning System (GPS), environmental modeling, and the Environmental Database Management System (EDMS), an enterprise Oracle relational database. It maintains nearly a terabyte of environmental data from over 27 years of monitoring and research at KSC on water quality, terrestrial vegetation, sea grass, Florida manatees, sea turtles, scrub jays, wading birds, air quality, and weather. In addition, key Space Transportation System (STS) launch monitoring data is provided to support NASA Safety and Operations. Efforts during the past few years have predominantly addressed the logical warehousing and archiving of several long-term environmental data sets, as well as miscellaneous short-term projects. The ESM & DM Laboratory provide user-friendly tools to access and view data within the EDMS, allowing data export to a customized Graphical Data Screening Tool (GDST) for rapid access, viewing, and analysis.

Laboratory Services

- Systems administration (Unix Solaris 10.0, Linux Red Hat REL5)
- Database design, administration, and warehousing (Oracle 10.2 Enterprise Server, Postgres SQL 8.0.1, MS Access) and data warehousing support
- Image analysis, GIS development, spatial-temporal analyses, and simulation modeling
- GPS technology
- Web development

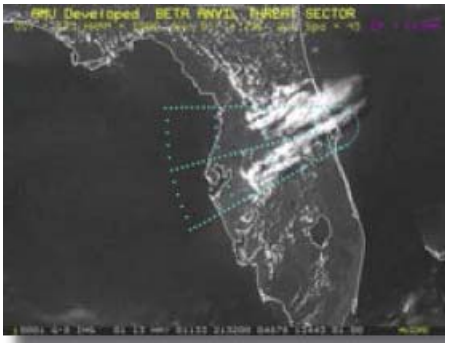
Fee Schedule

Facility use is negotiated on a per-proposal basis.

Applied Meteorology Unit (AMU)

Laboratory Operator & POCs:
NASA – Dr. Frank Merceret, Mail Stop: KT-C-H, KSC, FL,32899
Francis.J.Merceret@nasa.gov, (321) 867-0818
Contractor – Dr. William H. Bauman, III
Mail Stop: AMU, KSC, FL 32899
Bauman.Bill@ENSCO.com, (321) 853-8202
Location: Range Operations Control Center Bldg. at Cape Canaveral Air Force Station

Description



The Applied Meteorology Unit (AMU) develops, evaluates, tailors, and transitions technology to improve weather support to spaceport and range operations. It is operated under a joint NASA – Air Force – National Weather Service Memorandum of Understanding. Relevant technologies include meteorological instrumentation; atmospheric data analysis; weather forecasting algorithms and indices; and numerical weather prediction, data assimilation, and modeling. The AMU personnel encompass a broad range of

expertise, including computational fluid dynamics, computer programming, data analysis and statistics, instrumentation, and weather support to spaceport and range operations.

Laboratory Services

- Development of weather forecasting algorithms, indices, and tools
- Evaluation of meteorological instrument performance
- Evaluation, custom-tailoring, and operational transition of numerical weather prediction systems
- Development of concepts of operation for optimal application of instruments, tools, and models
- Development of training tools and materials for weather sensors, models, and data systems
- Development of data analysis techniques, databases, and data visualization methodologies
- Expert advice on the acquisition and deployment of meteorological instrumentation and modeling systems
- Expert advice on transitioning newly developed or acquired products into operation

Fee Schedule

Facility use is negotiated on a per-proposal basis.