Approved: February 14, 2011
Date

MINUTES OF THE HOUSE APPROPRIATIONS COMMITTEE

The meeting was called to order by Chairman Marc Rhoades at 9:10 a.m. on February 4, 2011, in Room 346-S of the Capitol.

All members were present except:
Representative Kelley - excused

Committee staff present:
Jim Wilson, Office of the Revisor of Statutes
Nobuko Folmsbee, Office of the Revisor of Statutes
Jarod Waltner, Kansas Legislative Research Department
Shirley Morrow, Kansas Legislative Research Department
Kathy Holscher, Committee Assistant, Appropriations Committee

Others attending:
See attached list.

- Attachment 1 — NIAR Executive Summary
- Attachment 2 — NCAT Equipment Report
- Attachment 3 — Kansas Aviation Industry: Economic Outlook

Chairman Rhoades made a motion to introduce legislation regarding budget publications for cities and counties that would allow the option to use local newspapers or internet services. The motion was seconded by Representative Gordon. Motion carried.

Representative Kleeb made a motin to introduce legislation regarding purchasing guidelines. The motion was seconded by Representative Brown. Motion carried.

Representative Colloton reviewed the conents of a bill introduction that would would not reduce the base state aid per pupil but would redefine "At Risk" children, and would be a savings of $100 million. She stated that the poverty money would remain the same through the third grade, fourth through eighth grade would have the same weighting for students who are not proficient in Math and/or Reading, and this weighting would also apply from eighth through high school age students.

Represenative Mast made a motion to introduce legislation that would redefine At Risk. The motion was seconded by Representative Denning. Motion carried.

Chairman Rhoades stated that the NIAR Executive Summary, (Attachment 1), and the NCAT Equipment Report, (Attachment 2), has been distributed to committee members. He introduced John Dieker, Vice-President, Bombardier Learjet.

John Dieker, Vice-President, Bombardier Learjet, presented an overview on the Kansas Aviation Industry's Economic Outlook, (Attachment 3). He stated that the Kansas aviation industry is approximately 22% of the state's workforce and exports are continuing to increase. Global competition is a concern and he emphasized the need to sustain our competitive advantage through increased technology, research and training.

Vice-President Dieker, responded to questions from committee members. He discussed components of a positive business environment to encourage job growth. As requested, additional information regarding the tax limitations on delivery of product will be provided. He noted that a position paper is being prepared and should be ready for the committee next week.

John Tomlin, Director, NIAR, responded to questions from committee members regarding the replication of NIAR in the Oklahoma area. He noted that collaborative efforts are underway with SPIRIT. He discussed the establishment of repair projects that could be available in service centers throughout the country. Director Tomlin stated that Kansas is rated fourth in the nation in aereospace research.

Meeting adjourned at 9:48 a.m.

Marc Rhoades, Chairman

APPROPRIATIONS COMMITTEE GUEST LIST

DATE: 2-4-11

NAME	REPRESENTING
Leigh Keck	Capitol Strategies
Tom Bruno	WATC

NIAR

RESEARCH / DESIGN / TESTING / CERTIFICATION

N-I-S

NIAR – Industry – State Research Program

Executive Summary

December 2010

Appropriations Committee
Date February 4, 2011
Attachment 1

Table of Contents

Appropriations Committee
Date February 4, 2011
Attachment 1-2

NIAR/Industry/State (NIS) Aviation Research Program

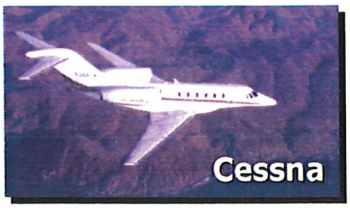
Program Summary – December 2010

The Kansas aviation industry is pleased that the Governor and Kansas Legislature have maintained their focus on economic growth in Kansas. Boeing, Bombardier-Learjet, Cessna Aircraft, Spirit AeroSystems, and Hawker Beechcraft account for a significant portion of the gross domestic product of the state and have a vested interest in initiatives that help maintain and grow their contribution to the state economy. By 2016 it is forecasted that 16.1% of all wages earned in Kansas will be attributable to the aviation industry.

The importance of the existing aviation industry on the Kansas economy is noted below by the following 2009/2010 statistics:

- ~$7.1B annual economic impact, leading the nation with $2,561 per capita contribution (twice that of the next most competitive state)
- Industry leading OEM's such as Cessna, Bombardier Learjet, Hawker Beechcraft, Airbus (Engineering) and Boeing (Military)
  - Kansas GA OEM's shipped 1,708 airplanes worth $5.8B with exports accounting for 537 airplanes or $2.3B (40%)
- Kansas aviation companies deliver over 50% of all GA aircraft employing 17.8% of all Kansas manufacturing employees
  - Aerospace products and parts employment represents 19.8% of all Kansas manufacturing employees.
- Each Kansas taxpayer saves $525 in taxes paid in Kansas as a result of the aviation industry
- Each aviation job generates an additional 3.7 jobs

Appropriations Committee
Date February 4, 2011
Attachment 1-3.



Today, the aviation industry must compete in a global economic environment far different from that of the past. New challenges to our leadership are arising from aircraft manufacturers in Europe, the Pacific Rim, and Brazil. For example, the commercial airplane industry must now compete against the European union (13 countries). Furthermore, new foreign government-supported research and test facilities, particularly in Europe, are attracting business from United States aircraft companies because of availability, quality of results, rapid response and low cost.

To address this competition, the nation's research and development base in aircraft design and manufacturing must be expanded in partnership with the aviation industry and state governments. It is through research and the application of new technology in aerodynamics, materials, structures, sensors, and safety that the U.S. will be able to maintain its leading position in aviation in the 21st century.

The NIAR/Industry/State (NIS) program was created in FY 2003 to aid the aerospace industry in Kansas and enable technology that allows the Kansas aviation industry to compete in a global economic environment. The program was funded by the State Legislature as a result of an industry campaign. It is executed by industrial representatives through an executive committee comprised of representatives from Boeing, Bombardier-Learjet, Cessna, Hawker Beechcraft and Spirit AeroSystems. WSU representatives on the executive committee consist of J. David McDonald (Assoc. Provost for Research) and John Tomblin (National Institute for Aviation Research) who collectively serve in an

advisory role for the industry executive committee with respect to university polices and procedures.

Each program year the industry's most pressing problems are identified by industry representatives on the executive committee, and are matched to existing expertise within NIAR. Each project is conducted with a fixed budget, definite deliverables, and a one-year schedule. The researchers work closely with industry representatives who serve as points of contact and monitor the progress of the research.

The NIS program is structured differently than traditional research program in that the deliverables are more focused towards keeping the Kansas aviation companies competitive by rapid insertion of technology, reduced time-to-market , recued cost and increased quality and safety. Due to these specific goals, the Principle investigators (PIs) on each project agree to the following:

(1) Most NIS projects are proprietary in nature and therefore publication opportunities may have to be negotiated with the aviation companies.
(2) Each project will be assigned a primary industry contact who will develop and monitor the project. Weekly or biweekly meetings with the industry project contacts will be required for each project. The executive committee has also assigned a NIS Liaison to forward briefing information to the executive committee. Regular briefing meetings will be held with the NIS Liaison and it is the responsibility of the principal investigator to brief the liaison, as he/she will represent each project to the executive committee.
(3) Budgets developed under the NIS program will not be charged University research overhead due to State funding. Routine research expenditures such as release time, summer salary, post docs, graduate/undergraduate students, laboratory fees and materials and supplies will be typical in the budget developed for the project. Limited equipment purchases and travel will be allowed for the project but must be approved by the executive committee and industry monitors and must be directly related to the successful project outcome.
(4) The industrial executive committee will periodically review each project and reserves the right to discontinue or reduce funding for nonperformance or lack of expenditures. PIs are required to submit monthly expenditure reports on the project.

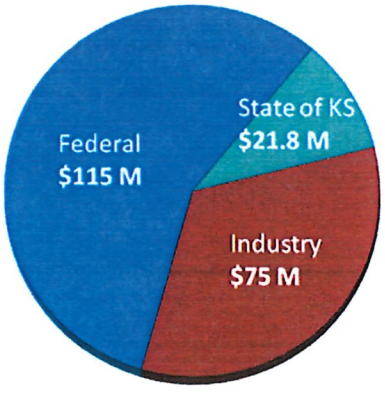
In 2003, 2004, 2005, and 2006 the Kansas Legislature and the Governor approved $1M, $2M, $2M, and $2M, respectively, for aviation related research to support future products. In 2007, the Kansas aviation industry requested a second initiative for enhanced funding over a five-year period, which was funded at $4.75M, $5M, $4.9M, and $4.75M respectively, in 2007, 2008, 2009, and 2010. In 2011, the industry is requesting the fifth year of funding of $10M to support research and technical support in the areas of:

- Composites and Advanced Materials Applications
- Aircraft Icing
- Environmental Effects on Aircraft Operation
- Advanced Manufacturing Techniques
- Crash Dynamics and Crash Safety
- CAD/CAM Applications and Design
- Advanced Joining

These research projects will help the Kansas aviation industry reduce cycle time-to-market, reduce costs, enhance quality and safety for improved competitiveness, and retain and create jobs. Based upon the report by the Commission on the Future of the United States Aerospace Industry, Wichita was cited as having the largest concentration of aerospace and aviation industry jobs in the nation, accounting for one out of every five jobs. While Boeing, Bombardier-Learjet, Cessna, Hawker Beechcraft and Spirit AeroSystems dominate employment in south central Kansas, there are 1,800 smaller manufacturing shops in the 13-county region surrounding Wichita. Economists estimate that there are 2.9 jobs outside aerospace for every direct job within aerospace.

The primary purpose of the program is to transition research directly onto the production floor but it has also been instrumental in attracting federal funding dollars and industry contract dollars into the State. As of the fiscal year end of 2009, this program has generated a 9:1 match with respect to the State dollars invested

Research Investments
2003-2010
$211.8 Million



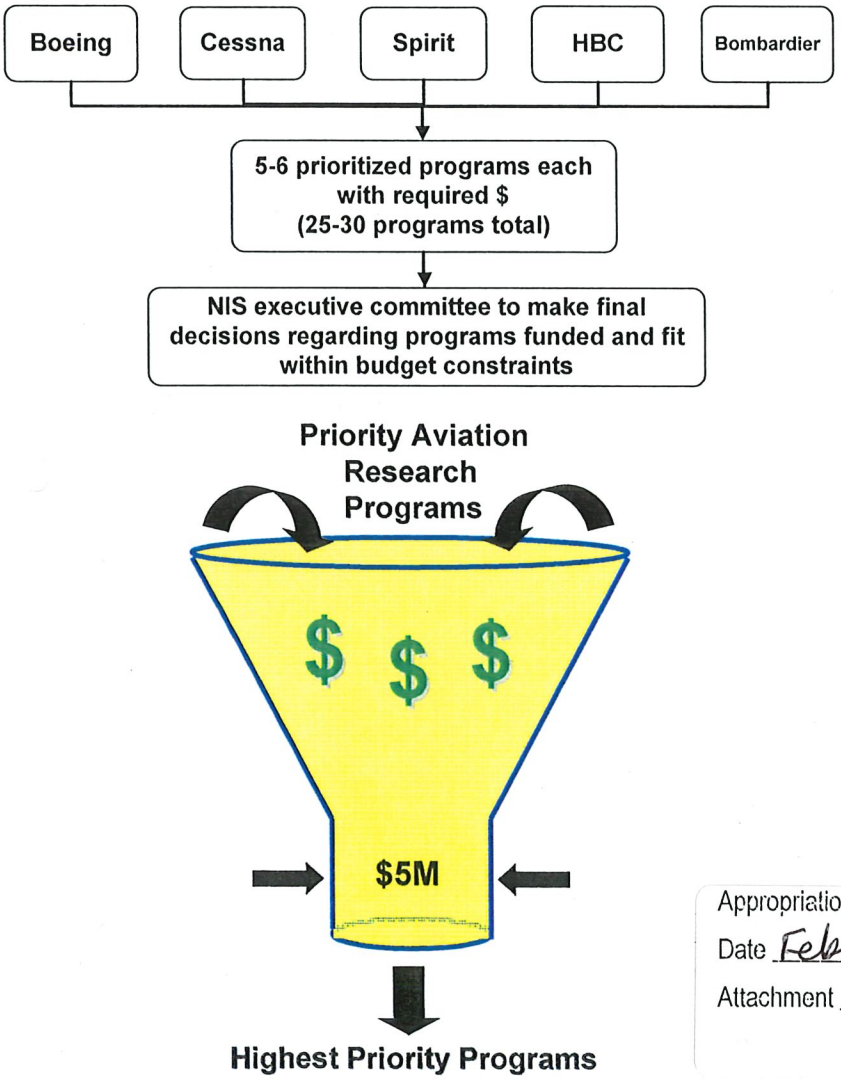
9:1
return
on investment

Appropriations Committee
Date February 4, 2012
Attachment 1-6

Program Protocol Procedures

The protocol which the executive committee follows is based upon each industrial representative presenting 5-6 high priority research project within their company and sharing with the total group. These projects are summarized in a combined list and discussed among the executive committee which projects have overlap and may be combined, which projects bring the highest return on investment (from providing the greatest competitive advantage for the Kansas aviation cluster) and which projects could achieve specific goals in the required time frame. Budgets are also placed with each project. Based upon the funding provided by the State legislature, the project listing is trimmed or rescaled to fit within the NIS budget year as well as the allowable funding. The following figures depict this process.

NIS Funding Protocol



Appropriations Committee
Date February 4, 2011
Attachment 1-7

DETAILED PROGRAM REVIEW FOR 2011

The following sections provide a listing of each project funded by the NIS executive committee for program year 2010 along with a brief project description and a listing of the categorized expenditures incurred by each specific project.

A summary listing is provided for NIS funding years of 2004-2010.

Appropriations Committee
Date February 4, 2011
Attachment 1-8

Research Topics for 2011

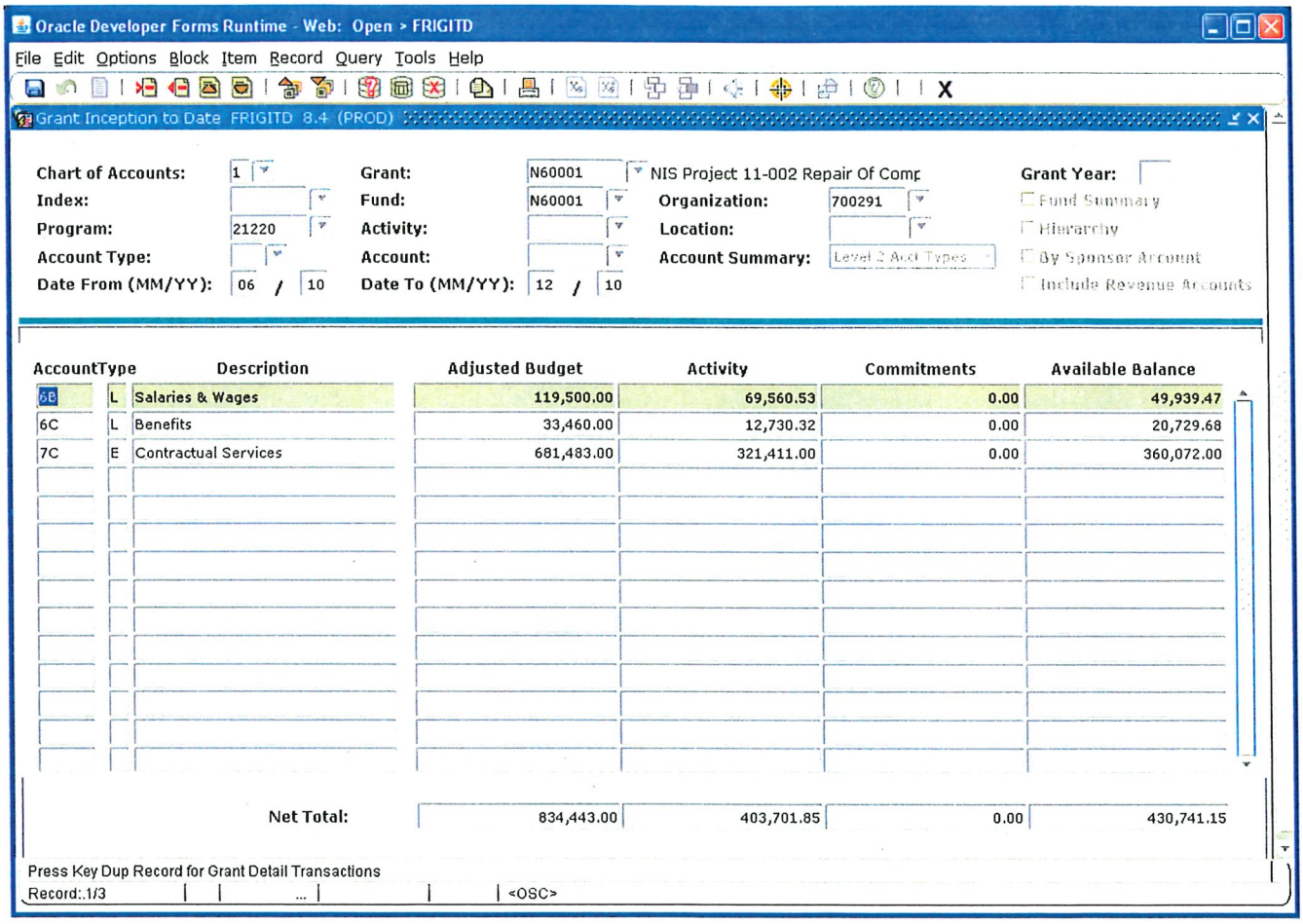
Project	Title	PI	FY 2011 Budgeted Funding
11-002	Repair of Composite Structures (including sandwich)	Salah	$834,443
11-003	Blind or One-Sided Fastener Usage in Composite Structures (Production and Repair Applications)	Raju	$150,000
11-019	Quiet Interiors Development	Hoffman	$189,721
11-011	Adhesive Joint Characterization and Testing	Aldag	$439,721
11-017	Composite Bearing Allowables Baseline	Seneviratne	$189,721
11-026	Electromagnetic Characterization of Composite Fuselages	Skinner	$160,000
11-030	Effects of Manufacturing Defects on Composites Materials (NDI Development)	Aldag	$289,721
11-031	Engine Inlet Ice Protection System	Papadakis	$100,000
11-032	Influence of Environmental Knock-down Factors in Composite Design Structural Margins	Tomblin / Seneviratne	$250,000
11-037	Acoustical impact to composite sandwich structures (dampening, core shear and thermal)	Sharma	$70,839
11-039	Simulation and modeling of bird strike testing	Olivares	$132,500
11-040	Large Scale Tooling Prediction for Composite Structures	Minaie	$250,000
11-042	Thermal Effects of Paint on Composite Structures	Tomblin/Lovingfoss	$100,000
11-043	Virtual Environment Study (including ECS systems - CATIA to VR)	Toledo	$200,000
11-044	Legacy Domain and Data Knowledge Preservation	Malzahn	$125,000
11-045	Ground Deice Fluid Equivalency (Papadakis)	Papadakis	$200,000
11-046	Fastened Joint B-Basis Allowables	Salah	$150,000
11-047	Stacked Drilling of Composites and Titanium	Krishnan	$200,000
11-048	Mechanical and Microstructural Property Evaluation of Joined and Deposited Titanium Structures	Burford	$200,000
11-049	Damage Growth of Fluid Ingression in Sandwich Panels	Seneviratne	$239,721
11-050	Laminate Level testing 5330	Seneviratne	$500,000
11-051	Modeling Direct Effects of Lightning		$0
N50019	Administration / Liaison		$25,000
			$4,996,387

Appropriations Committee
Date February 4, 2011
Attachment 1-9

FY 2011 Project Descriptions and Expenditures

Repair of Composite Structures (including sandwich)

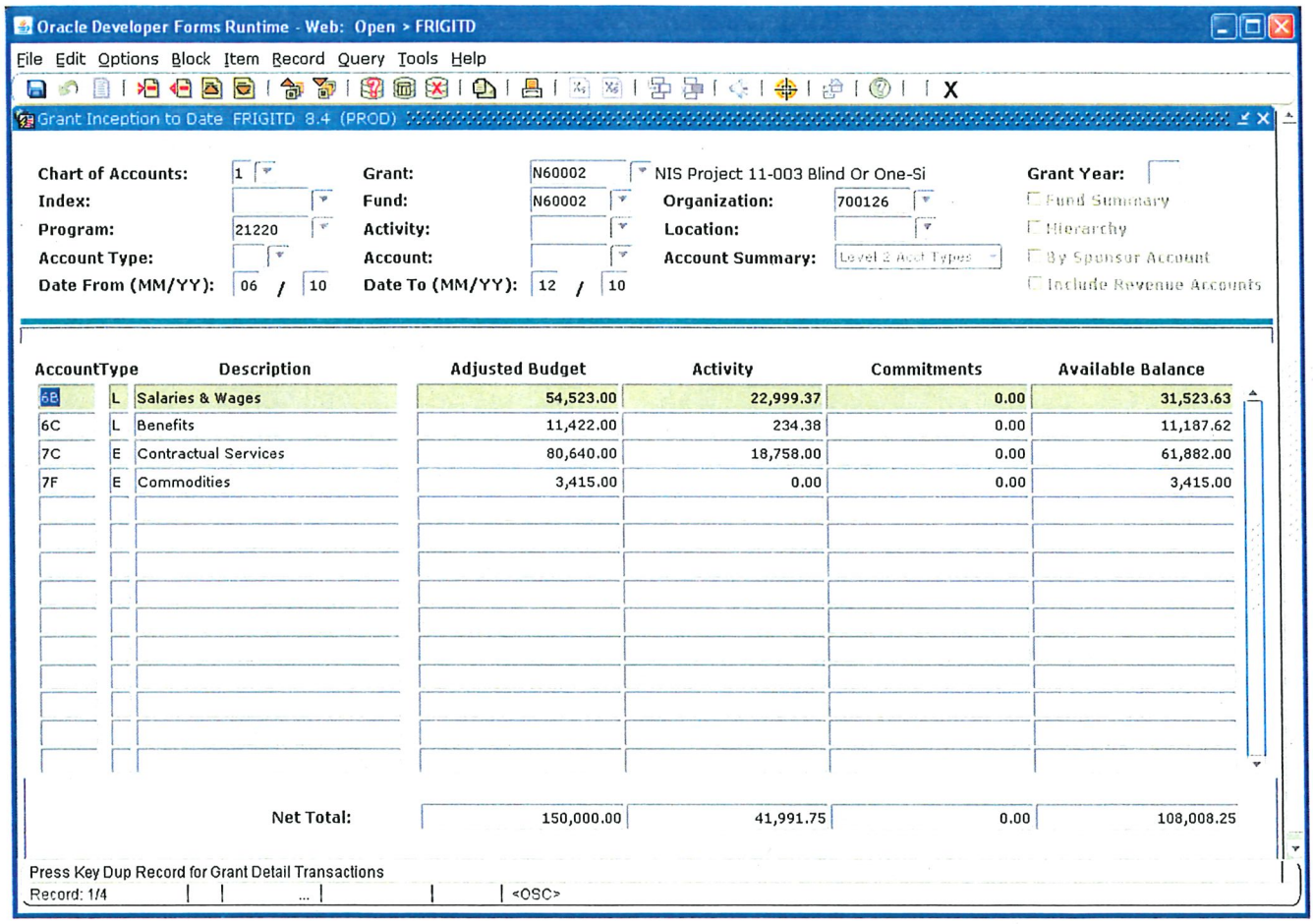
Composite structures can be damaged during construction, maintenance, or by normal use. This project was concerned with assessing such damage and developing durable repairs to insure structural integrity.



Appropriations Committee
Date February 4, 2011
Attachment 1-10

Blind or One-Sided Fastener Usage in Composite Structures (Production and Repair Applications)

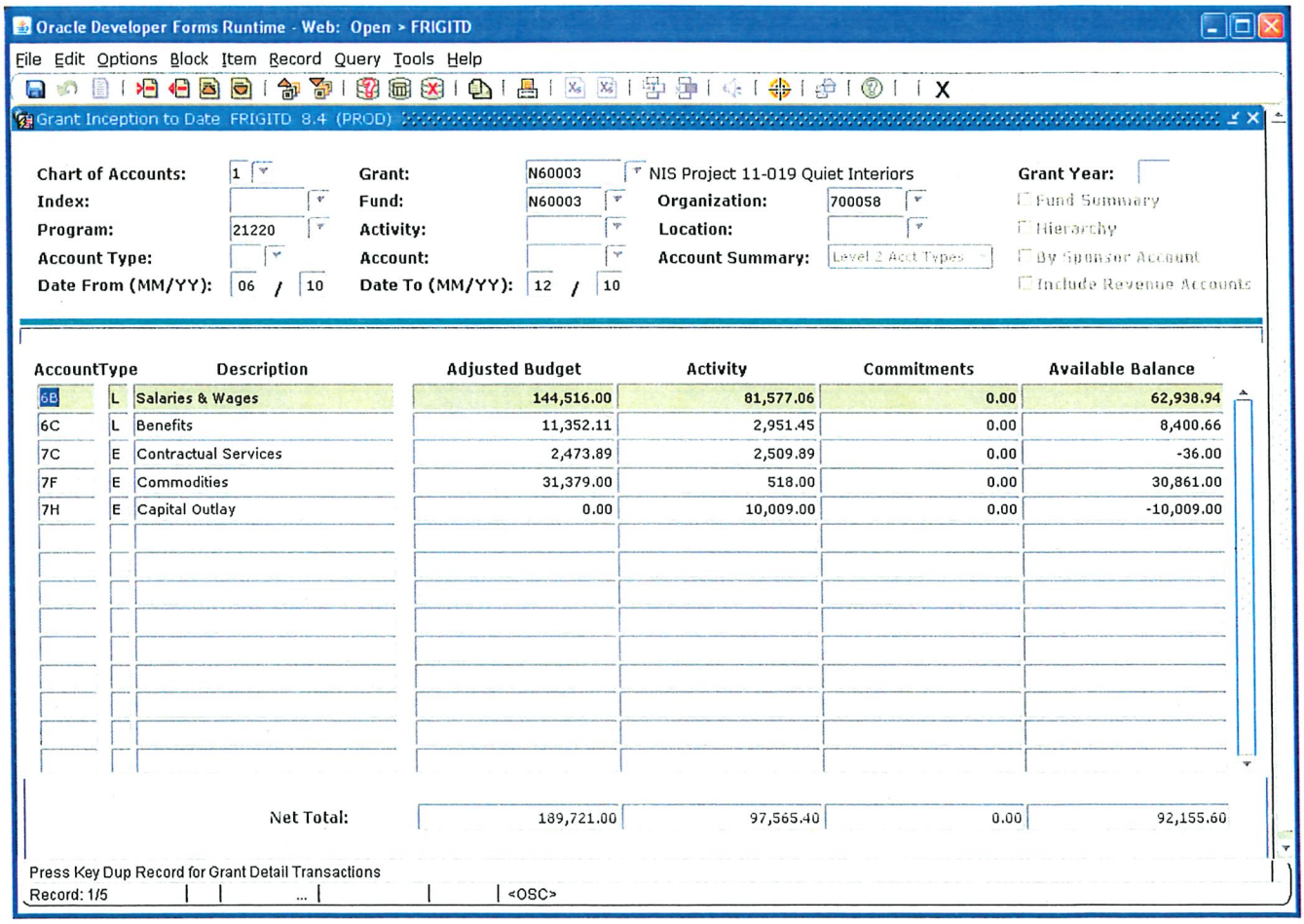
The use of fasteners in aircraft constrained by accessibility to one side of a joint were reviewed with regard to installation processes, hole quality, corrosion, and performance under fatigue loading.



Appropriations Committee
Date February 4, 2011
Attachment 1-11

Quiet Interiors Development

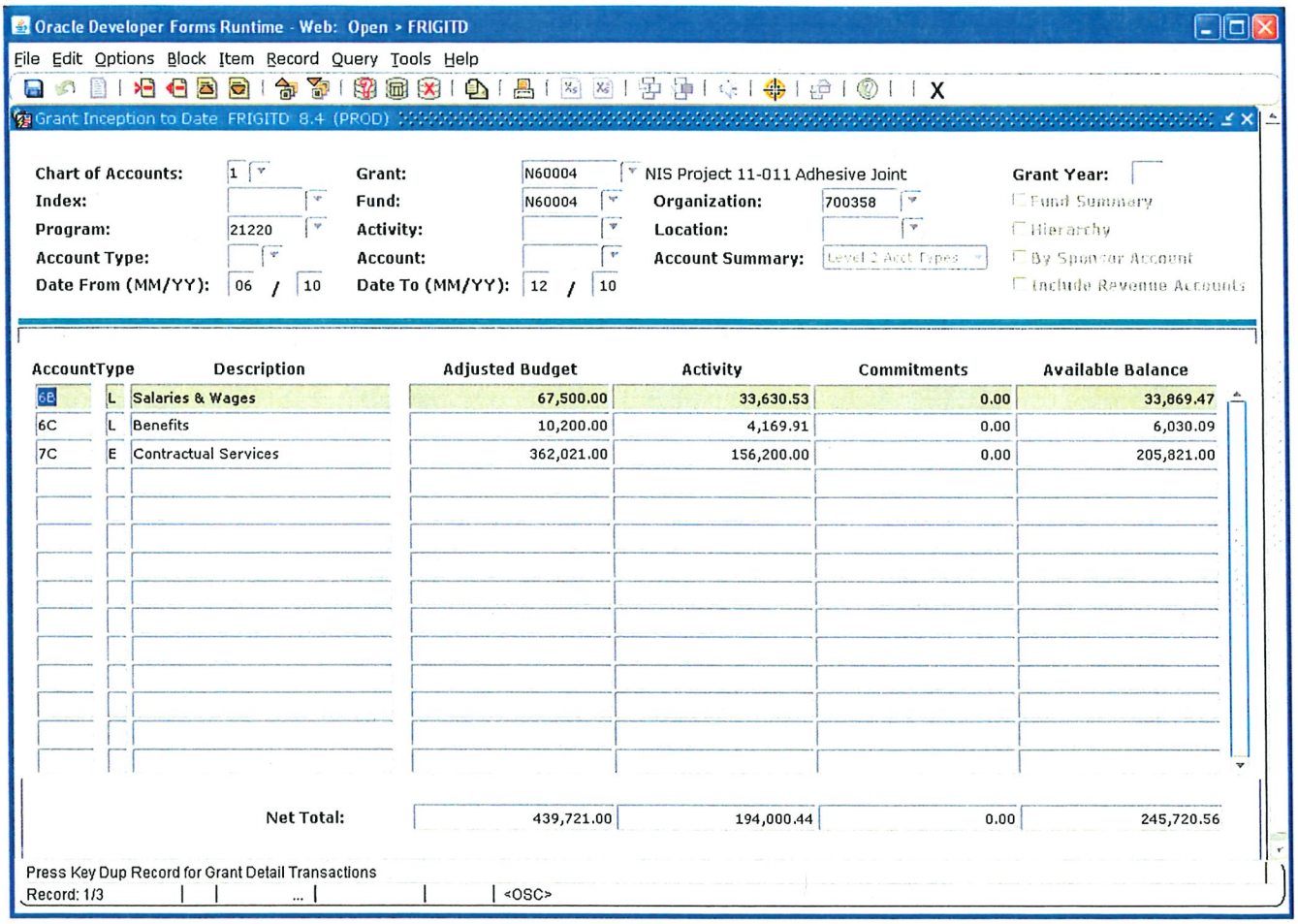
The turbulent boundary layer (TBL) is the dominant noise source at cruise in modern aircraft. It is necessary to better understand this source of noise to design effective noise control treatments. This project will conduct large scale computational fluid dynamics (CFD) simulations as one means of better understanding this source of noise.



Appropriations Committee
Date February 4, 2011
Attachment 1-12

Adhesive Joint Characterization and Testing

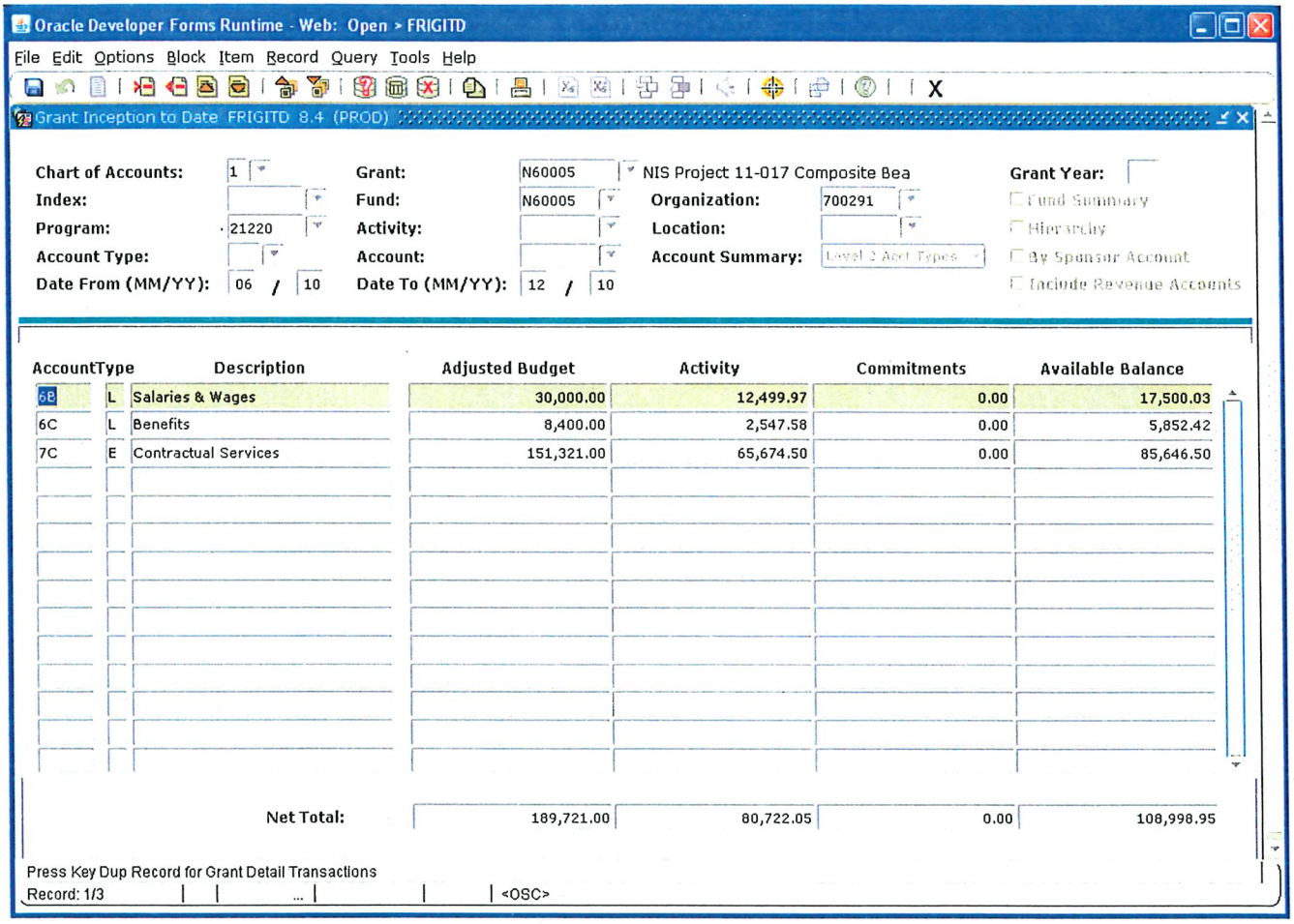
This investigation addressed defects that could occur in adhesively bonded joints during the manufacture or operation of the joints. Environmental durability of adhesive joints was also tested.



Appropriations Committee
Date February 4, 2011
Attachment 1-13

Composite Bearing Allowables Baseline

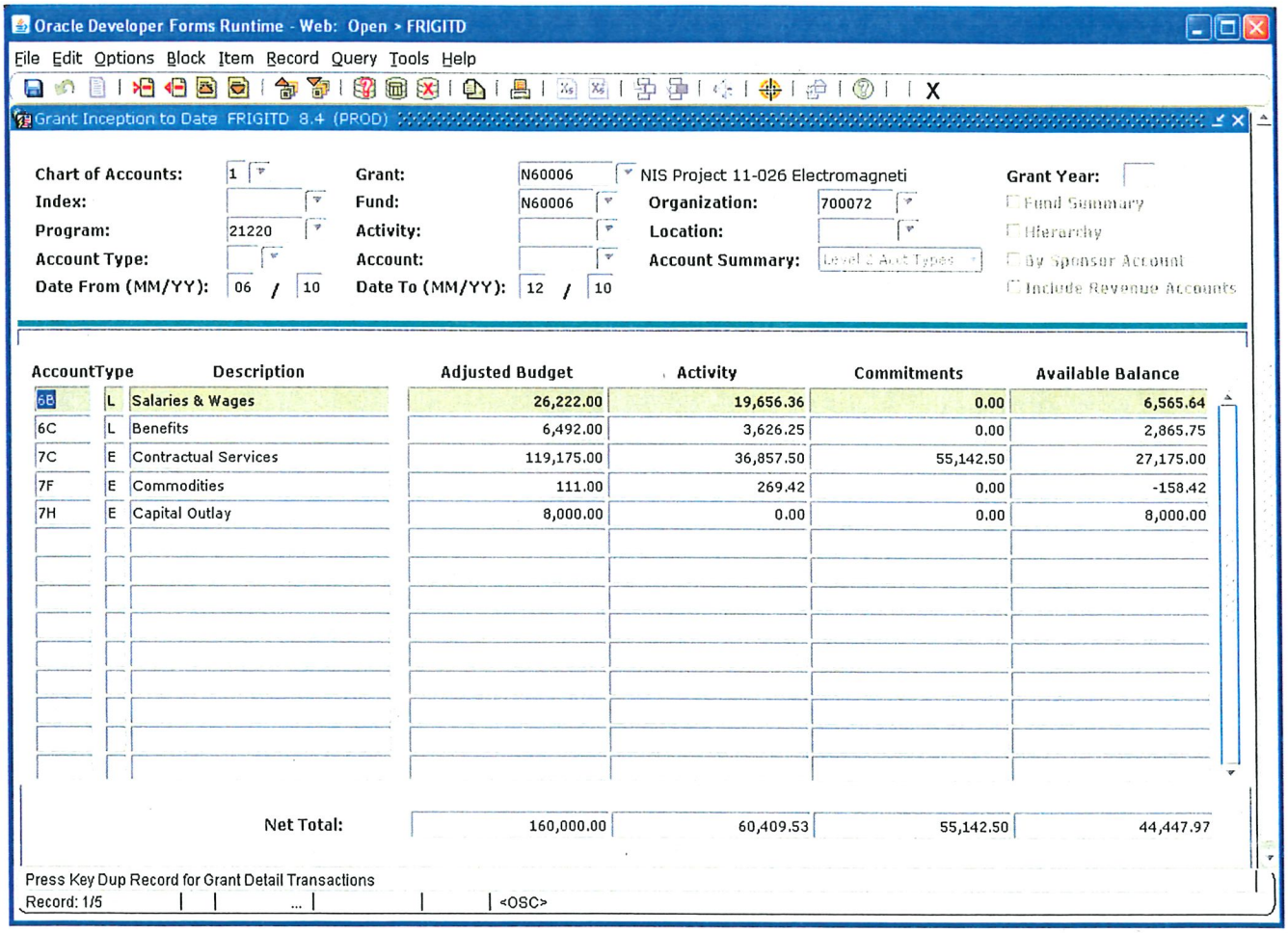
This project will develop methodology of predicting conservative bearing allowables for new design and the means to combine the bearing capabilities of uni-directional and plain-weave laminates.



Appropriations Committee
Date February 4, 2011
Attachment 1-14

Electromagnetic Characterization of Composite Fuselages

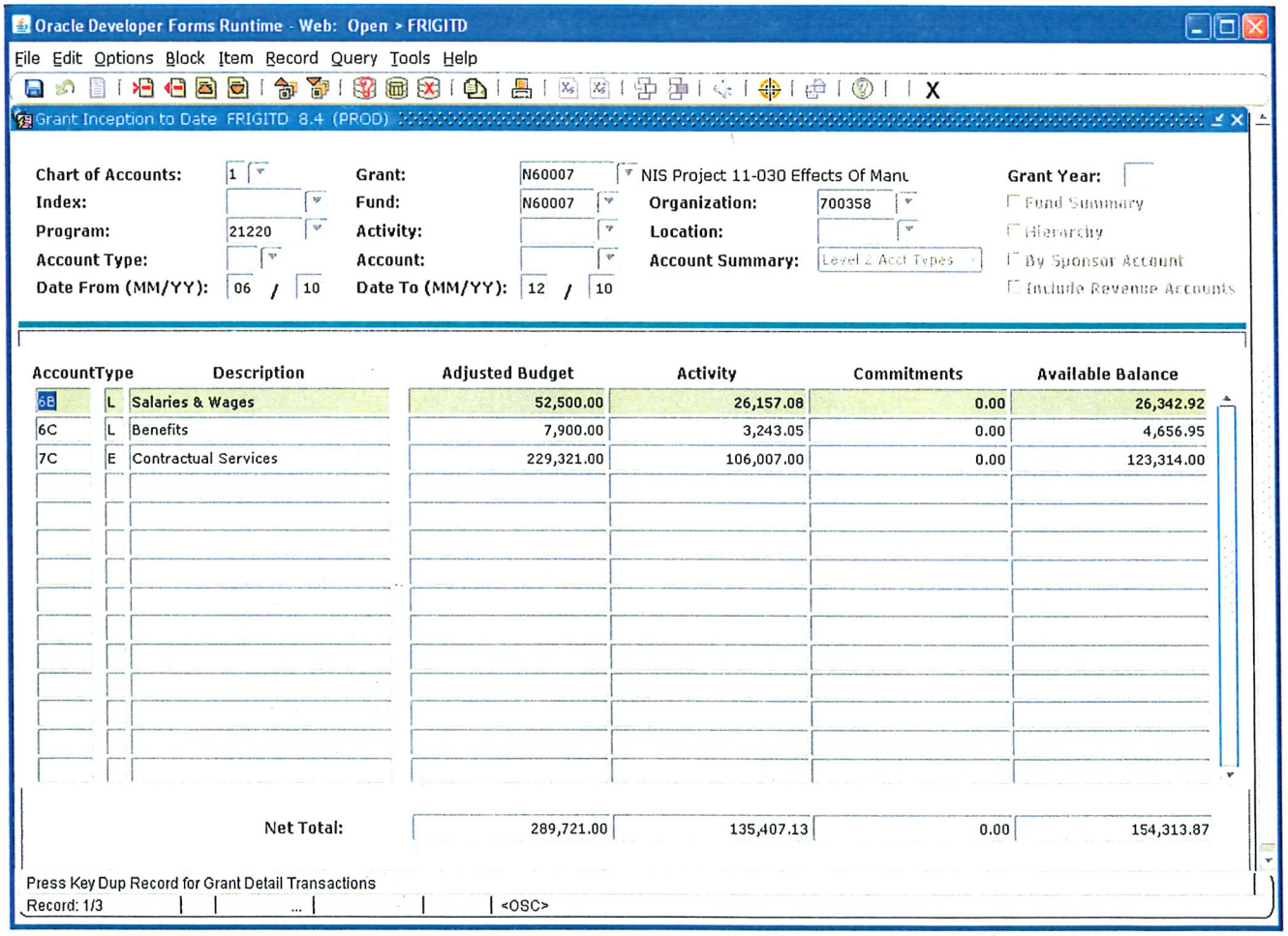
Currently no analytical methods are available for predicting the indirect effects of lightning, therefore extensive and expensive testing is required to show compliance of new designs to FAA requirements. This project will develop a predictive tool correlated with test data to enable the design of robust systems and permit substantial verification with a minimum amount of testing.



Appropriations Committee
Date February 4, 2011
Attachment 1-15

Effects of Manufacturing Defects on Composites Materials (NDI Development)

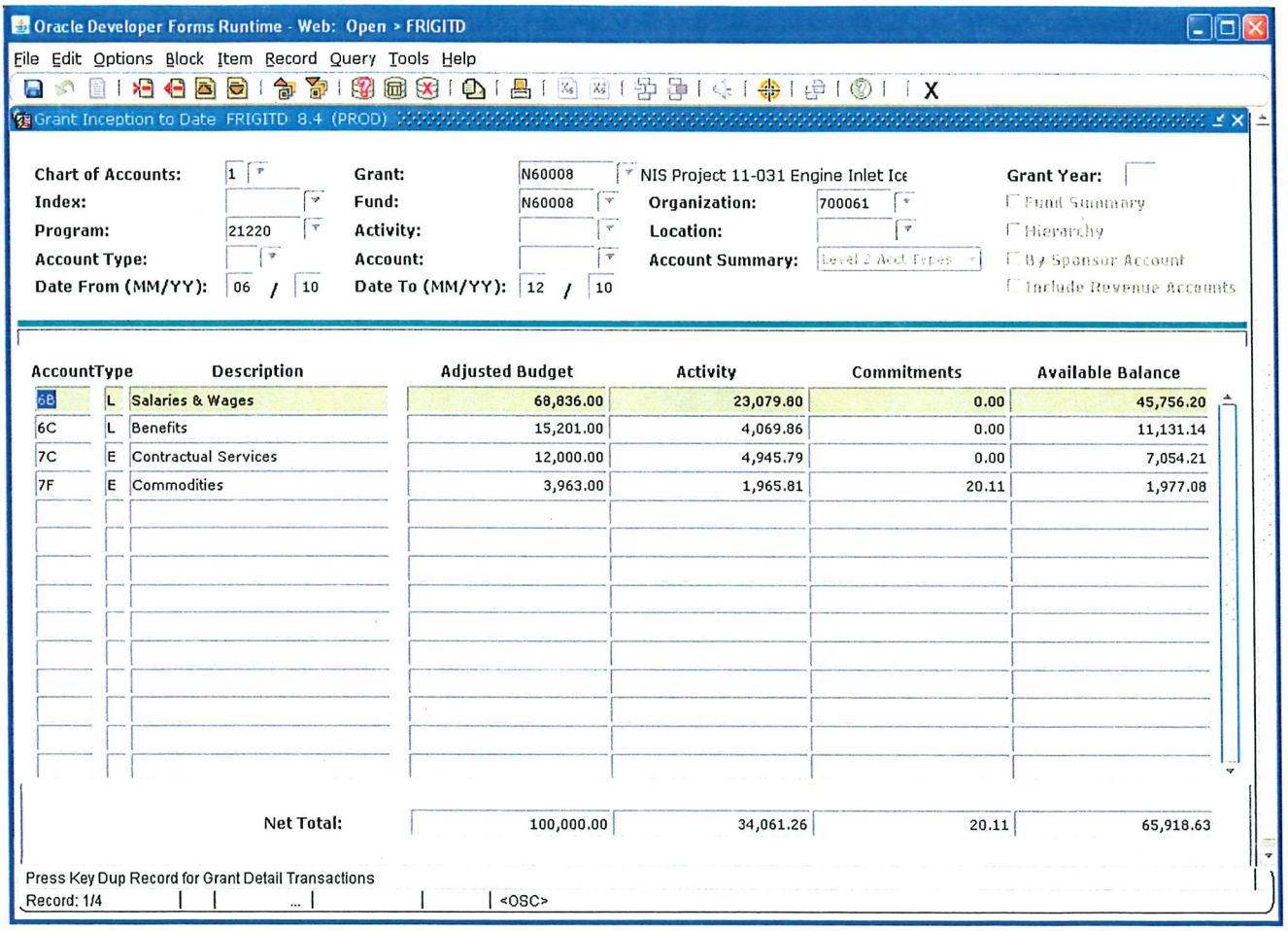
Applications of composite materials in very large, primary structures are becoming commonplace however, defects occurring during the lay-up and cure cycles result in significant rework or worst case, scrap of a part. Understanding the criticality of defect size and density on strength and fatigue properties has the potential to improve manufacturing time and part quality. This project consists of two parts: 1) evaluation and calibration of NDI techniques for determining porosity and 2) understanding the effect of porosity on strength and fatigue properties.



Appropriations Committee
Date February 4, 2011
Attachment 1-16

Engine Inlet Ice Protection System

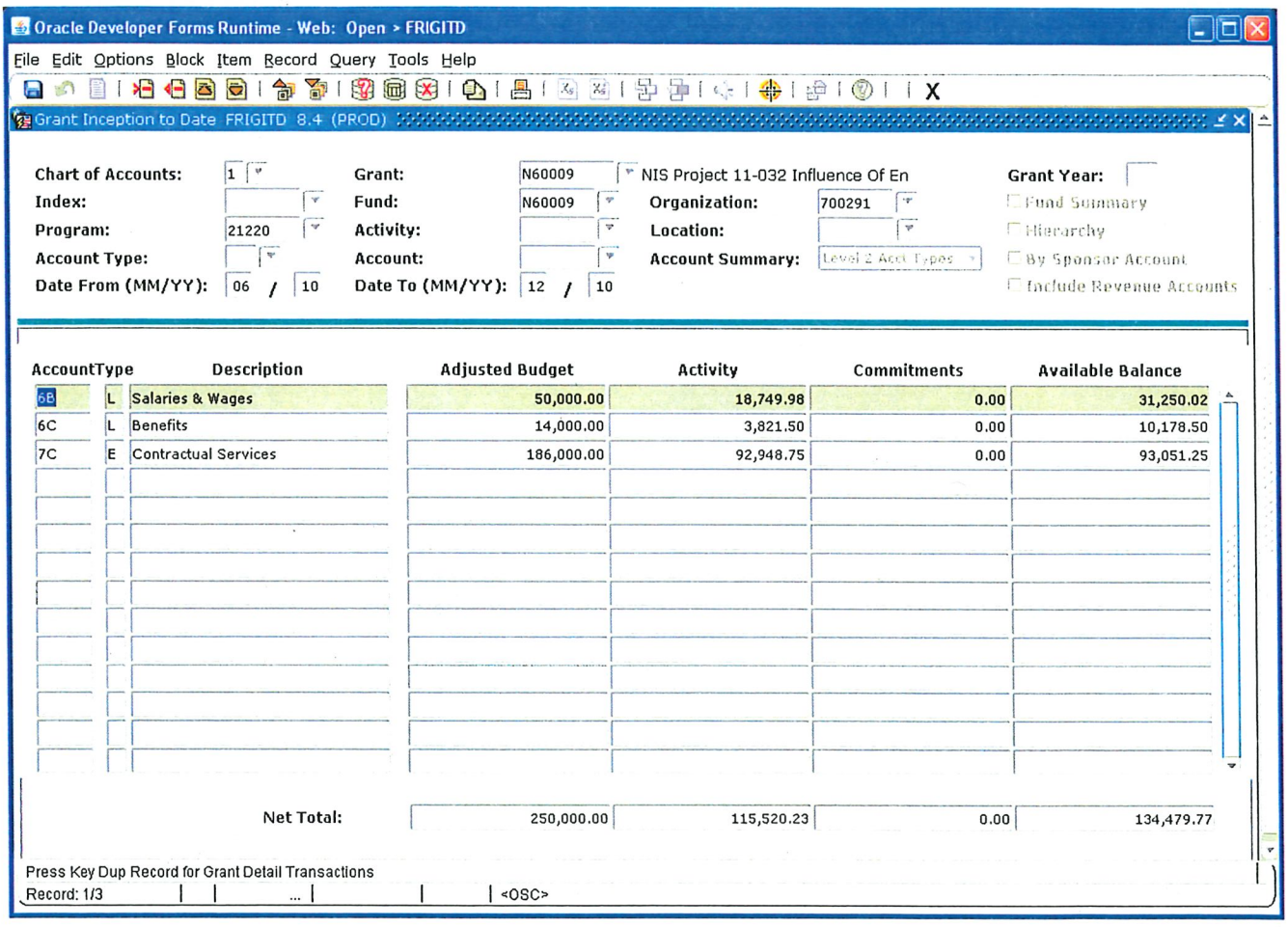
Safe operation of jet engines in icing conditions requires utilization of ice protection systems (IPS) to prevent the formation of ice accretions that would adversely affect engine performance and aircraft safety. This project will focus on the design, fabrication and testing of light weight, low-power Electro-Expulsive and or hybrid ice protection systems that will keep the inlet lip free or nearly free (< 1mm) of ice.



Appropriations Committee
Date February 4, 2011
Attachment 1-17

Influence of Environmental Knock-down Factors in Composite Design Structural Margins

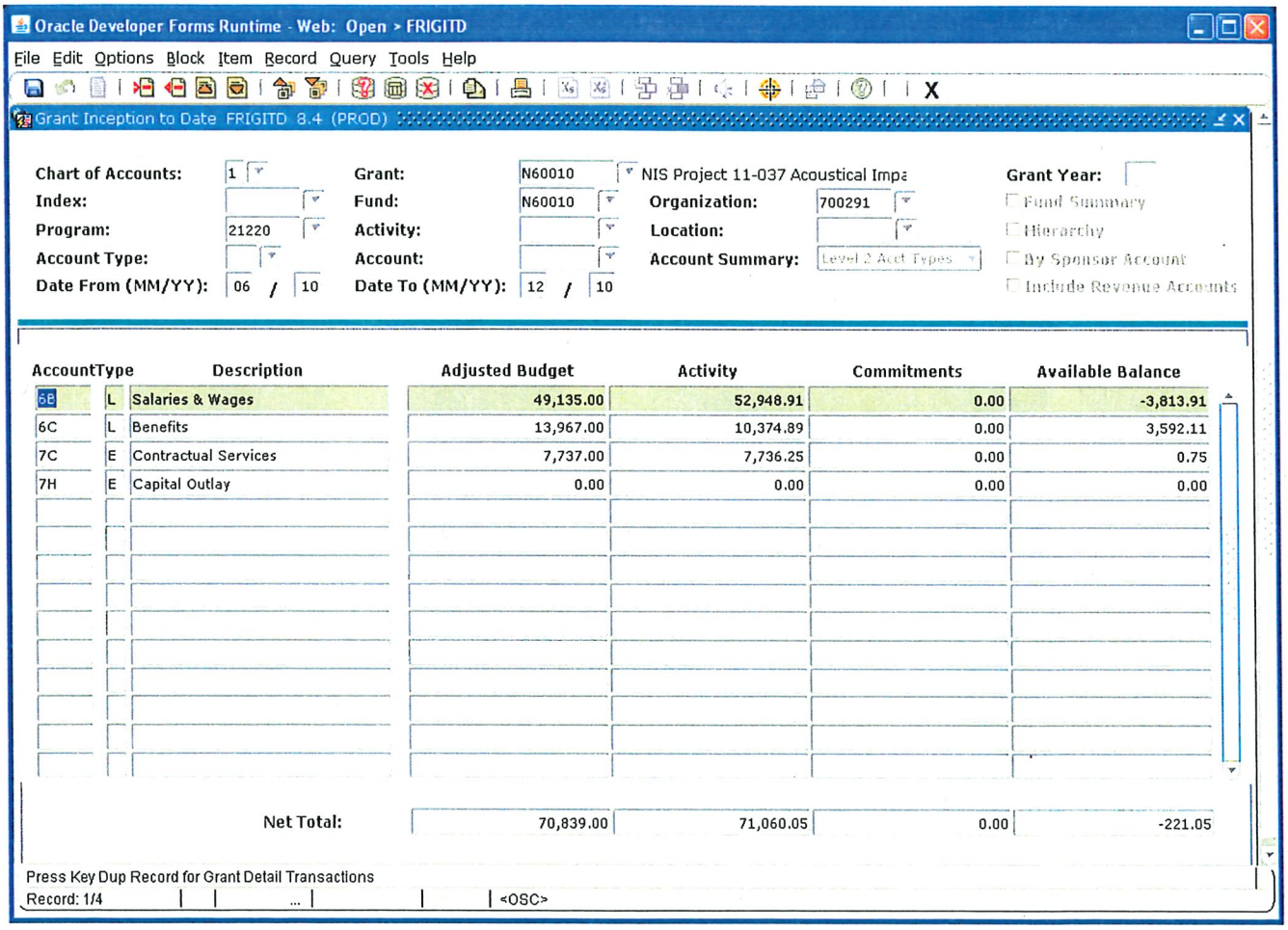
A common problem encountered with composites is their sensitivity to environmental conditions such as temperature and moisture. The current practice for the static test article is to account for these environmental enhancement factors in a manner similar to the load enhancement factor approach. This project will document a procedure for applying environmental enhancement and scatter factors to account for the static test condition environment and provide some results for the effects of environment as related to temperature and moisture.



Appropriations Committee
Date February 4, 2011
Attachment 1-18

Acoustical Impact to Composite Sandwich Structures (Dampening, Core Shear and Thermal)

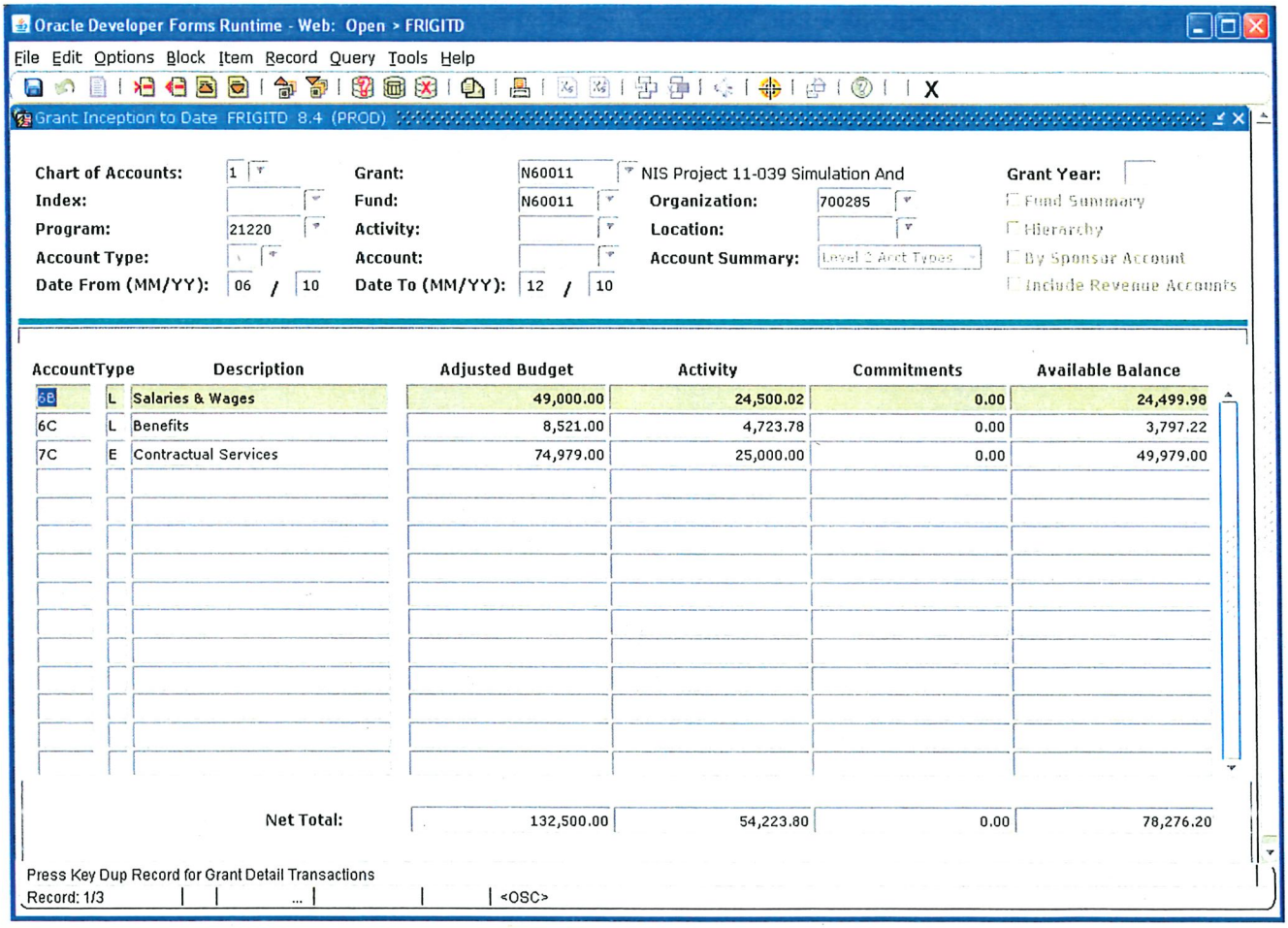
Interior noise in the aircraft cabin is contributed by a variety of sources. Use of composite fuselage structures and floor panels reduces overall weight with increased stiffness while the honeycomb sandwich composite panel is known to have higher radiation efficiency and low coincidence frequency. This results in lower sound Transmission Loss (TL) and hence increased noise levels inside the aircraft. By increasing the core stiffness the sound transmission loss can be increased. An effort to research and procure the available damping, insulation and core materials with varying properties will be made during the initial phase of the project.



Appropriations Committee
Date February 4, 2011
Attachment 1-19

Simulation and Modeling of Bird Strike Testing

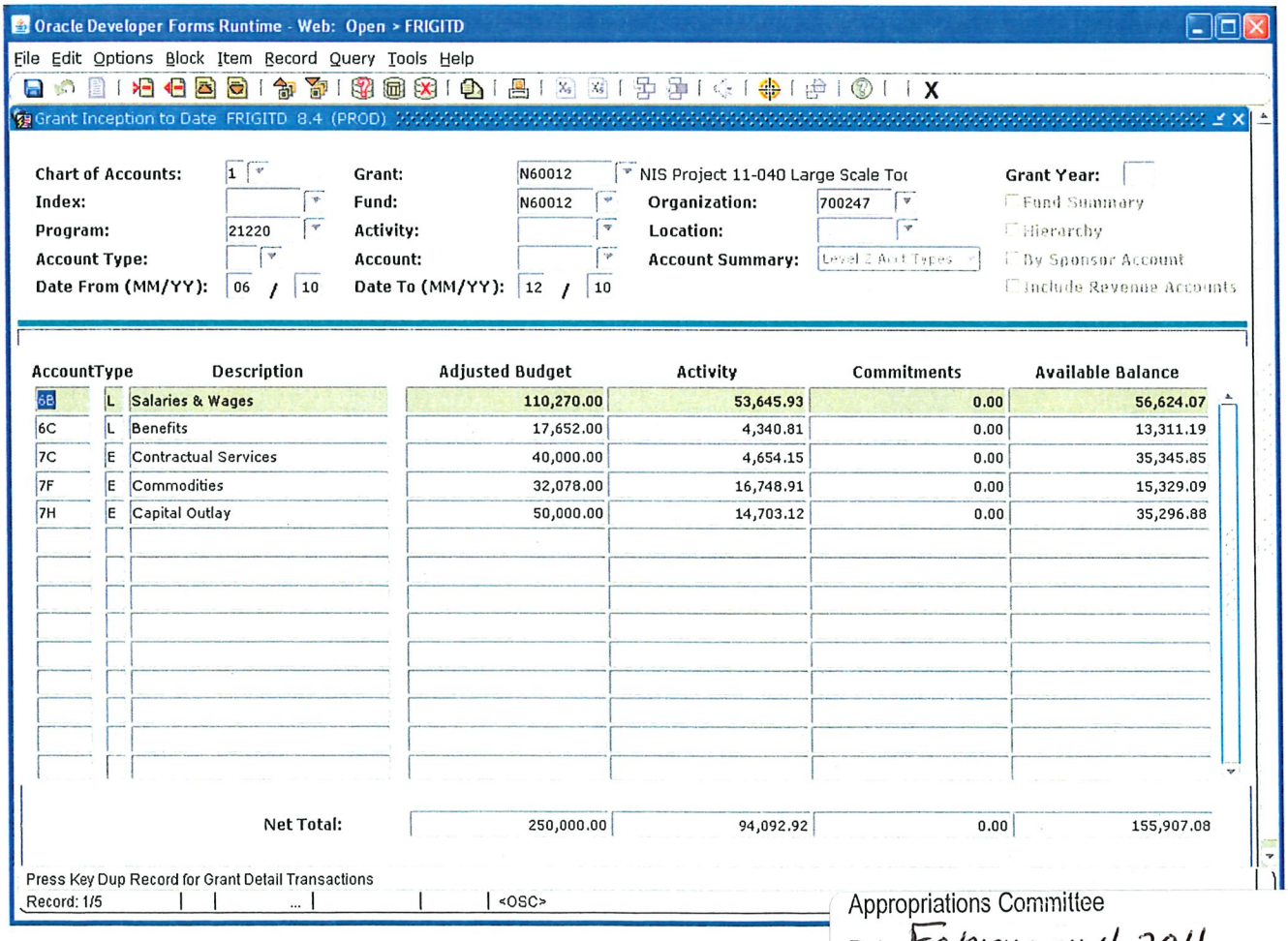
Aircraft are susceptible to bird impacts, mostly during takeoff and landing conditions, on forward facing components such as cockpit windshields and wing leading edges. These components should be capable of withstanding the impact load without causing catastrophic failures or penetration that can cause damage to structural members or pilots and passengers. Significant savings in money and time can be achieved by using state of the art modeling tools rather than expensive, time-consuming full scale testing.



Appropriations Committee
Date February 4, 2011
Attachment 1-20

Large Scale Tooling Prediction for Composite Structures

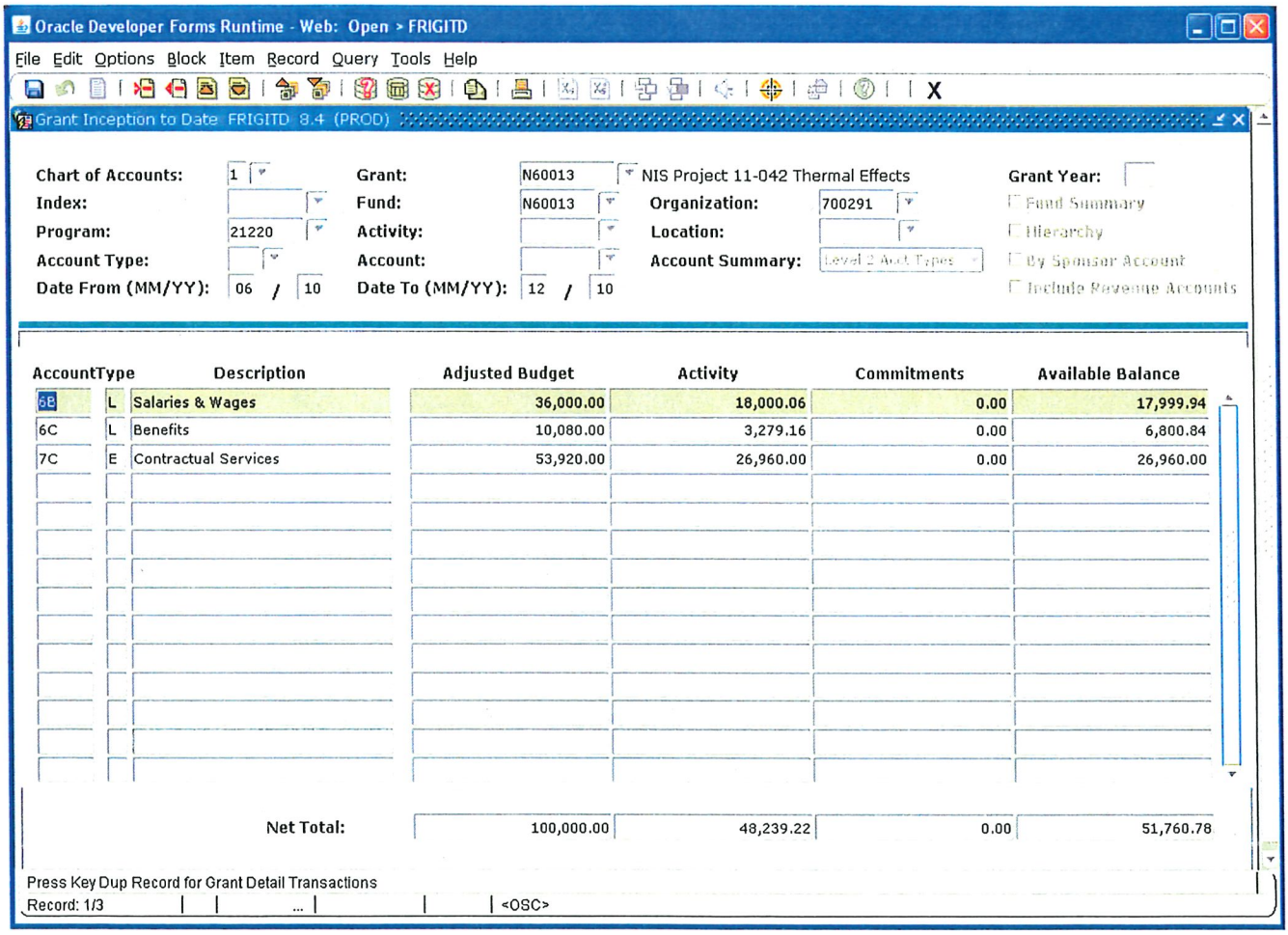
Design and manufacturing of composites with required dimensions has become crucial in the assembly line of polymer-based composite structures. Control over dimensional tolerance in large parts is imperative in order to effectively assemble and integrate composite systems. Failure to control the dimensional tolerance may result in uneven composite assemblies that must be either repaired or rejected. A typical approach used to reduce the distortion of composites is to compensate for the distortion by modifying the shape of the tool in the tool design phase. This approach requires a costly trial-and-error period where different molds have to be physically made and tested until the desired final dimensions of the composite part are achieved. In contrast to this costly method, simulation can be utilized to predict the final part shape.



Appropriations Committee
Date February 4, 2011
Attachment 1-21

Thermal Effects of Paint on Composite Structures

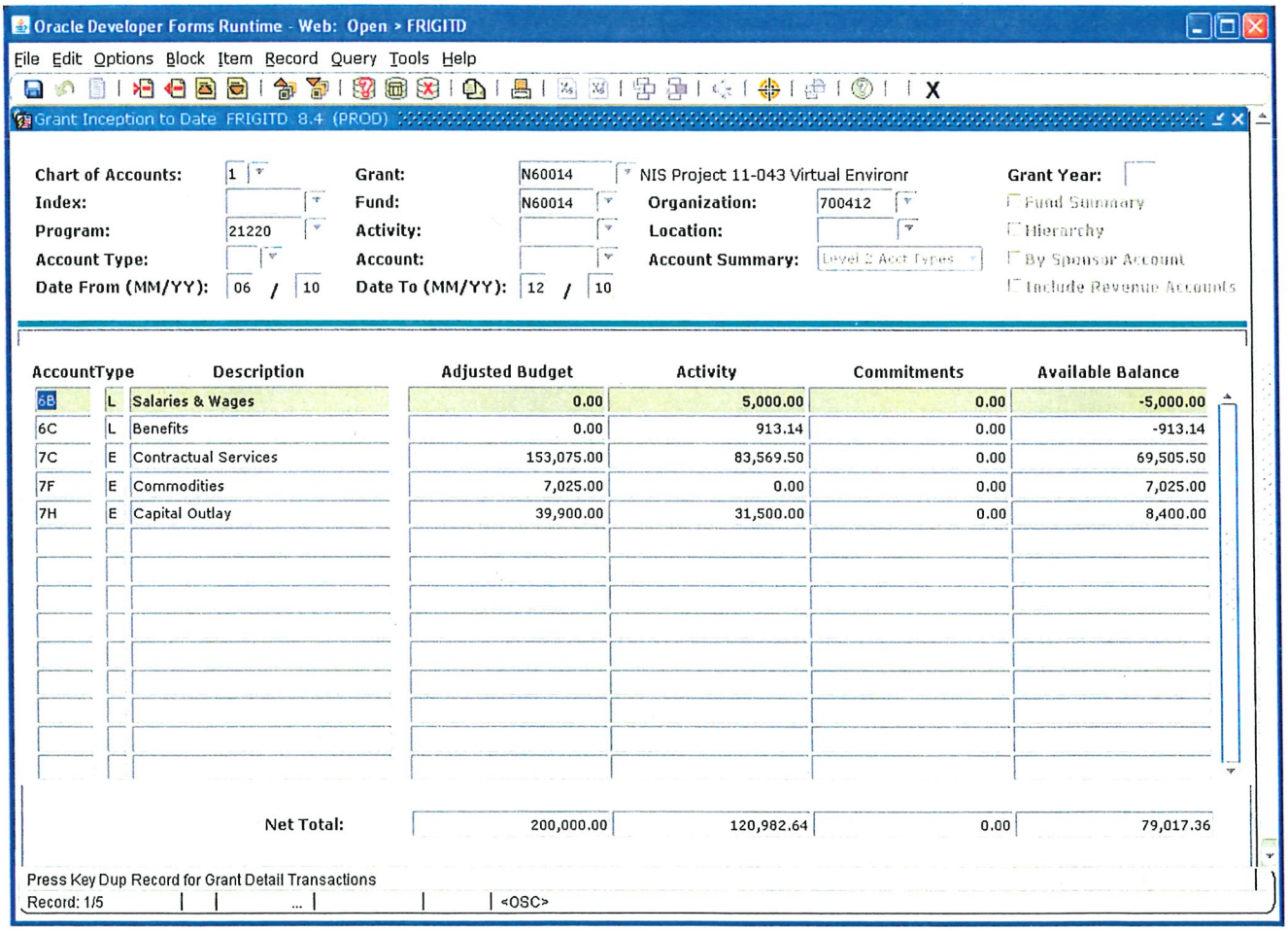
Once thought of as a niche material that could be used for secondary structures, composite materials, such as laminates and honeycomb structures are now being used for entire fuselages and wings. The objective of this project is to investigate the use of composite material systems and their interactions with paints (thermal effects).



Appropriations Committee
Date February 4, 2011
Attachment 1-22

Virtual Environmental Study (Including ECS-Systems – CATIA to VR)

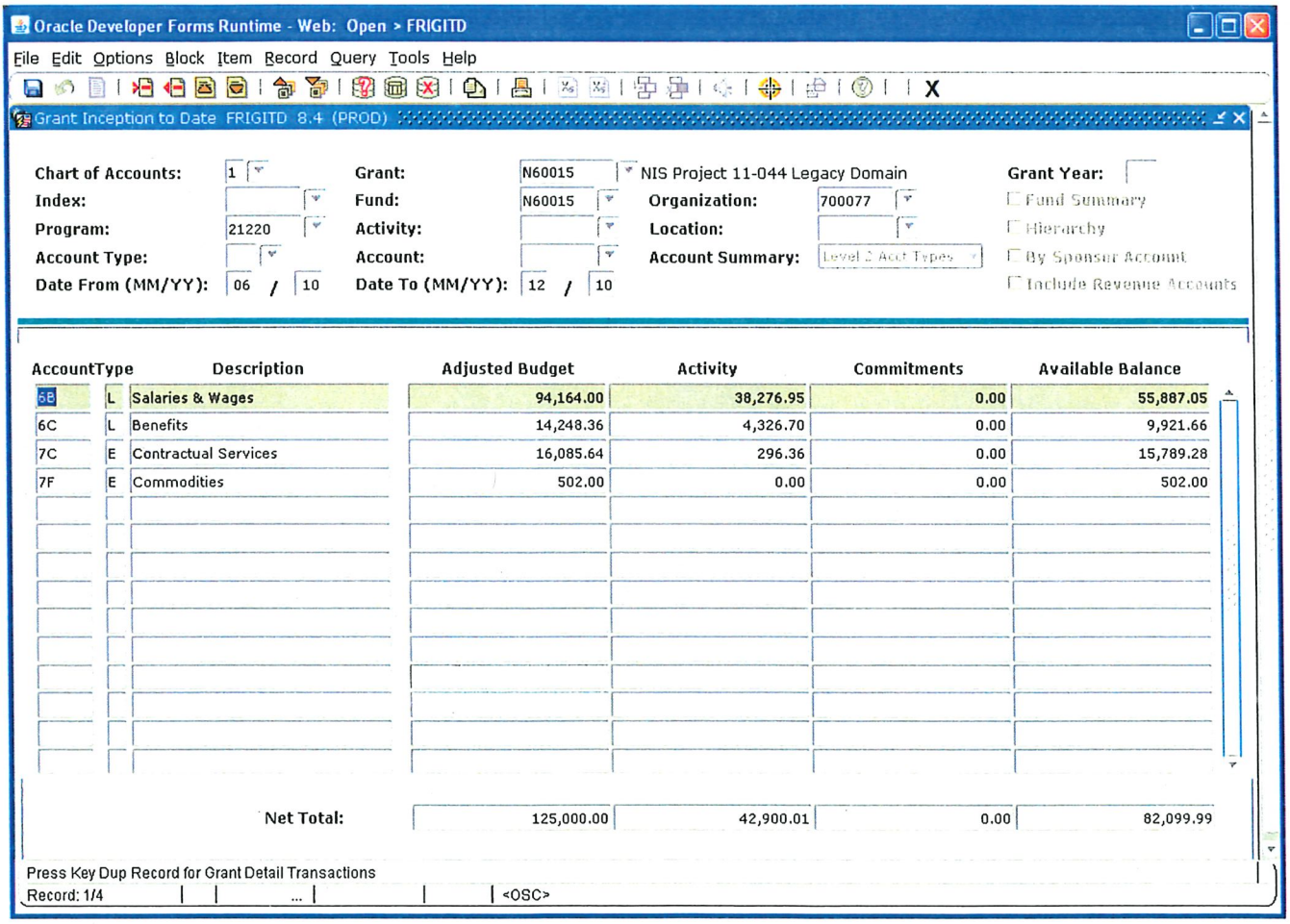
This project addresses the current change in design decision tools from time consuming, costly physical mock-ups to a multi-collaborative virtual environment combining knowledge-based engineering, behavioral simulation software, computers, and immersive visualization systems. A system and procedural process will be developed to integrate a product lifecycle management database into a virtual environment that allows designers and engineers to share information and access function, operation, safety, ergonomics and other human factors issues by performing changes in real time.



Appropriations Committee
Date February 4, 2011
Attachment 1-23

Legacy Domain and Data Knowledge Preservation

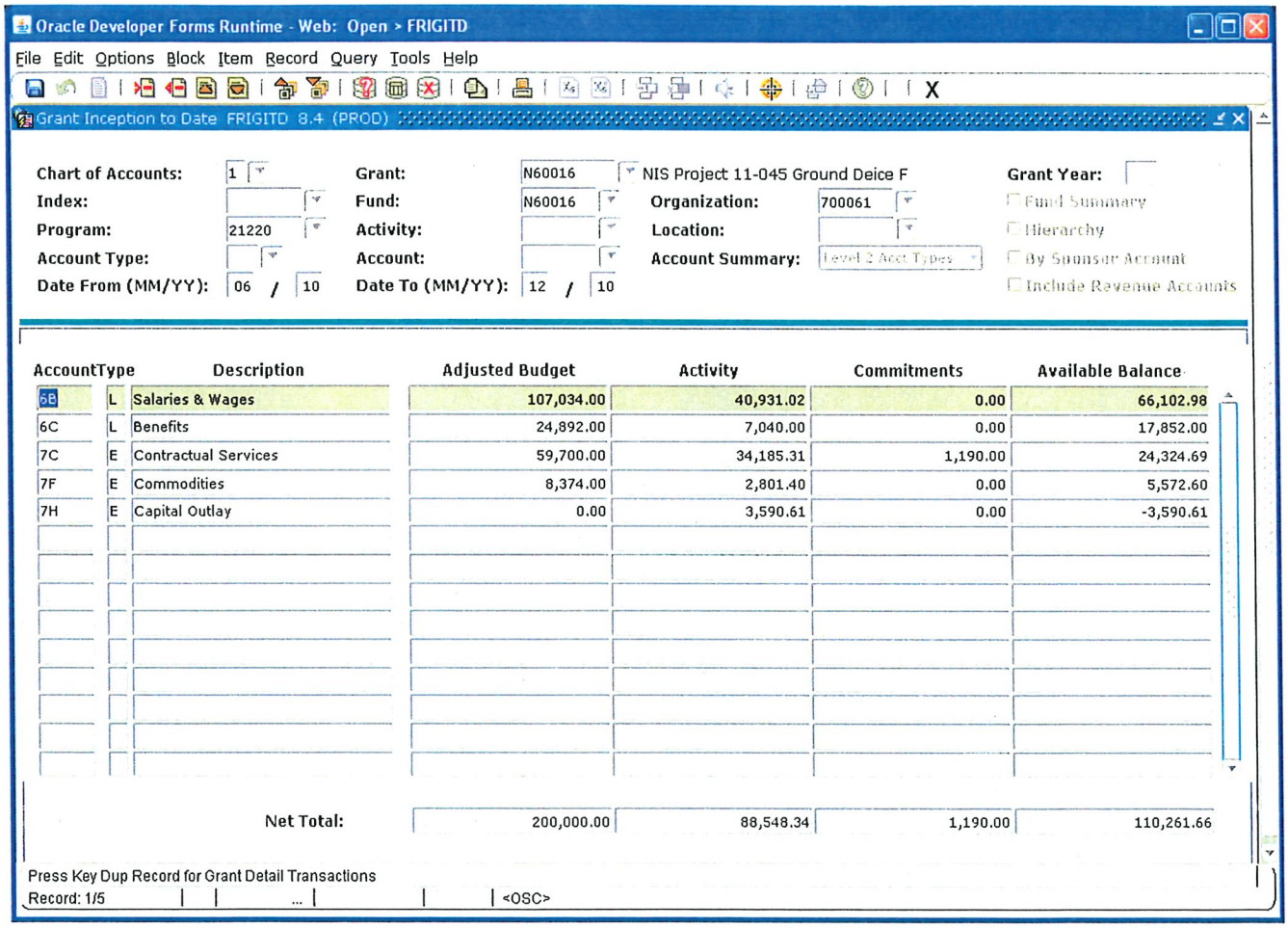
It is difficult to track the myriad of perceptions and thought processes that contribute to engineering accomplished through team based design and complex product realization processes. Knowledge management tools that capture the relevant data are available, but these tools do capture not the mind set or specific acuities that produced the outcome. The goal of this project is development of a template to support the effective translation of legacy domain knowledge into systems accessible to modern engineering groups and processes.



Appropriations Committee
Date February 4, 2011
Attachment 1-24

Ground Deice Fluid Equivalency

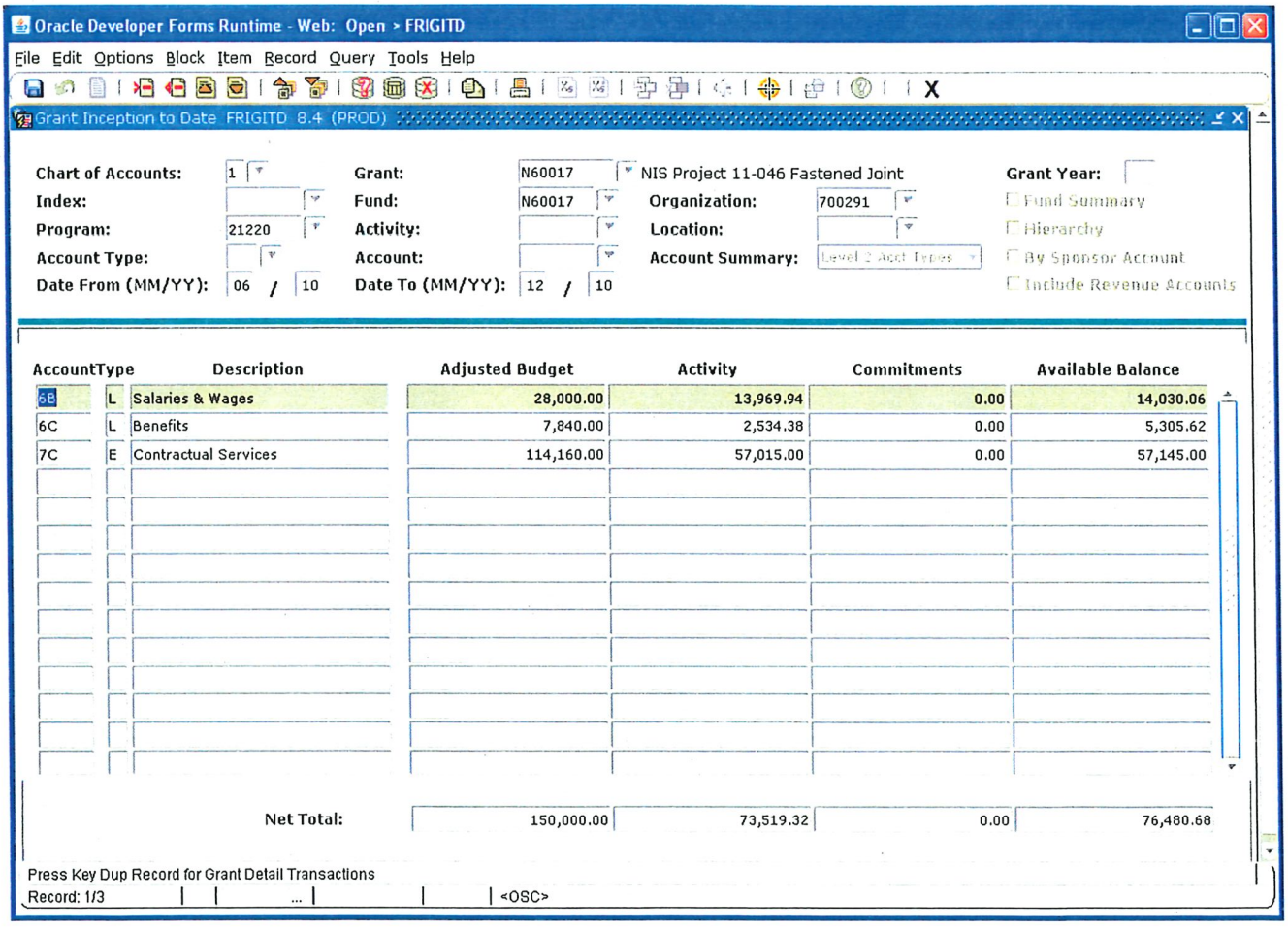
Aircraft icing on the ground is a common occurrence during wintertime and poses a substantial risk to safe aircraft operation during takeoff. A variety of deicing and anti-icing fluids are used to treat ice and snow deposits on aircraft prior to takeoff. This project will develop methodologies and tools to assist aircraft manufacturers in assessing the aerodynamic effects of ground deicing/anti-icing fluids based on the SAE AMS standard.



Appropriations Committee
Date February 4, 2011
Attachment 1-25

Fastened Joint B-Basis Allowables

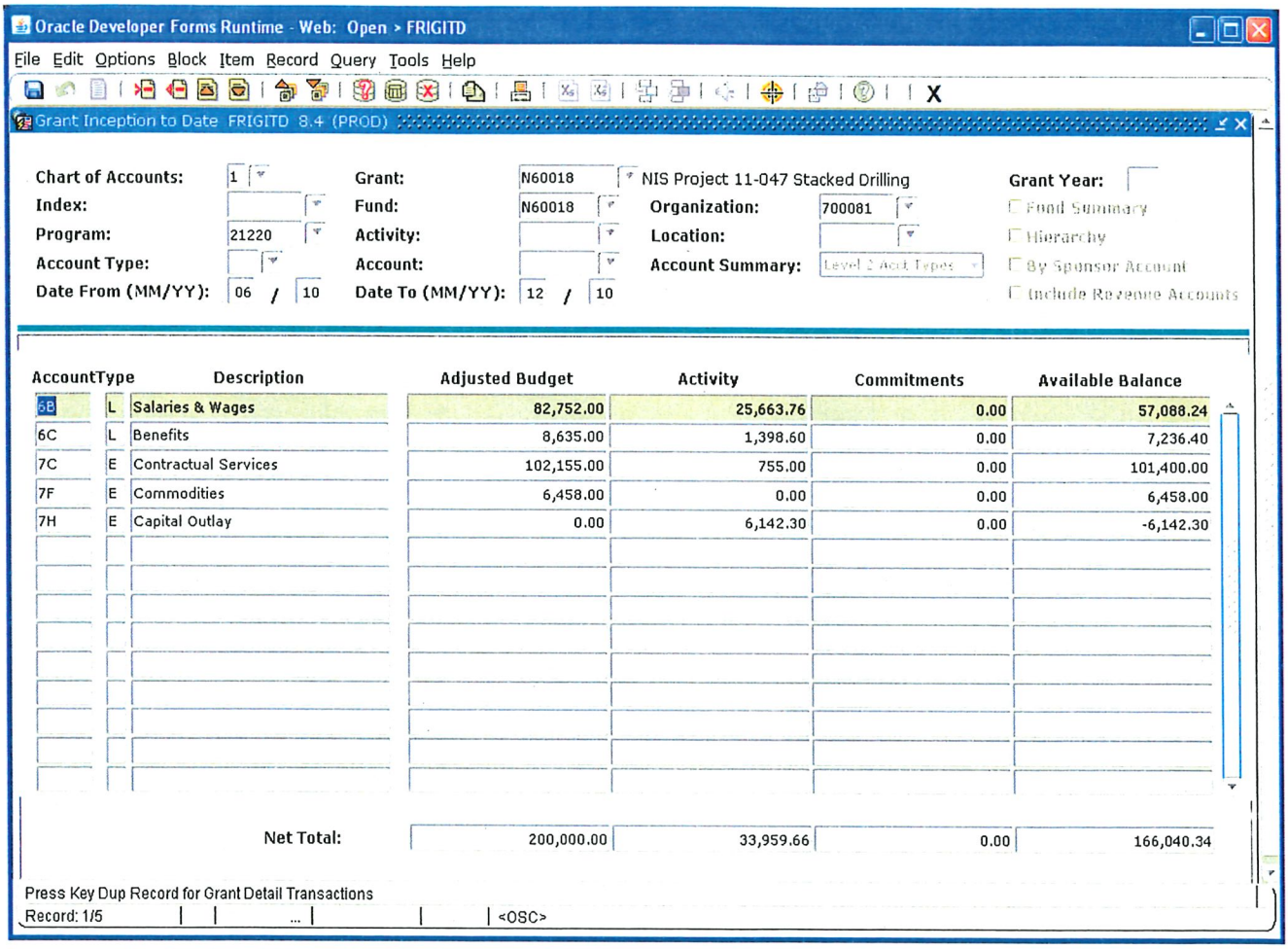
The Metallic Materials Properties Development and Standardization Handbook (MMPDS-04) contains joint design allowables for a variety of fasteners installed in metallic materials. There are a number of fasteners of interest to industry that are either not included in the handbook or the values are for fasteners installed in materials other than those desired. This project will generate B-basis design allowables for a number of these fasteners.



Appropriations Committee
Date February 4, 2011
Attachment 1-26

Stacked Drilling of Composites and Titanium

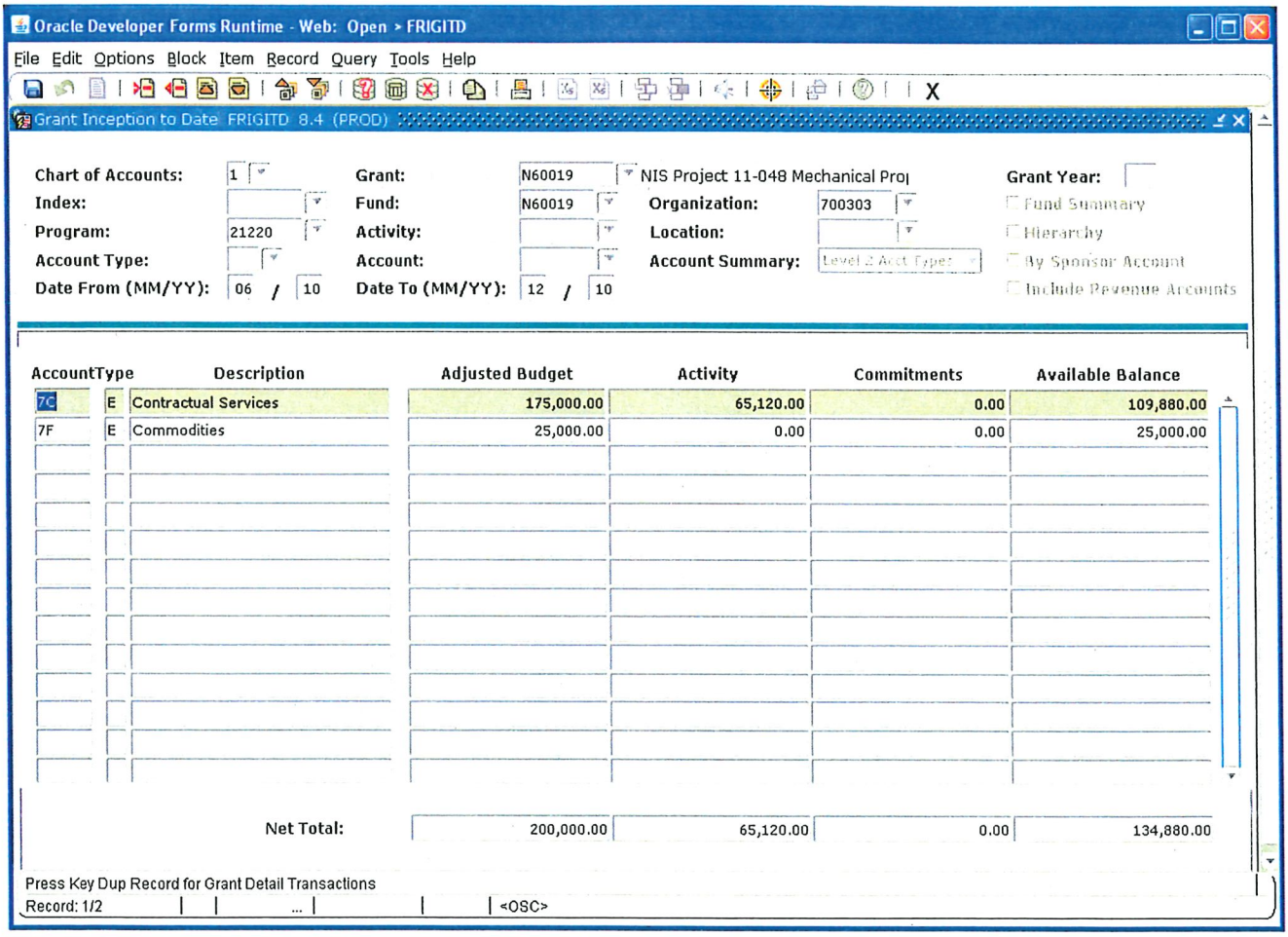
Aircraft manufacturing requires drilling of hundreds of thousands of holes in the aircraft. The typical cost of drilling each hole is 11 – 15 cents per hole, with an increase to as high as $4.00 per hole when using composites stacked with titanium. This project will establish criteria for machining parameters such as feed and speed to maintain hole quality and increase tool life, thus reducing the cost of drilling.



Appropriations Committee
Date February 4, 2011
Attachment 1-27

Mechanical Property Evaluation of Welded Titanium Structures

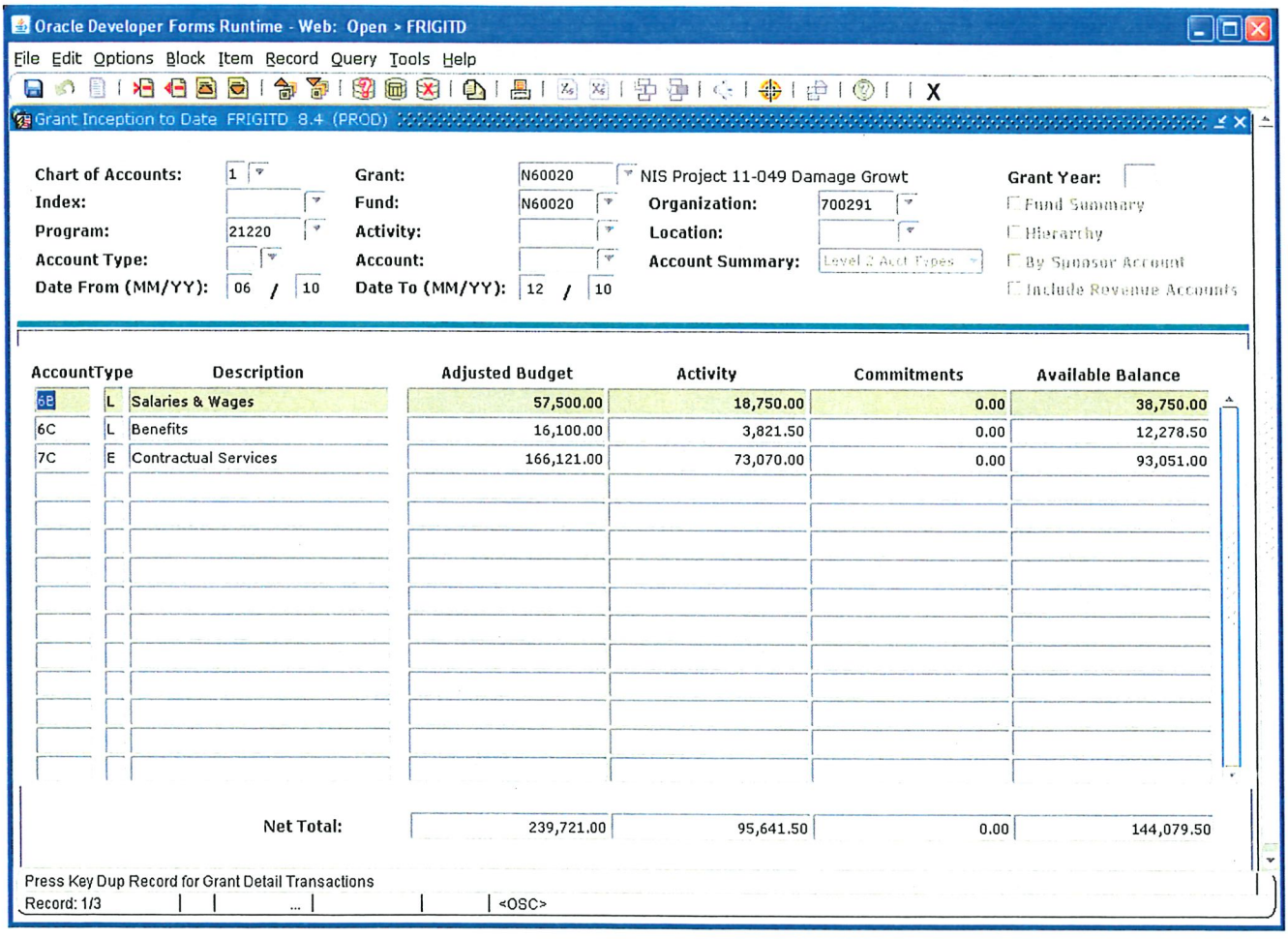
Titanium structure may be joined in a number of ways. Joining titanium components to form tailored blanks and integral structure can save on production costs and offer opportunities to reduce production and supply chain lead times as well as offering flexibility in manufacturing and a reduced part count. This project will evaluate the mechanical properties of titanium components that have been joined by various methods.



Appropriations Committee
Date February 4, 2011
Attachment 1-28

Damage Growth of Fluid Ingression in Sandwich Panels

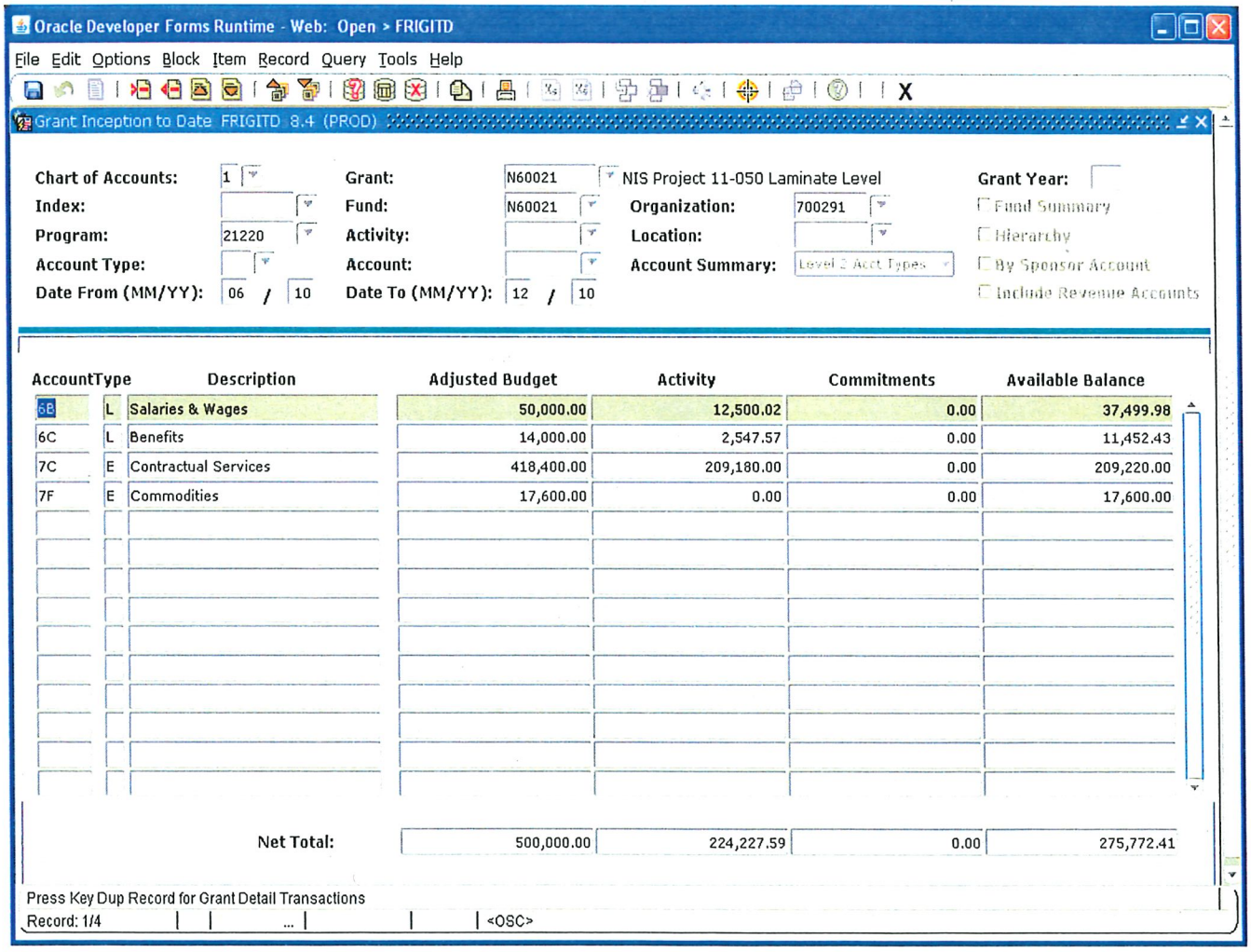
This project will examine the influence of sandwich parameters such as core size, density, and facesheet/core stiffness ratio on the onset and damage growth rate of sandwich composites. The influence of fluid ingression on the onset and damage growth rate of sandwich composites will also be examined, and a test methodology for determination of Mode I fracture toughness and damage growth rates will be developed.



Appropriations Committee
Date February 4, 2011
Attachment 1-29

Laminate Level Testing 5330

Modern innovative composite design and processing techniques related to the use of composite materials in primary aircraft structures have resulted in the need for new materials and/or process technologies to be qualified for structural use. Federal Aviation Administration (FAA) approved B-basis design allowable for Cytec's 5330 out of autoclave curing epoxy prepreg were generated in an earlier project. The FY11 project will develop laminate material properties and allowables where applicable.



Appropriations Committee
Date February 4, 2011
Attachment 1-30

Research Topics for 2010

Project	Title	PI	FY 2010 Budgeted Funding
10-002 N50001	Repair of Composite Structures (including sandwich)	Salah	$800,000
10-003 N50002	Blind or One-Sided Fastener Usage in Composite Structures (Production and Repair Applications)	Raju	$150,000
10-019 N50003	Quiet Interiors Development	Hoffman	$150,000
10-006 N50004	Friction Stir Welding and Related Topics	Burford	$200,000
10-011 N50005	Adhesive Joint Characterization and Testing	Aldag	$390,000
10-017 N50006	Composite Bearing Allowables Baseline	Seneviratne	$350,000
10-026 N50007	Electromagnetic Characterization of Composite Fuselages	Skinner	$160,000
10-027 N50008	Metadata Enabled Thinking Systems Tools for Implementation IVHM	Malzahn	$200,000
10-030 N50009	Effects of Manufacturing Defects on Composites Materials (NDI Development)	Aldag	$250,000
10-031 N50010	Engine Inlet Ice Protection System	Papadakis	$100,000
10-032 N50011	Influence of Environmental Knock-down Factors in Composite Design Structural Margins	Tomblin / Seneviratne	$250,000
10-034 N50012	Composite Fuel Bay Sealant Liner Materials	Lovingfoss	$100,000
10-035 N50013	Correlation between cure and mechanical properties of composite materials	Minaie	$200,000
10-037 N50014	Acoustical impact to composite sandwich structures (dampening, core shear and thermal)	Sharma	$200,000
10-039 N50015	Simulation and modeling of bird strike testing	Olivares	$150,000
10-040 N50016	Large Scale Tooling Prediction for Composite Structures	Minaie/Violette	$250,000
10-041 N50017	Out of Autoclave Material Development Program (Cytec 5330 - 3 systems)	Tomblin	$769,337
10-042 N50018	Fire Retardant Materials for Composite Materials	Lovingfoss	$300,000
N50019	Administration / Liaison		$25,000
			$4,994,337

Appropriations Committee
Date February 4, 2011
Attachment 1-31

Research Topics for 2009

Project	Title	PI	FY 2009 Budgeted Funding
09-002	Repair of Composite Structures (including sandwich)	Salah	$800,000
09-003	Blind or One-Sided Fastener Usage in Composite Structures (Production and Repair Applications)	Raju	$200,000
09-019	Quiet Interiors Development	Hoffman	$250,000
09-006	Friction Stir Welding and Related Topics	Burford	$250,000
09-011	Adhesive Joint Characterization and Testing	Aldag	$300,000
09-017	Composite Bearing Allowables Baseline	Seneviratne	$300,000
09-023	Ground Anti-Ice Development	Papadakis	$150,000
09-026	Electromagnetic Characterization of Composite Fuselages	Skinner	$160,000
09-027	Metadata Enabled Thinking Systems Tools for Implementation IVHM	Malzahn	$240,000
09-029	Microcracks in Composites	Lovingfoss	$120,000
09-030	Effects of Manufacturing Defects on Composites Materials (NDI Development)	Aldag	$250,000
09-031	Engine Inlet Ice Protection System	Papadakis	$200,000
09-032	Influence of Environmental Knock-down Factors in Composite Design Structural Margins	Tomblin / Seneviratne	$400,000
09-033	CAD neutral data exchange and 64bit functionality	Ehrstein	$150,000
09-034	Composite Fuel Bay Sealant Liner Materials	Lovingfoss	$100,000
09-035	Correlation between cure and mechanical properties of composite materials	Minaie	$200,000
09-036	Low-cost Light-weight Methods for Flutter Excitation	Rokhsaz	$100,000
09-037	Acoustical impact to composite sandwich structures (dampening, core shear and thermal)	Sharma	$200,000
09-038	5-axis machine verification by using transducers (concept)	Madhavan	$100,000
09-039	Simulation and modeling of bird strike testing	Olivares	$150,000
			$4,620,000

Appropriations Committee
Date February 4, 2011
Attachment 1-32

Research Topics for 2008

Project	Title	Principal Investigator	FY 2008 Budgeted Funding
08-002	Repair of Composite Structures (including sandwich)	Lamia Salah/John Tomblin	$800,000
08-003	Blind or One-Sided Fastener Usage in Composite Structures (Production and Repair Applications)	K.S. Raju	$200,000
08-019	Quiet Interiors Development	Klaus Hoffmann	$250,000
08-006	Friction Stir Welding and Related Topics	Dwight Burford	$500,000
08-020	Potting Compound Strength/Density Enhancement	Bob Minaie	$150,000
08-011	Adhesive Joint Characterization and Testing	Tom Aldag/John Tomblin	$300,000
08-012	Aviation Network Security	Ravi Pendse	$150,000
08-021	Integrated Vehicle Health Monitoring Requirements Definition	James Steck	$200,000
08-017	Composite Bearing Allowables Baseline	John Tomblin / Allison Crockett	$300,000
08-023	Ground Anti-Ice Development	Michael Papadakis	$150,000
08-024	Fuel Tank Inerting	Bill Stevenson	$150,000
08-025	Virtual Reality Crashworthiness (Certification by Analysis)	Gerardo Olivares	$265,000
08-026	Electromagnetic Characterization of Composite Fuselages	Steven Skinner - John O'Loughlin	$160,000
08-027	Metadata Enabled Thinking Systems Tools	Don Malzahn	$120,000
08-028	CATIA Workspace Enhancements Trade Study	Shawn Ehrstein	$115,000
08-029	Microcracks in Composites	John Tomblin / Allison Crockett	$120,000
08-030	Effects of Defects on Composites Materials (NDI Development)	Tom Aldag/John Tomblin/Tim Hickey WSU contact plus subcontract to Sandia or Iowa State	$250,000
08-031	Engine Inlet Ice Protection System	Michael Papadakis	$200,000
08-032	Influence of Environmental Knock-down Factors in Composite Design Structural Margins	John Tomblin/Tim Hickey/Tom Aldag	$330,000
			$4,710,000

Appropriations Committee
Date February 4, 2011
Attachment 1-33

Research Topics for 2007

Project	Title	Principal Investigator	FY 2007 Budgeted Funding
07-001	Design Philosophies for Structures Utilizing Metal and Composites with Large CTE Differences	Charles Yang	$150,000
07-002	Repair of Composite Structures (including sandwich)	Lamia Salah/John Tomblin	$450,000
07-003	Blind or One-Sided Fastener Usage in Composite Structures (Production and Repair Applications)	K.S. Raju	$100,000
07-019	Quiet Interiors Development	Klaus Hoffmann	$120,000
07-006	Friction Stir Welding and Related Topics	Dwight Burford	$200,000
07-020	Potting Compound Strength/Density Enhancement	Bob Minaie	$100,000
07-011	Adhesive Joint Characterization and Testing	W. Seneviratne/John Tomblin	$150,000
07-012	Aviation Network Security	Ravi Pendse	$90,000
07-013	Icing Tanker Spray Nozzle Characteristics and Performance Evaluation	Michael Papadakis	$150,000
07-021	Integrated Vehicle Health Monitoring Requirements Definition	James Steck	$100,000
07-017	Composite Bearing Allowables Baseline	W. Seneviratne/John Tomblin	$150,000
07-018	NDE Simulations of Aircraft Structure	Bob Minaie	$150,000
07-022	Quiet Composite Fuselage Panels	Kurt Soschinske	$130,000
			$2,040,000

Appropriations Committee
Date February 4, 2011
Attachment 1-34

Research Topics for 2006

Project	Title	Principal Investigator	FY 2006 Budgeted Funding
06-001	Design Philosophies for Structures Utilizing Metal and Composites with Large CTE Differences	Charles Yang	$200,000
06-002	Repair of Composite Structures	Lamia Salah/John Tomblin	$200,000
06-003	Blind or One-Sided Fastener Usage in Composite Structures (Production and Repair Applications)	K.S. Raju	$120,000
06-004	Analysis of Braided Composite Structures (3rd year)	W. Seneviratne/John Tomblin	$100,000
06-005	Crashworthiness of Composite Fuselage Structure	K.S. Raju	$120,000
06-006	Friction Stir Welding and Related Topics (3rd year)	Dwight Burford	$160,000
06-007	Tolerancing Overview of Application to Support Aircraft Final Assembly	Hossein Charaghi	$80,000
06-009	Characterization of Fatigue Crack Development and Growth from Dents in 7475-T7351 Machined Wing Planks and Crack Growth Correlation Between CRACKS95, AFGROW, and Empirical Data	Bert Smith	$60,000
06-011	Adhesive Joint Characterization and Testing	W. Seneviratne/John Tomblin	$120,000
06-012	Aviation Network Security (3rd year)	Ravi Pendese	$100,000
06-013	Icing Tanker Spray Nozzle Characteristics and Performance Evaluation (3rd year)	Michael Papadakis	$100,000
06-014	Acoustic Material Database (3rd year)	James Locke	$80,000
06-015	Blitzen Code Investigation (3rd year)	Steve Skinner	$80,000
06-016	Child Safety Seat Provisions	Gerardo Olivares	$120,000
06-017	Composite Bearing Allowables Baseline	W. Seneviratne/John Tomblin	$96,000
06-018	NDE Simulations of Aircraft Structure	Bob Minaie	$80,000
06-019	Potting Compound Strength/Density Enhancement	Bob Minaie	$96,000
06-020	Flammability Characterization of Materials for Aircraft Interiors	Dave Koert	$80,000
			$1,992,000

Appropriations Committee
Date February 4, 2011
Attachment 1-35

Research Topics for 2005

	Title	Principal Investigator	FY 2005 Budgeted Funding
05-001	Icing Tanker Spray Nozzle Characteristics and Performance Evaluation (2nd year)	Mike Papadakis	$200,000
05-002	Design Philosophies for Structures Utilizing Metal and Composites with Large CTE Differences	Charles Yang	$250,000
05-003	Aviation Network Security (2nd year)	Ravi Pendse	$125,000
05-004	Repair of Composite Structures	John Tomblin	$250,000
05-005	Blind or One-Sided Fastener Usage in Composite Structures (Production and Repair Applications)	K.S. Raju	$150,000
05-006	Crashworthiness of Composite Fuselage Structure	K.S. Raju	$150,000
05-007	Blitzen Code Investigation (2nd year)	John O'Loughin	$65,000
05-008	Acoustic Material Database (2nd year)	James Locke	$60,000
05-009	Friction Stir Welding and Related Topics (2nd year)	Dale Cope	$200,000
05-010	Tolerancing Overview of Application to Support Aircraft Final Assembly	Hossein Cheraghi	$65,000
05-011	Analysis of Braided Composite Structures (2nd year)	W. Seneviratne	$100,000
05-012	Catia V5 Beta Model Generation – Automated Crack Analysis Tool	Shawn Ehrstein	$65,000
05-013	Characterization of Fatigue Crack Development and Growth from Dents in 7475-T7351 Machined Wing Planks and Crack Growth Correlation Between CRACKS95, AFGROW, and Empirical Data	Bert Smith	$100,000
05-014	Review of the Capabilitilies of the Photogrametry Technology as a Non-Destrcutive Testing Methodology	K.S. Raju	$70,000
05-015	Adhesive Joint Characterization and Testing	John Tomblin	$150,000
			$2,000,000

Appropriations Committee
Date February 4, 2011
Attachment 1-36

Research Topics for 2004

Project	Title	PI	FY 2004 Budgeted Funding
04-001	Simulated Icing Test Nozzle Design and Feasibility Study	Papadakis & Tan	$75,000
04-002	Paint Thickness Measurement Over Composites	Steck & Skinner	$70,000
04-003	Network-based Aviation Security	Pendse	$75,000
04-004	Carbo Tri-axial Braid Material Qualification	Tomblin	$200,000
04-005	Assessment of Load Distribution in composite Panels with Semi-Parasitic Acoustic Treatments	Raju	$150,000
04-006	Development of Design Philosophies for Large Bonded and Fastened Assemblies Containing Metals and Composites with Large CTE Differences	Yang	$150,000
04-007	Lighning Protection of Composite Aircraft	O'Loughlin & Skinner	$75,000
04-008	Cabin Acoustics	Locke	$75,000
04-009/04-010/ 04-012	Fiscal Year 2004 Progress Report and Friction Stir Welding and Laser Welding Feasibility Study	Cope	$100,000
04-011	Analysis of a Tri-axial Braided Composite Structure with a Constant Cross Section	Tomblin	$30,000
			$1,000,000

National Center for Aviation Training (NCAT) Equipment Report

December 2010

Appropriations Committee
Date February 4, 2011
Attachment 2

Table of Contents

Appropriations Committee
Date February 4, 2011
Attachment 2-20

Introduction/Summary

The National Center for Aviation Training (NCAT) technical training advisory board will be created to aid the aerospace industry in Kansas and enable training opportunities that allows the Kansas aviation industry to compete in a global economic environment. This board will be called the State Aviation Technical Training Board (SATTB). It will be executed by industrial representatives through an executive committee comprised of representatives from Boeing, Bombardier-Learjet, Cessna, Hawker Beechcraft and Spirit AeroSystems. Wichita State University (WSU) and the National Institute for Aviation Research (NIAR) will administer the technical training board. A representative from Wichita Area Technical College (WATC) and a representative from Sedgwick County will also be non-voting members of the board to coordinate activities with the training offered by WATC as well as equipment of other infrastructure concerns within the NCAT building.

Each program year, the industry's most pressing training needs will be identified by industry representatives on the executive committee and will be matched to existing expertise within Kansas to offer unique training opportunities within the aerospace cluster in Kansas. The equipment funded via this program will be selected from the five member aviation industry executive committee. Each equipment purchase will be selected with a budget and tied to definitive training deliverables to increase competiveness within Kansas. WSU will work closely with industry representatives who serve as points of contact and monitor the progress of the equipment purchases along with the link to the training opportunities for the aerospace cluster. WSU will provide a summary report each year which details expenditures made as part of this program to the board and legislature.

Board Membership

Aviation Board Members

Aviation Board Chairman, 2010-2011
John Dieker — email : john.dieker@aero.bombardier.com
Vice President of Operations
Bombardier-Learjet

Jim Walters — email : JWalters@cessna.textron.com
Senior Vice-President, Human Resources
Cessna Aircraft

Jeff Turner — email : jeffrey.l.turner@spiritaero.com
President and CEO
Spirit AeroSystems

Jeff Jones — email : Jeff_Jones@hawkerbeechcraft.com
Vice President, Safety Quality, Training, Mfg Tech
Hawker Beechcraft

Brad Gorsuch — email : brad.gorsuch@boeing.com
Director of Operations
Boeing Defense, Space & Security

Ex-Officio Board Members

Bill Buchanan — email : wbuchana@sedgwick.gov
County Manager
Sedgwick County Government

Ray Frederick — email : RFrederick@watc.edu
Interim President
Wichita Area Technical College

Board Administrator

John Tomblin — email : john.tomblin@wichita.edu
Executive Director, NIAR
Wichita State University

Appropriations Committee
Date February 4, 2011
Attachment 2-4

Legislative Language

"That during the fiscal year ending June 30, 2011, notwithstanding the provisions of any other statute, in addition to the other purposes for which expenditures may be made from the aviation infrastructure account of the state economic development initiatives fund for fiscal year 2011 by Wichita State University by this or other appropriation act of the 2010 regular session of the legislature, the moneys appropriated in the aviation infrastructure account of the state economic development initiatives fund for fiscal year 2011 may only be expended for training equipment expenditures of the National Center for Aviation Training.

(d) During the fiscal years ending June 30, 2010, and June 30, 2011, in addition to the other purposes for which expenditures may be made by Wichita State University from moneys appropriated from the state general fund or any special revenue fund for the above agency for fiscal year 2010 or fiscal year 2011 by chapter 124 or chapter 144 of the 2009 Session Laws of Kansas, or by this or other appropriation act of the 2010 regular session of the legislature, expenditures shall be made by Wichita State University from the state general fund or from any special revenue fund for fiscal year 2010 and fiscal year 2011, after consultation with the National Institute for Aviation Research, to provide for the establishment of a technical training board: Provided, That, except as otherwise provided in this subsection (d), such board shall be similar in composition to the aviation research board and shall advise the president of Wichita State University, and others representing Wichita State University, on all expenditures from the aviation infrastructure account of the state economic development initiatives fund for fiscal year 2010 and fiscal year 2011: Provided further, That such board shall review and evaluate all such expenditures: And provided further, That the executive director of the National Institute for Aviation Research shall be the administrator for the technical training board: And provided further, That the membership of the technical training board shall include representatives of Sedgwick County and representatives of the Wichita Area Technical College as ex-officio, nonvoting members: And provided further, That the technical training board shall prepare and submit a report to the legislature, which shall be presented to the education budget committee of the house of representatives and to the appropriate subcommittee of the ways and means committee of the senate, not later than the 10th calendar day of the 2011 regular session of the legislature, detailing the findings of the technical training board regarding the expenditures by Wichita State University from the aviation infrastructure account of the state economic development initiatives fund for fiscal year 2010 and fiscal year 2011."

Appropriations Committee
Date February 4, 2011
Attachment 2-5

SATTB Operational Flow

Board advisory to what organization	The President of Wichita State University, and others representing Wichita State university
Board Membership	Such board shall be similar in composition to the aviation research board; 1 member from each OEM, SEDCO and WATC as non voting members
Executive Director	The Executive Director of the National Institute for Aviation Research shall be the administrator for the technical training board
Expenditures from the aviation infrastructure account of the state economic development initiatives fund	Expenditures shall be made by Wichita State University following all State of Kansas guidelines from the state general fund or from any special revenue fund
Reporting	Executive Director of SATTB prepares and SATTB approves

Appropriations Committee
Date February 4, 2011
Attachment 2-6

State of Kansas and Wichita State University Purchasing Guidelines

The following is a summary of the Wichita State University purchasing guidelines. Details may be found in chapter 14 of the Wichita State University Policies and Procedures Manual (http://webs.wichita.edu/inaudit/ch_14.htm).

General Purchasing Policies

All purchases of materials and contractual services in the amount of $5,000 or more will be made by the Office of Purchasing. This office also manages and controls the system for direct departmental purchases less than $5,000. The Office of Purchasing establishes contractual service agreements for professional services and service maintenance agreements and maintain all statewide open-end contracts. The Office of Purchasing cannot purchase items for individuals for their personal use and as a general policy, no University purchase orders will be awarded to University employees.

State Contracts for Supplies and Services:

Contracts for commonly used equipment, supplies, and services have been developed by the State of Kansas Division of Purchases. A complete listing of state contracts is available at the Office of Purchasing. Copies and updates of these contracts are maintained by the Office of Purchasing and are forwarded to departments expected to have need for the items covered by the contract. State contracts for commonly used equipment and materials must be utilized unless it can be clearly demonstrated that an alternative purchase would be in the best interest of the University. Approval by the Office of Purchasing is required when deviating from this policy, **prior to acquisition.**

Used Equipment:

The University does not generally purchase used equipment. However, if it can be demonstrated that it is advantageous to do so, used equipment may be purchased from an established and reliable vendor of the type of equipment to be purchased. Normal purchase procedures are required for this type of purchase.

Purchases Less Than $5,000

Many items are required to be purchased using state or local contracts, University sources, Kansas State Use Catalog, or otherwise require advance approval from the University, the Kansas Board of Regents. For those goods and services that are not available from one of the above sources, departments may be authorized to make purchases direct from any vendor when the delivered

dollar value of the purchase is less than $5,000, no additional orders for like products or services will be placed again within 30 days (which would make the overall accumulated purchase exceed the $5,000 limit), or the purchase of the desired product or service is not otherwise restricted. Departments are responsible for checking to see if their desired purchases are restricted items and are encouraged to contact the Office of Purchasing for help in doing so.

Some contracts allow for an exception to be granted prior to purchase for items that are on contract, but are found at a lower price elsewhere with the same quality and specifications. A Prior Authorization for Off-Contract Purchase form shall be completed by the department and submitted, along with an indication of the funding source, to the Office of Purchasing for consideration. Certain items such as personal computer systems and certain vendors such as such as those in the Kansas State Use Catalog are not subject to granting of this exception.

The Office of Internal Audit and the Office of Purchasing will conduct periodic audits to determine whether or not items are being purchased that are available from University sources or from state-contracted vendors, unauthorized items are being purchased, and/or purchases are being split up into increments of less than $5,000 (in order to bypass procedures for larger purchases). They will also check to see how effectively departments are making follow-up inquiries to obtain credit on tax charged by vendors, accurate and prompt notification of items to the University's Accounts Payable Department, and whether adequate departmental control records are being kept. Departmental delegated purchasing authority can and will be revoked by the Director of Purchasing if found to be abused or used irresponsibly.

Purchases Greater Than $5,000

Competitive bids on purchases of $5,000 or more, including purchases using research or grant funds, will be obtained by the Office of Purchasing, either by telephone or written request. The processing time for award of a purchase order could be a few days to multiple weeks depending upon the complexity of the purchase. The Office of Purchasing will conduct all negotiations with vendors in cooperation with the respective department. All bids, regardless of the source of funds, that are estimated to be in the amount of $50,000 or more, must be advertised and open for a minimum of two (2) weeks and processed with the receipt of formal written bids.

Specifications

The Office of Purchasing has authority to challenge an ordering department concerning the quality, quantity, and type of material requested in order to serve the best interests of the University. However, the final decision and the

responsibility for justification of the quality and quantity rests with the user department. A department will not be asked to accept inferior products, only to evaluate recommended alternatives.

Preparing Specifications:

Specifications should be developed with the knowledge that a bid shall be awarded to the bidder who submits the lowest price for a good or service that meets the stated specifications with delivery within a time frame that meets the University's need and is reasonable for the particular industry under current market conditions.

In obtaining material or equipment which meets the requirements for performance and quality, the preparation of clear and complete specifications is essential. Specifications may be as simple as a list of requirements that could be described over the telephone, or very complex requiring detailed explanation in writing. Kansas statutes prohibit specifications from being fixed in a manner to effectively exclude any responsible bidder from offering a comparable product or service. The Office of Purchasing will assist in the preparation of specifications upon request.

In general, specifications should be as simple as possible while specific enough to assure that no loophole exists by which a vendor may take advantage of competitors or the buyer. Specify the brand and model number of the desired equipment (e.g, Model 351OD ATT facsimile or equivalent) including the names and model numbers of two or more manufacturers whenever possible. Identify the features and/or characteristics considered essential to the function or intended use of the product. Flexible specifications allow more competition and better pricing.

Specifications should be edited for nonessential proprietary features of characteristics of the named brands which tend to effectively exclude competition in bidding. Minor deviations in size and operational characteristics from those set forth in the specifications will be considered when such deviations do not deter the user from accomplishing the intended use or function at the desired level of performance.

Ethical Conduct and Vendor Representatives

Departments should always contact more than one vendor whenever possible and be sure to provide each with exactly the same information to obtain multiple price quotes. Inform sales representatives that several sources are being evaluated, but do not discuss the amount budgeted for the purchase or prices offered by competitors. Discuss all aspects of the needed product using a life-cycle approach. Learn about the long-term implications of owning the product with respect to reliability, availability, and cost of maintenance and repairs, operational skills required for its use, trade-in-value of unit at the end of cycle, energy consumption, and other such operating concerns. Have the vendor provide all of the technical information needed to write a complete and detailed

specification. Be wary of overreacting to vendor-created crises that call for a hasty decision such as an upcoming price increase or potential stock-out of the desired product and do not offer verbal commitments to buy (the University is committed only by means of an authorized purchase order). The purchase requisition should be submitted as early as possible and should include pertinent information about the suggested vendor such as the name of the company, their representative, address, and telephone and fax number.

Conflict of Interest:

The State of Kansas has statutory laws covering gratuities and conflict of interest which provide that, among other things, no state employee in his or her capacity shall participate in the making of a contract with any person or business with which the employee has a substantial interest. No employee of the State of Kansas may accept gifts, gratuities, or special discounts from persons or firms having business with any state agency or governmental entity. These laws apply to all individuals on the state payroll, regardless of the type of funds used (general use, restricted fees, research, endowment, etc.). Only gifts donated to the University through the WSU Foundation are acceptable.

Externally Sponsored Research Programs

Procurement for externally sponsored research programs must comply with the following: University policies; state or federal laws and regulations; and requirements of the funding source. All procurement for externally sponsored research programs will be processed through the Office of Purchasing. Federal procurement standards[1] and any special constraints imposed by the sponsoring agency must be observed. Expenditures require funding approval from the Office of Research Administration and all applicable research budgets and purchasing requisitions shall be routed through the Office of Research Administration prior to forwarding to the Office of Purchasing.

Ordering From Kansas Correctional Industries and Organizations Listed with the Kansas State Use Catalog

There are a number of products and services available from certain state agencies and organizations listed with the Kansas State Use Catalog. Kansas law mandates that such suppliers be used by other state agencies. If the suppliers are unable to supply the product ordered or cannot meet delivery requirements, the ordering department will be notified immediately and the Office of Purchasing will work with the department to obtain the required statutory exceptions to proceed pursuant to normal purchasing policies and procedures. Departments seeking an exemption for the procurement of consumable supplies or services may do so through the Office of Purchasing on a case-by-case basis. If an exemption is granted, a copy of the written approval must accompany the purchase requisition.

Anti-Kickback

Purpose:
To state University policy with regard to the establishment of procedures designed to prevent and detect possible violations of 41 U.S. Code Sections 51-58 (the Anti-Kickback Act of 1986).

Preamble:
The Anti-Kickback Act of 1986 was passed to deter subcontractors from making payments, and contractors from accepting payments, for the purpose of improperly obtaining or rewarding favorable treatment in connection with a contract or contractual action entered into by the United States for the purpose of obtaining supplies, materials, equipment, or service of any kind.

Policy Statement:

1. When the University has reasonable grounds to believe that a violation of the Anti-Kickback Act of 1986 may have occurred, the University shall promptly report in writing the possible violation. Such reports shall be made to the inspector general of the contracting department or agency of the United States, the head of the contracting department or agency of the United States if the department or agency does not have an inspector general, or the Department of Justice.

2. The University shall cooperate fully with any Federal agency investigating a possible violation of the Anti-Kickback Act of 1986.

3. The University shall incorporate the following language in all subcontracts entered into by the University to obtain supplies, materials, equipment, or service of any kind in connection with a University contract with a department or agency of the United States that exceed $100,000.

a. When the university has reasonable grounds to believe that a violation of the Anti-Kickback Act of 1986 may have occurred, the university shall promptly report in writing the possible violation. Such reports shall be made to the inspector general of the contracting department or agency of the United States, the head of the contracting department or agency of the United States if the department or agency does not have an inspector general, or the Department of Justice.

b. The university shall cooperate fully with any Federal agency investigating a possible violation of the Anti-Kickback Act of 1986.

c. The Contracting Officer may (1) offset the amount of the kickback against any monies owed by the United States under the prime contract and/or (2) direct that the Prime Contractor withhold from sums owed a contractor under the prime contract the amount of the kickback. The Contracting Officer may order that monies withheld under subdivision c. (1) of this clause be paid over to the United States Government unless the Government has already offset those monies under subdivision c. (2) of this clause. In either case, the Prime Contractor shall notify the Contracting Officer when the monies are withheld.

d. The university agrees to incorporate the substance of this clause, including subparagraph d., in all subcontracts under this contract which exceed $100,000.

Appropriations Committee
Date February 4, 2011
Attachment 2-12

Protocol and Timeline for Equipment Expenditures

1. Initial equipment list will be collected by NIAR/WSU from WATC, Sedgwick County, WSU/NIAR and any aviation company which describes specific training needs. This list will be developed prior to the first board meeting each year with the following information:

    (1) Detailed Equipment Description
    (2) Estimated Cost
    (3) Justification for equipment in supporting the training needs of the aviation industry

    Timeframe : July / August

2. This equipment list will be combined and summarized prior to the SATTB board meeting for board member review prior to the meeting. This will be sent to each board member via email at least two weeks prior to the SATTB board meeting. These should be prioritized by the aviation industry to fit within the available yearly budget.

    Timeframe : August / September

3. The SATTB board meeting will approve an equipment expenditure list along with an estimated budget for purchasing.

    Timeframe : August / September SATTB Board Meeting

4. Approval by the President of WSU (or others representing WSU)

    Timeframe : following August / September SATTB Board Meeting

5. Following the State of Kansas and WSU procurement guidelines, purchases will be made according to the approved equipment list. A monthly update will be provided via email to all board members showing an estimated versus actual cost. This monthly update will also be transmitted to the SCTETA board for inclusion in their monthly meeting.

    Timeframe : September through December

Appropriations Committee
Date February 4, 2011
Attachment 2-13

6. SATTB board meeting to review progress to date and reconciliation of any open action items. Final expenditure plan approved for the existing or anticipated balance of the equipment funds. Draft of the expenditure report to the legislature to be reviewed at that time.

   Timeframe : December SATTB Board Meeting

7. Approval by the President of WSU (or others representing WSU)

   Timeframe : following December SATTB Board Meeting

8. Report prepared and delivered to KS legislature by WSU

   Timeframe : January

9. Finalized purchasing per the SATTB board approved expenditure plan

   Timeframe : January through June

10. Updated final report for the SATTB board and KS legislature

    Timeframe : July

Appropriations Committee
Date February 4, 2011
Attachment 2-14

NCAT FACILITY

The National Center for Aviation Training built by Sedgwick County fuses Kansas' aviation experience and expertise with cutting-edge instructional techniques and technology to forge a new educational standard. The 224,000 sq. ft. facility will provide for significant growth capacity for students to engage in aviation and advanced manufacturing training along with strong FAA involvement and support. The $50 million campus offers capacity to train up to 1,500 students and the Jabara Airport location allows ready access to aircraft for hands-on training.

Figures 1 – 3 show the layout of the facility along with the specific curriculum areas being focused on with these equipment expenditures. All equipment purchases using these funds will be located in the NCAT facilities.

Appropriations Committee
Date February 4, 2011
Attachment 2-15

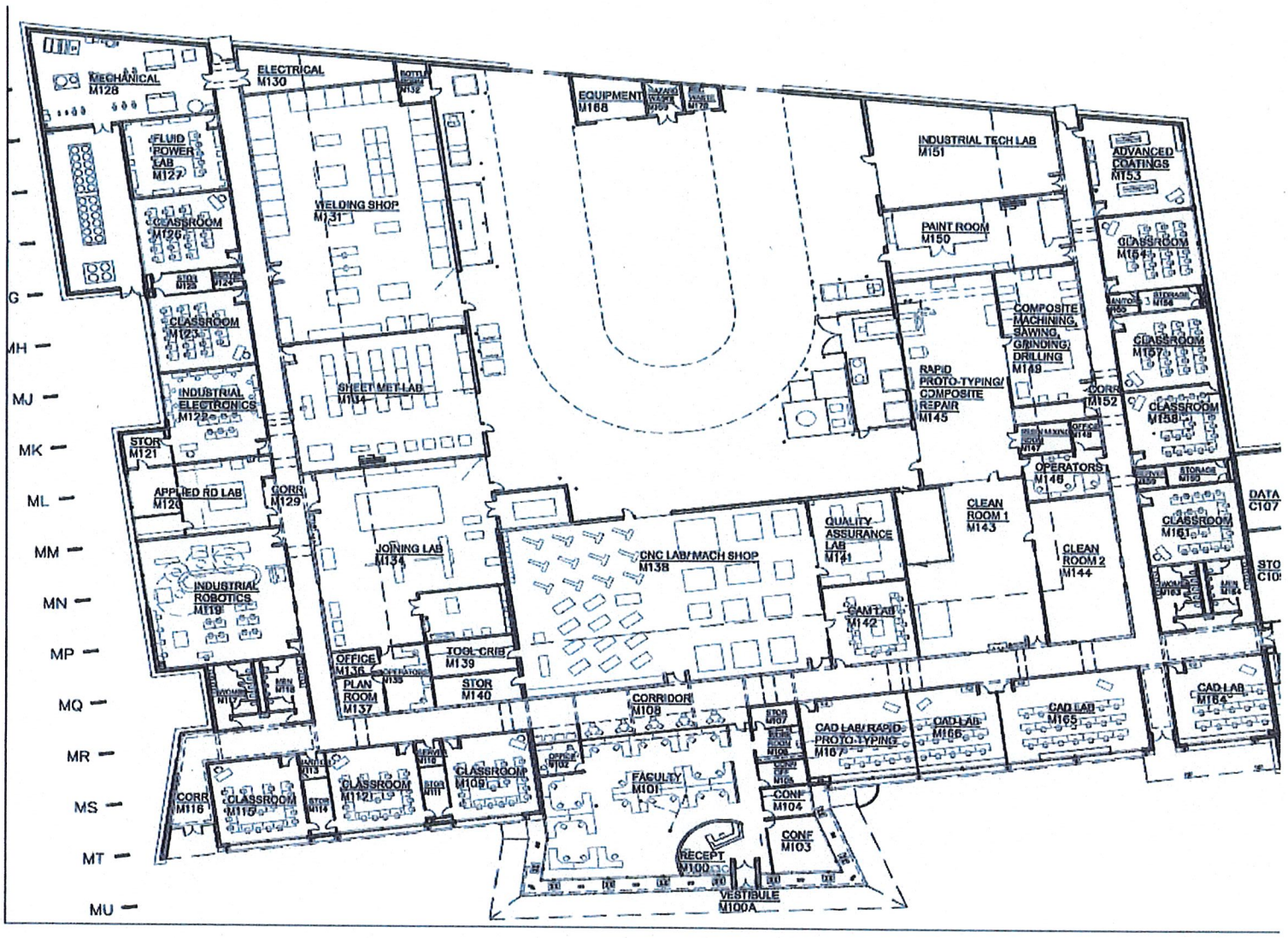


Figure 1

Manufacturing Building
Building 200
1st Floor

Appropriations Committee
Date February 4, 2011
Attachment 2-16

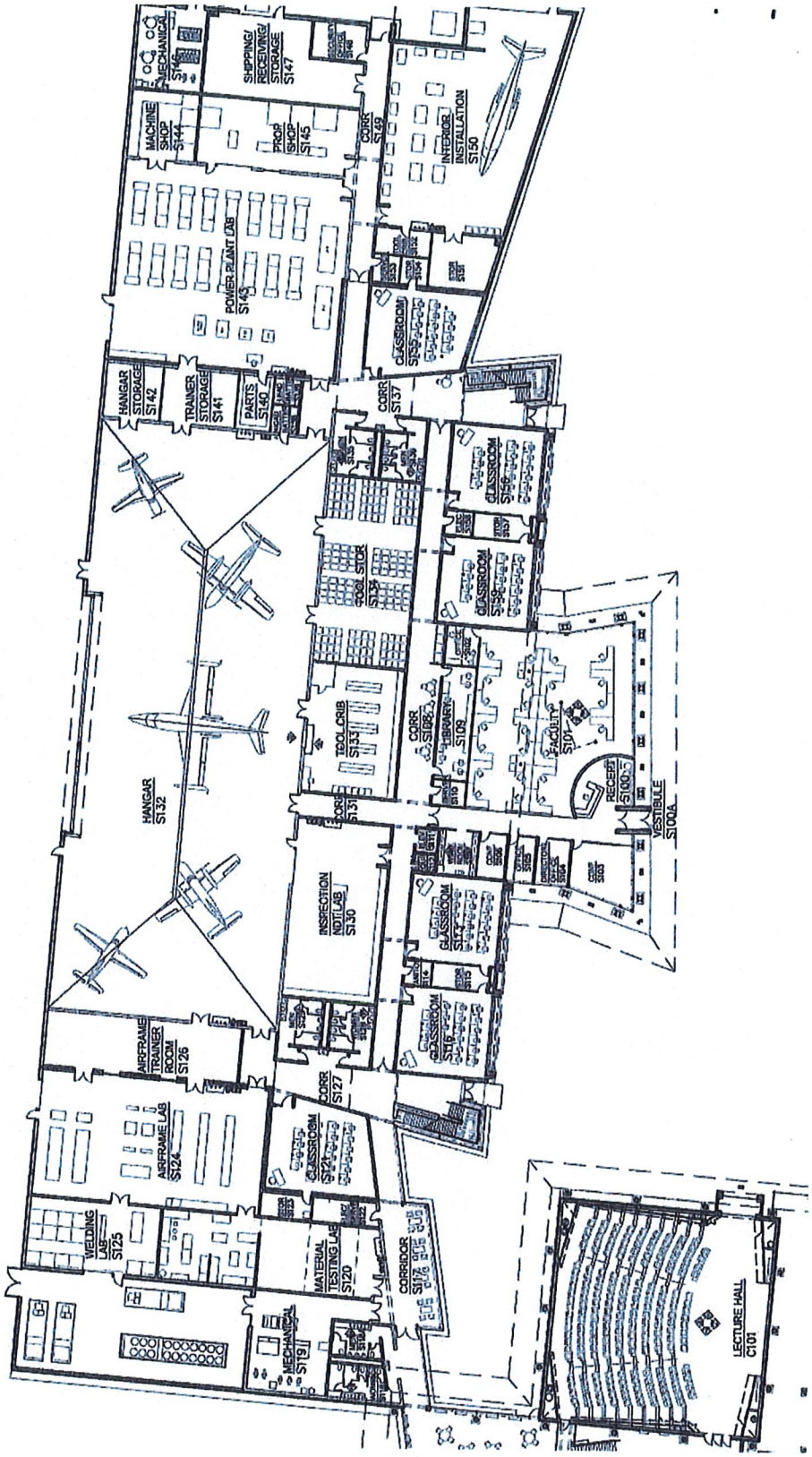


Figure 2

Aviation Maintenance Building
Building 300
1st Floor

Appropriations Committee
Date February 4, 2011
Attachment 2-17

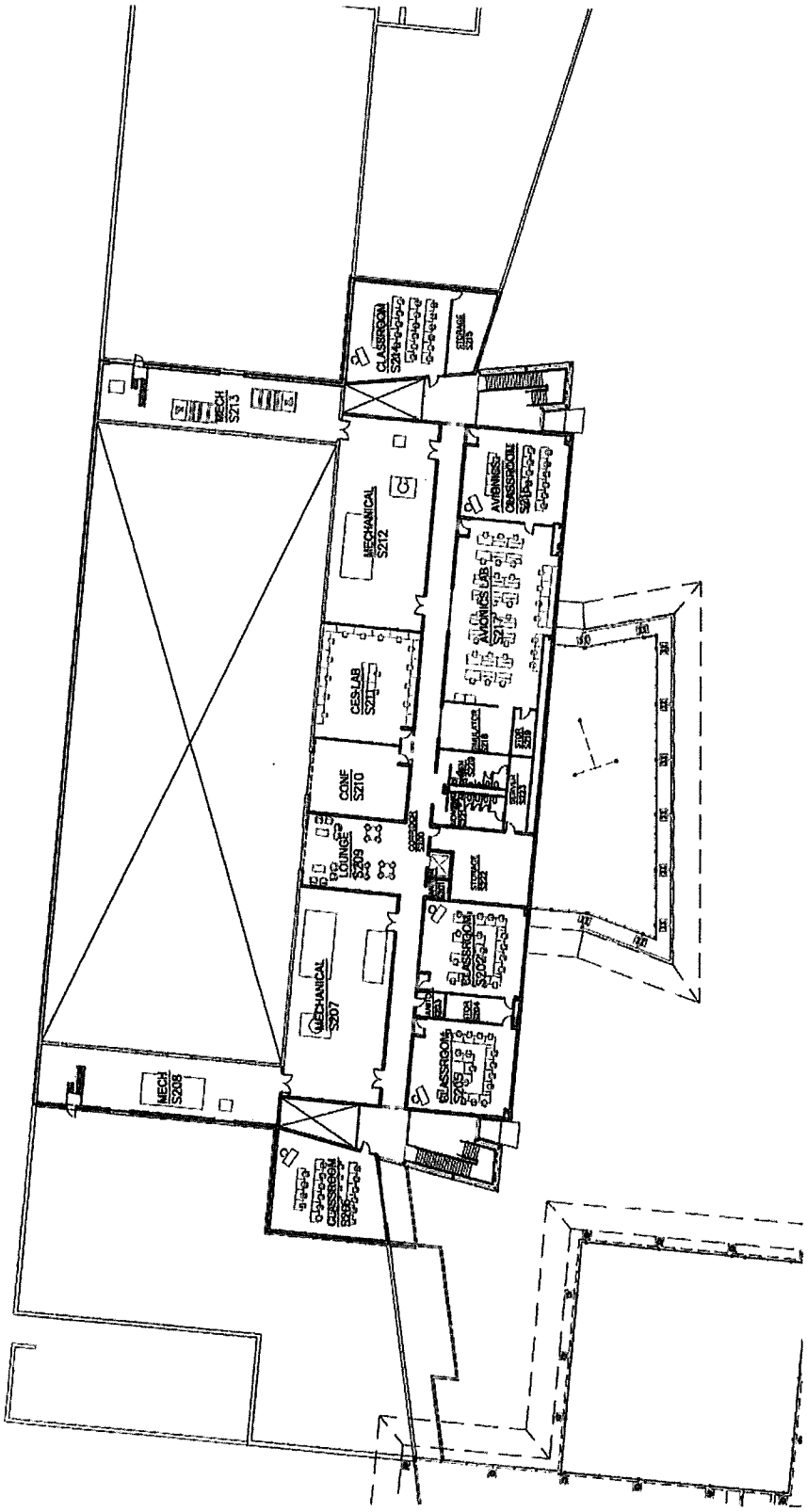


Figure 3

Aviation Maintenance Building
Building 300
2nd Floor

Appropriations Committee
Date February 4, 2011
Attachment 2-18

Appropriations Committee
Date February 4, 2011
Attachment 2-19

SUMMARY LISTING BY CURRICULUM

Description	Amount Approved	Percentage to Total	
MANUFACTURING			
CAD/CAM - CATIA	$553,600	11.07%	46.04%
Composites	$263,021	5.26%	
Robotics	$416,000	8.32%	
Machining	$370,603	7.41%	
Paint Applications and Advanced Coatings	$585,955	11.72%	
Electromechanical/Mechanical Systems	$113,050	2.26%	
AVIATION MAINTENANCE			
Avionics	$139,198	2.78%	46.81%
Airframe / Powerplant	$1,922,224	38.44%	
Non-Destructive Inspection	$279,000	5.58%	
NCAT GENERAL			
Data Center, Classrooms, Distance Learning	$357,349	7.15%	7.15%
TOTAL REQUESTED	**$5,000,000**	100.00%	
TOTAL BUDGET	**$5,000,000**		
REMAINDER	**$0**		

DETAILED LISTING BY CURRICULUM AND NCAT FACILITY LOCATION (Room #)

		Budget 11/30/2010	Not to Exceed
Manufacturing		**$2,302,229**	
1	**CAD/CAM - CATIA**	**$553,600**	
1A	Rooms M164, M165, M166		
	DVI System		56,100
	Monitors/Room Speakers		16,000
	Commercial Licenses		90,000
	High End Workstations		11,500
	Portable Inspection Devices and Scanning Head		100,000
	Laser Tracker and Laser Scanning Technologies		280,000
			$ 553,600.00
2	**Composites**	**$263,021**	
2A	Rooms M143-M147, M149 Composites Lab		
	Laser Projection		82,500
	Debulk and Cure Tables		24,000
	Micro Duster Air Filtration		26,000
	3' x 3' Oven		20,000
	Saws		13,500
	Processing and Storage (6 rooms)		97,021
			$ 263,021.00
3	**Advanced Manufacturing/Robotics**	**$ 416,000.00**	
3A	Room M119 Robotics Technology		
	Basic/ Advanced Programmable Logic Controls Equipment		98,000
	Industrial Instrumentation Trainers		112,000
	Introductory Robotics Programming Equip		16,000
	Material Handling and Machining Robot		100,000
			$ 326,000.00

Appropriations Committee
Date February 4, 2011
Attachment 2-20

3B	Rooms M120, M134, M134B Advanced Joining		
	Robotic Rail System		90,000
	e-NDE Process Control		0
	Robotic End-Effector for Composite Drilling		0
			$ 90,000.00
4	**Machining**	**$370,603**	
4A	Room M138 Machine Lab		
	Clausing Colchester Lathes (2)		55,700
	Bridgeport Mills		110,000
	HAAS SR100 Router		40,212
	HAAS Vertical Machining Center with 5-axis capability		96,579
	HAAS Vertical Machine w/2-axis capability		68,112
			$ 370,603.00
5	**Paint Applications & Advanced Coatings**	**$585,955**	
5A	Room M150 Paint Lab		
	Paint Application Equipment		45,956
	Color Technology		89,662
	Materials/Material Handling		56,499
	Safety/Maintenance		20,266
	Storage		29,073
	Paint Testing Equipment		36,544
			$ 278,000.00
5B	Room M151 Test Chamber Lab		
	Corrosion Test Chamber		23,740
	Environmental Exposure Chambers		75,607
	Test Equipment		28,033
	Weathering Chambers		77,897
	Installation/Maintenance		9,685
			$ 214,962.00
5C	Room M153 Advance Coatings Lab		
	Test Chambers		13,371
	Materials/Material Handling		34,843
	Safety/Maintenance		4,591
	Test Equipment		38,688
	Installation		1,500

			$ 92,993.00
6	**Electromechanical/Mechanical Systems**	**$113,050**	
6A	Room M127 Electromechanical Lab		
	Safety		6,900
	Direct and Alternating Current		46,500
	Industrial Wiring		4,800
	DC and AC Motors and Motor Control		54,850
			$ 113,050.00
Aviation Maintenance		**$2,340,422**	
7	**Avionics**	**$139,198**	
7A	Room S219 Avionics Lab		
	Digital Training Systems		139,198
			$ 139,198.00
8	**Airframe/Powerplant**	**$1,922,224**	
8A	Rooms S126, S124, S125 Airframe Trainer, Airframe, Weld Shop		
	Systems Trainers, Cut away Articles		67,176
	Weld Shop Supplies		14,342
	Student Test Articles and Test Equipment		36,231
	Component Trainers		100,755
			$ 218,504.00
8B	Rooms S143, S150, S145, S144 Power Plant Labs, Prop Shop, Machine Shop		
	Power Plant Trainers		138,044
	Power Plant Equipment and Tools		141,847
	Propeller Equipment and Training Articles		14,169
	Power Plant (Engines)		1,063,384
	Supplies to Sustain Engines/Suppt Rebuilds		82,098
	Student Component Trainer Supplies		80,120
			$ 1,519,662.00
8C	Rooms S132, S133, S138 Hanger, Tool Crib, Battery Room		
	Hanger Maintenance, Tools and Supplies		95,879
	Training Materials for Aircraft & Aircraft Sprt		61,769
	Support items for all Labs and Hanger		17,775
	Battery Shop		[illegible]35

Appropriations Committee
Date February 4, 2011
Attachment 2-22

			$ 184,058.00
9	**Non-Destructive Inspection**	**$279,000**	
9A	Room S130 NDI		
	Lubricant Spectrometer, FTIR Analyzer, Viscometer, and Particle Counter		135,000
	Vibration Analyzer and Software		51,000
	Thermal Imaging Cameras		34,000
	Acoustic Emission System		13,500
	Eddy Current		45,500
			$ 279,000.00
NCAT General		**$357,349**	
10	**Data Center, Classrooms, Distance Learning**	**$357,349**	
10A	Room C110 Data Center		
	Desktop Virtualization		152,349
10B	Classrooms		
	Computers		125,000
10C	Distance Learning		
	HD monitors, cameras, speakers, microphones, software, video equip for 2 classrooms		80,000
			$ 357,349.00
		$ 5,000,000.00	**$ 5,000,000.00**

Appropriations Committee
Date February 4, 2011
Attachment 2-23

EQUIPMENT DESCRIPTION CORRESPONDING TO AVIATION INDUSTRY NEED

Appropriations Committee
Date February 4, 2011
Attachment 2-24

NUFACTURING			
Curriculum	**Equipment**	**Approved Budget**	**Equipment Description Corresponding with Industry Need**
CAD/CAM - CATIA			
	DVI System	$56,100	This system allows the instructor display to be projected out to all of the students' displays. When teaching CATIA, FiberSim, Analysis, etc. type courses the icons and options are fairly small. The projector(s) in each room helps to demonstrate the use of the software when teaching however in a lot of cases it can be hard for the attendees to see the screen clearly enough from the 2nd and 3rd row of the classroom. In addition, it allows the instructor to project to just certain students or bring a student's display to the instructor and/or projector. This helps when some students need more demonstration than others or if they have a circumstance that needs to be discussed amongst the group. We have a similar system although it is VGA in some of our rooms at NIAR and it has proven to be very beneficial for the attendees. This will make these three labs equivalent to M167.
	Monitors/Room Speakers	$16,000	Some of the industry style courses are providing materials in an electronic form or are providing videos for the students to watch as they work. In addition, some of the instruction is done in a follow along fashion. The issue that arises is that it is very hard for the attendees to watch the instructor work and be able to work on the their machine at the same time. With dual monitors, this allows for an area to project the instructor's display to and/or to be used for pdf's or videos while the student does the work alongside on their first display. Front wall mounted speakers and all necessary audio hook ups for instructor computer along with laptop hook up. This would be nice for when you are presenting something to a class requiring sound.
	Commercial Licenses	$90,000	More and more companies are asking us to help with various projects that require commercial licenses. We have the personnel and computer resources to help with these projects but the cost of commercial licenses makes it hard to ramp up effectively. With these in place we can help industry with their overload situations without them having to go outside of Kansas or hire a lot of people for a short term.

Appropriations Committee
Date February 4, 2011
Attachment 2-20

MANUFACTURING			
Curriculum	**Equipment**	**Approved Budget**	**Equipment Description Corresponding with Industry Need**
CAD/CAM - CATIA			
	High End Workstations	$11,500	Three high end workstations for working with industry level CAD data. Allows us to handle the large data packages used by the aviation industry in order to better understand their requirements.
	Portable Inspection Devices and Scanning Head And Laser Tracker and Laser Scanning Technologies	$100,000 $280,000	We are doing more and more reverse engineering and we don't have easy access to the laser scanning equipment necessary to perform the job. We hope to get this equipment and be able to not only use it on projects but to integrate it with our CATIA labs to provide training on the use of reverse engineering software and its integration with CATIA. This is becoming more and more of a need in industry due to a lot of companies inspecting back to a 3D model instead of a printed drawing.
Composites			
	Laser Projection	$82,500	Composite manufacturing industries are swiftly moving to the use of laser technology to ensure the most accurate ply orientation and ply placement during composite parts fabrication. With the purchase of this equipment WATC can create an advanced composite course. Graduates of the advanced course will provide composite manufactures with trained personnel capable of operating, maintaining and programming laser projection equipment.
	Debulk and Cure Tables	$24,000	The cure tables will be used to cure laminates instead of using the ovens and autoclaves. This saves money and reduces landfill waste from the bagging supplies normally used during an oven cure operation. During fabrication, many of the new "out of autoclave" resin systems are dependent on multiple debulk cycles. The debulk tables reduce debulk time and the cost and waste of bagging materials used during debulk cycles.
	Micro Duster Air Filtration	$26,000	The Micro dusters are needed to help insure the dust particle counts are at levels equal or better than industry clean rooms. The Micro Duster filters will be placed near the two ply cutting machines in the large layup room.

MANUFACTURING			
Curriculum	**Equipment**	**Approved Budget**	**Equipment Description Corresponding with Industry Need**
Composites			
	3' x 3' Oven	$20,000	The oven will have the same controller used for large ovens used in industry. This controller is capable of multi segment programming and programmed heat up/ ramp rates. Compared to the large ovens, this smaller oven is more efficient for small batch cure cycles and training of oven operation. The oven will be set up with a communications port so data / cure cycles can be archived in the same manner as the factory.
	Saws	$13,500	The industrial saws selected for purchase are heavy duty construction. The same saws are used in industry to cut and trim composite parts and assemblies. Training on industry equipment and understanding how to safely operate and maintain this equipment prior to using them in the factory is important.
	Processing and Storage	$97,021	This purchase would cover several items including: 1) room surveillance equipment that provides the ability to monitor, record and archive the time, date, temperature and humidity of all the rooms and freezer at NCAT 2) a dust particle collection pump providing the capability to measure air quality in the layup rooms. Air quality is a requirement of composite manufacturing and students will be trained in the importance of checking it 3) all appropriate safety equipment is included in this budget. Students must be trained to understand and properly use all safety equipment.
Advanced Manufacturing/Robotics			
	Basic/Advanced Programmable Logic Controls Equipment	$98,000	These are beginning pieces of equipment will allow training to begin in PLC for industry and will allow the Robotics program to begin with the first certificate of completion of PLC for students interested in the Robotics AAS degree.
	Industrial Instrumentation Trainers	$112,000	These trainers will provide the basic equipment needed to begin teaching several classes in the Robotics program. Needed for the first semester of the program.
	Introductory Robotics Programming Equipment	$16,000	This system will provide the basic introductory equipment for ROB100 - this course is used in Robotics Technology and Electromechanical Systems.

MANUFACTURING			
Curriculum	**Equipment**	**Approved Budget**	**Equipment Description Corresponding with Industry Need**
Advanced Manufacturing/Robotics			
	Material Handling and Machining Robot	$100,000	To teach the student how to pick and place a part using vacuum. How to use auxiliary equipment to aid the robot in processing the part, to make use of interchangeable tooling to use the robot for multiple functions, and to machine a part using a pneumatic router. This cell will use vision to locate the shapes to be routed. It will also introduce advanced functions such as program shift and user frames to allow the student to teach a program on process stand #1 and transfer it to process stand #2. This robot is in the number one priority space because it will be used in ROB 100 which is required for both Robotics Program and Electromechancial Systems Technology Program .

Appropriations Committee
Date February 4, 2011
Attachment 2-28

MANUFACTURING			
Curriculum	**Equipment**	**Approved Budget**	**Equipment Description Corresponding with Industry Need**
Advanced Manufacturing/Robotics			
	Robotic Rail System And e-NDE Process Control And Robotic End Effector for Composite Drilling	$90,000	Rail system will be used for facilitating interaction between the robots and the MTS FSW welder to achieve fully automated robtic cell. Students will receive education and training in coordinated robotic motion in a robotic cell equipped with industry-capable robots and manufacturing systems. The robot rail system will enable the currently installed lab robots to interact as well as to operate independently. It will provide a seventh axis to the ABB IRB 6600 robot, allowing it to interact with the ABB IRB 7700 robot and other production-capable lab equipment. Students will first learn to program the lab robots and to define their coordinated motion with CAD/CAM software. They will then learn to actually operate the robots for coordinated tasks to carry out drilling, fastening, welding, and other advanced automated assembly operations. Research will be carried out in advanced assembly and joining processing for aircraft structure development and maintenance. Students and researchers will receive education and training in advanced e-NDE (electronic Non-destructive Evaluation) techniques for joining and processing technologies. These new techniques are based on process monitoring and have been shown to increase the accuracy and precision of probability of detection (POD) analyses when compared to conventional inspection techniques for friction stir welding, for example. In FSW the transverse force feedback signal is correlated with defect formation. e-NDE is a real-time, non-destructive "green" evaluation system for predicting weld quality using feedback signals monitored during the welding process. It provides a control system with important feedback information about joint quality. The control system will be used in research to analyze the process parameters in terms of the feedback information to certify sound, flawless joints. Research will be conducted to extend e-NDE to real-time inspection to reduce and potentially eliminate the need for secondary inspection operations like X-ray, and ultrasonic inspection steps. Students will receive education and training in robotic drilling and machining of composites for fastening composites to composites and composites to metals. An advanced orbital end effector will give students experience in drilling through multiple layer stack-ups of composites and metals with state-of-the-art equipment. The system will provide researchers and developers with instrumented equipment for evaluating cutters and procedures for drilling advanced materials. Tooling and flexible fixturing components and units designed to enable the drilling of complex aircraft components will ensure students are trained in real-life applications.

MANUFACTURING			
Curriculum	**Equipment**	**Approved Budget**	**Equipment Description Corresponding with Industry Need**
Machining			
	Clausing Colchester Lathes	$55,700	To serve students in lab and match machines purchased in FY2010.
	Bridgeport Mills	$110,000	To update all mill machines in lab to current standard equipment.
	HAAS SR100 Router	$40,212	Entrusted equipment from Haas; if not purchased by spring 2011, equipment will be removed by Haas and not replaced.
	Haas VF-2S5TR Vertical Machining Center w/ 5 axis capability	$96,579	Entrusted equipment from Haas; if not purchased by spring 2011, equipment will be removed by Haas and not replaced.
	Haas VF-2S5TR Vertical Machining Center w/ 2 axis capability	$68,112	Entrusted equipment from Haas; if not purchased by spring 2011, equipment will be removed by Haas and not replaced.
Paint Applications and Advanced Coatings			
	Paint Application Equipment	$45,956	Spray guns and equipment used for application of interior and exterior aircraft coatings. Equipment is used in aircraft industry by paint suppliers, OEM's, and refinishers. Equipment covers variety of application methods used for items from small parts to full aircraft.
	Color Technology	$89,662	Equipment used by aircraft paint suppliers, OEM's, refinish shops to develop color matches in standard and special effect coatings, and equipment used by aircraft paint suppliers and OEM's to evaluate color evaluation skill of technicians and painters.

Appropriations Committee
Date February 4, 2011
Attachment 2-30

Appropriations Committee
Date February 4, 2011
Attachment 2-31

MANUFACTURING			
Curriculum	**Equipment**	**Approved Budget**	**Equipment Description Corresponding with Industry Need**
Paint Applications and Advanced Coatings			
	Materials/ Material Handling	$56,499	Equipment used to prepare aircraft surfaces prior to coating application and to detail finished coating film. Equipment includes materials for masking, sanding, design layout, polishing and cleaning.
	Safety/Maint-enance	$20,266	Supplies for set-up, use, and maintenance of aerospace applications equipment.
	Storage	$29,073	Equipment for storage of materials, tools, test equipment, etc.
	Paint Testing Equipment	$36,544	Equipment used by aircraft paint suppliers, OEM's, refinish shops to develop color matches in standard and special effect coatings and testing equipment used to measure various properties of painted objects and for measurements during coatings application process.
	Corrosion Test Chamber	$23,740	Used for general testing of coatings and especially newer non-chrome primer technologies. Required by industry coatings specifications.
	Environmental Exposure Chambers	$75,607	Used to stress coated panels at extremes of temperature, at programmed intervals to simulate changes in climate due to altitude and test humidity resistance of painted parts. Testing is requirement of military and OEM specifications.
	Test Equipment	$28,033	Used by aerospace paint suppliers, military, and OEM's to study tensile properties of films of paint, adhesives, and sealants.
	Weathering Chambers	$77,897	Used for accelerated weathering testing of painted panels, product development and approval. Commonly used by aircraft paint suppliers, military, and OEM's to test and approve coatings for use on aircraft.
	Installation/ Maintenance	$9,685	Installation of machinery, access to water and/or electricity required for operation.

ANUFACTURING			
Curriculum	**Equipment**	**Approved Budget**	**Equipment Description Corresponding with Industry Need**
Paint Applications and Advanced Coatings			
	Test Chambers	$13,371	To work with the paint booth and mixing room in the Paint lab in order to meet competencies outlined in the Paint program.
	Materials/ Material Handling	$34,843	Supply lab for instruction on aircraft coatings blending and testing of wet and cured coatings. Equipment is representative of tools operated by lab technicians, engineers, and painters in the aircraft industry.
	Safety/ Maintenance	$4,591	Safety and maintenance equipment for lab exercises.
	Test Equipment	$36,688	Supply lab for instruction on aircraft coatings blending and testing of wet and cured coatings. Equipment is representative of tools operated by lab technicians, engineers, and painters in the aircraft industry.
	Installation	$1,500	Installation of machinery, access to water and/or electricity required for operation.
Electromechanical/Mechanical Systems			
	Safety	$6,900	IND 100 Industrial Safety training will be provided in the first semester of the Electormechcanical Systems program.
	Direct and Alternating Current	46,500	IND 106 Direct and Alternating Current Circuits provided for training in electrical circuitry used in aviation production. Needed in the first semester of the Electormechcanical Systems program.
	Industrial Wiring	$4,800	IND 108 Industrial Wiring provides training for electrical wiring used in maintenance and repair of aviation production processes. Needed in the first semester of the Electormechcanical Systems program.
	DC and AC Motors and Motor Control	$54,850	IND 110 DC and AC Motors and IND 112 Fundamentals of Motor Controls - provides for training in the repair and maintenance of motors used in aviation production processes. Needed in the first semester of the Electormechcanical Systems program.

Appropriations Committee
Date February 4, 2011
Attachment 2-32

AVIATION MAINTENANCE			
Curriculum	**Equipment**	**Approved Budget**	**Equipment Description Corresponding with Industry Need**
Avionics			
	Digital Training System	$139,198	Simulators and test stations in order to create a teaching and learning environment for students for digital training of avionics instruction.
Airframe/Powerplant			
	Systems Trainers, Cut Away Articles	$67,176	Trainers to assist with teaching of hydraulic, pressurization anti-skid and air conditioning for Airframe I and II students.
	Weld Shop Supplies	$14,342	Tables, storage and vises for the welding shop for Airframe I and II students.
	Student Test Articles and Test Equipment	$36,231	Pilot static system trainer for Airframe I and II students.
	Component Trainers	$100,755	Trainers for voltage, brake drums, master cylinders, generators, starters, alternators, calipers and brake systems for Airframe I and II students.
	Power Plant Trainers	$138,044	Trainers that simulate fuel systems carburetion, injection, electrical and thrust reverse for Powerplant I and II students.
	Power Plant Equipment and Tools	$141,847	Instructor tools, generator test bench, valve grinder and compression tools, engine test kits and tools for Powerplant I and II students.
	Propeller Equipment and Training Articles	$14,169	Propeller blade trainers, drive units and blade prop storage.
	Powerplant Articles (Engines)	$1,063,384	New engines (Lycoming and Pratt Whitney) and tools for Powerplant I and II students to provide real world learning experiences on a variety of engines.

Appropriations Committee
Date February 4, 2011
Attachment 2-33

AVIATION MAINTENANCE			
Curriculum	**Equipment**	**Approved Budget**	**E Equipment Description Corresponding with Industry Need**
Airframe/Powerplant			
	Supplies to Sustain Engines/Support Rebuilds	$82,098	Overhaul kits to enable the ability for students to re-build engines in existing planes. All supplies will be used in Powerplant I and II to teach re-building of turbine and reciprocating engines.
	Student Component Trainer Supplies	$80,120	Carburetor, magneto overhaul kits for turbine and reciprocating engines for Powerplant I and II
	Hanger Mainten-ance, Tools and Supplies	$95,879	Pressure washer, Instructor tool sets, tool crib toolset, assorted hardware and high-temp degreaser cleaner to meet competencies for students in the General portion of the A&P program.
	Training Materials for Aircraft and Aircraft Support	$61,769	Tools and equipment needed for support of all aviation programs that utilize the hanger.
	Support Items for All Labs and Hanger	$17,775	Support items for the labs and hanger for the aviation programs.
	Battery Shop	$8,635	Aircraft batteries, battery charger and workbenches for the Powerplant I and II students.

Appropriations Committee
Date February 4, 2011
Attachment 3-34

AVIATION MAINTENANCE			
Curriculum	**Equipment**	**Approved Budget**	**Equipment Description Corresponding with Industry Need**
Non-Destructive Inspection			
	Lubricant Spectrometer, FTIR Analyzer, Viscometer, and Particle Counter	$135,000	Simultaneous analysis of multiple wear metals in aircraft engine oil, analyze aircraft engine oil for oxidation, nitration, sulfation, water, coolant, fuel, soot, and additive depletion, determine the viscosity of aircraft lubricants, count wear metal particles in aircraft lubricating fluids and identify them with shape recognition software. This equipment is used to analyze engine and hydraulic fluids for serviceability in support of Airframe and Powerplant training. This type of analysis is common during aircraft servicing and troubleshooting. Cross over applications include ground transportation, oil and gas processing, agribusiness food and feed manufacture, chemical industries, and power generation. Students will learn to operate and calibrate instruments to industry specifications. Further instruction will be given on test result interpretation, failure levels, predicting failure timelines, determining preventative maintenance practices and their intervals.
	Vibration Analyzer and Software	$51,000	Monitors and analyzes aircraft engine bearing for wear or damage. Vibration analysis can be used to identify causes of vibration (propellers, turbines, accessories) that lead to noise, structural fatigue and crew discomfort. Vibration analysis is used on both new products and on aircraft undergoing service. Cross over applications include ground transportation, oil and gas processing, agribusiness food and feed manufacture, chemical industries, and power generation. Students will learn to operate and calibrate instruments to industry specifications. Further instruction will be given on test result interpretation, failure levels, predicting failure timelines, determining preventative maintenance practices and their intervals.
	Thermal Imaging Cameras	$34,000	Large area scanning for disbond and delaminated aircraft surfaces is especially important as more composite structures are introduced into service. This is a newer technology that is starting to be used more within the aircraft industry because of the speed and accuracy at which bonded structures can be evaluated. A secondary use is for aircraft electrical system scanning for heat producing electrical problems. Cross over applications include ground transportation and power generation. Students will learn to operate and calibrate instruments to industry specifications.

AVIATION MAINTENANCE			
Curriculum	**Equipment**	**Approved Budget**	**Equipment Description Corresponding with Industry Need**
Non-Destructive Inspection			
	Acoustic Emission System	$13,500	In-service monitoring of aircraft structures, particularly composite structures. The technology is designed to monitor structures while in service in real time or in capture time elapsed. This technology has been evolving for many years and is becoming more mature leading to its acceptance as a viable method of structural monitoring. Acoustic emission technology is vital to research efforts on aging aircraft structures and is also the leading technology in research being done on wind power generation structures. Cross over applications include ground transportation and power generation. Students will learn to operate and calibrate instruments to industry specifications. Further instruction will be given on installation and interpretation.
	Eddy Current	$45,500	The Eddy Array modules add another capability to the ultrasonic phased array system. With the addition of the Eddy Array modules, the students will be able to take full advantage of the existing equipment for both education and also the industry research endeavors on the manufacture and repair of composite aircraft surfaces. Cross over applications include ground transportation, oil and gas processing, agribusiness food and feed manufacture, chemical industries, and power generation. Students will learn to operate and calibrate instruments to industry specifications.
NCAT GENERAL			
Data Center			
	Desktop Virtualization	$152,349	Used to run any aviation industry programs/software at NCAT. Rapidly reconfigure NCAT computer labs for aviation industry training.
Classrooms			
	Computers	$125,000	Replace outdated NCAT student computers to keep up with aviation industry standards.

Appropriations Committee
Date February 4, 2011
Attachment 2-36

NCAT GENERAL			
Curriculum	**Equipment**	**Approved Budget**	**Equipment Description Corresponding with Industry Need**
Distance Learning			
	HD Monitors, Cameras, Speakers, Microphones, Software, Video Equipment	$80,000	Equip classrooms at NCAT to accommodate video conferencing, video recording and interactive distance learning to train aviation workers remotely.

Appropriations Committee
Date February 4, 2011
Attachment 2-37

Kansas Aviation Industry: Economic Outlook and Our Future

John Dieker
Vice President Operations
Bombardier Learjet

Preparing for Alternate Futures

UP

- Stable global economy
- Consumer confidence increasing in emerging markets
- Increasing civil transport production rates
- Anticipated corporate profit rebound
- Global air travel improving
- Orders for large biz jets increasing

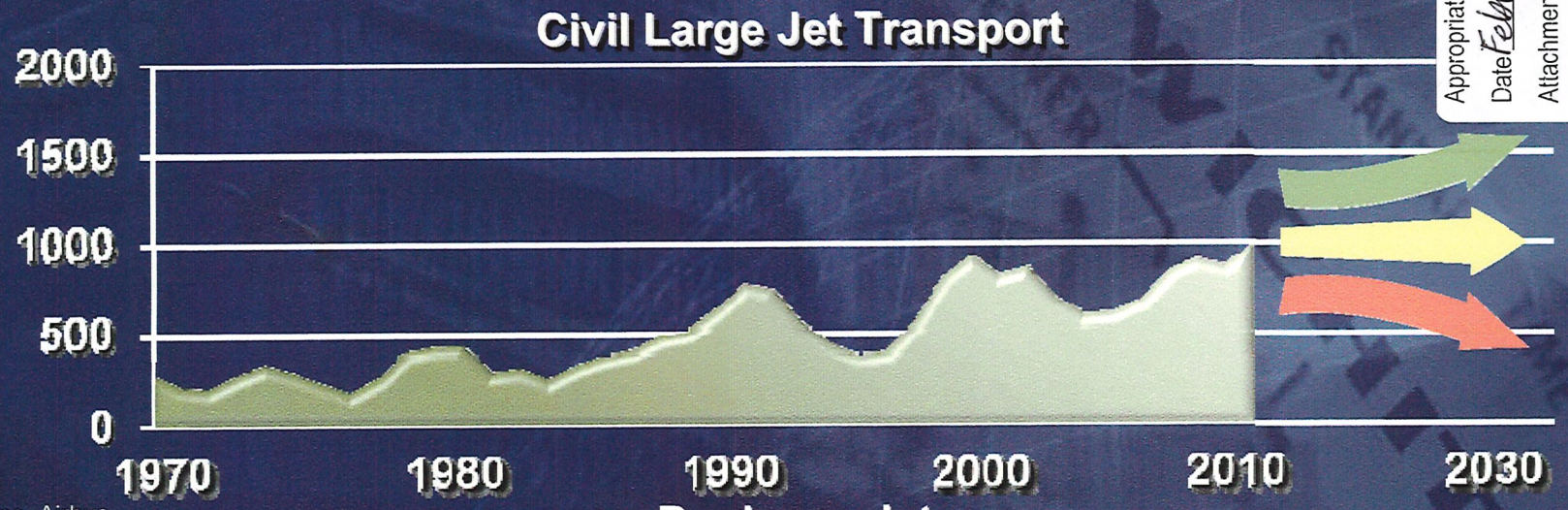
DOWN

- Potential geo-political disruption
- Increasing deflation potential
- U.S. unemployment remains high
- Used biz jet inventory too high
- Sovereign debt crisis

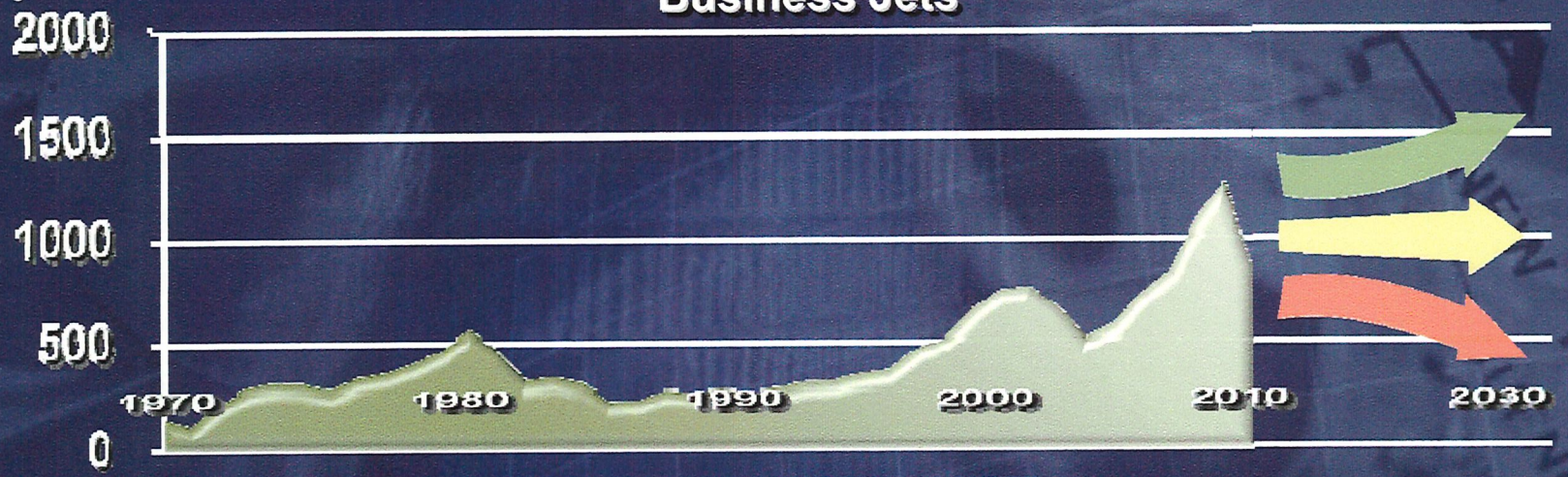
FLAT

- Credit still tight
- Stagnant U.S. capital investment
- U.S. Consumer confidence flat/declining

Aircraft Production



Source: Boeing, Airbus

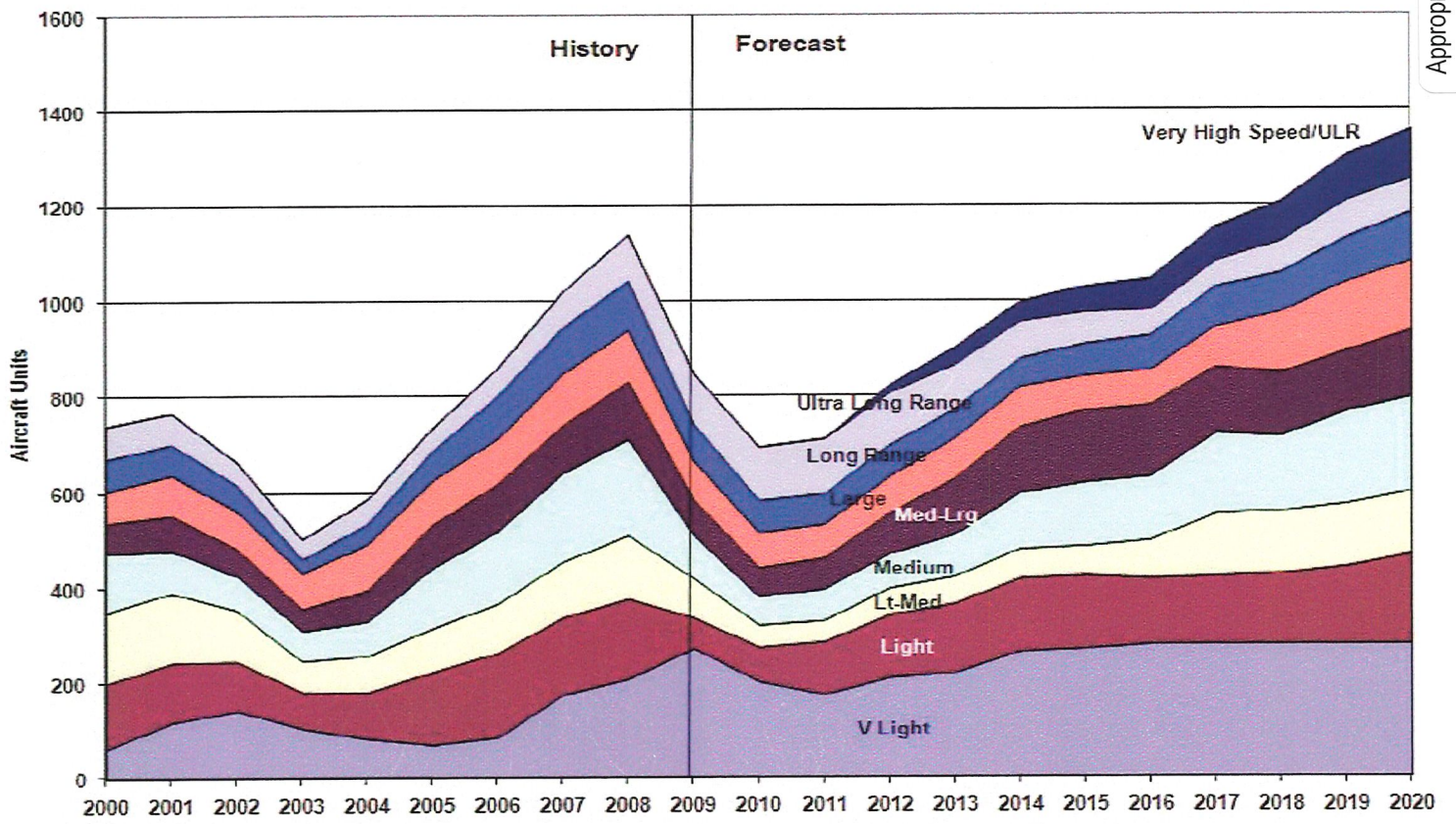


Source: Teal Group

Growth with cycles

Industry Review and Outlook

Honeywell Business Jet Shipment Forecast



11,000 Aircraft from 2010 - 2020

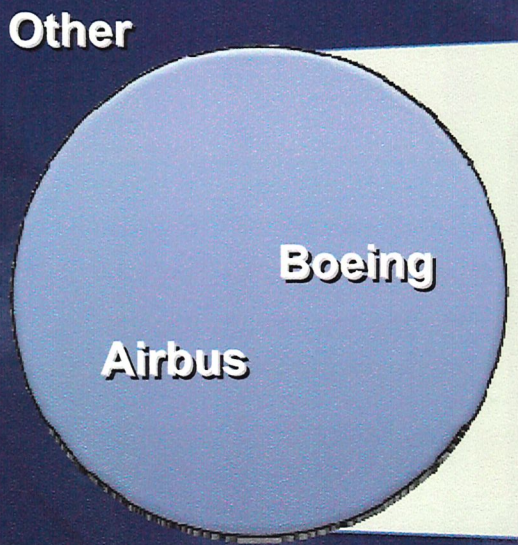
Broad consensus on 2010 trough, slow climb and return to peak

Source: *Honeywell September 2010*

Civil Jet Transport Market

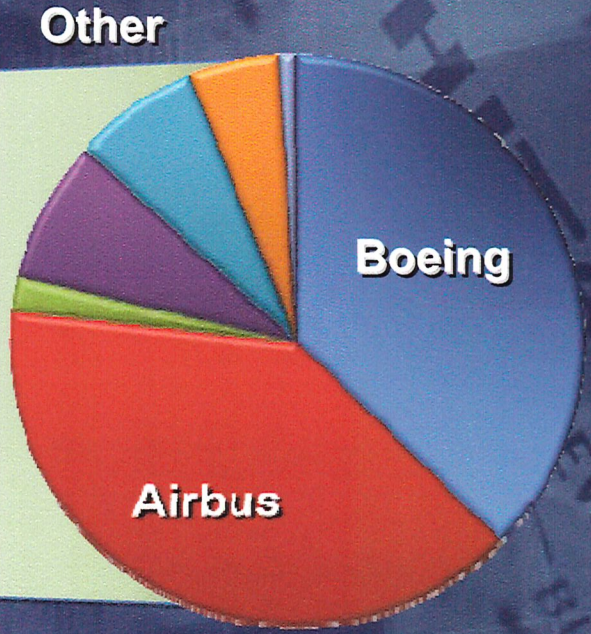
Appropriations Committee
Date February 4, 2011
Attachment 3-5

Current



1,100 Deliveries

2025



1,590 Deliveries

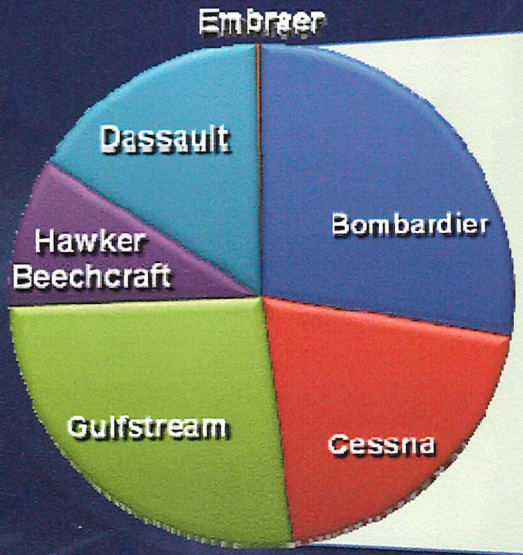
Sources: Spirit

More players entering market

Business Jet Market

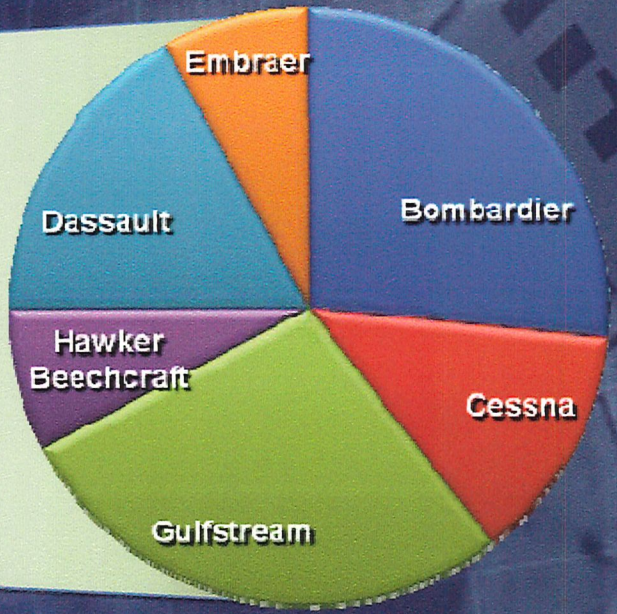
Appropriations Committee
Date February 4, 2011
Attachment 3-6

2000-2009



7,889 Units

2010-2019



10,313 Units

Competition is growing globally

Sources: Teal

Kansas Aviation Industry
Economic Impact

- Kansas contributions
  - **~$7.1B** annual economic impact, leading the nation with $2,561 per capita contribution (twice that of the next most competitive state)
  - **Industry leading OEM's** such as Cessna, Bombardier Learjet, Hawker Beechcraft, Airbus (Engineering) and Boeing (Military)
    - Kansas GA OEM's shipped 1,708 airplanes worth **$5.8B** with exports accounting for 537 airplanes or **$2.3B (40%)**
  - Kansas aviation companies deliver over **50% of all GA aircraft** employing **17.8%** of all Kansas manufacturing employees
  - Each Kansas taxpayer saves **$525** in taxes paid in Kansas as a result of the aviation industry
  - Each aviation job generates an additional **3.6** jobs

Output, employment and earnings multiply

Sources: *KS Aviation Mfg Report CEDBR 2008, Alliance for Aviation Across America, Aviation Week*

Kansas Aviation Industry Investment

THIS IS A GLOBAL COMPETITION !

Existing Global Aviation Clusters:

- ***South Central Kansas***
- Dallas-Fort Worth
- Montreal
- Puget Sound / Seattle
- Toulouse

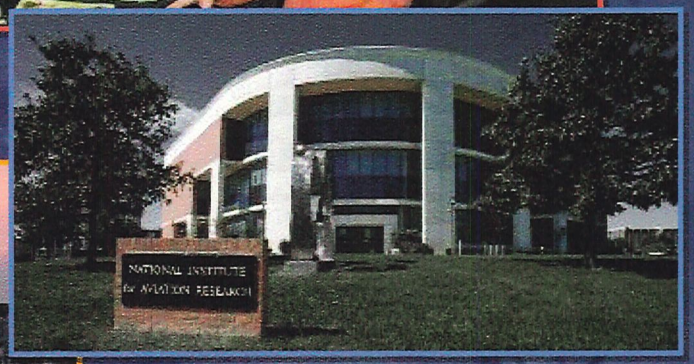
Other Global Competitors:

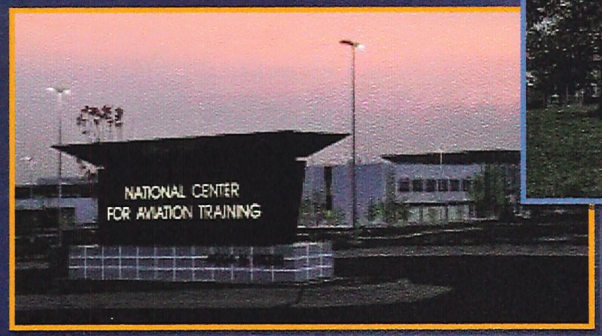
- Brazil
- Mexico
- European Union
- Russia
- Japan
- China

"It is difficult to build an aviation cluster, but easy to destroy one." - Richard Aboulafia, Teal Group

Sustaining our Competitive Advantage

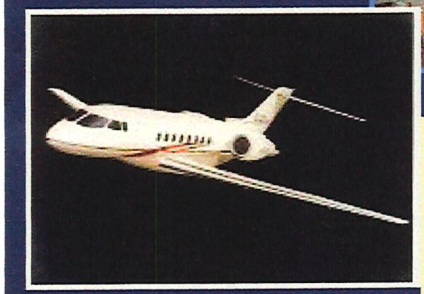
- Increase Technology Integration / Research
- Grow and Maintain a Skilled Motivated Workforce
- Invest in Research & Training for the future
  - NIAR
  - NCAT

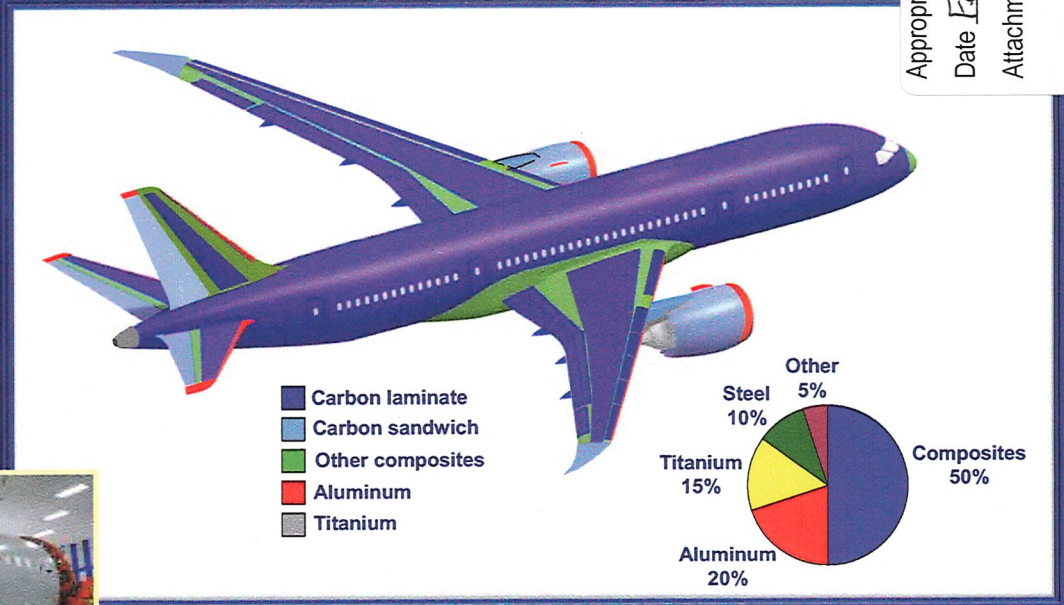




Industry Need for Future Technology Investment

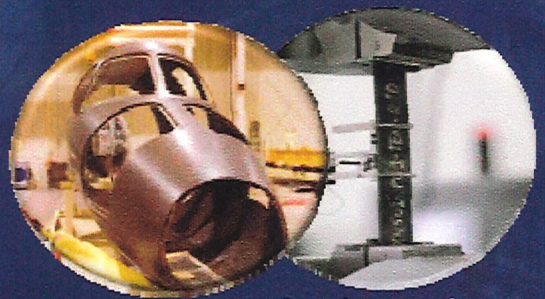
Airplane design and construction is changing rapidly



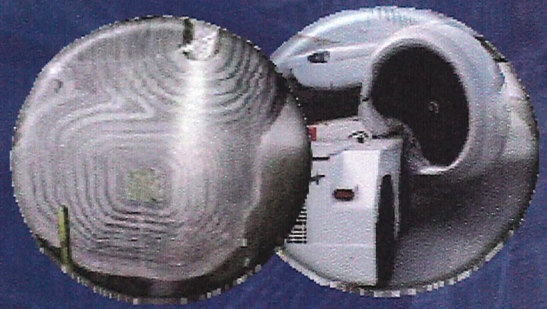


To maintain the leadership position and grow this market, we must invest.

Research Funding Distribution
2010 - 2011

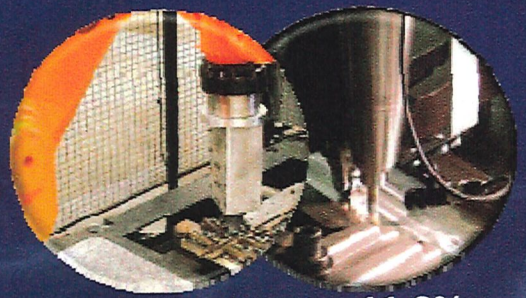


Composite & Advanced Materials Design 21.6%



Composite & Advanced Materials Repair 17.4%

Increased Performance & Technology Integration 8.5%

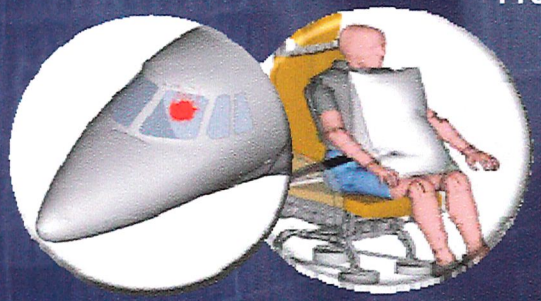


Advanced Joining 11.8%

NIAR

Protection from Environmental Effects 19%

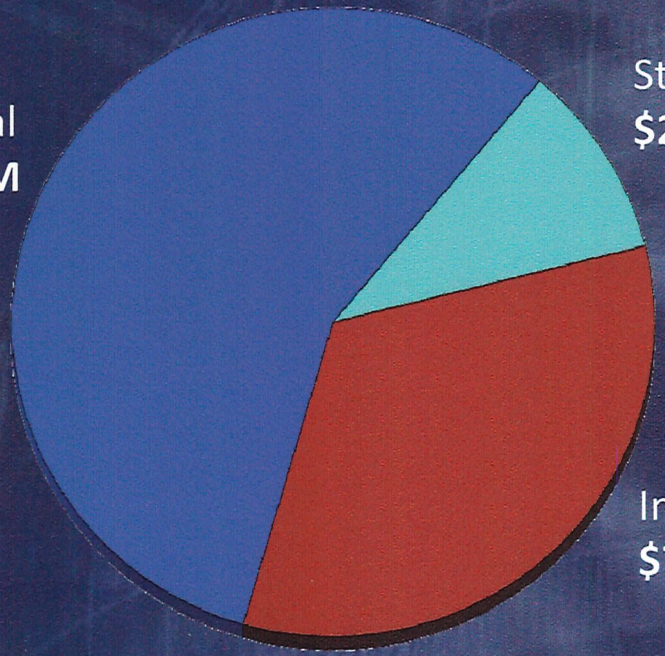
Composite & Advanced Materials Manufacturing 14.8%



Simulation & Modeling 6.9%

NIAR Investments and Leverage

The State's investment has allowed us to leverage significant federal and industry funding into Kansas



9:1
return on investment

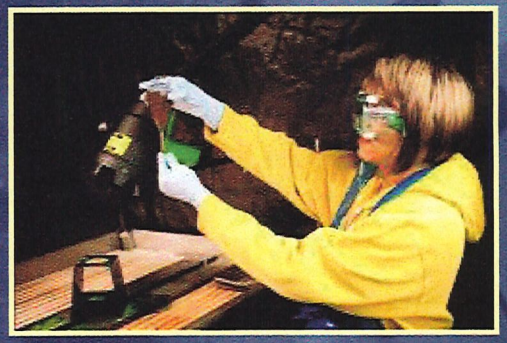
We need to continue to invest in the technology development for our future products.

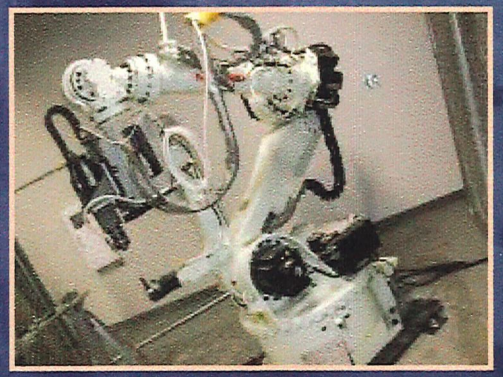
National Center for Aviation Training

- County, City, State, Aviation Manufacturers, and Federal Partnership
  - $50M+ in facility invested
  - Requires millions in infrastructure support (equipment, technology, infrastructure, curriculum & start-up)
- Manufacturing Tech Center & Aviation Training Center opened in Fall 2010

www.ncatkansas.org

NCAT
NATIONAL CENTER FOR AVIATION TRAINING





Appropriations Committee
Date February 4, 2011
Attachment 3-13

National Center for Aviation Training

Appropriations Committee
Date February 4, 2011
Attachment 3-14

Programs Launched or Planned for Launch in 2011

- Advanced Engineering
  - Manufacturing Engineering Design
  - CATIA
    - Design
    - Machining
  - Manufacturing Engineering Technician
  - Manufacturing Robotics Engineering
  - Industrial Engineering Technician
  - Quality Engineering Technician
  - Aeronautical Engineering Technician
- Mechanical Systems Technology
- Programmable Logic Controls Technician
- Nondestructive Testing
- Lean Manufacturing Process Technician
- Industrial Systems Technology
- Aerospace Quality Control
- Composite Technician
  - Fabrication Repair
- Aerospace Fiber Optics
- Project Management Certification
- Advancing Productivity, Innovation, and Competitive Success
- Six Sigma Certification

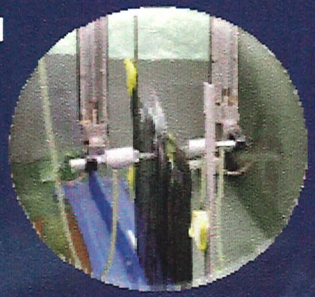
Equipment Funding Distribution
2010 - 2011

NCAT General
7%

Airframe & Powerplant
39%

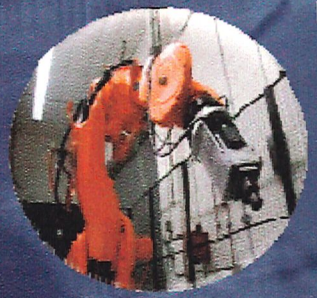
Paint Applications & Advanced
Coatings 12%

NDI 6%

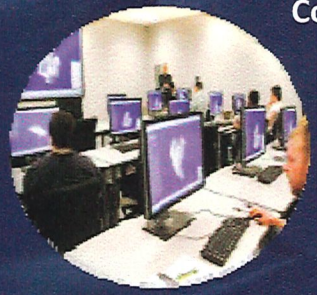


Composites 5%

NCAT
NATIONAL CENTER FOR AVIATION TRAINING



Robotics 8%



CAD/CAM 11%

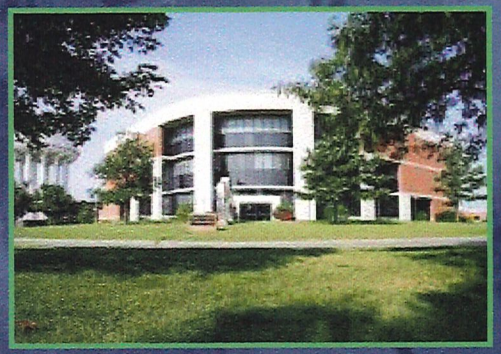
Electromechanical/ Mechanical
Systems 2%

Machining 7%

Avionics 3%

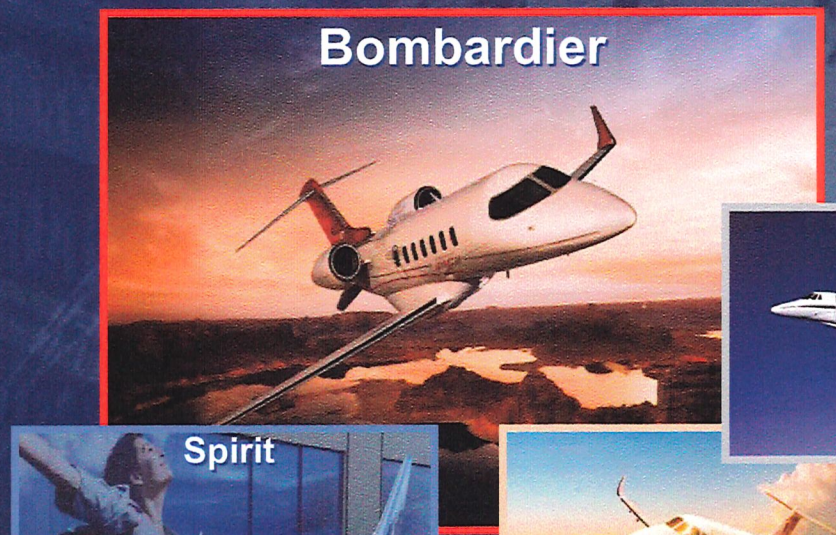
Growing the Kansas Economy
Success Factors

- Largest economic sector in Kansas is **Manufacturing**
- Retain existing aviation industry – strong companies and suppliers
- Grow our position as global leader in aviation research = **NIAR**
- Flexible, business-driven, high-tech training to meet future skilled workforce needs = **NCAT**
- Stronger Kansas economy and provide stability to state budget



Industry Request

We request your support for combined aviation research and aviation-related training in the current legislative session.



Appropriations Committee
Date February 4, 2011
Attachment 3-17

Kansas Aviation Jewel
What's it Worth?

Jobs:

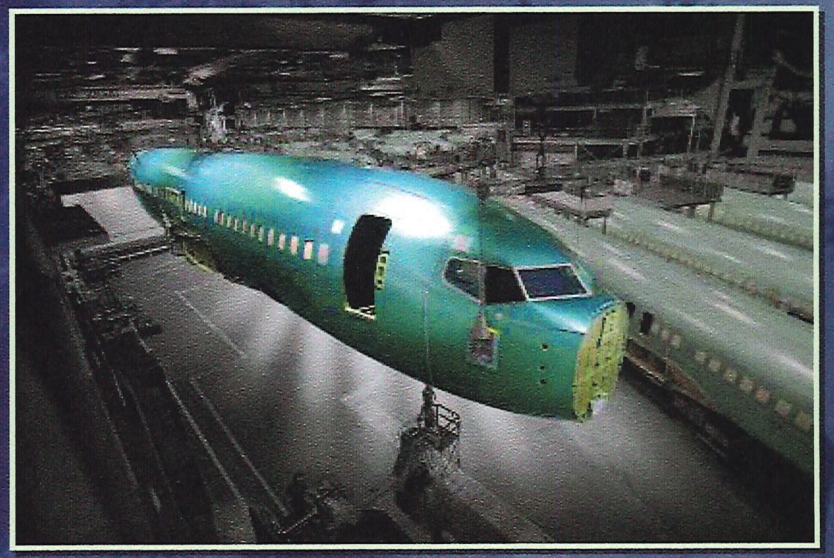
- 119,000 incl. indirect

Wages:

- $67,440 avg.
- $2.3B total
- $5.2B incl. indirect

Corporate/Employee:

- $5.3M to United Way = 35%
- 10,000's of volunteer hours



~22% of Kansas economy

Sources: U.S. Bureau of Labor Statistics
W.S.U. CEDBR

Sustaining our Competitive Advantage

Competitive cost structure

Community strategy/plan

Protect the Kansas aviation jewel

Appropriations Committee
Date February 4, 2011
Attachment 3-19