The USAF Test Pilot School's Test Management Projects Process:

Partnerships of Government, Industry and Academia for Test Projects

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Overview

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- USAF Test Pilot School Structure
- Test Management Projects (TMPs)
  - Requirements / Scope
  - Recent TMPs
  - Costs / Benefits
  - Timeline
- Customers & Contacts for Future Opportunities, i.e….
  - How do I get my flight test project flown as a TMP?

Curriculum

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- ***48-week Program: Masters of Sci, Flight Test Engineering***
- ***3 Curricula:***
  - ***Experimental Test Pilot***
  - ***Experimental Test CSO/RPA Pilot***
  - ***Flight Test Engineer***
- ***4 Major Subdisciplines***
  - ***Performance***
  - ***Flying Qualities***
  - ***Systems***
  - ***Test Management***
- ***13 Academic Courses = 50 sem-hrs total***
  - ***2500 Graduate hrs Average (+300 Ancillary Training hrs)***
  - ***21 Scored Academic Exams***
    - *19 Individual Academic Exams*
    - *Comprehensive Written & Oral Exams*
  - ***85 Flights (or Airborne Laboratories)***
  - ***38 Graded Reports (31 written + 7 oral)***
    - *Capstone Test Management Project (Report + Defense)*

Phase / Course Layout

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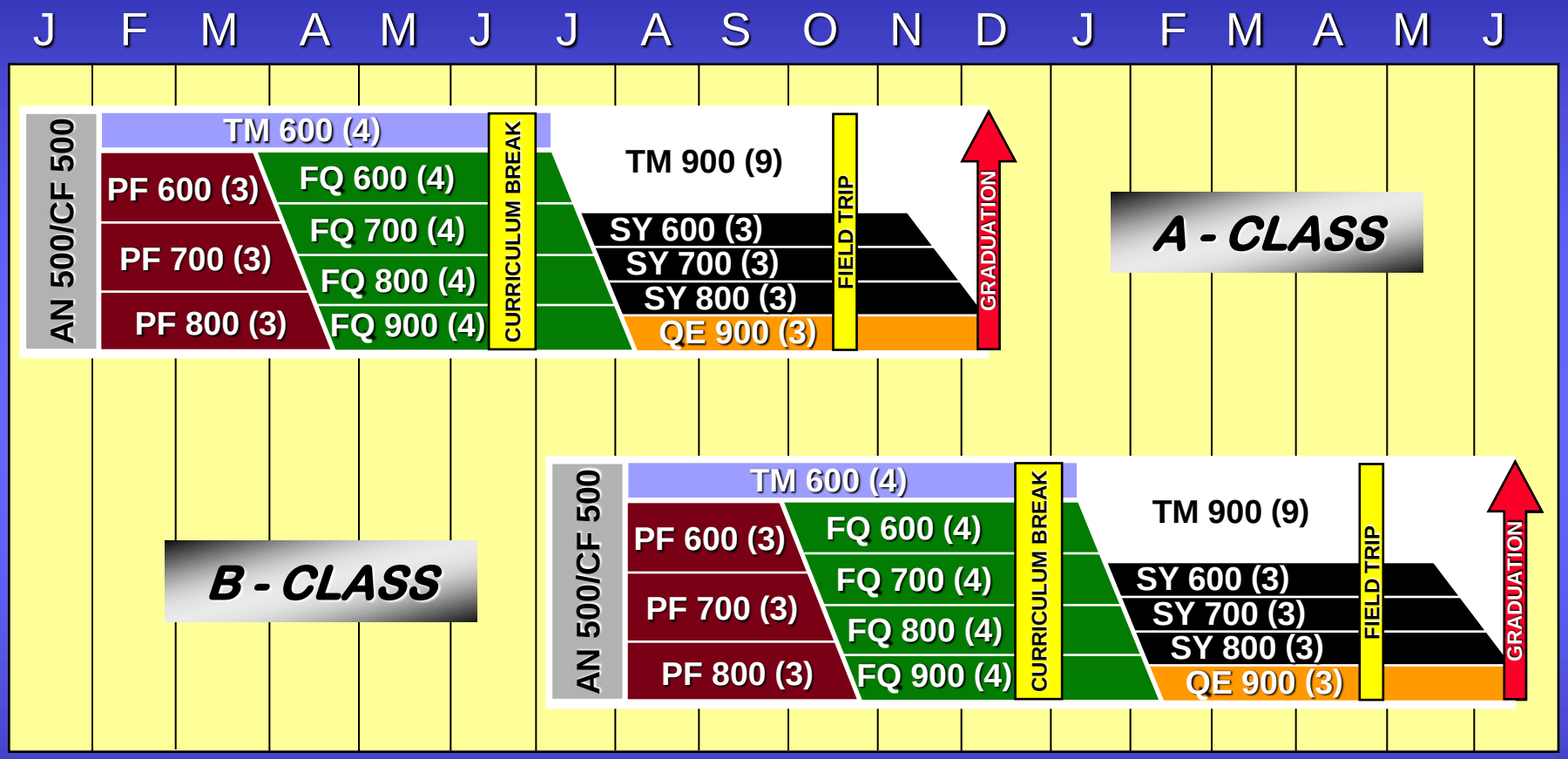

AN	=	Ancillary Training	SY	=	Systems Subdiscipline
CF	=	Check Flights	TM	=	Test Management Subdiscipline
PF	=	Performance Subdiscipline	TMP	=	Test Management Project
FQ	=	Flying Qualities Subdiscipline	QE	=	Qualitative-Evaluation Program

Curriculum Aircraft

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Curriculum Aircraft

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NF-16D VISTA

ASSETS

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- **FQ Sim**: Flying and Handling qualities Simulator
  - Robust, programmable, and modular - simulate any calculable model in real-time
- **Variable Stability Surrogate RPA** (name TBD!)
  - Calspan's Variable stability Learjet, operated from FQ Simulator
    - Able to model UAV controls, schemes, links
- **VISTA** – Variable stability Inflight Systems Testing Aircraft
  - Highly modified F-16 capable of replicating numerous aircraft flight control and systems models
- **RASCAL** – Reconfigurable Airborne Sensor Comm and Laser pod
  - Modified, instrumented, certified store for SUT captive carry

TMP Objective

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- TMPs exist to give Test Pilot School students a chance to learn the Test Management Process
  - Test Planning
  - Resource Planning/Coordination
  - Safety Planning
  - Test Execution
  - Reporting

Real research, unknown answers.

Test Management Projects

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- ***What are TMPs?***
  - *End-to-End Staff/Student **Real-World** Flight Test Opportunities*
  - *Conduct ~ 8 Projects/Year (4 in Spring, 4 in Fall)*
  - *Peer-Reviewed, **Published Written Report** & Oral Defense*

- ***Customer Provides:***
  - *Cutting edge research concept to be flight tested*
  - *Funding for any specialized support or major acft mods*

- ***TPS Provides:***
  - ***Test Aircraft** - Usually flown on AFTC Assets*
  - ***Dedicated Test Team** of Pilots/Engineers (4-6 individuals)*
  - ***Resources** – range, clearances, mission support*
  - *Flight Test Data, Data Reduction, Data Analysis*

TMPs for Class 11B (Mar 2012)

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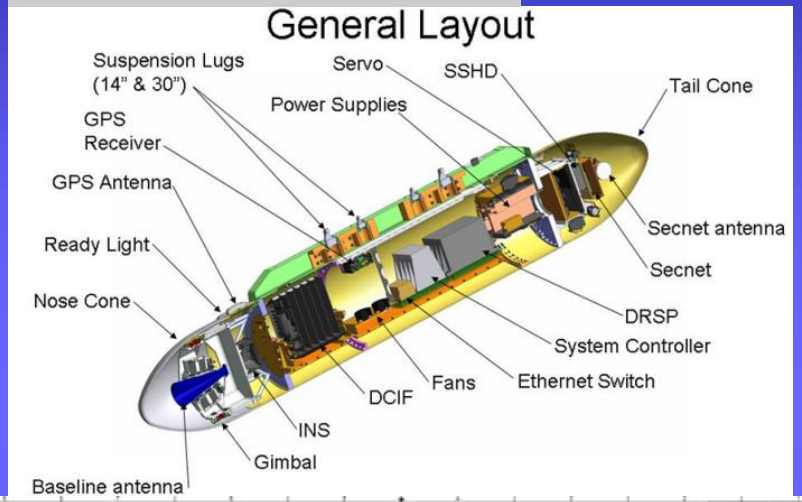
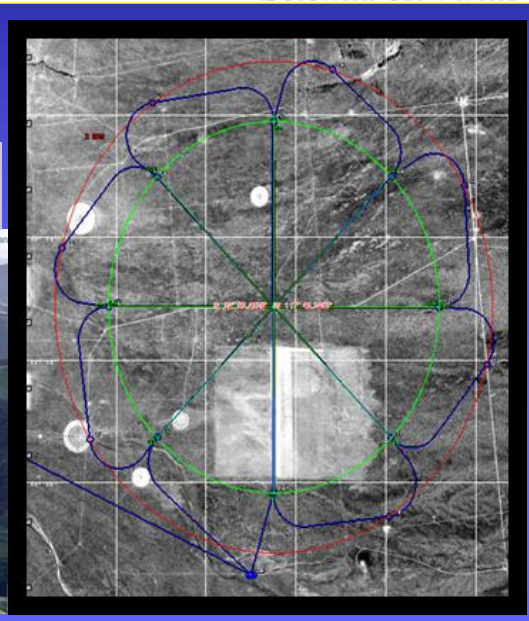
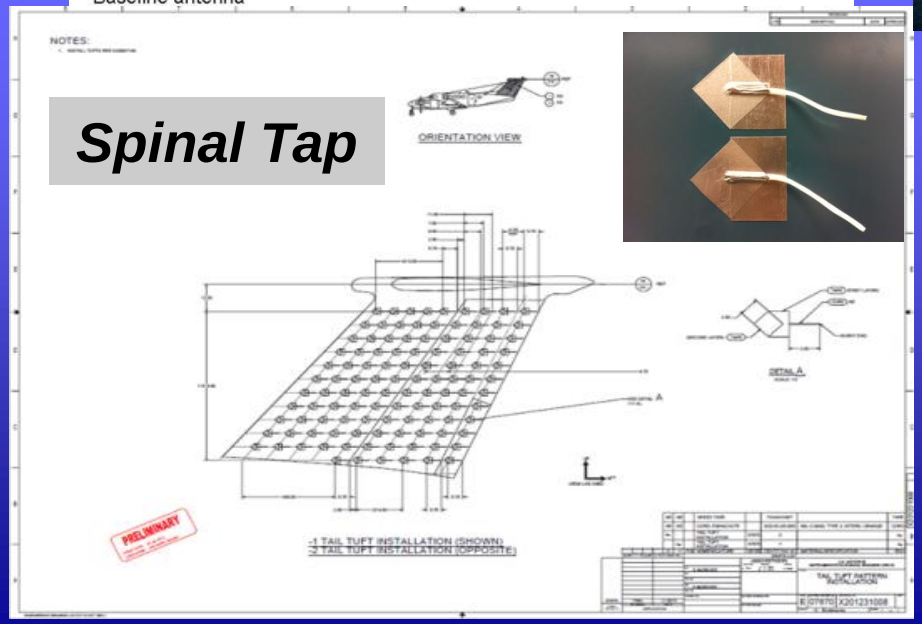
Have TROn 11



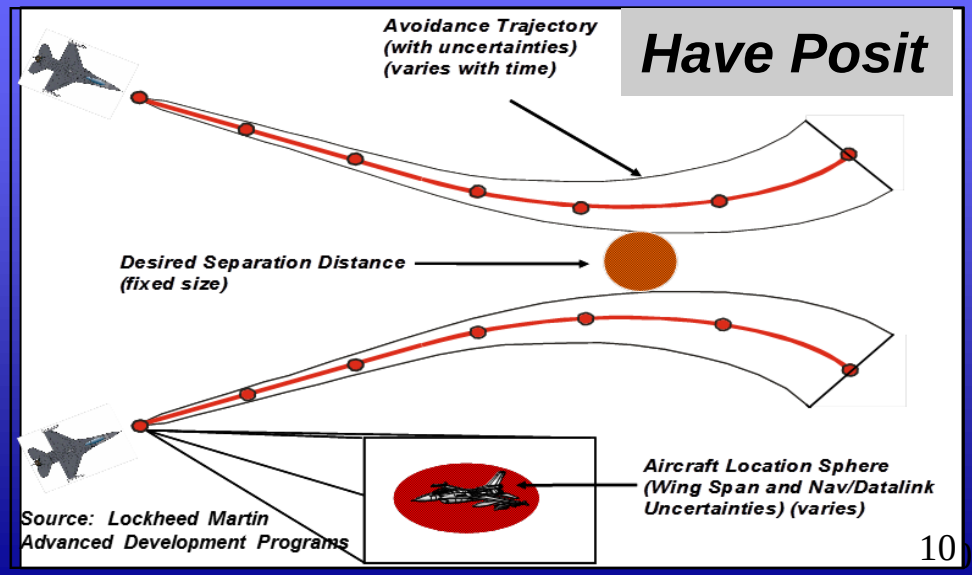
Pave Swift



Spinal Tap



Have Posit



HAVE RPA

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OBJECTIVE

Evaluate the ability of the Calspan Learjet to function as a **surrogate Remotely Piloted Aircraft (RPA) for future test utility**

CONCEPT / CONDUCT

Determine datalink performance, autopilot response to Ground Control Station inputs, observe and evaluate Pilot-Vehicle Interface

Demonstrate **remotely-piloted approach**

IMPACT

- Demo autonomous landing control
- Ability to do **cutting edge RPA testing without airspace control issues**
- Significant **risk, cost reductions** in developing future RPA capability

CUSTOMER

USAF Test Pilot School

HAVE HAL

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OBJECTIVE

Evaluate enhancements to the Calspan Learjet functioning as a surrogate Remotely Piloted Aircraft (RPA)

CONCEPT / CONDUCT

Determine upgraded datalink performance, autopilot (including autothrottle) response to Ground Control Station inputs, observe and evaluate Pilot-Vehicle Interface improvements

IMPACT

- Improve ability to do cutting edge RPA testing without airspace control issues
- Significant risk, cost reductions in developing future RPA capability

CUSTOMER

AFMC/A3

HAVE PAIN

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OBJECTIVE

Limited comparison of legacy and full coverage g-suits

CONCEPT / CONDUCT

- Gather physiological response data on response to G
- Compare each of the g-suits in prescribed high-g profiles in flight and centrifuge

IMPACT

- Improved pilot protection against G-induced Loss of Consciousness (GLOC)
- Provide additional data (including physiological data) to allow usage across DoD of full coverage suits

CUSTOMER

USAF Test Pilot School

HAVE RAVEN

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OBJECTIVE

Determine the **detection and track range of small, low flying aircraft**

CONCEPT / CONDUCT

•Various aircraft/sensors executing level **radar intercepts against small, nontraditional** single target aircraft

•Buildup to attempt **detection of small rotorcraft over mountainous terrain**

IMPACT

•Improved capability to **detect LO incursions** into CONUS

•First in a series of **cooperative efforts** between TPS and external Government Agencies

CUSTOMER

Department of Homeland Security

Scope and Limitations

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- Project Must:
  - Be early
    - Staff works 9-18 months from execution, students 4 months
  - Be executable in a 2 week fly window (10-25 flight hours)
    - Fixed by academic calendar, March and September
    - NO ABILITY TO SLIDE !!!
    - 4-6 Students in a busy program--may need to “descope”
  - Accept programmatic risk
    - If the asset is unavailable, gets weathered out, etc., there is a chance to lose the opportunity completely (great track record, through…)
  - Must have a required data analysis element
  - Accept “training in progress”
  - Prefer to have Publically Releasable Component

Costs / Benefits

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- TPS provides partial funding towards the program
  - Majority of Flying hour costs are covered TPS
  - Customer funds unique modification
- Data analysis and reporting can be completely covered by students or collaborative
- Customers provides new technology / capability
- TPS provides instrumentation, checkout flights, range time, program management, test and safety planning, oral presentation & final written report

Costs / Benefits

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Ex: HAVE RAVEN

- F-16: 13.5 Hrs / 8 sorties (Test)
- F-16: 8.4 Hours / 6 Sorties (Training)
- CJ-550: 15 Hours / 7 Sorties
- Light Sport A/C: 7 Hours / 4 Sorties
- R-22 Helicopter: 13 Hours / 6 Sorties
- C-172/182: 7.5 Hours / 3 Sorties
- Cessna 414: 6 Hours / 2 Sorties
- All project management, multimedia, range,frequency management, test plans, reports, briefs

Total cost to customer: $124K

Approximate Fully Burdened Rate:

- F-16: $216K + $134K = $350K
- CJ-550: $110K*
- LSA: $2K *
- R-22: $5K*
- C-172/182: $2K
- Cessna 414: $21K*
- Other Support Costs: $120K

**Approximations based upon market rates for similar aircraft*

Approximate Total: $610K

This is only an example, actual funding may vary

TMP Timeline

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- **For the A class**
  - Concept/Exploration — Jan-Feb
  - Student Test And Safety Planning — Jun-Aug
  - SUT Validation — Jul-Aug
  - Flight Test — Sep
  - Analyze and Reporting — Oct-Nov
- **For the B Class**
  - Concept/Exploration — Jul-Aug
  - Student Test And Safety Planning — Dec-Feb
  - SUT Validation — Jan-Feb
  - Flight Test — Mar
  - Analyze and Reporting — Apr-May

TMP Student Timeline

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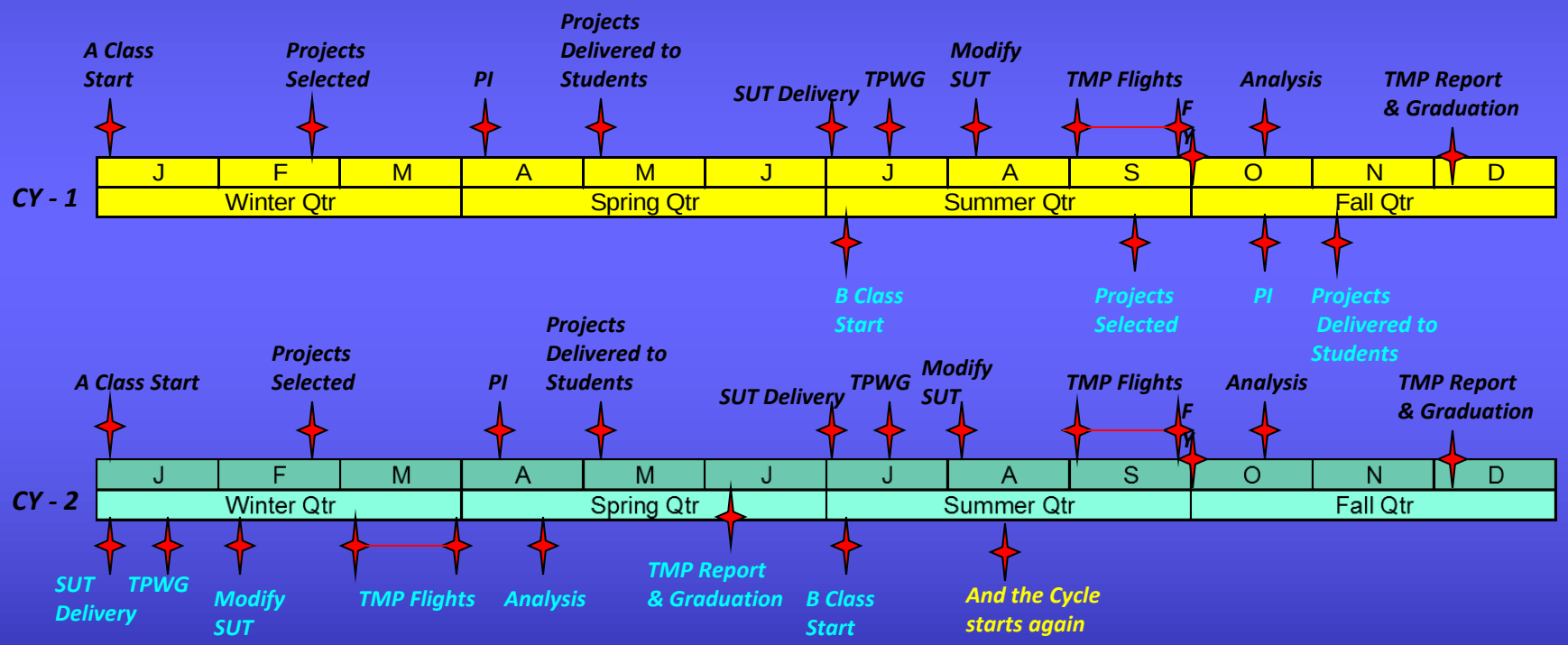
A & B Cycle



Where do TPS get the projects?

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- SPO
- Private Industry (CRDA, SBIR)
- Non-DoD Agencies (NASA, DHS)
- Military (AFRL, AFRCO)
- Academic Institutions (AFIT, MIT)

AND ….

- *YOU !!!*

Who To Contact

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- TMP Master Instructor – Lynn McNeely
  - 661-277-7476
  - mary.mcneely@edwards.af.mil
- TMP Program Control – Major Spencer Rasmussen
  - 661-277-3046
  - spencer.rasmussen@edwards.af.mil
- TMP Program Analyst – Lilly Aguilar
  - 661-277-6254
  - lillian.aguilar@edwards.af.mil
- TPS Front Office
  - 661-277-3000

Bottom Line

USAF Test Pilot School's Test Management Projects are:

The students end-to-end test projects

and

A means for customers to partner with TPS for flight testing your ideas


VISA
USAF Test Pilot School
GRADUATE
USAF TEST PILOT SCHOOL

Questions?

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Definitions

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- **PI:**
  - **Program Introduction Document. Provided by the customer outlining requirements and specific test objectives**
- **SUT:**
  - **System Under Test. The asset(s) under test, which can also include logistics, scheduling, modification, ground and flight test**
- **TPWG:**
  - **Test Plan Working Group. A logistics, scheduling and technical meeting conducted by the student test team. The students present their draft test matrix and test and safety plan approach.**