



# NASA Armstrong (AFRC) Human Factors Program



## Introduction:

Armstrong Flight Research Center is NASA's premier flight research center. It is located on Edwards AFB in the high desert of California.

The AFRC Safety and Mission Assurance Directorates Human Factors Program is one tool that enables Armstrong to be the national center of excellence for conducting leading-edge aerospace flight research, airborne science, and airborne astronomy by providing responsive, effective, and adaptive Safety & Mission Assurance support.

The AFRC Human Factors Specialist is also a member of the Agency Human Factors Task Force which provides and expands the understanding and impact of Human Factors across the Agency. The Program is managed by the Office of Safety and Mission Assurance at NASA Headquarters.





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## Data Base / Methodology

- NASA Mishap Information System (NMIS), a web-based repository is the data base.
- The Human Factors Specialist helped to develop NASAHFACS, which is the Agency version of Shappell and Weigmann's HFACS tool. NASAHFACS included a Space Environment in the preconditions tier to allow incident coding in that realm of operations
- The Human Factors Specialist is assigned to the AFRC Safety and Mission Assurance office as a Human Factors Mishap Investigation Specialist and Deputy Mishap Program Manager.

## Human Factors

The Human Factors Program resides within the Office of Safety and Mission Assurance (OSMA). It provides and expands the understanding and impact of Human Factors across the agency. This includes consideration of Human Factors preventatively for improved organizational performance as well as identification of Human Factors retrospectively in mishap investigations.

The Human Factors Program supports all NASA missions and strategic efforts within the agency, which includes Headquarters, centers and mission directorates, institutions, support functions, component facilities, crew members or vehicles, operations, and training. The program manager is the OSMA representative on the agency Human System Integration team and functions in an advisory capacity to the chief of SMA in Human Factors-related issues.



<https://sma.nasa.gov/sma-disciplines/human-factors>  
Human Factors Program website [Human Factors](#)



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## Beta Testing

Beginning in 2015, the Agency Human Factors Technical Manager requested from the Director for Flight Operations at AFRC, a cadre of personnel from within the Flight Operations Division for the purpose of training new personnel for capturing systemic issues that would be used for mitigation and prevention of Human Error in the maintenance workforce.

## Results

This team reviewed NMIS records for the fiscal year periods of FY14, 15 and 16 and provided analysis with the then current taxonomy.

- Data from NMIS on AFRC Flight Operations events indicated areas of concern.

2014-2016 Comparison Chart





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## Response

The data was presented to senior Armstrong leadership and resulted in Human Factors in Aviation Maintenance training for Branch Management, and was well received. Further Human Factors courses are currently being implemented with in the Flight Operations Directorate at AFRC with the goal of 100% Mechanics and Technicians.

Participation from Maintainers have endorsed this training curriculum as beneficial. Branch Chiefs also conduct a practical exercise following classroom training with specificity to their area of expertise using AFRC events as course content. In addition, NASAHFACS executive level training was given to Center Executive management and Project Managers.

Follow on data indicated that Human Factors training to branch level supervisors was successful in reducing the number of supervisory and organizational findings.

The level of effectiveness of the measures taken were plotted. Notice a reduced rate of Supervisor findings between the two time lines. In the chart presented here, all 21 buckets of the NSAHFACS model are presented. The number of annual Armstrong events coded is relatively small, typically averaging 35 a year.

AFRC 2017 NASAHFACS

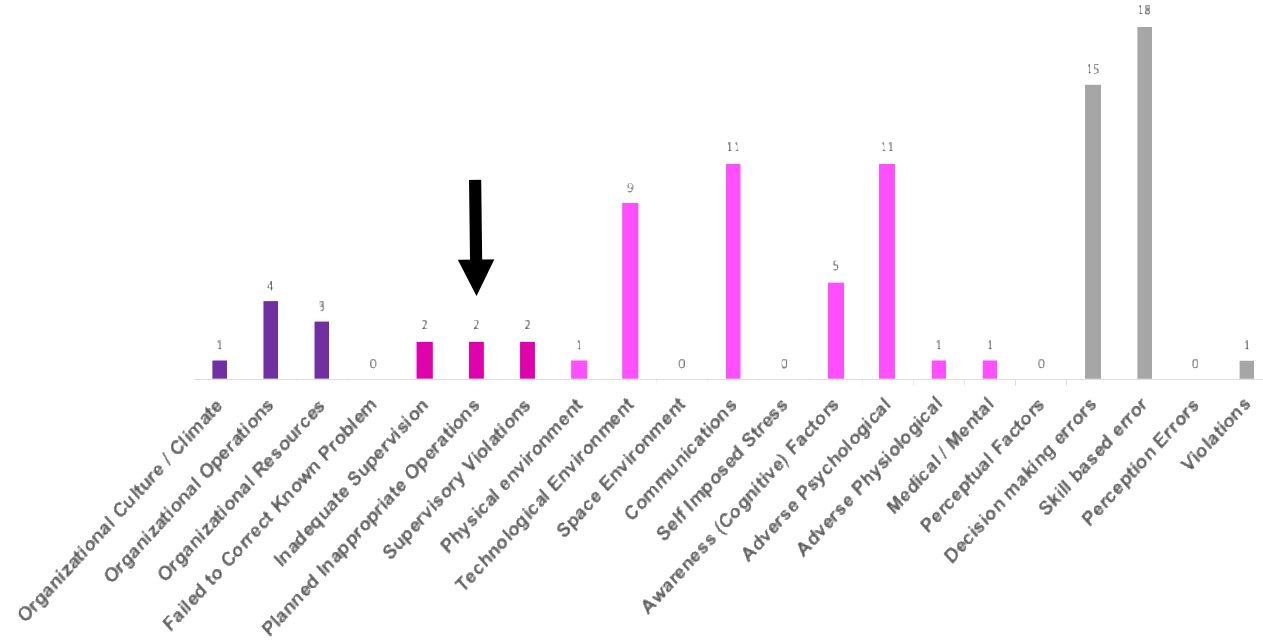


Chart indicating Human Factors training effectiveness for supervisors



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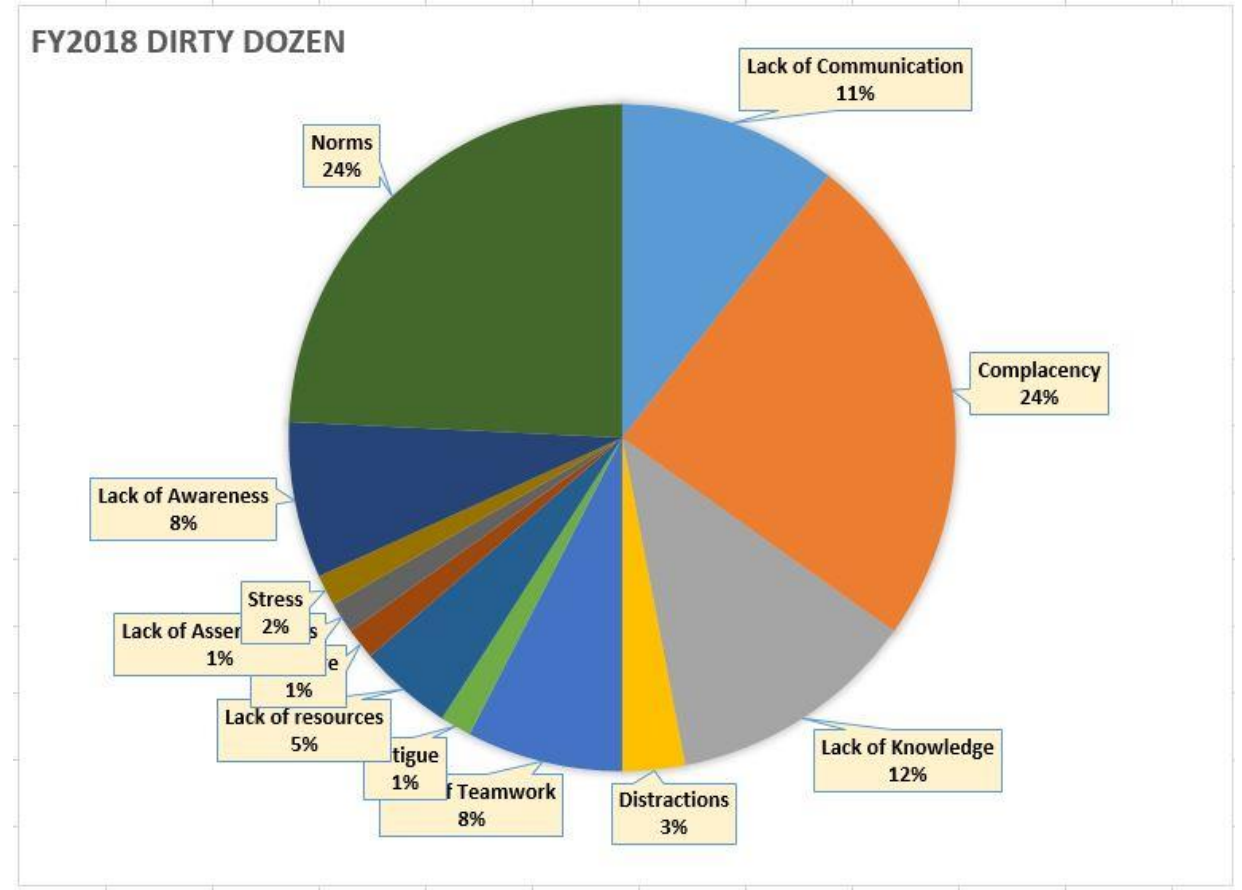


## Intra-Center cooperation

As a member of the Aviation Safety Working Group (ASWG), the HF Specialist also assists with the development of the Center Annual Aviation Safety Plan. Last year, the working group agreed to add the maintenance “Dirty Dozen” factors to the causal analysis of incidents to provide an additional focus to the factors that were affecting the maintenance activity. The source of data is the NMIS data base and the NASAHFACS analysis for the fiscal year or specific incident for review.

The ASWG continues to recommend the strategy that each Branch Chief will take Threat and Error Management training and develop the employee level course to improve understanding, commitment, and implementation.

## Dirty Dozen



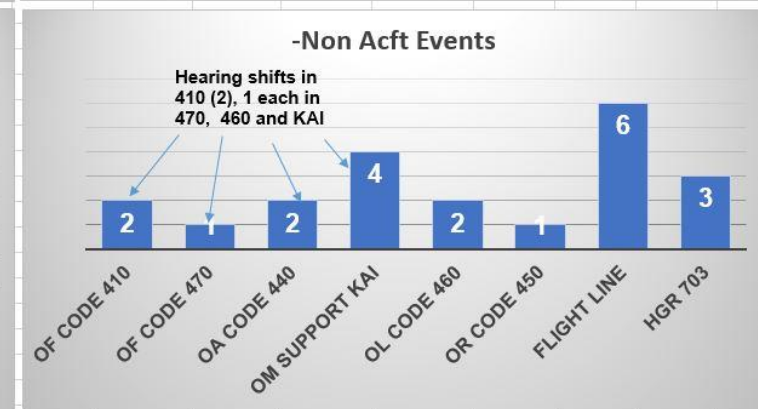
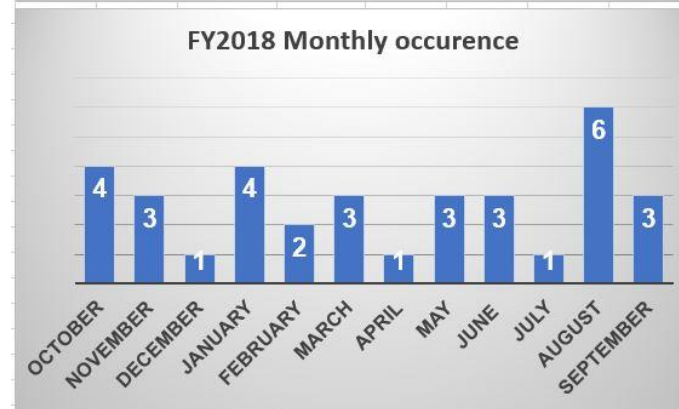
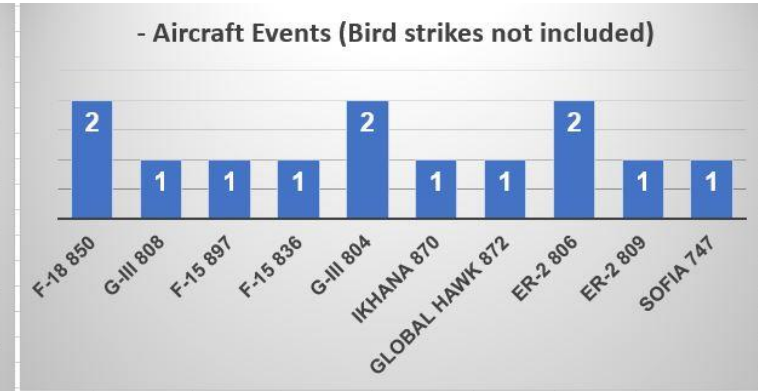
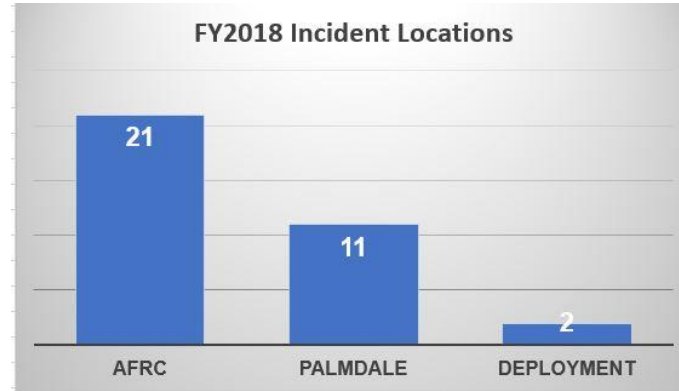


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## Other aspects

Not only the number of incidents, NASAHFACS analysis and Dirty Dozen are recorded, but incident locations, on or off aircraft, and monthly occurrences are presented for Branch Supervision to analyze staffing issues, deployment stressors, frequency of recurrence in targeted sections. This allows mid level management a mechanism to address at a higher level, safety threats that could be a driver to negative performance shaping factors.



Charting to display location, monthly occurrences and aircraft or non aircraft incidents



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## P.A.C.E program

As a part of the maintenance work force Human Factors in Aviation Maintenance training and as a Safety Culture initiative, the ASWG developed the P.A.C.E. Program, which stands for

- Pause- stop and focus
- Assess-are you or the team ready for the task?
- Communicate – not only amongst yourselves, but all those around you, affected by your task or involved at any level
- Execute and Evaluate- you planned the work, you worked the plan, capture and share the Lessons Learned!

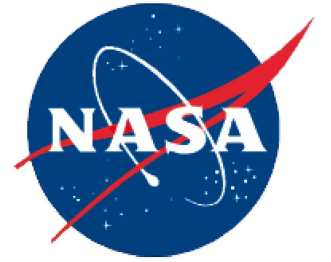




# Disclosure Information

*90<sup>th</sup> Annual Scientific Meeting*

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Investigation Specialist*



I have no financial relationships to disclose.

I will not discuss off-label use and/or investigational use in my presentation