FEDERAL AVIATION ADMINISTRATION
AAR-100 (Room 907)
800 Independence Avenue, S.W.
Washington, D.C. 20591

Tel: 202-267-8758
Fax: 202-267-5797
william.krebs@faa.gov

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From: Aviation Maintenance Human Factors Program Manager, AAR-100
To: Airworthiness TCRG

Subj: AVIATION MAINTENANCE HUMAN FACTORS SECOND QUARTER '03 REPORT

Ref: (a) Aviation maintenance human factors execution plans

1) Per reference (a), the second quarter 2003 report for each aviation maintenance human factors projects are listed below.

   a) An Evaluation of Broadband Applications to Aircraft Maintenance Safety.

      CAMI: The researcher made a site visit to Goodrich Aviation Technical Services in Everett, WA. Through interviewing Goodrich personnel, the researcher was able to gather preliminary information to help identify the advantages and disadvantages in using electronic signatures, portable display units, and electronic manuals in the aviation maintenance work environment.

      NASA Ames: On January 6, 2003, the researchers toured the Rolls Royce engine maintenance facilities in Oakland, CA. This facility repairs and overhauls a variety of Rolls Royce engine products and also performs quick engine changes. Rolls Royce uses broadband technologies for the following applications: (1) inventory, supply, and part tracking; (2) accessing the illustrated parts catalog on the shop floor; and (3) electronically initiating work orders at the airplane.

      On January 8, 2003, the researchers toured the Alaska Airlines maintenance facility in Oakland, CA. This facility performs C-checks on several airplanes in Alaska's fleet. This facility uses computer workstations to: (1) initiate work orders; (2) access illustrated parts catalog and maintenance manual. Currently, there is no way to remotely access these computers from arbitrary points on the shop floor.

      On February 5, 2003, the researchers shadowed a maintenance crew on a 10-hour night shift at the Fed Ex line maintenance facility in Oakland, CA. This facility is the west coast hub for the entire Pacific operation. Fed Ex has made extensive use of broadband technologies, including laptop and pen-based portable

computers that can be used anywhere on the facility grounds. These computers communicate with host computers via a radio frequency network that employs a collection of antennas that are placed on the corners of most buildings on site. This networked system allows maintenance technicians to: (1) remotely access illustrated parts catalogs, maintenance manuals, logbooks, and manufacturer data; (2) remotely review records of work performed by technicians on any previous shift; (3) and transmit digital images taken at the airplane to other technician anywhere on site. Additionally, Fed Ex has implemented a system that tracks the location and status of every airplane that is parked or taxiing on the ramp.

Fed Ex has the most sophisticated broadband technologies we have seen to date. After some dialogue, Fed Ex is interested in working cooperatively with us as we progress into the research phase of our project.

Fed Ex has invited us to visit their main facility in Memphis, TN, and talk with more senior managers about future collaborations. The Memphis visit is scheduled for April 14, 2003.

On March 27, 2003, a FAA CAMI researcher visited NASA Ames to meet with NASA Ames research team. NASA Ames research plans are quite similar in focus and we have arranged to collaborate our future efforts.

All indications indicate that this project is on track to complete year 1 milestones as planned.

b) Vision Testing Requirements for Certain Persons Maintaining and Inspecting Aircraft and Aircraft Components.

NASA Ames:
February 12-13, 2003 meeting at Sandia Labs reviewed and accepted proposed Phase II methodology and defined Phase II deliverables. Project was presented to the REDAC subcommittee on February 26, 2003. NASA team is preparing crack images obtained from Sandia Labs for computational modeling and psychophysical testing. Software for modeling effort is under development.

NASA team will provide computational model predictions for visual acuity and contrast sensitivity requirement. These results will be presented at the HFACS and ECVP conferences in the fall.

Ohio State Univeristy/CAMI:
Based on sponsor feedback, the job vision task analysis may be performed at military installations, rather than air transport maintenance facilities. Researcher submitted all requested documents on the CAMI/OSU research program to the Institutional Review Board of The Ohio State University (2/26). The IRB determined that the application was exempt from review.

A meeting of participants in the NDI/NDT Vision Standards Program was held at Sandia National Laboratories in Albuquerque, NM (2/12-13). During the meeting, a preliminary essential vision task list from 3 NDI/NDT procedures was identified; NDI/NDT personnel survey questionnaires and data acquisition forms for vision task analysis in support of this project were reviewed; and, coordination with the program sponsor, Mr. Rusty Jones (AFS-300), was initiated to facilitate visits to military and civilian maintenance facilities for data collection.

Dr. Nakagawara met with Mr. Michael Paulk, US Air Force NDI Program Manager, to coordinate a possible data collection session at Tinker AFB, OK (3/6). Mr. Paulk initiated a request for administrative clearance for their participation in this study. Dr. Nakagawara provided a briefing on this project to the Tinker AFB Maintenance Management Team (3/26). Tinker AFB is willing to participate in the study, but has requested Dr. Nakagawara provide a similar briefing to representatives of the union, public affairs, and occupational medicine sometime in April 2003 to get their support and approval.

Dr. Nakagawara had ongoing correspondence with Ms. Reba Roseman, Manager of Medical Regulatory Compliance, at Timco Aviation Services, Inc., Greensboro, NC, and with Mr. Jeff Bongard, Senior Quality Assurance Auditor at Goodrich Corporation Aviation Technical Services, Everett, WA, for possible data collection sessions at their facilities. A visit to Timco has been scheduled for April 8-10, 2003.

All indications indicate that this project is on track to complete Phase II milestones as planned; however there may be problems accessing military and civilian maintenance facilities which will impact the Phase II deliverables.

c) Language Barriers Result in Maintenance Deficiencies. The researcher completed the literature survey and the analysis of a manufacture's database, now with 115 organizations worldwide. The results of the survey only changed slightly from the earlier analysis of 80 organizations. Further analysis of the first focus groups' data has resulted in a revised list of language issues. These have been combined with literature search and data base analysis findings to produce a paper for the HFES 2003. The summary for this paper was submitted on time, and in fact the whole paper has already been written.

Data collection procedures for the non-US sites have been completed and on-site collection begins in March with a visit to Scotland. The rest of the data collection overseas has been planned for May 2003.

All indications indicate that this project is on track to complete year 1 milestones as planned.

d) Using Technology to Support Inspector Training. The researcher conducted site visits to GA facilities in Atlanta and Columbia. Developed a column and hierarchical format to support task analysis. Developed a taxonomy of inspection

errors. Identified training needs to mitigate the effect of errors. Attended Sandia Laboratory facilities to exchange ideas with investigators on a FAA funded research effort. He briefed the REDAC subcommittee on the current status of research. This past quarter, the researcher collected data to support the task analysis, completed taxonomy of errors, and training needs analysis. The researcher was not able to access the AVN hangar facility due to increased security.

All indications indicate that this project is on track to complete year 1 milestones as planned.

e) Review Amateur-Built Aircraft Accident/Incidents. The researchers are waiting for the sponsor to select a date to brief the phase I results.

Project is complete.

f) General Aviation Alaska Maintenance Accidents. The researcher began work on March 18th, 2003 on this new FY03 requirement. The researcher is gathering NTSB accident data to investigate what are the leading maintenance factors that contribute to GA accidents and incidents in the U.S from 1990-2000. By the fourth quarter 2003, the researcher will (1) compare Alaska data to the rest of United States to determine if there are significant differences between the two regions and (2) determine if maintenance errors are contributing factor or a direct causal factor to accidents to a greater degree in Alaska than in the rest of the country.

All indications indicate that this project is on track to complete year 1 milestones as planned.

William K. Krebs