

NASA NDE WORKING GROUP NEWSLETTER

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Quarterly Newsletter

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CONTENTS

	<u>Page No.</u>
NASA HQ Code QW Message.....	1
NNWG Highlight.....	2
NNWG Personnel News	2
Current Events and Action item	3
NASA Centers News and Announcements.....	3
Coming Events.....	6

NASA HQ Code QW MESSAGE (J. Siedlecki, 202-.258-020.5)

The final results for the recent POP call for RTOP funding are still not available. As soon as the printout is received I will disseminate the results to the NNWG. I expect the information to be forthcoming soon, in time for consideration of funding expectations that will impact the next planning cycle for RTOP submissions. I thank all of you for your timely inputs to the NDE Directory and the NNWG Newsletter, and to Mr. John Larson and Dr. Yoseph Bar-Cohen for their extensive efforts in this regard.

Please review carefully the draft NDE strategic Plan provided by Dr. Bar-Cohen, and make suggested revisions in time for the late August NNWG telecon. The draft charter for the combined NDE Headquarters Coordinating Group and the NNWG should be reviewed in the context at a first submittal which will be sent to the several headquarters Codes NDE Representatives as they are identified by their respective Associate Administrators. We expect the NNWG sections to remain essentially intact as the Headquarters review is conducted, but anticipate more suggestions from the other codes regarding the Headquarters participation.

Mr. Robert Neuschaeffer and Mrs. Marie Havican deserve recognition for their outstanding leadership efforts as the initial "pro- tempers" Chair and vice-chair of the working Group during the formative stage of the NNWG. In less than a year this NNWG went from the idea stage to an organization with an active membership and a defined role in representing the NNWG community within NASA and providing the avenue and process for cooperation, interaction and planning among individual scientists, engineers and managers from the NASA Centers and JPL. During this time Mr. Hector Delgado has provided excellent direction as Chair for the Code Q standing committee, which has established an initial process for RTOP

review and ratings. Through their leadership and the contributions of every member of the NNWG, much progress has been made toward, meeting the initial purpose to "provide a forum for Agencywide cooperation to improve the effectiveness of communication and coordination in the NASA NNWG community, promote technical integration, improve customer interfaces, and optimize the use of resources." Kccp up the excellent work!

NNWG HIGHLIGHTS (M. Havican, 713-483- 7124 and Dr. Yoseph Bar-Cohen, 818-354-2610)

The NNWG is drafting an NDI Strategic Plan for the Office of Safety and Mission Assurance (OSMA), NASA Headquarters, Code Q. The Working Group is defining objectives and areas that are recommended for emphasis. This plan will be submitted to all Codes participating in NDI in NASA Headquarters.

The NASA NDI Working Group has been publicized in a brief mention in the July 1994 issue of Materials Evaluation. A full article, with a photograph of the new Space Station, will be published in the August 1994 issue - Look for it.

NNWG PERSONNEL NEWS

Congratulations to Marie Prebilsky's Wedding (Mazel Tov!!). She is now Mrs. Havican.



NNWG would like to congratulate Dr. F. James Chern for being nominated and approved by the ASNT Board of Directors as the 1994 Fellow Award recipient. We are proud of you!



• CURRENT EVENTS AND ACTION ITEMS

The NN WG has distributed the first edition of the NASA NDI Directory. The Directory describes the NASA Centers' NDI capabilities, facilities, responsible personnel and contractors. Thanks and congratulations are due to Mr. John Larson of KSC, who spent more hours than he planned on this project !

Our NASA Headquarters advocate in Code QW, Joe Siedlecki, reports that NDI projects and Metrology/(calibration projects will now be added together for RTOP funds consideration. This means that new FY96 NDI projects will have to be considered against the merits of Metrology proposals as well as other NDI proposals.

JJ], has recently developed a Mosaic Homepage system for NASA Materials and Process Standards, which is under the responsibility of Richard Weinstein. This system is taking advantage of the information superhighway and public domain software. A link has been reserved to an NDI Gateway that will become active once an equivalent NDI effort is sponsored. The access address to this new NASA-only M&P Homepage system is now available and this Newsletter issue is accessible through the 1 homepage system. For more information please contact Mr. 13ar-Cohen (818-354-261 ()) or send an E-Mail message to yosi@jpl.nasa.gov .

Prof. Ajit K. Mal is organizing the ASME-AME-MI Summer conference from June 28 to 30, 1995 at the University of California, Los Angeles (UCLA). Prof. Mal has suggested to dedicate a Session of the Conference to NDI for Space Applications. Since this topic is the NNWG responsibility, we are considering active participation in this proposed Session.

NASACENTERS NEWS AND ANNOUNCEMENTS

GSFC, Dr. E. James Chern (301-286-5836)

MANAGEMENT CHANGES IN ASSURANCE TECHNOLOGIES DIVISION - Ms. Abigail Harper, Chief of the Assurance Technologies Division, Office of Flight Assurance has moved to Engineering Directorate in May. Mr. David G. Cleveland, Associate Director of Office of Flight Assurance and former Division Chief, is acting as the 1 Division Chief of Assurance Technologies Division. Assurance Technologies Division consists of Parts Branch, Electronic Packaging & Processes Branch, and Materials Branch and provides various technical and laboratory support to space flight assurance.

MATERIALS BRANCH HOSTS SUMMER STUDENTS AND TEACHERS - The GSFC Materials Branch hosts two high school teachers and five summer students this summer. Teachers and students from various summer programs are working with their respective mentors in the Materials Branch on various test and measurement activities such as ultrasonic NDI, mechanical testing, X-ray, Scanning Electron Microscopy, polymer analyses, Auger electron spectroscopy, etc. that support GSFC flight projects.

DR. CHERN IS AN ASNT FELLOW CLASS 01'94- Dr. E. James Chern has been nominated and approved by the ASNT Board of Directors as the 1994 Fellow Award recipient. He is to receive his Fellow Award during ceremonies at the 1994 ASNT Fall Conference to be held in Atlanta, Georgia. Dr. Chern has also been appointed as the Vice Chairman of the Personnel Qualification Division of the Education and Qualification Council for 1994-1995.

JPI (Dr. Y. Bar-Cohen, 818-354-2610)

JINA TECHNICAL SEMINARS - The JPI/Industry/Academia (JINA) Seminar series continued and three technical seminars were held at the JPI's Space Materials Science and Engineering Section. In July Mr. Greg Strand, President of Intec, Seattle WA, made a presentation entitled "Composite Fabrication and Testing". The presentation covered Intec's capability and he was assisted by Mr. Brian Coxon, 1 Director of Research, and by Rick Bryens, Manager, Composite Fabrication.

11) I WAS AWARDED 1'1 IASIBIR - innovative Dynamics inc. (IDI) has been informed recently that they have been awarded a base IASIBIR program, entitled "Development of an integrated Health Monitoring System for Spacecraft Applications. The program monitor is Dr. Bar-Cohen. IDI is developing a system that is based on imbedded sensors and a neural network algorithm to detect and identify flaws in structures during service.

JSC (M. Havican, 713-487-7134)

Southwest Research Institute in San Antonio was visited by JSC NDE personnel from both the Engineering and SRQA organizations. A specialized eddy current probe was demonstrated. This probe was able to detect a 0.25 inch diameter hole in aluminum skin while testing through a 1.5 inch thick thermal protection tile. The pmc has proven the feasibility of using eddy current to detect some defects without removing the tile on the Shuttle orbiter. Further work will include detectability studies using corrosion standards in lieu of through-holes.

LaRC (Dr. Bob Batten and Dr. E. I. Madaras, 804-864-4670)

TRANSFER OF NEW SIMPSON PROBE NDE TECHNOLOGY FOR CRACK DETECTION - Two engineers from Krautkramer Branson, Jeff Draper and Tom Carodiskey, visited NISB (Nondestructive Evaluation Sciences Branch) to obtain the detailed design characteristics and fabrication methodology of the Simpson probe. The firm was selected to be the commercialization partner for the LaRC-developed Simpson probe technology, and the licensing agreement between LaRC and the firm is being finalized. The firm has promised to take less than 13 weeks after the agreement, to deliver the first commercial version of the Simpson probe, **which is the hand-held crack detector**. Incidentally, the end of this 13-week period coincides with the ASNT (American Society for Nondestructive Testing) Fall Meeting where new products can attract critical attention. Hence, NISB provided all the technical information necessary for the successful fabrication of the probes, and the collaboration is continuing. (Min Namkung).

BOEING/MCDONNELL DOUGLASSITE VISITS FOCUS ON COOPERATIVE

DEVELOPMENT OF NDE PLANS FOR ACT PROGRAM - Researchers from the Nondestructive Evaluation Sciences Branch traveled to McDonnell Douglas, Long Beach, and Boeing, Seattle, to discuss plans for an expanded Langley role in developing NDE technology under the Advanced Composites Technology (ACT) program. Discussions were focused on the NDE needs for successful application of advanced composite technologies for aircraft structures. At each site, aircraft manufacturing and assembly plants and NDE laboratories were toured to help understand the scope of inspection requirements and the current state of the art of inspection facilities. Plans were begun for cooperative efforts toward development of performance-based accept/reject criteria and application of advanced NDE methodologies. (Patrick H. Johnston, D. Michele Icath, and William H. Presser).

LOCKHEED CORPORATION TO USE 1'1 THERMAL BOND IN SPIKEHOLE SYSTEM - Researchers from NISB installed LaRC-developed software on computer systems at Lockheed Corporation and

Martin Marietta Georgia. The software will be used as the heart of a thermal inspection system being developed by Lockheed for the characterization of composite aircraft components. Additional training of Lockheed personnel on the use of the software is planned once the remaining components of the thermal system have been acquired. (K. Elliott Cramer and Ijazari I. Syed (AS&M)).

LeRC (A. Vary, 216-4.??-6019 or hr. G. Baaklini, 216-4.??-6016)

LeRC RECEIVED A NEW X-RAY COMPUTED MICROTOMOGRAPHY - The Lewis Research Center's x-ray computed microtomography system was delivered and installed in the NDE laboratory. Acceptance and shakedown tests were performed. The system is fully operational and personnel training has been completed. The main features of the system are: maximum of 180 KV potential at 1 mA current, 25 µm spatial resolution, and 0.5% differential density resolution. Capabilities include 3-D tomography, dual energy radiography, and laminography. Current applications are focused on advanced aerospace and automotive engine components. These applications include flaw detection and materials characterization in monolithic ceramics and ceramic, intermetallic, and polymer matrix composites.

MSFC (R. Neuschaeffer and Dr. S. Russell, 20.5-S44-4416)

NDE OF Si3N4 CONNITRIDE BALLS FOR BALL BEARINGS - Pratt & Whitney, West Palm Beach, FL, accepted delivery of certification and flight production Si3N4 balls for ball bearings used in the Alternate Turbopump Development (ATD) LOX pumps for the Space Shuttle Main Engine. Ultrasonic surface and shear wave inspection was performed at CFI in Germany. These balls were **also** inspected for acceptance by fluorescent penetrant, visual inspection, and conventional radiography. Resonant Ultrasound Spectroscopy (RUS) was used to gather engineering data. RUS has potential for future applications. All required NDE was performed in time to support building of two certification and flight pumps under co-funding by ATD Project office and Code Q. Code Q funded Tribology studies by the National Institute of Standards and Technology at Boulder, CO and fabrication of seeded defect reference standards by the Lawrence Livermore National Laboratory (LLNL). This was the first collaborative effort between MSFC and LLNL. Work at LLNL was performed using instructions provided by Dr. George Baaklini at LeRC. Jonathan Salem, also of LeRC, provided reference standards for surface breaking flaws, as well as very helpful consultation. Dr. Eric Madaras, LeRC, and his staff were most helpful in characterizing reference standards and defects using advanced CT, Scanning Acoustic Microscopy and Scanning Laser Acoustic Microscopy.

Rig testing by MSFC of the LOX pump configuration under the ATD program necessitates continued participation of the NASA NDE community. Complete NDE will be performed on all ceramics used in the rig tests.

SHEAROGRAPHY - A Probability of Detection (POD) study was performed on detection of paint unbonds with application to the redesigned solid rocket motor (RSRM) paint. Test panels of case steel, with thin sheets of aluminum as debonds, were painted with RSRM epoxy primer and paint per ASPIM specifications. A total of 112 debonds of various sizes were examined by three operators using the NASA-P&W built shearography system using convection heating to excite the panels. With a field of view of 1.2x1.8-m, the 90% probability with 95% confidence was determined to be 15.6mm. Further investigations will examine the effects of excitation, field of view, and image shear angle,

NEW OPTICALLY STIMULATED ELECTRON EMISSION INSTRUMENT (OSEE 111) -
Optically stimulated electron emission (OSEE) is currently used in surface cleanliness inspection of RSRM hardware. A joint effort between MSFC, Langley Research Center (LaRC), and Thiokol has been undertaken to develop a new generation inspection instrument to improve system reliability. Improvements that were most feasible and could be accomplished within the allotted budget have been carried out into the fabrication of the new instrument. Electronics improvements have resulted from new shielding and electronics design. The new ultraviolet device, designed with active response loop, maintains constant bulb output. Environmental fluctuations have been minimized by incorporating an argon purge system into the Sensor head. Patents on resulting improvements, including light source stability, a Kelvin probe attachment for surface work function measurements, and sensor circuit and technique refinement--have been applied for by the Langley team.

COMING EVENTS (all events are give in EDT format)

21st Annual Review of Progress in Quantitative NDE, organized by Iowa State University, to be held at Snowmass Village, CO, July 31 to August 5, 1994.

NNWG Telecon - August 30, 1994 at 2:00 pm

ASNT 1994 Fall Conference, Atlanta, GA, Sept. 19 to 23, 1994.

JANNAF NDE Subcommittee meeting, Oct. 24-28, 1994, C/O-Al .C, Hill Air Force Base, UT

3rd NASA M&P Engineering Meeting - Marshall Space Flight Center, AL., March 1995.

NASA NDE Working Group (NNWG) Newsletter

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