

Minutes

of the

100th MIL-HDBK-5 Coordination Meeting

held in

Dayton, OH

April 2-5, 2001

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COORDINATION MEETING**

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**MINUTES OF THE 100TH MIL-HDBK-5
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I. Chairman's Remarks

Welcome to our 100th MIL-HDBK-5 meeting and a celebration of one of the world's finest materials handbooks. At this time I would like to thank all who are present here today, their companies who encourage participation and provide the means for attendance, and most certainly our technical support team from Battelle. Without you, this process that is used globally for safe and effective aerospace vehicle design, certification, and maintenance would not have been possible. I would also like to acknowledge the 10th meeting anniversary by our Russian participants.

As many of you know we are in a state of transition. It is somewhat ironic that many years ago (approximately 1938) the CAA (Civil Aeronautics Administration and predecessor to today's FAA) volunteered to lead an effort to develop an industry coordinated, standardized database as a service to the aircraft industry. Attendance was reported to be 45 to 50 people on a regular basis at a time when more people traveled by train than air. The Air Force was not an independent agency at the time. An Army (Air Corp), Navy and CAA committee met and produced the ANC-5 series of handbooks, which evolved into the process we now know as MIL-HDBK-5. It was approximately 1959 when the Air Force's first MIL-HDBK-5 meeting was held. Now just about 40 years, or 80 meetings later, we are about to come full circle.

(A short presentation on the transition plan for the handbook was given at this point. A copy of the viewgraphs is included as an attachment to these minutes.)

The scope of the effort, technical objectives, and goals should remain the same. The FAA's directive is to also reduce their initial costs of managing the program over time. Participation by ISG membership and support by Government Agencies and the DoD are more important now than ever. Our best opportunity to further materials transition and for acceptance of new alloys and processes is to continue to work with Battelle and the successful process developed over these 100 meetings. A "MIL-HDBK-5" or a Metallic Materials Properties Development and Standardization "MMPDS" activity is not really a book, but a process. Regardless of the label, what makes it work is the combination of people in this room. So celebrate our centennial meeting today but don't forget to mark your calendars for the future¹.

Neal R. Ontko, Chairman MIL-HDBK-5 and Steven R Thompson, Vice-Chairman

¹ A vote was taken at the close of the coordination meeting to identify the first and second choices for the next Handbook coordination meeting, which is tentatively planned for October 23-25, 2001. The most popular location was Cocoa Beach, FL. The second-most popular location was Charleston, SC.

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II. Approval of 99th Meeting Minutes

The minutes of the 99th meeting were approved as distributed.

III. 100th Meeting Recognitions

No Item No. **MIL-HDBK-5 Historical Information (GCC).** R. Rice, Battelle, reviewed this handout item. A copy is included with the minutes for the benefit of those unable to attend the coordination meeting.

No Item No. **Award Presentations (GCC).** N. Ontko, AFRL, coordinated award presentations to representatives from Battelle, TecCon, the FAA, and AFRL in recognition of the 100th MIL-HDBK-5 coordination meeting. A copy of selected photographs from those award presentations is included as an attachment to the minutes.

IV. Order of Business

The order in which items were discussed followed the chronology of the final agenda, which was included on pages 9 – 13 of the meeting handout. Activity on specific agenda items is recorded in these minutes in order, by chapter. A list of new item numbers assigned at this meeting is also attached.

CHAPTER 1. GENERAL

No Item No. **AMS Coordination. (GCC)** J. Jackson, Battelle, reviewed a handout on relevant AMS material specifications that have been approved or initiated since the 99th coordination meeting. Ms. Jackson indicated that the Spring 2001 AMS meeting would be in Savannah, GA the week of April 23rd, and the Fall 2001 AMS meeting would be in Colorado Springs, CO the week of October 15th.

Action: Item continued.

No Item No. **Meetings of Potential Interest to MIL-HDBK-5 Coordination Members. (GCC)** R. Rice reviewed the list of meetings. He also indicated the Spring 2001 Aluminum Association meeting would be in New York, NY on May 17 and 18, and the Fall 2001 Aluminum Association meeting would be in Asheville, NC on October 8 and 9. He also indicated that future updates to the list of meetings would contain a list of relevant technical society websites.

Action: Item continued.

No Item No. **Cancellation of Government Specifications and Subsequent Replacement Specifications. (GCC)** J. Jackson reviewed a handout on the most recent information available from SAE/AMS. Ms. Jackson made a commitment to coordinate with J.T. Amin, Lockheed, to get an updated list from AIA for the next meeting and to become an ongoing member of the AIA Early Warning Group.

Action: Item continued.

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No Item No. **Collection of Additional Fatigue, Fatigue Crack Growth, and Fracture Toughness Data. (GCC)** R. Rice presented a status report. He indicated this was an ongoing item to highlight continuing interest within the MIL-HDBK-5 coordination group to expand statistically-based coverage of fatigue, fatigue crack growth and fracture toughness behavior of materials in MIL-HDBK-5. He noted that material specific agenda items are initiated and tracked by alloy when significant quantities of data are accumulated. He emphasized that submission of this type of data was particularly important for alloys/tempers covered by specification minimum requirements for fatigue, crack growth and/or fracture toughness.

Action: Item continued.

No Item No. **PMP Handbook Overview. (GCC)** J. Jackson provided a final status report. She indicated that the second release of the PMP HDBK was recently completed and copies are now available from AFRL/MLSC on CD-ROM. It contains both English and metric versions of the data and includes 98 additional pages of material property information compared to the first edition.

Action: Item closed.

No Item No. **Tour of Air Force Museum. (GCC)** A tour of the United States Air Force Museum was conducted on Tuesday afternoon, following the Guidelines Task Group meeting.

Action: Item closed.

No Item No. **Special Presentation on Laser Shock Processing (GCC)** D. Lahrman, LSP Technologies, gave a technical presentation on Wednesday morning of Air Force applications of laser shock processing. A copy of the presentation is included with the minutes.

Action: Item closed.

No Item No. **Special Presentation on Development and Application of Titanium SP700 (GCC)** J. Ferrero, RMI Titanium Company, gave a technical presentation on Thursday morning. He described the development and emerging aircraft applications for a super-plastically-formable Ti-6Al-4V replacement alloy. A copy of the presentation is included with the minutes.

Action: Item closed.

No Item No. **Special Presentation on the Cambridge Engineering Selector (MTG)** N. Wittridge, Granta Design Limited, gave a technical presentation on Wednesday morning of the CES system and potential applications of MIL-HDBK-5 data within the system. A copy of the presentation is included with the minutes.

Action: Item closed.

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No Item No. **Special Presentation on Development and Implementation of Drop-in-Replacement Alloys for 7075-T6. (MTG)** I. Gheorghe, Universal Alloy Corporation, gave a presentation on this topic on Wednesday. A copy of the presentation is included with the minutes.

Action: Item closed.

No Item No. **Special Presentation on MA2-1pch Magnesium Alloy Plate. (MTG)** V. Leibov, Aviation Register, gave a presentation on this Russian alloy on Wednesday. A copy of the presentation is included with the minutes.

Action: Item closed.

No Item No. **Industrial Steering Group. (GCC)** R. Rice gave a status report on current ISG-supported activities. A copy of viewgraphs he presented at the GCC meeting is included with the minutes. JT Amin questioned whether the continuation of ISG activities would be affected by the transition of MIL-HDBK-5 from an Air Force led effort to an FAA led Metallic Material Properties Development and Standardization (MMPDS) Handbook. N Ontko indicated that the ISG would continue unaffected by the transition since it is an independent body.

Action: Item continued.

No Item No. **Guidelines Task Group. (GTG)** R. Rice led discussion of the current Chapter 9 items in the Guidelines Task Group meeting, which took place on Tuesday, April 3rd. Decisions made concerning individual GTG items are documented under the individual agenda items.

Action: Item continued.

No Item No. **Materials Task Group. (MTG)** J. Jackson led discussion of the new and continued materials items for Chapters 2 through 7 in the Materials Task Group meeting, which was held on Wednesday, April 4th. Decisions made concerning individual MTG items are documented under the individual agenda items.

Action: Item continued.

No Item No. **Statistics Working Group. (SWG)** S. Rust and H.C. Tsai, both of Battelle, led a discussion of new and continued statistics items at the Statistics Working Group meeting, which was held on Tuesday, April 3rd. Decisions made concerning individual SWG items are documented under the individual agenda items.

Action: Item continued.

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CHAPTER 2. STEEL ALLOYS

Item 98-10 **A- and B-Basis Properties for AerMet 100 (280 ksi). (MTG)** J. Jackson reviewed the results of A- and B-basis analyses on AerMet 100 (280 ksi strength level). It was agreed that Attachment A should be included along with a footnote to show the T_{99} value of 41 for RA (reduction in area). It was agreed that proposed footnote c should be deleted. A correction to the proposed $F_{TU} L$ value (from 279 to 275 ksi) was noted. A final version of this table is attached to the minutes.

Action: Item approved and closed.

Item 01-07 **Fracture Toughness Properties of AerMet 100. (MTG)** JT Amin requested this new item number to cover the addition of plane strain fracture toughness data on AerMet 100 into MIL-HDBK-5. R Rice agreed to check to see if the data are still available that were used for qualification of the fracture toughness minimum value in the AMS specification. A request was also made for more recent receiving inspection plane strain fracture toughness data on this alloy.

Action: New item initiated.

Item 00-2 **Update Air Melted Low Alloy Steel Tables to Include Specific Thickness Ranges and Elongation Values with Each Column of Data. (MTG)** R. Rice reviewed this brief agenda item. He noted that some low alloy steel tables do not show specific thickness ranges or elongation values for individual columns of mechanical properties, and this ambiguity could increase the likelihood of inaccurate usage of design minimum values. The proposed changes to Tables 2.3.1.0(f_1), (f_2) and (h_2) were accepted. A final version of these tables is included as an attachment to the minutes.

Action: Item approved and closed.

CHAPTER 3. ALUMINUM ALLOYS

Item 95-28 **Review of the Fracture Toughness Tables in Chapter 3. (MTG)** R. Rice presented a status report on fracture toughness data collection efforts. It was agreed there should be ongoing efforts to collect new fracture toughness data. It was also agreed that it should not be necessary to reexamine the validity of fracture toughness data currently in the handbook.

Action: Item continued.

Item 98-2 **Design Properties for Russian Alloy 1163-T7 (2224A-T351). (MTG)** J. Jackson presented a status report. It was noted that no action on an AMS specification or inclusion of this material in MIL-HDBK-5 will take place until a second AMS user is identified.

Action: Item continued.

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Item 98-14 **A- and B-Basis Tensile Properties for 7150-T7751 Aluminum Alloy Plate. (MTG)** J. Jackson reviewed this agenda item. Several editorial corrections to Table 3.7.7.0(b₂) were identified. The corrected version of this table is included as an attachment to these minutes.

Action: Approved for inclusion in Change Notice 1 and closed.

Item 98-23 **Collection of Plane-Stress Fracture Toughness Data. (MTG)** R. Rice presented a status report. A decision was made to discontinue data collection efforts until new guidelines for collecting and analyzing plane-stress fracture toughness data are developed and approved (see new Item 01-08).

Action: Item closed with no action.

Item 01-08 **Update Test Methods for Plane-Stress Fracture Toughness Data. (MTG)** R. Rice requested this new item to cover the preparation of guidelines for collection and analysis of R-curve fracture toughness data in MIL-HDBK-5.

Action: New item initiated.

Item 00-5 **Review of Converted Effect of Temperature Curves in MIL-HDBK-5. (MTG)** R. Rice reviewed the status of this “house-keeping” item. He requested that any remaining corrections to converted effect of temperature curves be provided by May 30, 2001 to allow their inclusion in CN1.

Action: Item continued.

Item 00-6 **A and B-Basis Properties for 2297-T8R85 Plate. (MTG)** J. Jackson reviewed this agenda item. It was accepted contingent on approval of the specification without technical changes by the AMS Aerospace Council.

Action: Accepted and closed-out on a contingency basis, as noted above. Unfortunately, approval was not obtained in time for inclusion in Change Notice 1 of Revision H. The status of the specification will be reviewed at the next Handbook coordination meeting and the material will be reconsidered for inclusion in the first edition of the MMPDS.

Item 01-09 **Derived Properties for 2297-T87. (MTG)** This new item was initiated to cover the collection and analysis of derived property data on 2297-T87.

Action: New item initiated.

Item 00-9 **Including EXCO Ratings in MIL-HDBK-5. (MTG)** R. Rice reviewed the status of data collection efforts on this item. J. Yudin, Universal Alloy, A. Walker, SCI, and P. Brouwer, Alcoa, volunteered to help provide the necessary information.

Action: Item continued.

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No Item No. **Stress Corrosion Threshold Values in MIL-HDBK-5 (MTG)** T. Khaled, FAA, requested this new No Item No. He expressed an interest in seeing quantitative values of SCC (in terms of stress and time) included in MIL-HDBK-5, as a replacement for the current letter ratings. Individuals with information and opinions concerning this issue are invited to submit the information to R. Rice at Battelle; he agreed to provide a status report on this item at the 101st coordination meeting.

Action: New item initiated. An item number will be assigned at the time that it is apparent that changes to the Handbook will be necessary.

Item 00-10 **Reference for Weldability of Aluminum in Section 3.1.3.4. (MTG)** J. Jackson reviewed a handout. It was noted that AWS D17.1 and the ASM Handbook on Weldability should be reviewed before the update to this section is finalized. J.T. Amin agreed to send these references to J. Jackson at Battelle.

Action: Item continued.

Item 01-16 **A- and B-Basis Tensile Properties for 7249-T76511 Aluminum Alloy Wide Extrusions. (MTG)** J. Jackson reviewed this agenda item. It was assigned an item number and approved pending approval of the specification by AMS. It was agreed that K_{IC} and stress-strain data should be added as soon as possible.

Action: New item accepted for CN1 and closed, pending AMS specification approval. Unfortunately, approval was not obtained in time for inclusion in Change Notice 1 of Revision H. The status of the specification will be reviewed at the next Handbook coordination meeting and the material will be reconsidered for inclusion in the first edition of the MMPDS.

No Item No. **Beryllium-free D357-T6. (MTG)** J. Jackson indicated that D357 and A357 typically contain beryllium. She reviewed the results of a comparison of Be-free D357-T6 tensile properties with standard D357 MIL-HDBK-5 minimums. No significant difference in the properties was found when compared with other suppliers. The AMS specification for Be-free D357 is being balloted. An agenda item will be prepared to list the Be-free alloy with the D357 and A357 alloys.

Action: Item continued.

Item 01-10 **Correction to Correlative Information for Figure 3.7.8.1.8(b) Unnotched Fatigue Data for 7475-T61 and T761 Sheet, Thickness > 0.125 Inch, Longitudinal and Long-Transverse Directions. (MTG)** R. Rice reviewed this brief item (originally distributed with the agenda as a No Item No.). The necessary corrections were approved as proposed. JT Amin indicated he might have additional fatigue data on this material. If and when sufficient data are provided to warrant a reevaluation of these fatigue curves a new item will be initiated.

Action: Approved for inclusion in CN1 and closed.

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Item 01-11 **A- and B-Basis Properties for 7250-T7451 Aluminum Alloy Plate. (MTG)** J. Jackson reviewed this item (originally distributed with the agenda as a No Item No.). There is a typo that needs to be corrected in Table 8 of the agenda on page 59. The standard deviation for BYS 1.5 (LT)/TYS (LT) should be 0.036. The final draft of the specification is currently in review.

Action: New item assigned and continued.

Item 01-12 **S-Basis Properties for 2026-T3511 Aluminum Alloy Extrusions. (MTG)** J. Jackson reviewed this agenda item. It was agreed to publish as approved in the minutes and put the information in CN1 if the specification is finalized with no change by ASC by 4/24.

Action: New item accepted for CN1 and closed, pending AMS specification approval. Unfortunately, approval was not obtained in time for inclusion in Change Notice 1 of Revision H. The status of the specification will be reviewed at the next Handbook coordination meeting and the material will be reconsidered for inclusion in the first edition of the MMPDS.

Item 01-15 **S-Basis Properties for 7055-T76511 Aluminum Extrusions (MTG).** New item. P. Brouwer agreed to submit data for analysis on this alloy.

Action: New item.

CHAPTER 4. MAGNESIUM ALLOYS

No items were considered.

CHAPTER 5. TITANIUM ALLOYS

Item 99-11 **A- and B-Basis Design Mechanical Properties for Ti-6-4 Castings. (MTG)** J. Jackson reviewed the enclosed agenda item and handout. It was noted that the AMS specification may need to be replaced with a new specification. Additional data analysis will be done including data from cut-up castings. It was agreed that the suppliers' data should be combined for analysis.

Action: Item continued.

Item 01-13 **A- and B-Basis Tensile Properties for Ti-4.5Al-3V-2Fe-2Mo Titanium Sheet. (MTG)** The title of this item (originally distributed with the agenda and handout as a No Item No.) was corrected as noted above. J. Jackson reviewed initial analysis results on this proposed new material for inclusion in Chapter 5 of MIL-HDBK-5.

Action: Include in CN1 with marked changes. Item closed.

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CHAPTER 6. HEAT RESISTANT ALLOYS

Item 01-14 **A- and B-Basis Properties for HAYNES® HR-120® Alloy Sheet, Strip, and Plate.** (MTG) J. Jackson, Battelle, reviewed this handout item. Several editorial corrections requested by HAYNES were made and additional stress rupture information was added. A copy of the corrected attachment is included for 60-day approval. AMS 5916 was approved for publication by ASC.

Action: The item is out for a 60-day approval. If no objections are received within 60 days of the mailing date for the minutes (May 18, 2001), the item will be considered approved and closed and the material will be included in the first edition of the MMPDS.

CHAPTER 7. MISCELLANEOUS ALLOYS AND HYBRID MATERIALS

No items were considered.

CHAPTER 8. STRUCTURAL JOINTS

Item 99-13 **Addition of Brazing Strength Design Factors. (FTG)** R. Goode, Lockheed Martin, indicated that no progress had been made on the revision of Section 8.2.3.

Action: Item continued. Randy Goode, will rework wording.

Item 00-12 **Removal of Tables for Allfast parts AF3212, AF3213, AF3242, and AF3243 from MIL-HDBK-5H, CN1. (FTG)** T. Kilinski will review this agenda item. He indicated that the FTG decided not to remove these tables. He also indicated that any new data would be analyzed with existing data.

Action: Item closed, no action.

Item 01-17 **Addition of Section 8.1.1.2 Data Sources. (FTG)** S. Ford, TecCon, Inc., requested this new agenda item to address the possible addition of a new section to Chapter 8 of MIL-HDBK-5. There was some disagreement on whether this is a MIL-HDBK-5 problem and should even be considered by the FTG and/or the GCC. S. Thompson indicated that he did not think the cautionary part of the proposed new section should be included in MIL-5. JT Amin agreed to review this issue with fastener people at Lockheed.

The proposed wording for Section 8.1.1.2 is as follows:

“The data shown in subsequent tables are provided by one or more manufacturers as listed in the table. There may be more than one producer of a fastener type, but data support is provided by only the footnoted source. **Caution should be exercised to ensure that use of static joint strength data is applicable only for the data producer indicated by the footnote on each table.**”

Action: New item initiated.

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No Item No. **Fastener Task Group. (FTG)** T. Kilinski, Battelle, reviewed the results of FTG discussions, which took place on Wednesday, April 4th.

Action: Item continued.

No Item No. **Fastener Industry Working Group. (FIWG)** The Fastener Industry Working Group met with the Fastener Task Group on Wednesday morning, April 4th. Only two fastener companies were represented. A change in the timing of the FTG and FIWG meetings at future MIL-HDBK-5 coordination meetings was proposed to encourage broader fastener industry participation. Tentatively, at the next meeting the FIWG and FTG will meet jointly in the morning on Wednesday of coordination week and the two groups will meet separately for as long as necessary in the afternoon to resolve any open issues within the respective groups.

The main topic of discussion in the joint FIWG and FTG meeting was the proposed new methods for statistical analysis of fastener data. There was broad agreement that these procedures offer a "step in the right direction", but they need to be validated more broadly on a range of different fastener systems. This will be done prior to the next coordination meeting.

There was some controversy regarding the issue of "triplicate" data at specific t/D test points. T. Kilinski, Battelle, showed an Excel spreadsheet that H.C. Tsai, Battelle, drafted up for the meeting. He explained the steps easily performed in Excel, and described the step that would require the use of a "macro" or lookup table (i.e. the percentiles for noncentral t distribution). He also showed, by example, how the spreadsheet handles test reports where the data are given in "triplicate". He indicated that Battelle did not have time to perform the analysis on a similar data set where the data were generated in groups of 3's, 4's, and 5's. He indicated this could be done, but would make the spreadsheet somewhat more complicated. He suggested modifications that could be incorporated to make it reasonably user-friendly to use, but still allow more than 3 replicate tests at a given condition (fastener diameter and sheet thickness).

A question was raised regarding how the analysis would be affected by a company who, while trying to add data to a suspect region – where 1 of 3 initial tests may show a substantially lower result – performs additional tests to help with the confidence in the results at that particular t/d. The question was raised as to what the FTG would do in the event that a fastener report was submitted that had lots of replicate tests performed at a particular t/d, and only triplicate tests performed in other areas. Specifically, the question was "would the polynomial fit be skewed by the "loaded" testing at one t/d"?

The FTG's consensus was that to help maintain some consistency to the data (past and present), and to establish a standard test plan, the FTG would write that triplicate tests should be performed for each diameter vs. t/D combination. To help the FTG maintain a check on specimen-to-specimen scatter, it was proposed that data suppliers be required to perform the additional tests in sets of threes. This would keep the analysis/spreadsheet calculations less complicated, and also prevent the addition of "single replicate data points" being added to the data set. Since the

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additional tests could very possibly be performed by a different technician/load frame/lab, the FTG would generally analyze the additional data with the same constraints as the original data (i.e. sets of three replicate tests using the same equipment/fastener lot/person...). It was agreed within the FTG that multiple sets of three's (for the same condition) should be treated as separate sets, resulting in more than one "average" point (one for each 3 tests). It is understood that statistically, this may not be the perfect solution. Alternatives will be considered leading up to the next coordination meeting and they will be reviewed at that time.

Action: Item continued.

CHAPTER 9. GUIDELINES FOR THE PRESENTATION OF DATA

Item 94-26 **Production Methods and Their Impact on Design Allowables. (SWG)** H.C. Tsai reviewed this agenda item. The statistical procedure itself was not particularly controversial. However, the issue of when the procedure should be applied and how the statistical results should be interpreted was very controversial. R. Goode, Lockheed, asked when such a procedure might be used – what would trigger it? J. Goodman, Alcoa, suggested that when such a trigger is used, and the statistical result is inconclusive, it should lead to a request for more data. J.T. Amin noted that static properties may not change, but dynamic properties could be affected by a change in processing. R. Goode suggested that material users should try to catch specification changes pro-actively. S. Thompson referred to a titanium specification (that led to the initial discussion on this item in 1994) where the melting practice changed but the specification minimum values were not changed. This led to the next question as to who has the authority to force the generation of more data? Most GTG members agreed the matter is up to the user, and that MIL-HDBK-5 does not have the authority to act as a policing agent. Because of the extent of unresolved conflict on the engineering aspects of this issue it was agreed that the item should be held open and transferred to the Guidelines Task Group for resolution of the engineering issues. A request was also made that the Airframer Steering Group should consider this issue and report back to the GTG.

Action: Item continued, but transferred to GTG.

Item 98-3 **Procedure for Analyzing Lower Tail Censoring. (SWG)** H.C. Tsai presented a handout describing the status of this item and offered recommendations for future work. The SWG agreed that entire data sets should be excluded if the supplier does not provide below specification data from censored lots. S. Rust suggested the word “truncated” be used, instead of censored. N. Ontko suggested “truncated” be added in parentheses. There was a mixed response. It was agreed that the SWG should focus on the development of a procedure that provides statistical guidance on whether specific data sets have been censored below the specification value.

Action: Item continued.

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Item 98-7 **Complete Restructuring of Chapter 9 Guidelines to Improve Usability. (GTG)**
R. Rice presented a status report. He indicated that the AF had not emphasized work on this item since the 98th coordination meeting. He noted that, when work was reinitiated on this item, it would take 1 to 1 ½ years to complete the second and final drafts and reviews of the restructured Chapter 9.

Action: Item continued.

Item 99-27 **Revised Analytical Techniques for Analysis of Fastened Joints. (FIWG) T.**
Kilinski reviewed the proposed new statistical procedure for analyzing fastened joints. It was noted that the statistical software required was being developed with ISG funding and the resultant software would be made available on the ISG website. Issues regarding replicate testing were discussed at length, as discussed under the FIWG item. The current item was approved, with corrections, for inclusion in the minutes. Documentation of the procedure in the guidelines will be covered under Item 00-13.

Action: Statistical procedure approved, with corrections, for inclusion in the minutes. Item continued to cover additional validation of the procedure with a broader range of fastener systems.

Item 00-13 **Rewrite of Section 9.4 Properties of Joints and Structures. (FTG) T.** Kilinski presented a status report. He indicated that a final version of Section 9.4 would include the revised analytical technique covered under Item 99-27.

Action: Item continued.

Item 00-14 **Summary of Recommended Testing Standards within MIL-HDBK-5. (GTG)**
R. Rice reviewed this item. It was noted that the standard for Fastener Test Methods should be identified as NASM-1312. Suggested additions included G34 – the standard test method for exfoliation corrosion testing, and B557 – the standard test method for tension testing of aluminum and magnesium alloy products. It was agreed that the proposed table of test standards would be included, with corrections, in Change Notice 1. A copy of the corrected table is included as an attachment to these minutes.

Action: Item approved, with corrections, for inclusion in CN1.

Item 00-15 **Summary of Heat, Lot, and Sample Size Requirements within MIL-HDBK-5. (GTG)**
R. Rice reviewed this item. An error in the testing requirements for development of creep and stress rupture properties was identified. It was agreed that this table should focus on specification of the number of tests, heats and lots because the applicable ASTM specifications generally do not address these MIL-5 specific requirements. A copy of the corrected table is included as an attachment to these minutes.

Action: Item approved, with corrections, for inclusion in CN1.

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- Item 00-17 **Clarification of the Bias of the Normal Method. (SWG)** H.C. Tsai reviewed this brief agenda item. It was accepted as proposed for inclusion in CN1.
- Action: Item approved and closed.
- Item 00-19 **Evaluation of the Pros and Cons of Adding the Date of Last Revision to Tables and Figures in MIL-HDBK-5. (GTG)** R. Rice reviewed the issues concerning this agenda item. His recommendation to close this item with no action was approved.
- Action: Item closed with no action.
- Item 01-06 **Historical Review of MIL-HDBK-5 Round-off Procedures. (GTG)** J. Jackson reviewed this agenda item. A suggestion was made to check AMS conversion procedures from English to metric units. A. Walker agreed to investigate this issue. P. Brower and J. Yudin agreed to collect the relevant information from the Aluminum Association. The general consensus was that the coordination group was not ready to abandon the traditional MIL-HDBK-5 round-off procedure, but the item should be continued for additional discussion at future coordination meetings.
- Action: Item continued.
- Item 01-01 **Regression for Skewed Data. (SWG)** H.C. Tsai presented a handout describing the status of this item (which was previously tracked as a No Item No.). She noted that current design allowable regression analysis procedures in MIL-HDBK-5 are restricted to assumed normality of regression residuals. It was noted that this assumption is sometimes not realistic and may result in conservative (in the case of positively skewed residuals) or non-conservative (in the case of negatively skewed residuals) design allowable estimates. It was agreed that an agenda item should be prepared to address this issue in more detail for the next coordination meeting.
- Action: Item continued.
- Item 01-02 **Proposal to Change Backoff Limit to Percentage of Standard Deviation in the Sequential Weibull and Sequential Pearson Procedures. (SWG)** H.C. Tsai reviewed a brief handout on this new item. J. Goodman noted that he does not like use of the standard deviation as a factor in determining the backoff limit. He would prefer the use of a percentage of the specification value, since it is a published value.
- Action: Item continued.
- Item 01-03 **Calculation Corrections to the Test for Pearsonity and Pearson Probability Plot. (SWG)** J. Jackson discussed this brief new agenda item. It was approved as presented.
- Action: Item approved and closed, corrected equations will be included in CN1.

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Item 01-04 **Reevaluation of Statistical Procedures for Calculations of S-Basis Design Values. (SWG)** R. Rice and H.C. Tsai reviewed this new agenda item. R. Rice described the limitations of the normality assumption currently used to compute S-basis design values. He suggested the evaluation of the 2-parameter Weibull distribution as an alternative. S. Rust indicated his preference for the Pearson distribution, even if it required the use of higher than normal (95%) confidence level. It was agreed that the next major step is to develop a procedure that the MIL-HDBK-5 coordination group would like to see adopted by AMS. P. Brouwer and J. Jackson agreed to lead this effort. Then, after AMS adopts a new procedure, it can be used to update Section 9.1.6.8 of MIL-HDBK-5.

Action: Item continued, in terms of evaluation of applicable statistical procedures for determination of S-basis values.

Item 01-05 **Revise Section 9.1.6.8 in Coordination with SAE/AMS. (GTG)** This new item will cover the efforts (see Item 01-04) to modify Section 9.1.6.8 of MIL-HDBK-5 in coordination with the SAE/AMS committee.

Action: New item number assigned.

No Item No. **Define Lower Bound Properties for Elongation (SWG)** – J. Goodman, Alcoa requested this item. He noted that it was difficult to calculate realistic design minimum values for elongation using the current ISG software (which was designed to conform with current Handbook guidelines).

Action: New item. Item number will be assigned when it is evident that changes to the guidelines will be necessary.