REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY *(Leave blank)*	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	April 11, 2002	Final Report – 8/30/00 to 9/30/01

4. TITLE AND SUBTITLE
A Research and Assessment of Quality Engineering Tools, Engineering Management Communication, and Systems Engineering Tools in Support of Aviation and Missile Mfg.

5. FUNDING NUMBERS

6. AUTHORS

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
University of Alabama in Huntsville
301 Sparkman Drive
Huntsville, AL 35899

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

U.S. Army Aviation and Missile Command
Redstone Arsenal, AL 35898

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT

A

12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

This report briefly reviews a task to provide analytical support to the AMCOM – RDEC's Engineering Directorate in the area of Quality Engineering tools usage, Engineering Management communication, and Systems Engineering tools usage.

14. SUBJECT TERMS
Quality Engineering, Engineering Management, Systems Engineering

15. NUMBER OF PAGES
5

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT

DEFENSE TECHNICAL INFORMATION CENTER
REQUEST FOR SCIENTIFIC AND TECHNICAL REPORTS

Title A RESEARCH AND ASSESSMENT OF QUALITY ENGR TOOLS, ENGR. MGMT COMMUNICATION, & SYS. ENGR TOOLS IN SUPPORT OF AVIATION & MISSILE MANUFACTURING

1. Report Availability *(Please check one box)*

☑ This report is available. *Complete sections 2a - 2f.*

☐ This report is not available. *Complete section 3.*

2a. Number of Copies Forwarded 5

2b. Forwarding Date 5/6/02

2c. Distribution Statement *(Please check ONE box)*

DoD Directive 5230.24, "Distribution Statements on Technical Documents," 18 Mar 87, contains seven distribution statements, as described briefly below. Technical documents MUST be assigned a distribution statement.

☑ DISTRIBUTION STATEMENT A: Approved for public release. Distribution is unlimited.

☐ DISTRIBUTION STATEMENT B: Distribution authorized to U.S. Government Agencies only.

☐ DISTRIBUTION STATEMENT C: Distribution authorized to U.S. Government Agencies and their contractors.

☐ DISTRIBUTION STATEMENT D: Distribution authorized to U.S. Department of Defense (DoD) and U.S DoD contractors only.

☐ DISTRIBUTION STATEMENT E: Distribution authorized to U.S. Department of Defense (DoD) components only.

☐ DISTRIBUTION STATEMENT F: Further dissemination only as directed by the controlling DoD office indicated below or by higher authority.

☐ DISTRIBUTION STATEMENT X: Distribution authorized to U.S. Government agencies and private individuals or enterprises eligible to obtain export-controlled technical data in accordance with DoD Directive 5230.25, Withholding of Unclassified Technical Data from Public Disclosure, 6 Nov 84.

2d. Reason For the Above Distribution Statement *(in accordance with DoD Directive 5230.24)*

2e. Controlling Office

2f. Date of Distribution Statement Determination

3. This report is NOT forwarded for the following reasons. *(Please check appropriate box)*

☐ It was previously forwarded to DTIC on ..... *(date)* and the AD number is .....

☐ It will be published at a later date. Enter approximate date if known. .....

☐ In accordance with the provisions of DoD Directive 3200.12, the requested document is not supplied because:

.....

.....

.....

Print or Type Name PHILLIP A. FARRINGTON

Signature [signature]

Telephone

(For DTIC Use Only)
AQ Number

Technical Report 5-21123
Contract No. DAAH01-98-D-R001
Delivery Order No. 104 Mod 1

A Research and Assessment of Quality Engineering Tools, Engineering Management Communication, and Systems Engineering Tools in Support of Aviation and Missile Manufacturing

(5-21123)

Final Technical Report for Period
30 August 2000 through 30 September 2001

April 2002

Prepared by:

Phillip A Farrington

N133 Technology Hall
Industrial and Systems Engineering and Engineering Management Department
The University of Alabama in Huntsville
Huntsville, Alabama 35899

Prepared for:

U.S. Army Aviation & Missile Command
Redstone Arsenal, AL 35898
Attn.: Ms. Patti Martin

PREFACE

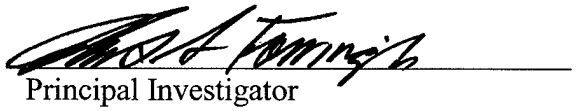
This technical report was prepared by the faculty of the Industrial and Systems Engineering and Engineering Management Department at the University of Alabama in Huntsville. The purpose of this report is to provide documentation of the work performed and results obtained under Delivery Order 104 Mod 1 of AMCOM Contract No. DAAH01-98-D-R001. Dr. Phillip Farrington was the principal investigator. Drs. Dawn R. Utley, Sampson Gholston, and Paul J. Componation served as co-principal investigators for the project. Ms. Patti Martin and Mr. Tom Reynolds, Engineering Directorate, Missile Research, Development and Engineering Center, provided technical guidance.

The views, opinions, and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision unless so designated by other official documentation.

Except as provided by the Contract Data Requirements List DD Form 1423, hereof, the distribution of any contract report in any state of development or completion is prohibited without the approval of the Contracting Officer.

Prepared for: Commander
U.S. Army Aviation & Missile Command
Redstone Arsenal, AL 35898

I have reviewed this report, dated April 11, 2002, and the report contains no classified information.



Principal Investigator

TABLE OF CONTENTS

1.0 Introduction

The Engineering Directorate of the Aviation and Missile Command Research Development and Engineering Center (AMRDEC) provides systems engineering support to AMCOM aviation and missile weapon system project offices. The systems engineering function includes the analysis of quality engineering principles employed during the life-cycle of the system.

Requirements for the implementation of systems engineering are the proper use of specific tools to accomplish the task, plus adequate engineering management communication to ensure that the outputs of these tools are disseminated to the appropriate organizations. To meet the requirements of its assigned function, the engineering directorate (ED) requires support and an expert assessment in these critical areas.

2.0 Objective

The objective of this task is to provide analytical support to the ED in the areas of quality engineering tools, engineering management communications and systems engineering tools. This task shall include as analysis of the current AMCOM and ED infrastructures to support the weapon system manufacturing process. An outcome of the task shall be recommendations regarding the AMRDEC and ED strategies for implementing quality engineering tools, engineering management communication techniques and systems engineering methodologies.

3.0 Statement of Work

The statement of work, as outlined in delivery order 104 Mod 1, was as follows:

3.1 UAH shall investigate current quality engineering tools and methodologies used within the AMRDEC and ED to ensure quality standards are maintained throughout the life cycle of AMCOM-managed weapon systems. This investigation shall focus on the development of a survey instrument to assess the current level of tool usage and skill development within the Quality Engineering, Reliability Engineering, and Quality Management Divisions.

3.2 UAH shall perform data gathering activities and perform as assessment of the current engineering management communications process as it currently resides at ED and AMRDEC. This assessment shall lead to the development and presentation of recommendations concerning the improvement of these processes. This presentation shall be made in a structured forum to all first-line supervisors and team leads within ED.

3.3 UAH shall investigate current systems engineering tools and methodologies used within the AMRDEC and ED to ensure systems engineering principles are maintained during the development and production of AMCOM-managed weapon systems. This project shall focus on the development of a survey instrument to assess the current level of Systems Engineering tool usage and skill development within the AMCOM community.

4.0 Conclusion and Recommendations

During the time frame allocated by the delivery order, members of the UAH Industrial and Systems Engineering Department discussed needs with the associate branch chief. Research into the types of tools used by quality engineers was conducted and documented. A survey was developed to assess the current tool usage and familiarity with concepts. As part of the final assessment of the survey, it was distributed to the division chiefs for comment. It was decided that the survey was not necessary and would not be distributed. The document was given to the Director's office for future distribution if the need changed.

As part of the delivery order, members of the UAH Industrial and Systems Engineering Department, with the cooperation of representatives from AMCOM Engineering Directorate, conducted research and analysis into the current methods and strategies for maintaining communication. As a result, a training/education program was developed and offered to ED engineering personnel. A two hour long seminar was developed and offered multiple times to the supervisors, division chiefs, team leads, and other ED personnel who wanted to attend.

Discussions were held with key personnel about the merging of the aviations group and the missile group and the resultant special challenges and opportunities to apply systems engineering. Interviews were conducted with ED personnel who were currently working in the systems engineering field. Research was conducted into the latest tools and techniques for use in systems engineering. Other organizations such as NASA were benchmarked with respect to their systems engineering efforts. A survey was developed which brought together tools, concepts, and specific responsibilities in order to assess the level of systems engineering currently conducted within the ED, AMCOM.