

BOEING PROPRIETARY

August 21, 2000
1-9148-JMW-00-025

To: R. C. Brunton 3-4A00 K32-20
V. Jackson 3-1400 K15-80

Subject: **Draft Report Coordination** - Boeing Wichita Division, Tooling Audit at AHF-Ducommun, Audit Report, Project 99-8-028.

The enclosed draft audit report is provided for your review and comment prior to formal release. The purpose is to obtain your concurrence with the contents of the report, including the conditions and action items. Action items in the report are called Management Actions. No formal or written response to the action items is requested at this time. However, completion dates for Management Actions completed during the audit, or Committed Completion Dates (CCDs) for Management Actions that have already been planned, are required before the audit report is released.

The executive summary section of this report will be included in a monthly report addressed or copied to the following:

S. Belyamani	A. R. Mulally
S. E. Carson	E. E. Mulloy
W. B. Gillette	E. F. Otis
J. M. Jamieson	J. R. Phillips
L. T. Koellner	D. Sanchez
D. J. Mikov	T. E. Schick
F. C. Mitchell	R. Swindler
S. L. Mizuta	J. L. Turner
J. J. Morris	

Please review the draft and

- o Make comments directly on the draft.
- o Initial and date the front page.
- o Return the draft report to the undersigned in Company offices Internal Audit (M/S K79-23) by (August 23, 2000 - close of business).
- o If no comments are made, please indicate your concurrence with the report as written.

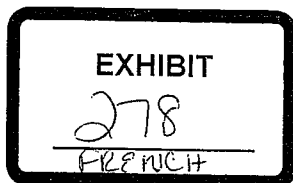
It is important that copies not be made of this draft, as distribution of draft reports is limited to those with direct input. If you have any questions or want to discuss the report, please contact the undersigned.

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Enclosure: (1) Draft Audit Report

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August 21, 2000
Audit Report 99-8-028

To: R. C. Brunton K32-20
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R. Dodds K11-60
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J. L. Turner K15-30

**Subject: Boeing Wichita Division, Tooling Audit at Supplier AHF-Ducommun,
Audit Report 99-8-028**

Purpose and Scope

This review emerged as a result of a concern in the area of tooling procurement. A Boeing supplier, AHF-Ducommun, located in Gardena, California, was tested for contractual compliance. The scope included inventory accountability; evaluation of tool usage, storage, and quality; manufacturing planning and processes; and tooling costs.

Background

AHF-Ducommun specializes in large stretchform operations. Boeing Commercial Airplanes - Wichita Division (BCA-WD) currently has a 5-year, \$90 million contract with AHF-Ducommun for 241 part numbers, of which 172 are 737 Next Generation chords, frames and bearstraps. The remaining part numbers are 757 and 767 doublers and triplers.

A cross-functional team was created to perform a physical audit of Boeing-owned accountable tooling at AHF-Ducommun. The team consisted of highly experienced personnel from Tooling, Manufacturing Research and Development (MR&D), Procurement Quality Assurance (PQA), and Supplier Management and Procurement (SM&P). The activities of the team were sponsored by the Wichita SM&P Director. Internal Audit worked closely with the team in the development of audit strategy and execution.

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Executive Summary

The severity of anomalies discovered at AHF-Ducommun is such that restitution in the amount of \$5.3 million is being pursued by BCA-Wichita SM&P. Evidence of misrepresentation was discovered. Tools contractually represented to be required for a numerical control (NC) machine process were found being used as templates. Planning documents that were provided to the audit team indicated NC machine processing, NC machine-type tools, and NC programming tapes. However, planning documents on the shop floor at AHF-Ducommun indicated otherwise. Millions of dollars have been paid to AHF-Ducommun for machine processing and expensive machine process tooling. Observations at AHF-Ducommun revealed a labor-intensive hand-route/form process where machining-tools are used as shop-aids and contour templates. Insufficient processes, along with inadequate manufacturing and inspections, were found to exist at AHF-Ducommun and place the Company at risk.

The results of the review revealed deficiencies both externally and internally. Audit observations are discussed further in the Audit Results section of this report.

Response Requirements

Boeing Company-wide Procedure PRO-1873, "Internal Audit Responsibilities," requires a written response to this report by **October XX 2000**. Your written reply should be directed to the undersigned and include detailed plans and committed completion dates for each management action listed below and described in this report. The committed completion dates you provide will be used to track open action items. A schedule showing significant milestones should be prepared for and management action expected to be complete 180 days or more after the date of this report. Following completion of a management action, please notify the undersigned in writing, including in your submittal the basis on which you recommend the action be closed.

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Response Requirements (continued)

Action Responsibility:

(99-8-34-01)	R. C. Brunton
(99-8-34-02 through -03)	V. Jackson
(99-8-34-04 through -05)	R. C. Brunton
(99-8-34-06 through -07)	V. Jackson
(99-8-34-08 through -09)	R. C. Brunton
(99-8-34-10 through -19)	V. Jackson

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Audit Results**1.0 Control Environment**

The control environment sets the tone of an organization by influencing the control consciousness of its people. This audit was conducted with the support and cooperation of the Wichita SM&P Director and the Senior Procurement Manager responsible for contracts. However, resistant and defensive attitudes were encountered in dealings with the lower levels of procurement contract management.

Management Action

None.

2.0 Control Activities

Control activities consist of policies, procedures, and practices established to ensure that management directives are carried out as intended. Control activities reviewed included approvals, authorizations, verifications, management reviews, and segregation of duty considerations.

2.1 Inventory Results

A complete and comprehensive physical inventory for tooling was performed by the cross-functional team. A tool inventory list provided by AHF-Ducommun was incomplete and failed to identify current locations and serial numbers. Tool storage was inadequate and interspersed with tools identified as scrap as well as tools owned by other companies. Using a Boeing Contract on Line Tool List (CTOL), and the AHF-Ducommun inventory list, the team physically searched for all tools. Fifty-five accountable tools could not be located, and 142 tools were identified that were not on the CTOL. AHF-Ducommun has since located 45 of the 55 lost tools. The financial impact of the ten lost tools is \$87,809.

Management Action 99-8-034-01**R. C. Brunton**

Rectify the current tool storage condition at the AHF-Ducommun facility, per D33200, "Boeing Suppliers' Tooling Document", and ensure proper disposition of scrap tools.

Management Action 99-8-034-02**V. Jackson**

Recover costs in the amount of \$87,809 for the ten lost tools.

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Audit Results

2.1 Inventory Results (Continued)

Management Action 99-8-034-03**V. Jackson**

Ensure AHF-Ducommun implements an automated system that allows for adequate tool accountability.

2.2 Evaluation of Tooling

D33041, "Boeing Tool Identification Codes", requires tooling to be identified. Examination of tooling revealed incomplete identification, multiple tool codes and tool tags on the same tool, and missing component parts. D33061, "Tooling Material Catalog", and D32042, "Boeing Stretchform Blocks (STFB) and Postform Block (FB) Tooling Document", govern the proper materials to construct tools. Tool quality was poor in that many tools were fabricated with incorrect material. The severity of these conditions is documented via photographs and poses a quality risk to the production of quality airplane parts.

Required design drawings could not be provided for 128 tools. Category I tools require designs per D33200, "Boeing Suppliers' Tooling Document", Section 1.14 & WMFM 404. A total of \$251,761 was paid for non-existent Category I tool designs.

Management Action 99-8-034-04**R. C. Brunton**

Identify tools per D33181-40, "Boeing Tooling Procedure Standards" and applicable fabrication documents. Apply correct tool code per D33041-1 thru -13. Ensure multiple component tooling parts are stored with the base tool.

Management Action 99-8-034-05**R. C. Brunton**

Ensure tools used in current manufacturing process are in compliance with D33061-0 thru -52 and D32042-1 thru -20.

Management Action 99-8-034-06**V. Jackson**

Recover tool design charges paid to AHF-Ducommun in the amount of \$251,761.

2.3 Manufacturing Planning and Processes

Two sets of planning documents were found to exist. Planning provided to BCA-Wichita indicated numerical control (NC) manufacturing process. Planning used by AHF-Ducommun production personnel indicated a hand-route/form manufacturing process. Observations, interviews, and process evaluation revealed a labor-intensive manufacturing process that includes hand-route, hand-form using ball-peen steel hammers, scribing of the profile, and hand-sanding

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Audit Results**2.3 Manufacturing Planning and Processes (Continued)**

with a belt sander. If required, ATA holes are hand-drilled on a mill fixture (intended for NC machining). This manufacturing process was substantiated by AHF-Ducommun production personnel as being the "standard practice" for production of Boeing-Wichita parts. The use of steel ball-peen hammers against steel parts changes the molecular structure. AHF-Ducommun management contends that Boeing parts are NC machined. Contractual and financial agreements are based on NC machined production and not on manufacturing techniques AHF-Ducommun currently deploys. Misrepresentation of the manufacturing process jeopardizes the integrity of airplane parts and incurs unnecessary financial impact.

Management Action 99-8-034-07**V. Jackson**

Correct the manufacturing planning documentation to reflect the current and actual manufacturing process.

Management Action 99-8-034-08**R. C. Brunton**

Ensure and verify the usage of steel ball-peen hammers on Wichita Division parts is eliminated immediately.

2.4 Delegation of Authority – Product Acceptance

In 1996, AHF-Ducommun was given full delegation of product acceptance based, in part, on their numerically controlled (NC) manufacturing business process. Initial production used the NC process to attain First Article Inspection. Once the First Article Inspection was obtained, it is believed AHF-Ducommun reverted to the current manufacturing process stated above. The current manufacturing process does not meet the criteria for which the delegated authority was granted.

Currently, AHF-Ducommun uses tools for the acceptance of parts. These tools were found to be out of calibration and inadequate to assure dimensional accuracy of production parts. ATA holes are checked back to production tooling, which is not in compliance with 800-10438, "Requirements For Product Acceptance To Statistical Tolerance," a supplement that provides interpretation of statistical tolerances per BDS-1065 and defines the approved methods for determining if product meets the statistical drawing requirements.

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Audit Results

2.4 Delegation of Authority – Product Acceptance (Continued)

Management Action 99-8-034-09**R. C. Brunton**

Implement additional controls to ensure there is adequate supplier oversight, and immediately remove delegation authority of product acceptance from AHF-Ducommun. Conduct a First Article Inspection to identify the current manufacturing process (see Management Action 99-8-034-07). Instruct AHF-Ducommun to cease acceptance of parts using tools that are out of calibration.

2.5 Excessive and Unnecessary Tools

Incorrect tool codes can result in excessive tool costs. For example, AHF-Ducommun coded a mill fixture that was built as a typical hand-router fixture. A hand-router fixture cost is far below that of a mill fixture. Estimated excessive charges for these types of situations identified during the physical audit are \$1,016,645 and should be reimbursed.

Also, a detailed financial analysis of correctly coded tools revealed inflated charges. Tools were estimated in three categories: simple, average, and complex. A ten-year history by tool code and complexity for tools built in-house (Wichita), was used as a baseline. Tooling rates for the Southern California area were used in the calculations. Raw material and NC programming costs were also included. Comparison of the estimated should cost to the actual cost resulted in a delta of \$1,415,056 in excessive charges. The current tooling procurement process at BCA-Wichita lacks internal controls to prevent this situation from recurring.

Unnecessary tools were discovered. For example, one form die was identified that could produce a family of parts. However, seven tools were made by AHF-Ducommun with the same contour to allegedly support their production process. Additional examples include straightening fixtures, STFB's, ME's, and two sets of stairs. Total excess cost of unnecessary tools to Boeing Wichita is \$894,195.

BCA-Wichita paid over \$1 million for non-accountable tools. Of that, \$998,195 was paid for NC programming and NC tapes. However, the actual manufacturing process that AHF-Ducommun is using today does not require NC programming or NC tapes, as they do not manufacture parts on an NC machine. In addition, NC tapes were included in overhead and included in the cost of individual tools.

Management Action 99-8-034-10**V. Jackson**

Recover \$1,415,056 from AHF-Ducommun in overcharges for incorrectly coded tooling.

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Audit Results

2.5 Excessive and Unnecessary Tools (Continued)

Management Action 99-8-034-11 **V. Jackson**

Recover \$894,195 from AHF-Ducommun in overcharges for unnecessary tooling.

Management Action 99-8-034-12 **V. Jackson**

Recover \$998,195 from AHF-Ducommun in overcharges for non-accountable tooling.

Management Action 99-8-034-13 **V. Jackson**

Correct the tooling procurement process to ensure detailed fabrication cost breakdowns are furnished by the supplier prior to fabrication of tool. Supplier proposals for tooling packages should be quoted as "not to exceed," subject to downward negotiation by Boeing. Employees with the commensurate level of expertise should be included in the process for determining the need for tooling and associated tooling costs.

3.0 **Monitoring**

Monitoring determines the adequacy and effectiveness of the internal control system over time through evaluations by management of the process.

The cross-functional team created to perform the physical audit of Boeing-owned tooling at AHF-Ducommun used a significant amount of Company resources to perform this audit. AHF-Ducommun is a delegated source and has partnered with Boeing for many years. Conditions identified during this audit should never exist with suppliers partnered with The Boeing Company. In typical monitoring situations at suppliers, Company resources would not have been expended in travel and overtime.

Management Action 99-8-034-14 **V. Jackson**

Recover the audit team's travel and overtime costs from AHF-Ducommun in the amount of \$74,000.

3.1 Contracted versus Purchase Order Pricing

Negotiated tools and corresponding prices were placed on a contract with AHF-Ducommun in an initial total price. Boeing personnel requested unnecessary tooling be deleted from individual purchase orders. It appears purchase order prices for the remaining tools were increased by AHF-Ducommun at a later date to take advantage of the initial total price. This resulted in an unnecessary cost of \$324,074. Procurement system controls that monitor pricing are inadequate.

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Audit Results**3.1 Contracted versus Purchase Order Pricing (Continued)**

Controls within the contract/purchase order system do not exist. In addition, changes made within the procurement system, such as purchase order pricing, do not require employee identification for accountability. The lack of internal controls result in an ability to make anonymous transactions.

Management Action 99-8-034-15**V. Jackson**

Recover costs from AHF-Ducommun, due to increased pricing of individual tools, in the amount of \$324,074.

Management Action 99-8-034-16**V. Jackson**

Ensure the BCA-Wichita contract/purchase order systems require user identification for all transactions.

4.0 Observations and Concerns

Pricing of the proposed tools is reviewed and approved, but the fundamental question of whether the tool is required to support actual production remains unchallenged. No internal control is in place to assist in the fundamental procurement decision. This deficiency has been validated, and has existed for years.

Accomplishments and actions taken during the course of this review include the formation of a tooling task team by the BCA-Wichita SM&P Director. Team members are currently engaged in the correction of deficiencies in the tooling procurement process and tasked to examine and amend existing procedures and implement any new procedures required. Objectives of the team include producing a tooling audit program for use with all BCA-Wichita suppliers to ensure tool accountability and verification of tooling costs.

As a result of the critical findings of this audit, and the civil penalties proposed as a result of a recent special audit performed by the Federal Aviation Administration citing the Company with inadequate supplier oversight, this situation cannot be ignored. BCA-Wichita should not continue status quo with AHF-Ducommun. The integrity of AHF-Ducommun as a partnered supplier places The Boeing Company at risk.

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Audit Results

4.0 Observations and Concerns (Continued)

Management Action 99-8-034-17 V. Jackson

Ensure recommendations made by the tooling task team are implemented.

Management Action 99-8-034-18 V. Jackson

Immediately cease all new business activity with AHF-Ducommun and consider disengagement. A business case to continue an adversarial supplier relationship with AHF-Ducommun should be provided in the event that disengagement does not occur.

Management Action 99-8-034-19

Notify all Boeing Divisions of the audit findings in order to identify total impact to The Boeing Company.

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