UNITED STATES GENERAL ACCOUNTING OFFICE
REGIONAL OFFICE
2006 WASHINGTON BOULEVARD BUILDING
234 STATE STREET
DETROIT, MICHIGAN 48226

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MAR 2 1973

Lt. General James T. Stewart
Commander
Aeronautical Systems Division
Wright - Patterson Air Force Base, Ohio

AGC 00194

Dear General Stewart.

The enclosed summary highlights our observations from an industrial management review we made at Teledyne CAE, Toledo, Ohio, during June - October 1971. We made this review, a comprehensive evaluation of Teledyne's manufacturing and related operations, to identify areas where improvements could be made to effect savings to the Government Some of these involved practices of Government contracting and administrative activities as they related to the contractor's operations.

Our review surfaced a number of areas where better management by the Government and contractor could save over $2 million annually. We discussed our findings with representatives of your Directorate of Propulsion Subsystems and Industrial Resources Division at the end of our review and during our follow-up visit in December 1972 In December we also visited the contractor's plant and found many improvements had been made

We hope the enclosed information will assist you in future dealings with Teledyne. You may also find our observations useful in your evaluations of other contractors' operations

In making reviews of this type, the contractors' full cooperation is required. Sometimes this requires access to contractor data not ordinarily available to Government agencies. Accordingly, we have agreed not to identify contractors by name in our reports. We ask that you please cooperate in this regard.

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We would appreciate your comments on our observations. If you have any questions, please let us know. We are grateful for the cooperation provided by the Air Force during our work.

We are sending copies of the enclosure to the Defense Contract Administration Services Region - Cleveland and to Teledyne.

Sincerely,

Regional Manager

Enclosure
Summary

NOTICE--THIS REPORT RESTRICTED TO OFFICIAL USE

This report is being made available solely to those having responsibilities concerning the subjects discussed therein. Recipients of this report must not show or release its contents for other than official Government purposes. At all times it must be safeguarded to prevent unauthorized disclosure of the information contained therein.

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HIGHLIGHTS OF AN INDUSTRIAL MANAGEMENT REVIEW

Industrial management reviews -- evaluations of contractor manufacturing and related operations -- offer the Government valuable opportunities for more economical and efficient procurements. This was illustrated by such a review we made at an Air Force contractor plant which manufactures jet engines and spare parts.

Our review, made in 1971, identified several potential areas for improving contractor operations and Government contract administrative practices relating to (1) facilities and equipment management, (2) quality assurance, (3) labor management, and (4) production control. We estimated annual savings of $2 million should these improvements be made. In a return visit to the plant in December 1972, we noted substantial corrective action had been, or was in the process of being taken.

Our findings, improvements made, and action still needed are discussed below.

FACILITIES AND EQUIPMENT MANAGEMENT

Problems with plant utilization, plant layout, equipment modernization and maintenance prevented a smooth-running manufacturing operation and caused additional costs of about $1 million annually. Many of these problems were caused by prolonged negotiations to sell the plant to the contractor. Still in process as of December 1972, these negotiations have been going on for 8 years.

Plant utilization

Two Government-owned plants were being operated to perform work that could have been done in one plant at substantially lower costs.

In 1967, when the contractor was operating only one plant, it asked the Air Force to spend $990,000 to expand and modernize the plant. The contractor contended this was necessary to handle anticipated increases in engine production. The Air Force did not provide the funding. Instead, it provided another plant, some 750 miles away, and allocated $988,000 for modernization. The contractor acknowledged that the second plant could handle the

expected additional work and assured the Air Force it could expect substantial price reductions on future contracts.

This proved to be a costly move. After the second plant was opened, the contractor's sales actually decreased. In fact, sales dropped to the point where both plants operate at only 30 percent capacity. Further, the anticipated price reductions were not realized because production costs increased substantially rather than decreased.

In December 1972 the Air Force was studying the need for retaining the production capability of the two plants. We believe the apparent economic advantages of consolidation should be carefully considered during these studies.

Plant layout

The contractor's equipment arrangement was not conducive to a smooth flow of work-in-process. Machines were crammed together -- a condition caused by idle equipment occupying limited floor space. In-process material was maintained in holding areas not convenient to personnel operating the machines. This

resulted in double handling of materials -- sometimes the second handling being done by skilled machine operators or supervisors because material handlers were not available.

The Administrative Contracting Officer suggested that idle or excess Government-owned machines be moved out of the plant. This would have provided more space in the manufacturing areas. However, the anticipated sale of the plant delayed disposal of these machines for almost 4 years. In June 1971 the restriction was lifted and the contractor was permitted to move the equipment.

By the time of our return visit, 129 machines had been removed, improving plant layout significantly. The contractor has rearranged the remaining machines and convenient material staging areas have been set up.

This example illustrates a problem which could occur at other contractor plants. It can be avoided through more timely decisions.

Equipment modernization

Much of the production equipment was worn out.

Some was obsolete. As a result, some machines would not hold tolerances. On occasion, this delayed deliveries of engines In one instance, the tolerances were relaxed so that the delivery date would be met.

Prior to 1968 the Air Force provided funds for modernizing these machines, however, no money has been authorized since then. Repeatedly, the contractor had advised the Air Force to update the machines. The funds were not made available, however.

In cases like this, operating costs of the old equipment should be evaluated. Perhaps investing in more modern machines may be the most economical course of action. Another alternative is to seek replacements from the Government's inventory, thereby negating the need for additional funds.

Maintenance

The contractor's preventive maintenance program needed improvement in two areas -- frequency of inspection and sufficiency of cost data.

First, the machines were not being inspected on time. Scheduled for inspection every 3 months, we found some going 7 months between inspections.

Second, maintenance cost data were either not available or were incomplete for individual machines. Because of this, certain vital questions could not be answered.

-- How effective is maintenance on individual machines?

-- Which machines require the most maintenance?

-- Is it less expensive to replace certain machines?

In our follow up visit we noted the contractor had taken some action on both of these issues.

QUALITY ASSURANCE

Opportunities to cut quality assurance costs $400,000 annually were available, but not taken Contractor quality control data indicated fewer engines should have been disassembled for inspection and retesting Further, inspections of parts during manufacture should have been reduced.

Disassembled engines

In our initial review we noted that the contractor was tearing down every engine for an inspection and retest. While most engines were only partially torn down, some were completely disassembled. This was being done even though the contractor had an option to tear down only a sample of engines if a certain quality level could be attained. Test results for one engine type indicated the contractor could have qualified under a sampling plan in 1968, but failed to take the action needed to obtain approval to use this plan.

A review of the contractor's records showed that during January 1970 through August 1971, only 191 of 33,000 parts tested after teardown were defective.

Contractor officials agreed to seek Government approval for a sampling plan. However, they later determined it was not economically feasible to meet the Government's sampling criteria because of the declining volume in engine production. The contractor did, however, obtain approval to completely tear down fewer engines -- one of every 15.

Should the volume of production increase, we urge the Air Force to consider use of the sampling plan -- assuming the quality of the product remains at an acceptable level.

Parts

For some time the contractor had been compiling data showing results of parts inspections. In early 1971, the contractor, using this data, was able to reduce 880 inspections on 97 parts. This data, however, had not been used continuously to effect further reductions. Difficulties in getting Government approval for reductions was cited as the main reason for not making greater use of the data.

We analyzed the inspection records and determined that more reductions were in order. For example, a 2-year inspection history of 121 parts showed 85 parts with no rejects. The contractor is now devoting more time in evaluating its data.

Apparently the contractor's analyses were fruitful. During our return visit in December we noted approval had been granted for additional

reductions in parts inspections.

We believe the Air Force should encourage similar analyses at other contractor plants.

LABOR MANAGEMENT

Having reliable standards to measure labor performance and having a program to improve production methods -- these are two important goals that had not been achieved by the contractor's labor management. We suggested two ways to reach these goals and save $600,000 annually

-- Perform more time studies.

-- Initiate a methods-improvement program.

Time studies

Fifty-four percent of the contractor's labor standards were based on engineering estimates, not time studies -- the preferred method for setting standards. Contractor records showed that engineering estimates, when time studied, were reduced on an average of 20 percent. This is a strong case for more time studies

Contractor officials said time studies were limited to those standards most suspect of being

inaccurate and those affected by procedural changes. We agreed that these should receive top priority. However, in light of the significant reductions in standards which were studied, it seems that more warrant a time study

In December contractor officials informed us additional time studies had been made. Further, more can be expected because another time study engineer has recently been hired.

Methods improvement

The contractor had no formal methods improvement program. Such a program considers whether (1) machinery and tooling are adequate, (2) the best sequence of operations is used in manufacturing a product, (3) labor is applied efficiently, and (4) machines are operating efficiently. An effective methods improvement program can substantially reduce labor costs.

Contractor officials agreed that improvements in methods are possible through a formal methods improvement program. The manager of operations instructed the manufacturing engineering department

to concentrate on methods improvement as soon as labor standards had been adequately studied.

PRODUCTION CONTROL

An effective production control system coordinates and regulates manufacturing operations. It tells production people what to make, how many and when. Several things prevented the contractor's production control system from attaining these objectives

-- Inadequate scheduling of production.

-- Poor reporting and controlling of work-in-process.

-- Few written procedures.

Because production volume was low at the time of our review, it was difficult to measure the impact of these problems. Should production increase substantially, however, it is our belief these weaknesses would seriously impair production performance.

Scheduling

When scheduling production, the production control department gave little consideration to manufacturing department capacities -- manpower and machine time

available. This meant there was no assurance that various departments were effectively utilized. At times departments could be overscheduled, while at other times they might be underscheduled.

Because the contractor's volume of production was low at this time, overscheduling may not be an immediate problem. However, it could present problems if the volume were increased. According to one contractor official, if the volume were increased significantly, scheduling procedures would have to be modified.

Reporting

The contractor did not have a system for reporting the status of parts as they moved through the manufacturing cycle. This hampered coordination efforts of the production control department. For example, the department became aware of schedule slippages only when parts became short, that is, not available to meet delivery requirements. These parts were then put on a "hot list" which was reviewed daily. Without continuous information on

work-in-process, the department had little assurance that manufacturing and delivery schedules would be met.

Written procedures

Written procedures are essential to describe how production controls should work and how people should perform. The contractor had few written procedures. Consequently, key personnel performed their work by relying on informal communications and judgment. This makes it difficult to hold personnel accountable for their actions and to measure performance.

One individual in the production control department had the responsibility for plant-wide scheduling of purchases of raw materials, manufacture of parts, and assembly of engines. Procedures to guide his performance were not written down -- making it difficult for someone to perform these functions in his absence.

Recognizing it had problems in production control, the contractor had already begun a study, at the time of our review, to identify ways for

improvements. We later found that an additional computer system has been installed and will be used for parts scheduling and status reporting. Also, the contractor now has written production control and scheduling procedures.