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REPORT TO THE CONGRESS

Industrial Management Reviews Of Defense Contractors' Operations

B-159896

Department of Defense

*BY THE COMPTROLLER GENERAL
OF THE UNITED STATES*

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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON D C 20548

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C To the President of the Senate and the
Speaker of the House of Representatives

This report summarizes the results of our industrial management reviews of operations at the plants of three aircraft engine manufacturers performing a substantial amount of work for the Department of Defense. We made our examination pursuant to the Budget and Accounting Act, 1921 (31 U S C 53), and the Accounting and Auditing Act of 1950 (31 U S C 67).

In response to a recommendation by the Subcommittee on Economy in Government, Joint Economic Committee, we reported to the Congress in May 1970 (B-159896) that applying should-cost concepts in our reviews of contractors' performance appeared feasible. We made trial applications of should-cost techniques at four plants and reported the results to the Congress in February 1971 (B-159896). On the basis of this trial application, we concluded that using should-cost techniques in our reviews can be extremely beneficial and that we should make additional should-cost reviews. This report represents the results of our latest applications of should-cost techniques in reviewing contractors' operations. T 710

In recent years, the military services have made some use of should-cost techniques in analyzing contractors' cost proposals to formulate the Government's negotiation positions on the basis of what the contracts should cost to perform, assuming reasonably achievable economies and efficiencies. Reports on our assessments of the Army's and the Navy's should-cost studies were issued in October 1972 and May 1973, respectively (B-159896). A report on the Air Force studies will be issued shortly.

Unlike the studies made by the military services, our reviews--which we refer to as industrial management reviews--were not intended for use in contract price negotiations and were not designed to arrive at should-cost estimates for particular products. We used industrial engineering and financial management principles to identify conditions which could be unnecessarily increasing the cost of contract performance and to bring those conditions to the attention of the contractor or Government officials who could take appropriate action. Since we made plant-wide reviews, in most cases the findings would apply to all, or most, of the products manufactured, regardless of the procuring agency or commercial customer involved.

During 1971 the three contractors had total sales of \$313 million, of which 72 percent was for defense work. Defense work in the three plants ranged from almost 100 percent to 63 percent of the total.

We limited our review at each location to those areas that appeared to warrant attention on the basis of a preliminary investigation of the contractors' operations and the results of previous Government reviews in the plants. At each of the three plants, we identified areas in which we believe the contractors could improve the efficiency and economy of operations and in which changes in the Government's procurement and contract administration practices could favorably affect the cost of contractors' operations.

We have brought our findings and suggestions at each plant to the attention of the cognizant Department of Defense procurement and contract administration organizations and contractors. We believe the results of our efforts will be especially useful to the Government's procurement and contract administration personnel who will be dealing with these contractors in the future.

Some of our suggested improvements will require time to implement, during which product lines or product quantities may vary, and many of our suggestions will require further study by the contractors to determine the most feasible approach for changing their operations. Consequently, we were unable to precisely quantify the savings

which could result from our suggestions. We believe, however, that the savings would significantly exceed the cost to implement the improvements.

Examples of our findings are discussed below.

CONTROL AND USE OF LABOR RESOURCES

Standards provide management with a basis for identifying areas in which more efficiency may be achieved. Labor standards indicate the time necessary for an operation to be performed by an experienced operator working effectively at a normal pace allowing adequate time for rest and personal needs. Although each of the contractors had a program for establishing, using and maintaining labor standards, we believe that improvements could be made in the programs at two of the plants, such as

- Greater use of time studies to set standards
- More systematic review and updating of standards
- Greater use of standards to measure labor efficiency

Complementing the labor standards should be a methods improvement program to review manufacturing operations and identify ways to reduce costs. We found opportunities to improve the methods improvement programs of two of the three contractors.

At one plant where labor efficiency reports showed a 69-percent overall efficiency during 1971, we conducted a work-sampling study of the contractor's direct labor force. The study was designed not to set standards or to measure efficiency but to determine what the direct labor employees were actually doing in the manufacturing areas. The study, which was conducted over a 2-week period, showed that only 50 percent of the employees' time was spent working on direct production of parts. Of the remaining time, 29 percent was spent on indirect production tasks and 21 percent was classified as nonproductive. We believe that methods improvement studies could be beneficial in increasing the time spent on direct production work. If even a 10-percent increase in direct productive time could be achieved, we estimate that about \$500,000 could be saved annually.

The contractors informed us that actions were being taken or were under study to improve the control and use of labor resources

PRODUCTION PLANNING AND CONTROL

Production control systems provide management of an industrial facility with a means for scheduling, coordinating, and controlling manufacturing operations. We found that problems existed in the production control systems at all three plants, primarily in scheduling and controlling work in process. For example, production schedules were not being met for certain parts, assembly workers were idle or were being given temporary layoffs due to shortages of parts, and certain other parts were being produced in excess of known requirements.

At one plant the contractor's production control system was not effectively controlling the issuance of raw material to the manufacturing departments. In a test of raw materials issued during a 2-week period for 173 selected parts, we found that the quantity of raw material exceeded by 15 percent the quantities shown on the fabrication schedules for the next 2 months. On the basis of this finding, we examined the contractor's inventory of fabricated parts to determine whether parts were being generated in excess of known requirements.

We found that about \$8.9 million of the actual inventory was excess to known requirements while production was behind schedule on other parts valued at \$8.7 million needed to cover known requirements. Industry generally recognizes that there is a cost associated with carrying inventory. On the basis of a 1-percent carrying cost a month as used by the contractor, we estimated that over a 17-month period the contractor incurred carrying costs of about \$772,000 for inventory excess to known requirements.

Each of the contractors acknowledged that problems existed and informed us that studies would be performed to identify ways to correct them.

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QUALITY ASSURANCE

Management uses quality assurance programs to attain and maintain a quality product at minimum cost. Inspection is the procedure for maintaining a satisfactory level of quality.

At two plants we found that the amount of inspection and testing performed on material and parts and on the assembled product could be reduced, with a savings in the contractors' quality assurance costs. For example, at one plant we noted that the contractor was tearing down every engine for inspection and retest. While most engines were only partially torn down, some were completely disassembled, even though the contractor had an option to tear down only a sample of engines if a certain quality level could be attained. Our review of test results for one engine type indicated the contractor could have qualified under a sampling plan but failed to take the action needed to obtain approval to use this plan. We estimated that, under a sampling plan, quality assurance costs would have been about \$400,000 lower annually.

During our review contractor officials agreed to seek Government approval for a sampling plan. However, they determined that it was not possible 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.

Also, at one plant, we selected a random sample of 100 parts from a total of 1,353 in the receiving inspection department during 1 day. Our test showed that, under the contractor's inspection criteria, the number of inspections performed on 31 of the 100 parts could be reduced without reducing the quality of parts, this could result in a substantial savings in labor costs. The contractor informed us that the results of our work would be used to reduce inspection costs.

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MANUFACTURING FACILITIES AND EQUIPMENTPlant utilization

We noted that two of the contractors were each operating two Government-owned plants at less than 40 percent of their full capacities. In both cases, one of the two plants was producing parts while the other produced parts and assembled aircraft engines. Significant economics seem possible by consolidating the production work for each contractor.

After our review we were advised that the second plant operated by one contractor was to be declared excess by the Government, with primary impact of this change to be borne by the primary plant. In the other case, we were advised that the second plant now supplies parts competitively and competes for engine overhaul contracts. Also, certain Government facilities used in manufacturing critical components have been moved to the assembly plant.

Plant layout

At one plant idle production equipment occupied limited floor space and therefore hindered a smooth flow of work in process. In-process material was maintained in holding areas inconvenient to personnel operating the equipment and was thus handled twice, sometimes by expensive skilled operators. The Government administrative contracting officer suggested that the idle equipment be moved out of the plant, but approval for the move was delayed for 4 years because of the anticipated sale of the plant. During our review, the contractor was permitted to move the equipment, and on a return visit we found that a number of machines had been moved and the plant was rearranged to provide convenient material holding areas.

Use of Government equipment

Government equipment in contractors' plants may be used for commercial work, provided authorization is obtained before use. In such cases the Government charges rent for the equipment. At one plant the contractor

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routinely submits to the Government a list of Government equipment it plans to use. We selected 12 Government machines not shown on the lists and found that 6 had been used for commercial work without authorization or rental payments. Some contractor personnel apparently were unaware of or otherwise had not complied with existing procedures for reporting such use. We estimate that back rental on the six machines was about \$8,700.

Contractor officials stated that current procedures were reemphasized to plant employees and additional measures were being instituted to minimize the possibility of any further unauthorized use of Government equipment.

Because of our findings, resident Government officials made a special survey of the contractor's use of Government equipment on commercial work and found that additional machines had been used without authorization. The contractor was assessed \$65,907 for back rental and in December 1972 paid a \$50,000 penalty. Also, we were advised that Government surveillance was being increased to prevent further unauthorized use of Government equipment.

Contractors using Government-owned property are required to promptly report underutilized equipment so it may be considered for redistribution to other Defense contractors. At the time of our review at one plant, 222 of the 934 pieces of Government equipment on hand were excess under the contractor's established criteria for equipment use. This excess equipment cost about \$1 million. Also, a sample of other items of equipment indicated that 135 pieces with a value of \$5.9 million were underutilized.

After our review the contractor told us that the 222 pieces of equipment had been declared excess and a screening of all plant equipment was underway to identify other excess equipment.

Similar problems in equipment use were discussed in our report to the Congress entitled "Further Improvements Needed in Controls Over Government-Owned Plant Equipment in Custody of Contractors" (B-140389, Aug. 29, 1972). In that

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report we recommended that the Secretary of Defense remind contract administrators of the need to monitor the use of Government equipment and also to identify unauthorized use of equipment

Maintenance of equipment

Adequate maintenance of production equipment can increase the efficiency of any manufacturing process. Preventive maintenance is a program of periodically cleaning, servicing, and inspecting machinery and equipment and replacing worn parts when necessary. Some of the benefits of a preventive maintenance program are less production downtime, fewer large-scale repairs, lower machine repair costs, and less overtime.

We found that the preventive maintenance programs at all three plants needed improvements. At one plant emphasis had been placed on quick reaction to and repair of equipment breakdowns rather than on regularly scheduled inspections of equipment. Property system surveys by Government representatives had rated the maintenance program unsatisfactory for 3 consecutive years. After our review the contractor reorganized the maintenance staff and established new maintenance procedures.

At the other plants, we found that inspections were not performed on schedule and in some cases were superficial with little or no consideration given to machine usage or manufacturers' recommendations. Also machine usage or maintenance cost data was either not available or incomplete for individual machines. Without such data, the plants could not adequately evaluate the effectiveness of their preventive maintenance programs, which in one case totaled about \$1.8 million a year.

At one plant, the contractor has taken action on both of these issues and the other contractor informed us that corrective action would be taken. Also, we suggested that resident Government officials increase their surveillance efforts in the area of preventive maintenance.

Equipment modernization
and replacement

The efficiency of manufacturing operations and the quality of the items produced can be affected by the condition of production equipment. At two Government-owned plants, we found that many obsolete or worn out Government-owned machines were in use. These machines would not hold tolerances and resulted in the rework of parts and the high rate of scrap. According to one contractor's records, scrap generated during 1971 because of production equipment in poor condition was over \$336,000.

In one instance we requested the Defense Industrial Plant Equipment Center to screen its records for 17 items of equipment scheduled for replacement or rehabilitation in 1972. This screening showed that replacements were available in the Government's inventory for four of the items having an acquisition cost of \$75,880. Use of these items should reduce the amount needed to rehabilitate equipment and reduce scrap loss.

We suggested that responsible agency officials consider the potential economics of providing funds for modernization of equipment or replacement of obsolete equipment with items available in the Government's inventory rather than have contractors continue to operate subpar equipment.

After our review we were informed that one of the plants was to be declared excess, therefore modernization or replacement of the equipment was no longer appropriate. Also, we were informed that such modernization has been limited primarily to selected items in support of mobilization needs. The modernization or replacement of machines at the second plant may have been related to the possible sale of this plant. However, in this case negotiations have been underway for 8 years.

PACKAGING OF SPARE PARTS

Department of Defense instructions set requirements for packaging parts and equipment to be delivered to

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domestic and overseas destinations which have varied storage conditions. Military standards establish three levels of packaging ranging from that required for protection against the most severe conditions known or anticipated during shipment, handling, and storage to that required for protection under favorable conditions in the continental United States.

At one plant the military services were requiring the contractor to package essentially all spare parts to the highest levels, no matter where the parts were to be used. The contractor had previously suggested that the lowest level of packaging be used for those spare parts shipped to and used only in overhaul activities in the continental United States. Although the contractor estimated that from 65 to 90 percent of all spare parts shipped from his plant were used in overhaul facilities within the United States, the military services had not taken action on the contractor's suggestion. We estimated that reducing the packaging levels for certain parts, as suggested by the contractor, could have reduced its packaging costs during 1971 by about \$265,000. We suggested that agency officials reevaluate packaging requirements and use the lower levels where warranted.

Our report to the Congress entitled "Savings Attainable by Revising Packaging in the Department of Defense" (B-157476, May 21, 1973) discussed in more detail the practices of the military services in packaging hardware. In that report we recommended that the Secretary of Defense see that actions were taken to reduce the level of packaging as well as consider the use of commercial packaging under certain circumstances.

The Congress has become increasingly concerned over the rising cost of Defense hardware. This report illustrates the potential for reducing Defense procurement costs through using industrial engineering and financial management techniques in reviewing the operations at contractors' plants.

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We are requesting the Secretary of Defense to advise us of the actions taken or planned to identify and correct similar problems that may exist at the plants of other Defense contractors

Copies of this report are being sent to the Director, Office of Management and Budget, the Secretary of Defense, the Secretaries of the Army, Navy, and Air Force, and the Director, Defense Supply Agency

A handwritten signature in black ink, reading "James B. Stacks". The signature is written in a cursive style with a large, prominent initial "J".

Comptroller General
of the United States

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