

**DECISION**

**THE COMPTROLLER GENERAL  
OF THE UNITED STATES**  
WASHINGTON, D. C. 20548

FILE: B-183275

DATE: November 4, 1975

MATTER OF: Acurex Corporation

**DIGEST:**

Where agency maintained determination to standardize on magnetostrictive measuring equipment on erroneous assumption that non-magnetostrictive equipment of protester would have unacceptable 16,000 p.s.i. clamping pressure and on basis that magnetostrictive equipment has had 12 times more sea testing, recommendation is made to further review non-magnetostatic equipment and resolicit procurement if equipment is found to meet safety factors, since protester states that 8,000 p.s.i. is most that would be furnished and absence of service time was not critical in prior procurement of non-magnetostatic equipment.

On December 20, 1974, the Naval Sea Systems Command (NAVSEA) issued invitation for bids (IFB) No. N00024-75-B-4254 as a small business set-aside. The IFB solicited bids for the furnishing of 22 torsionmeters and repair parts. In response to the IFB, one bid, from Mechanical Technology, Incorporated (MTI), was received.

A second firm, Acurex Corporation (Acurex), declined to submit a bid on the basis that to do so, in light of the IFB as drafted, would have resulted in the submission of a nonresponsive bid. Acurex did, on the other hand, protest what it believed to be the restrictive language in the IFB to the Navy prior to the initial bid opening date, February 4, 1975. The Navy, in order to consider the merits of Acurex's protest, postponed bid opening until February 19, 1975. By telephone conversation of February 18, 1975, the Navy denied Acurex's protest. This action precipitated Acurex's timely protest to our Office.

During the pendency of this protest, the Navy, based upon a determination and finding of urgency, has made an award under the IFB in question to MTI on August 6, 1975.

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In essence, Acurex's protest involves the allegation that the IFB is unduly restrictive of competition. The IFB, at section "F," incorporated by reference Military Specification, MIL-T-24448A (SHIPS), dated April 20, 1971, which, in paragraph 3.3.22 states, in pertinent part that:

"\* \* \* Magnetostriction Techniques shall be employed for signal detection/development. \* \* \*"

The term magnetostriction, as used in the IFB, refers to the method or technique of measuring changes which may occur in the magnetic properties of a rotating propeller shaft. Such changes in magnetic properties reveal the degree of stress on the shaft.

Another method of measuring the stress is that employed by the Acurex torsionmeter. Acurex's unit is comprised of an electronic sensor fitted between two rings or collars made of a steel alloy which are mounted to the shaft; the sensor, containing two strain gages, electronically responds to or measures the degree of twist or displacement of the rotating shaft.

Under both methods of measurement, the results obtained are electronically displayed to the ship's personnel who, by this means, are given a continuous reading of the stress condition of the shaft. Therefore, it is Acurex's position that the limitation in the IFB to the magnetostrictive measuring technique is an unnecessary design specification which renders the IFB unduly restrictive of competition.

In response to Acurex's protest, the Navy has indicated that it standardized on magnetostrictive equipment because it provides safety factors for the propulsion shaft not found in the Acurex torsionmeter. However, as indicated below, the Acurex torsionmeter may very well meet the required safety factors.

It is the Navy's position that the magnetostrictive requirement is vitally important in order to safeguard the basic integrity of the propeller shafts that the torsionmeters are designed

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to protect. The Navy refers to two scientific and mathematical analyses conducted during the pendency of this protest, one performed by the Naval Ship Engineering Center (NAVSEC), the other conducted by two consultants from the Massachusetts Institute of Technology (MIT), the results of which were as follows:

| SAFETY FACTOR         | DD 963 | SSN 688 | DLGN 38 | CVA 41 |
|-----------------------|--------|---------|---------|--------|
| MINIMUM ALLOWED       | 1.75   | 2.00    | 1.75    | 1.75   |
| NAVSEC - CALCULATIONS | 2.40   | 1.88    | 1.76    | 1.60   |
| MIT - CALCULATIONS    | 2.61   | 2.02    | 1.81    | 1.75   |

The conclusion drawn by the Navy was:

"\* \* \* that the knife-edged Acurex Bands clamped on the shafts under 16,000 pounds per square inch would lower the shaft safety factors of the SSN 688-700 Class and of the CVA-41 Class shafts below minimum safety requirements. \* \* \* [and] \* \* \* that the shaft safety factor of the DLGN-38 with the two bands clamped on the shaft is marginal."

By memorandum of April 15, 1975, NAVSEC further concluded:

"The requirement for the use of the magnetostrictive technique is not a 'non-functional design feature'. The primary reason for the torsionmeter is to provide the ship with information relative to prevention of overstress conditions on the ship's propeller shaft and its related propulsion system. It logically follows that the torsion measurement technique should have no adverse affect on shaft strain.

"Torsionmeters based on the magnetostrictive technique, since they do not touch the ship's propeller shaft, have no affect on the stress condition of the shaft.

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"The Acurex system, however, having two knife edge steel collars tightly clamped around shaft has a considerable effect.

"Calculations of the effect on the stress condition of the propeller shaft due to the installation of the Acurex collars have been provided by NAVSEC 6140 letter 1640/CMJ Ser 22 of 19 March 1975.

"Based on the above analysis, the Acurex system would have an adverse effect on the very parameter it was installed to monitor, namely the stress condition of the shaft."

Acurex takes issue with the underlying basis of the shaft stress safety factor calculations, performed by the Navy and MIT. Acurex states that all calculations, both MIT's and NAVSEC's, were based upon a simple error of fundamental significance. Acurex points out that the March 19, 1975, letter from the Commander, NAVSEC, to the Commander, NAVSEA, conveying the NAVSEC and MIT findings (Subject: "Effect of Acurex Torsionmeter and Propulsion Shafting Strength") contained the following description of the Acurex Torsionmeter:

"1. The Acurex torsionmeter consists of a scaled strain gage transducer which senses the relative twist angle between two collars clamped 19.68 inches apart on the main propulsion shaft. Sixty units are currently programmed for installation on the DD 963 Class. Each collar is installed with a clamping pressure of 16,000 p.s.i., raising the question as to the effect of such a pressure on the line shafting strength. (emphasis added.)"

Having stated the parameters of its concern, viz., a clamping pressure of 16,000 p.s.i., NAVSEC then proceeded to report on the investigations made:

"2. The effect of the Acurex torsionmeter knife edge clamping pressure was investigated by the Naval Ship Engineering Center (NAVSEC) and \* \* \* the Massachusetts

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Institute of Technology (MIT). The results of these clamping pressure investigations showed consistent reductions in the factor of safety. \* \* \*

A tabular summary shown above was then presented of these findings for the four different classes of ships considered. Based on this dual investigation, NAVSEC concluded:

"3. The shaft safety factors for SSN 688 and CVA 41 with the Acurex device are below the minimum requirements and are considered unacceptable. The safety factor for DLGN 38 is marginal. The safety factor for DD 963 is satisfactory. It is recommended, therefore, that the Acurex torsionmeter not be procured for SSN 688, CVA 41 and DLGN 38."

Acurex, however, indicates that it was wrong to utilize a 16,000 p.s.i. clamping pressure. Acurex states:

"\* \* \* the simple truth of the matter is that the clamping pressure used in these calculations, viz., 16,000 p.s.i., was a figure assumed by NAVSEC to be basic to the ACUREX design and as such was transmitted to the Massachusetts Institute of Technology for investigation and analysis. It is not ACUREX's figure: it is not the correct figure."

Further, Acurex relates that in practice it normally "tailors" the clamping pressure to the specified application at hand and, in the instant case, the clamping pressure for each of the three classes of ships (SSN 688, DLGN 38 and CVA 41) involved in the procurement would be far below that which was arbitrarily assumed by NAVSEC. Acurex states that preliminary analysis by it indicates that, conservatively stated, a clamping pressure of less than half that assumed by NAVSEC, viz., 8,000 p.s.i., would be more than sufficient to satisfy all stated performance requirements without degradation to the requisite degree of reliability, for each of the three classes of ships. Further, Acurex's analysis indicates that additional reductions in clamping pressure are likely once it ascertains the basic shaft strengths for each class of ships.

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Acurex states that it is correct that for an entirely different class of ship (DD 963) not involved in the immediate procurement the Acurex design does utilize a clamping pressure of 16,000 p.s.i. However, Acurex asserts that NAVSEC was in error in assuming that the same clamping pressure is inherent to the Acurex design and would also be used on each of the other three classes of ships.

In order to ascertain the origin of the 16,000 p.s.i. figure utilized by both the Navy and MIT in their calculations of the safety of Acurex's torsionmeter, the following questions were asked of the Navy by our Office:

1. From what source did the Navy obtain the 16,000 p.s.i. figure?
2. Was the 16,000 p.s.i. figure used for all calculations?
3. Was Acurex contacted to verify the validity of the 16,000 p.s.i. figure?
4. Was 16,000 p.s.i. considered to be a possible variable?

In response, the Navy answered as follows:

1. The 16,000 p.s.i. figure was obtained from a presentation entitled "The Design and Development of a High Accuracy Marine Torsionmeter," given by Mr. Alan J. Adler, Principle Research Engineer, Acurex Corporation. The presentation was made in Tokyo, November 14, 1973, at The International Symposium on Marine Engineering.
2. Yes.
3. No.
4. No.

The presentation referred to in answer No. 1 states, at page 7 that,

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"\* \* \* Each collar is installed with a clamping pressure of  $1.2 \times 10^7$  kg/M<sup>2</sup> (16,00 psi). \* \* \*"

It was this statement that led the Navy to utilize the 16,000 p.s.i. figure in the manner it did. However, we have carefully examined the 1973 presentation and nowhere find anything that would indicate that either the 16,000 p.s.i. figure was a constant to be utilized by all Acurex torsionmeters or that the data generated by the DD-963 study was freely transferable for calculations concerning other classes of ships. In fact, the presentation begins with the following statement:

"The torsionmeter described in this paper was developed by Acurex Corporation for Litton Industries, Ingalls Shipbuilding Division for use on the US Navy DD-963 Class Destroyers." (Emphasis supplied.)

Accordingly, we believe that the Navy was unwarranted in utilizing the 16,000 p.s.i. figure in the instant procurement without first ascertaining the accuracy and/or transferability of this figure when the Acurex torsionmeter is installed on a ship other than of the DD-963 Class.

Both counsel for Acurex and the Navy have referenced similar decisions of our Office which reflect our position that the preparation and establishment of specifications to reflect the minimum needs of the Government are matters primarily within the jurisdiction of the procurement agency, to be questioned by our Office only when not supported by substantial evidence, East Bay Auto Supply, Inc., 53 Comp. Gen. 771 (1974), 74-1 CPD 193. While specifications should be drafted to maximize competition, B-172006, June 30, 1972, we will not substitute our judgment for that of the contracting agency "\* \* \* unless there is clear and convincing evidence that the agency opinion is in error and that a contract awarded on the basis of such specifications would, by unduly restricting competition \* \* \* be a violation of law." 40 Comp. Gen. 294, 297 (1960). Moreover, while our Office will determine whether specifications as written are unduly restrictive of competition, the fact that a particular prospective contractor may be unable or unwilling to meet

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the minimum requirements for supplying the Government's needs is not sufficient to warrant a conclusion that the specifications are unduly restrictive. 49 Comp. Gen. 857, 862 (1970). Since the Navy determination foreclosing Acurex from submitting a bid on its torsionmeter was based on an erroneous assumption, it appears that the procurement may have been unduly restrictive of competition.

The only other basis raised by the Navy to support the purchase of magnetostrictive equipment is that it has had about 12 times as much sea testing as the Acurex equipment. However, we note that the absence of service time was not deemed critical in the prior purchase of the Acurex equipment for the DD-963 class of ships.

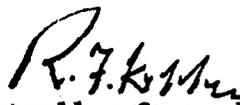
In the circumstances, it is recommended that a proper review be made of the Acurex equipment for use on the class of ships involved in the immediate procurement. If the equipment is found to meet the minimum safety factors specified at the outset, it is recommended that the procurement be resolicited without the magnetostrictive requirement. After the submission of bids, the present contract should be terminated for the convenience of the Government and a new contract entered into with the successful offeror, if other than MTI. If MTI remains successful, the existing contract should be modified in accordance with its new bid price.

The determination and finding of urgency which was the basis for the August 6, 1975, award to MTI stated that based on another contract with MTI "the actual production time for these torsionmeters varies from twelve (12) to fifteen (15) months" and "the first torsionmeter under this proposed contract is required to be shipped by 30 October 1976." The recommendation for corrective action in this decision is made in the face of the determination and finding, since it is observed that the analysis of the effect of the Acurex torsionmeter on propulsion shafting strength was accomplished by NAVSEC and MIT in about a month after the protest and Acurex has stated that its normal manufacturing cycle is 60 days. Thus, if an additional analysis is made which results in a resolicitation of the procurement there would be sufficient time for Acurex to ship by October 30, 1976, if it is the successful bidder. On the other hand, if MTI should continue to be

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successful, there would be no disruption of the contract and it would presumably deliver as required.

As this decision contains a recommendation for corrective action to be taken, it is being transmitted by letters of today to the congressional committees named in section 232 of the Legislative Reorganization Act of 1970, Public Law 91-510.

  
Acting Comptroller General  
of the United States