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Andy JFA

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[Redacted]

April 2, 1959

*Rec'd ED
4/3/59
9:00*

Dear Sir:

This summary letter report describes the work done under Work Order No. III, Task Order No. CC, from November 17, 1958, through February 16, 1959.

The effort in this research program was directed toward the following:

- (1) Primarily, to evaluate the feasibility of developing an appropriate instrument or apparatus for use as an accessory to your operating representatives' special two-component tool [Redacted]

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- (2) Secondly, to investigate limited modification of the special two-component tool, in an attempt to reduce breakage of the [Redacted] component in actual service.

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Initially, [Redacted] and one special tool were furnished for our study. Examination and manipulation of these items provided an opportunity for us to become familiar with at

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least some possible field problems, and several ideas were suggested by this experience. Subsequently, in conferences with you, it was found that some of these ideas had already been conceived and implemented advantageously, while others seemed to be new. However, for the record, two of the ideas resulting from this study are noted here:

(1) In the process of attempting [redacted] [redacted] some kind of indexing device might be of use as an aid in [redacted] rapidly and accurately. Such a mechanism was designed and prepared for use in connection with the special tool furnished us; the device was found to be distinctly helpful. The device, a detent mechanism, consisted essentially of a ball - spring unit which was clamped to the shaft of the moving component of the tool; the ball of this unit rested in a small hole in the moving-component shaft and contacted a set of transverse peripheral grooves on the shaft of the holding component. These grooves were equally spaced at a distance corresponding to the [redacted] [redacted] By means of a screw, the force exerted on the ball by the spring could be varied over a wide range, down to zero. Thus, it was possible for the mechanism to be easily adjusted to suit the operator and to some extent the service conditions. The holding component which was used in the laboratory experimentation with the detent mechanism was relatively soft, and the grooves tended to wear. However, as is discussed later, the special tool which was available to us is outmoded; the newer versions

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are harder and grooves in them could be expected to withstand this type of service without sustaining undue wear.

(2) It was also apparent that some provision for applying the holding torque mechanically would be advantageous. Mechanical aid of this sort would relieve the operator of a very tiresome task, it also offered a safety feature in limiting the torque to values considered to be safe with respect to the ultimate strength of the tools. Such a device and an accessory for supporting the outer end of the tool (so as to minimize the effects of slight misalignment) were designed, fabricated, and demonstrated to your representatives. The essence of this idea had apparently already been applied by your operating personnel.

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A recent discussion with you and your operating representative indicated that more current versions of the special tools have been fabricated from AISI 4340-type steel and a stainless steel, and that breakage is not a problem at present. In case breakage should be encountered in the future, it might be well to investigate the possibility of heat treating the steel used in order to obtain optimum strength and ductility for the particular application.

On the basis of a discussion of the above-described results with you, a research program was proposed in our letter dated March 6, 1959, to investigate the development of an appropriate torque-measuring and -indicating system. This program was subsequently set

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TABLE 1. DATA ON BROKEN SPECIAL TOOLS

Tool No.	Hardness		Estimated Ultimate Tensile Strength, psi	Probable Steel*
	Knoop	Rockwell		
0	808	C64	>283,000	AISI 1080
1	210	B94	96,000	AISI 1010
2	296	C24	118,000	AISI 8640
3	590	C54	>283,000	AISI 1040
4	295	C24	118,000	AISI 8640
5	282	C21	110,000	AISI 8640

*Based on analytical data.

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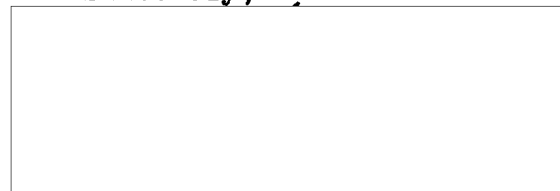
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up under Work Order No. X of Task Order No. CC, and the research is under way.

We would appreciate any comments that you or your associates might care to make with regard to the research performed under Work Order No. III.

Sincerely,



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In Triplicate

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