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Memorandum M 1943

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Digital Computer Laboratory
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SUBJECT: TESTING CORES FOR WWII
 To: David R. Brown
 From: J. H. McCusker
 Date: March 30, 1953

Abstract: Since approximately one to two tests per second have to be made to test sufficient cores for WWII in thirteen weeks, the present testing technique is unfeasible. Semi-automatic or preferably completely automatic testing is required.

For a 64 x 64 x 32 array, 131,072 cores are required. Assuming four spare arrays, approximately 150,000 cores will be needed. Testing is supposed to be completed in 13 weeks. Testing may begin as early as July 15, 1953, but no later than October 1, 1953.

The following chart is prepared on the basis of MTC core experience which is the only basis we have to go by. The total number of tests is the number of scope displays.

	Produced Gen. Cer.	Delivered MIT	Total Tests MIT	Good Cores	Sample Tests Gen. Cer.
Total	1,300,000	530,000	1,080,000	150,000	65,000
per week	100,000	41,000	83,000	11,500	5,000
per day	20,000	8,100	16,600	2,300	1,000
per hour			3,100	(1/3 down time)	
per second			≈ 1		

MTC core experience is as follows:

- 40 percent of cores produced at General Ceramics are delivered to MIT.
- General Ceramics samples 5 percent of cores in lot, then determines destination of lot, retain or send to MIT.
- 28 percent of cores delivered to MIT are acceptable.
- MIT tests all cores.
- MTC cores are all good (assumption).

On the basis of the tests required per day, 16,600, our present technique is entirely unfeasible. It will not even be considered here. A semi-automatic or automatic device is the only feasible way of testing.

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Assuming 25,000 cores per lot, 52 lots (approximately 1 per day) will be produced of which 21 will be acceptable on the basis of sample-testing by General Ceramics. Approximately 1,000 cores from each lot (less than 5 percent) will be sample tested.

One thousand cores from each lot will be run through a separate production tester for preliminary lot evaluation. If the lot is acceptable on this basis, delta will be measured on the acceptable cores (approximately 300) from the sample batch. If acceptable, the remaining 24,000 cores from the lot will be run through the production tester. One core-handling machine, one setup, and one girl will be required for these evaluation tests. The procedure for evaluating the lots at present is inadequate. This test must be an integral part of the production test.

The production tests must either be semi-automatic with visual observation, or automatic. With semi-operation, let us assume one girl with one setup can test a core every five seconds. I would like to emphasize here that this means one core every five seconds for thirteen weeks, not 2 minutes or 2 hours. At one core every five seconds, this would be 5,700 cores per day. Therefore, we would need 3 girls and 3 production setups (exclusive of the evaluation girl and setup) to test the required number of cores per day. However, due to vacations (July-September), illness, coffee hours, rest hours, equipment breakdown, etc., 5 girls and 4 production setups would be required as a minimum. A total of 6 girls and 5 setups are therefore needed for the production tester to operate satisfactory as a self-contained unit. Absenteeism was high during the MTC tests and may be extremely high during the summer and work output low due to the extreme heat that will undoubtedly be encountered. The cores must be air-conditioned and the workers should be, if possible.

Automatic testing may however be the best answer. Two girls might be required, one evaluating, one tending the production machines. A technician and an engineer would be required with another engineer completely familiar with the equipment in reserve.

The number of tests required with automatic equipment will be approximately doubled since the girls now do 2 to 3 observations at one time. Approximately 2 cores per second will have to be tested. Assuming a device capable of handling 1 core per second, 2 setups will be required. Another semi-automatic device will be required for the girl evaluating cores.

To sum up, present techniques are unfeasible. Semi-automatic operation appears feasible but undesirable due to large number of girls required and probable absenteeism (vacations, etc.). Automatic operation seems to be best if the equipment is sufficiently reliable. A machine must be developed which can test cores at a minimum rate of one per second reliably for a period of 3 months.

JHM/jk

cc: Group 63 Staff
Taylor, Papian, Kromer
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Signed

Joseph H. McCusker

Approved

David R. Brown

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