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ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numeric Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample is included. (AG)

# TECHNICAL REPORT

# ON

# STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

# FOR

# GLUING-MACHINE OPERATOR 6-42.390

B-586 S-306





U. S. Employment Service
in Cooperation with
Indiana, Michigan, Minnesota, Texas and Wisconsin
State Employment Services

Key State Agency - Wisconsin

June 1964

GATB # 2504

# STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

FOR

Gluing-Machine Operator (paper goods) 6-42.390

B-586 S-306

## Summary

The General Aptitude Test Battery, B-1002B was administered to a final sample of 53 men employed as Gluing-Machine Operator 6-42.390 at various member firms of the Folding Paper Box Association of America. These firms were located in Indiana, Michigan, Minnesota, Texas and Wisconsin. The criterion consisted of supervisory ratings. On the basis of mean scores, standard deviations, correlations with the criterion, job analysis data, and their combined selective efficiency, Aptitudes S-Spatial, P-Form Perception and M-Manual Dexterity were selected for inclusion in the final norms.

GATB Norms for Gluing-Machine Operator 6-42.390, B-586 S-306

| B-1001 | | | B-1002 | | |
|---|---|---|---|---|---|
| Aptitude | Tests | Minimum Acceptable Aptitude Score | Aptitude | Tests | Minimum Acceptable Aptitude Score |
| S | CB-1- F<br>CB-1- H | 85 | S | Part 3 | 80 |
| P | CB-1- A<br>CB-1- L | 70 | P | Part 5<br>Part 7 | 70 |
| M | CB-1- M<br>CB-1- N | 70 | M | Part 9<br>Part10 | 70 |

## Effectiveness of Norms

The data in Table IV indicate that only 68 percent of the non-test-selected workers used for this study were good workers; if the workers had been test-selected with the above norms, 90 percent would have been good workers. 32 percent of the non-test-selected workers used for this study were poor workers; if the workers had been test-selected with the above norms, only 10 percent would have been poor workers.

TECHNICAL REPORT

## I. Purpose

This study was conducted to determine the best combination of aptitudes and minimum scores to be used as norms on the General Aptitude Test Battery for the occupation of Gluing-Machine Operator 6-42.390.

## II. Sample

The GATB, B-1002B was administered during the period July 1962 to March 1964 to a final sample of 53 men employed as Gluing-Machine Operators 6-42.390 at the following member firms of the Folding Paper Box Association of America:

| State | Company |
|---|---|
| Indiana | Barger Box and Printing Co., Elkhart |
| Indiana | Crown Paper Box Co., Indianapolis |
| Indiana | Indianapolis Paper Container Co., Indianapolis |
| Indiana | Paper Package Co., Indianapolis |
| Michigan | Acme Carton Co., Dearborn |
| Michigan | KVP Sutherland Paper Co., Kalamazoo |
| Michigan | Michigan Carton Co., Battle Creek |
| Minnesota | Waldorf Paper Products Co., St. Paul |
| Texas | Houston Paper Co., Houston |
| Wisconsin | Cornell Paper Co., Milwaukee |
| Wisconsin | Forsberg Paper Box Co., Madison |
| Wisconsin | Green Bay Packing Co., Green Bay |
| Wisconsin | Marathon Corporation, Menasha |
| Wisconsin | Marathon Corporation, Wausau |
| Wisconsin | Milprint, Inc., Milwaukee |
| Wisconsin | Paper Box & Specialty Co., Sheboygan |
| Wisconsin | A. Geo. Schulz Co., Milwaukee |

No tests were used at any of these companies in the selection or workers for employment. The on-the-job training period at all companies is from nine to twelve months. All the men in the sample perform comparable work and are considered experienced workers.

TABLE I

Means (M), Standard Deviations ($\sigma$), Ranges, and Pearson Product-Moment Correlations with the Criterion (r) for Age, Education and Experience

| N = 53 | M | $\sigma$ | Range | r |
|---|---|---|---|---|
| Age (years) | 38.8 | 9.4 | 19-61 | -.330* |
| Education (years) | 10.5 | 1.8 | 6-14 | .229 |
| Experience (months) | 146.5 | 85.2 | 18-480 | -.284* |

*Significant at the .05 level

III. Job Description

Job Title: Gluing-Machine Operator (paper goods) 6-42.390

Job Summary: Glues and folds paper carton blanks by setting up and operating one or two automatic finishing machines. Makes machine adjustments and minor repairs when necessary. Lubricates machines, serves as machine crew leader, and maintains production records.

Work Performed: Examines sample carton to determine machine to be used, setups required, and adjustments necessary to accomplish gluing and folding. Sets up and makes adjustments after running sample carton blank through machine. Measures adjustments necessary with ruler, loosens previous setups with lead hammer, and alines machine for new run by moving hand cranks and setting screws with wrenches. Sets speed of feed and size of feed bed according to size of sample carton. Angles and sets belts and breakers in desired position to bend carton blanks on scored lines at correct degree for gluing operation. Adjusts turners of folding mechanism for proper carton fold and pressure on flaps. Sets timing of transfer unit when setting upright angle gluer. Alines steam jets of de-waxing unit, gluing mechanism, air cylinders, and other attachments necessary to adapt carton blanks for gluing and folding. According to size of carton and working speed of packers, sets spacing mechanism to partially eject carton and automatically separate counted stacks to facilitate packing. Checks setups and adjustments by running sample cartons through the machine and visually inspects cartons for quality of folds and glued parts.

Starts production by pressing starter button of machine. Feeds stock, paper carton blanks, into machine by placing in proper position on feed bed at a rate of 1000-1200 cartons per hour. Removes completed cartons from conveyer by hand, observes cartons for glue leaks or over stacking by machine and packs into cases prior to inspection by quality control department. Stops machine and makes adjustments and minor repairs, using hand tools, to maintain quality and production standards. Calls machine shop for assistance in case of major breakdown. Lubricates machines as required using oil can and grease gun. Follows lubricating chart to insure complete lubrication. Checks and fills glue pots, selecting proper glue required for cartons, before and during operation.

Directs the tasks of three or four members of machine crew. Trains crew members on the job in the performance of their assigned duties by explaining and demonstrating proper methods. Keeps records of production for each machine by shift and machine crew as recorded on electric counter.

## IV. Experimental Battery

All the tests of the GATB, B-1002B,, were administered to the sample group.

## V. Criterion

The criterion data collected consisted of two sets of independent ratings made by each worker's immediate supervisor on USES Form SP-21, "Descriptive Rating Scale." A period of at least two weeks elapsed between the first and second ratings. The rating scale consisted of nine items covering different aspects of job performance, with five alternatives for each item. Weights of one through five, indicating the degree of job proficiency attained, were assigned to the alternatives. A reliability coefficient of .95 was obtained for the criterion. Therefore, the two sets of ratings were combined, resulting in a distribution of final criterion scores of 31-90 with a mean of 62.0 and a standard deviation of 12.9.

## VI Qualitative and Quantitative Analyses

### A. Qualitative Analysis

On the basis of the job analysis data, the following aptitudes were rated "important" for success in this occupation:

Spatial Aptitude (S) - required to visualize type of machine and set-up needed to glue carton blanks by examing sample cartons, and to determine when adjustments to gluer are necessary.

Form Perception (P) - required to visually inspect cartons for quality of fold and gluing.

Motor Coordination (K) - required to run machine; to adjust feed and size of feed bed; to angle and set belt and breakers in desired position.

Manual Dexterity (M) - required to use hand tools in setting up and making adjustments to gluer, to feed stock into gluer and to remove completed cartons from conveyor.

Aptitude V, Verbal Aptitude, was rated "irrelevant" for success in this occupation.

B. Quantitative Analysis:

TABLE II

Means (M), Standard Deviations (σ), and Pearson Product-Moment Correlations with the Criterion (r) for the Aptitudes of the GATB; N = 53

| Aptitudes | M | σ | r |
|---|---|---|---|
| G-Intelligence | 96.6 | 18.3 | .520** |
| V-Verbal Aptitude | 92.2 | 15.0 | .391** |
| N-Numerical Aptitude | 93.8 | 18.7 | .466** |
| S-Spatial Aptitude | 103.1 | 21.5 | .453** |
| P-Form Perception | 91.8 | 19.6 | .533** |
| Q-Clerical Perception | 93.7 | 12.7 | .332* |
| K-Motor Coordination | 87.5 | 18.4 | .357** |
| F-Finger Dexterity | 88.8 | 16.6 | .381** |
| M-Manual Dexterity | 86.7 | 21.1 | .501** |

**Significant at the .01 level
*Significant at the .05 level

C. Selection of Test Norms:

TABLE III

Summary of Qualitative and Quantitative Data

| Type of Evidence | Aptitudes | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | G | V | N | S | P | Q | K | F | M |
| Job Analysis Data | | | | | | | | | |
| Important | | | | X | X | | X | | X |
| Irrelevant | | X | | | | | | | |
| Relatively High Mean | X | | X | X | | X | | | |
| Relatively Low Sigma | | | | | | X | | | |
| Significant Correlation with Criterion | X | X | X | X | X | X | X | X | X |
| Aptitudes to be Considered for Trial Norms | G | V | N | S | P | Q | K | F | M |

Trial norms consisting of various combinations of Aptitudes with appropriate cutting scores were evaluated against the criterion by means of the Phi Coefficient technique. A comparison of the results showed that B-1002 norms consisting of S-80, P-70, and M-70 had the best selective efficiency.

## VII. Validity of Norms

The validity of the norms was determined by computing a Phi Coefficient between the test norms and the criterion and applying the Chi Square test. The criterion was dichotomized by placing 32 percent of the sample in the low criterion group because this percent was considered to be the unsatisfactory or marginal workers.

Table IV shows the relationship between test norms consisting of Aptitudes S, P and M with critical scores of 80, 70, and 70 respectively, and the dichotomized criterion for Gluing-Machine Operator 6-42.390. Workers in the high criterion group have been designated as "good workers" and those in the low criterion group as "poor workers."

TABLE IV

Validity of Test Norms for Gluing-Machine Operator 6-42.390 (S-80, P-70, M-70)

| N = 53 | Non-Qualifying Test Scores | Qualifying Test Scores | Total |
|---|---|---|---|
| Good Workers | 7 | 29 | 36 |
| Poor Workers | 14 | 3 | 17 |
| Total | 21 | 32 | 53 |

Phi Coefficient = .600

$\chi^2$ = 19.080

P/2 < .0005

The data in the above table indicate a significant relationship between the test norms and the criterion for the sample.

## VIII. Conclusions

On the basis of the results of this study, Aptitudes S, P, and M with minimum scores of 80, 70, and 70, respectively, have been established as B-1002 norms for the occupation of Gluing-Machine Operator 6-42.390. The equivalent B-1001 norms consist of S-85, P-70, and M-70.

## IX. Determination of Occupational Aptitude Pattern

The data for this study met the requirements for incorporating the occupation studied into OAP-28 which is shown in Section II of the Guide to the Use of the General Aptitude Test Battery, January 1962.