

SCRAMBLED CODE LETTERS FOR PROGRESS REPORT 52  
 SUPPLEMENTARY REPORT ON CALIFER OF SINGLE-FACED BOARD  
 PROJECT 1108-17

Company - Mill	Machine No.	Code Letter
The Chesapeake Corporation - West Point	1	--
Continental Can Company, Inc. - Hopewell	1	P
Caylord Container Corporation - Bogalusa	4	--
International Paper Company		
Bartrop	1	M
Bartrop	2	--
Georgetown	1	A
Georgetown	2	--
The Mond Corporation		
Sylvia	1	D
Lynchburg	2	B
Harrison	1	K
Washington Fibre Products Company - Cochection	1	F
North Carolina Pulp Company - Plymouth	3	N
Olin Mathieson Chemical Corporation		
Monroe	1	--
Monroe	2	G
Owens-Illinois Glass Company		
Tennhawk	1	C
Tennhawk	2	O
Tennhawk	3	L
Big Island	1	J
Big Island	2	H
St. Joe Paper Company - Fort St. Joe	1	E
Union Bag-Camp Paper Corporation - Savannah	2	I
West Virginia Pulp and Paper Company		
Covington	6	--
Covington	7	--
Charleston	--	--

THE INSTITUTE OF PAPER CHEMISTRY

Appleton, Wisconsin

SUPPLEMENTARY REPORT ON CALIPER OF SINGLE-  
FACED BOARD

Project 1108-17

Progress Report 52

to

FOURDRINIER KRAFT BOARD INSTITUTE, INC.

October 1, 1959

THE INSTITUTE OF PAPER CHEMISTRY

Appleton, Wisconsin

This report is supplementary to Progress Report 51 of the baseline study on corrugating medium entitled, "Continuous evaluation of corrugating medium" which provides a program whereby participation mills have the opportunity to submit rolls of medium on a regular weekly schedule for evaluation with regard to physical characteristics of the medium and of the single-faced board made from the medium. Specifically, each medium is evaluated for caliper, basis weight, and Concora flat crush. In addition each medium is fabricated into A-flute single-faced corrugated board on the Institute's corrugator to determine its runability in terms of speed and tension, and the single-faced board obtained at maximum speed with minimum tension is evaluated for its flat crush strength.

This report is an extension of the baseline study and is concerned specifically with the caliper and uniformity of caliper of the single-faced board fabricated from each roll of medium as described above. Uniformity of caliper is generally considered to be another facet of the criteria used to evaluate the runability of corrugating medium and the Technical Committee of the Fourdrinier Kraft Board Institute, Inc., has requested that a measurement of the uniformity of caliper be included as a part of the evaluation given each roll of corrugating medium.

The evaluation of the caliper and uniformity of caliper of the single-faced board made from each roll of corrugating medium was carried out using the five circular specimens that were subsequently tested for flat crush strength. Each specimen was five square inches in area. They were cut at intervals of approximately two feet along the

central portion of a strip of the single-faced board fabricated at maximum speed and minimum tension. On each of these five specimens, caliper measurements were made on five consecutive flutes and the caliper difference between consecutive flutes was calculated, there being four calculations of differences for each specimen. The twenty-five caliper measurements (five calipers on each of the five specimens) were averaged and are reported as the caliper for each sample of medium. Likewise, the twenty caliper differences between consecutive flutes (four caliper differences on each of the five specimens) were averaged and are reported for each sample of corrugating medium as the caliper difference between consecutive flutes.

The instrument for measuring the caliper of individual flutes of single-faced board consists of a bench type thickness gage with a presser foot  $3/8$  inch in diameter and an anvil consisting of a plane circular surface 2 inches in diameter. The presser foot is attached to a dial indicator which can be read to 0.0001 inch. The load on the presser foot is  $100 \pm 10$  grams. A caliper determination is made by inserting each five-square-inch circular specimen between the presser foot and the anvil so that the foot rests on the second flute from one end of the specimen without touching either of the adjacent flutes. The  $3/8$ -inch diameter of the presser foot permits it to contact only one flute with ease. The specimen is pressed gently against the anvil, and the reading is then recorded. As mentioned previously, five consecutive flutes through the center of each specimen are calipered in this way. It should be emphasized that these calipers may not necessarily correspond to regular caliper measurements because of differences in load and other variables.

Caliper data have been obtained on the single-faced board fabricated from each of the one hundred and fourteen rolls of corrugating medium which were submitted for evaluation during the month of September. Also included for purposes of convenient reference are the single-face flat crush and runability data. The current machine averages for each test are summarized in Table I for Machines A through P. A graphical presentation of the caliper data on the single-faced board is shown in Figure 1, and a similar presentation of the data on the caliper difference between consecutive flutes is given in Figure 2. The test results obtained on the individual rolls of medium submitted by each company are given in Tables II through XVII for Machines A through P, respectively.

It may be seen in Figure 1 and Table I that the average caliper results for the single-faced boards varied from a low value of 194.2 points for Machine G to a high value of 198.1 points for Machine K. Likewise, from the results given in Table I and Figure 2, it may be noted that the average caliper difference between consecutive flutes ranged from a minimum of 1.5 points for Machines E and H to a maximum of 4.2 points for Machine G. The majority of the machines were associated with average caliper differences of less than 2 points. The difference of 4.2 points associated with Machine G appears to be excessive.

TABLE I  
 SUMMARY OF CURRENT MACHINE AVERAGES  
 September, 1959

Machine	Number of Rolls	Caliper, points	Caliper Difference Between Consecutive Flutes, points	Single-Face Flat Crush, p.s.i.
A	5	196.9	1.8	36.5
B	4	197.5	2.1	28.4
C	21	195.9	1.6	33.5
D	2	198.0	1.8	33.6
E	6	197.4	1.5	30.3
F	8	196.7	2.0	33.8
G	2	194.2	4.2	30.1
H	7	196.7	1.5	33.5
I	4	195.4	1.6	33.2
J	5	196.4	1.6	33.0
K	2	198.1	1.7	30.1
L	7	196.3	2.1	36.7
M	9	197.5	2.1	36.7
N	6	197.0	2.0	38.8
O	15	196.2	1.9	33.9
P	<u>11</u>	197.5	1.7	35.5
Total	114			

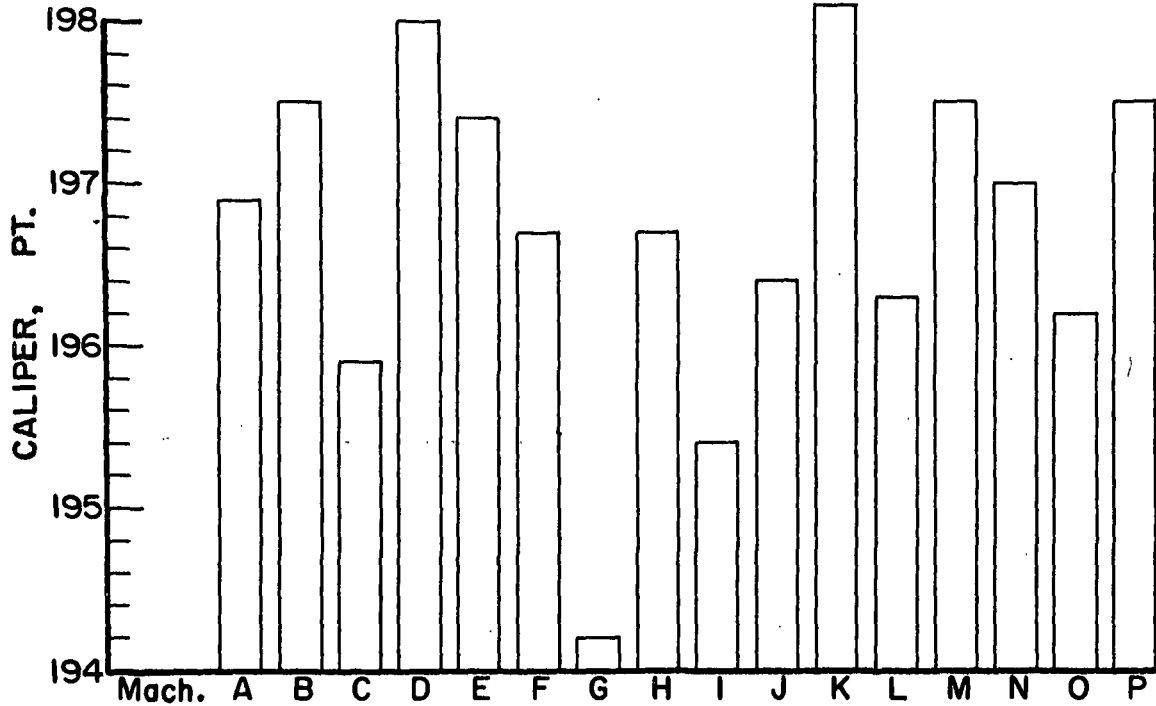


Figure 1  
Comparison of Caliper Results on Single-Faced Board  
September, 1959

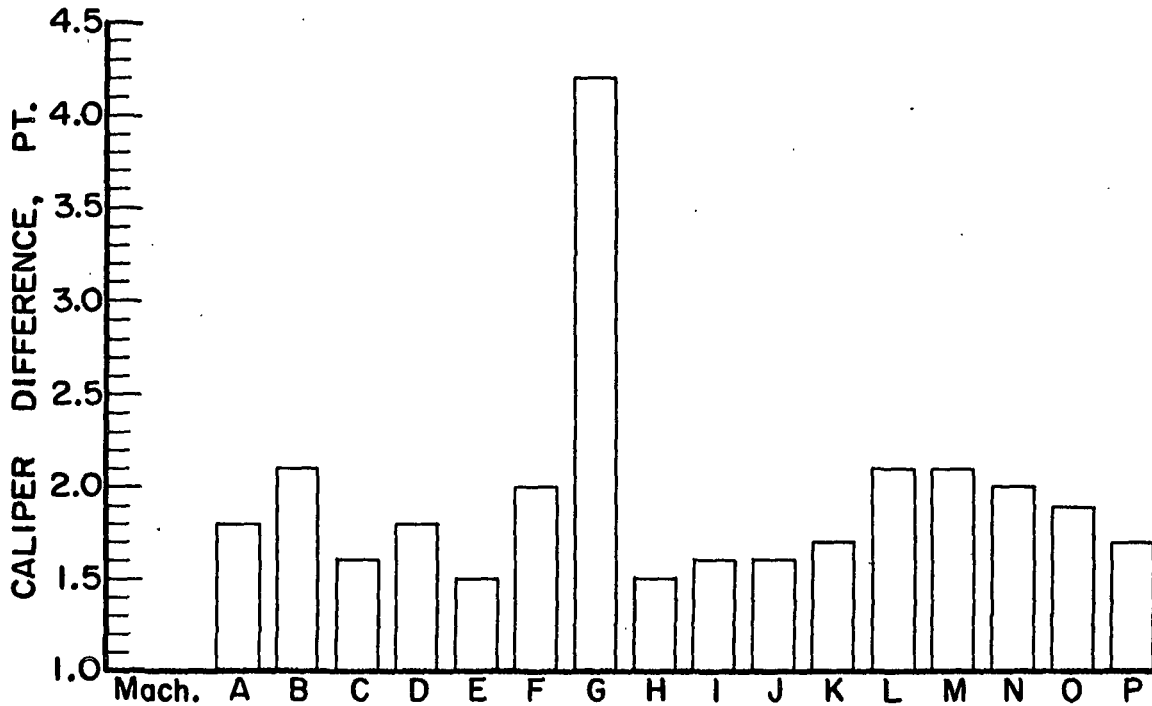


Figure 2  
Comparison of the Caliper Differences Between Consecutive  
Flutes of Single-Faced Board  
September, 1959

TABLE II

SUMMARY OF TEST RESULTS FOR MACHINE A  
 September, 1959

Code	Date Made	Mill Roll No.	Caliper, pt.	Caliper Difference Between Consecutive Flutes, points	Single-Face Flat Crush, p.s.i.	Runability, (Maximum Tension at 600 f.p.m.), lb./in.
A-1	8-20-59	339	196.4	1.5	37.6	1-1/2
A-2	8-27-59	340	196.8	2.1	38.2	1-1/2
A-3	8-28-59	341	196.8	2.4	36.1	1-1/2
A-4	9- 1-59	342	197.8	1.5	34.0	1-1/2
A-5	9- 4-59	343	196.6	1.3	36.8	1-1/2
Current Machine Av.			196.9	1.8	36.5	

TABLE III

SUMMARY OF TEST RESULTS FOR MACHINE B  
 September, 1959

B-1	8-21-59	175	196.4	2.0	29.6	1-1/2
B-2	8-21-59	176	196.4	1.7	29.8	1-1/2
B-3	9-11-59	181	198.9	2.0	27.0	1-1/2
B-4	9-11-59	182	198.3	2.7	27.1	1-1/2
Current Machine Av.			197.5	2.1	28.4	

TABLE IV

SUMMARY OF TEST RESULTS FOR MACHINE C  
 September, 1959

C-1	8-13-59	--	195.1	1.7	33.5	1-1/2
C-2	8-17-59	15	194.5	1.7	35.5	1
C-3	8-18-59	8	196.3	1.5	35.5	1-1/2
C-4	8-18-59	36	196.7	1.8	36.5	1-1/2
C-5	8-18-59	520	196.9	1.2	35.6	1-1/2
C-6	8-18-59	521	196.8	1.9	36.2	1-1/2
C-7	8-18-59	522	195.8	1.6	36.3	1/2
C-8	8-19-59	--	195.2	2.5	34.3	1/2
C-9	8-19-59	BE	195.0	1.8	32.5	1/2
C-10	8-20-59	--	194.6	1.2	32.1	1
C-11	8-24-59	18	196.0	1.4	37.4	1
C-12	8-28-59	--	197.4	1.7	34.5	1-1/2

(Continued on following page)

TABLE IV--CONTINUED

SUMMARY OF TEST RESULTS FOR MACHINE C  
 September, 1959

Code	Date Made	Mill Roll No.	Caliper, pt.	Caliper Difference Between consecutive Flutes, points	Single-Face Flat Crush, p.s.i.	Runability, (Maximum Tension at 600 f.p.m.), lb./in.
C-13	8-31-59	18-110	195.8	2.1	34.3	1-1/2
C-14	9- 8-59	18-110	193.4	1.5	30.0	1
C-15	9-14-59	15	195.7	1.1	33.0	1-1/2
C-16	9-15-59	100	196.6	1.9	32.6	1-1/2
C-17	9-16-59	200	195.7	1.0	31.8	1-1/2
C-18	9-21-59	18-110	196.5	1.6	31.2	1-1/2
C-19	9-21-59	C	196.5	1.9	29.7	1-1/2
C-20	9-22-59	20G	196.4	1.4	30.0	1-1/2
C-21	9-23-59	20G	196.7	2.0	30.2	1-1/2
Current Machine Av.			195.9	1.6	33.5	

TABLE V

SUMMARY OF TEST RESULTS FOR MACHINE D  
 September, 1959

D-1	8-31-59	177	198.9	2.3	31.4	1-1/2
D-2	8-31-59	178	197.2	1.3	35.7	1-1/2
Current Machine Av.			198.0	1.8	33.6	

TABLE VI

SUMMARY OF TEST RESULTS FOR MACHINE E  
 September, 1959

E-1	8-29-59	29	197.0	1.2	30.8	1-1/2
E-2	8-29-59	30	197.7	1.8	30.4	1-1/2
E-3	8-29-59	31	197.5	1.8	31.2	1-1/2
E-4	8-29-59	32	197.6	1.2	31.0	1-1/2
E-5	9- 4-59	33	196.9	1.7	29.1	1-1/2
E-6	9- 4-59	34	197.8	1.4	29.6	1-1/2
Current Machine Av.			197.4	1.5	30.3	

TABLE VII

SUMMARY OF TEST RESULTS FOR MACHINE F  
 September, 1959

Code	Date Made	Mill Roll No.	Caliper, pt.	Caliper Difference Between Consecutive Flutes, points	Single-Face Flat Crush, p.s.i.	Runability, (Maximum Tension at 600 f.p.m.) lb./in.
F-1	8-19-59		196.9	1.7	36.1	1-1/2
F-2	8-20-59		197.0	1.8	35.1	1-1/2
F-3	8-28-59		196.3	1.9	34.9	1-1/2
F-4	8-29-59		197.3	1.5	32.5	1-1/2
F-5	8-31-59		197.5	2.5	30.8	1-1/2
F-6	9- 3-59		196.7	2.3	33.0	1-1/2
F-7	9-10-59		196.5	2.0	34.6	1
F-8	9-11-59		195.2	1.9	33.1	1-1/2
Current Machine Av.			196.7	2.0	33.8	

TABLE VIII

SUMMARY OF TEST RESULTS FOR MACHINE G  
 September, 1959

G-1	9-13-59	175	194.3	4.3	30.0	Note a
G-2	9-13-59	176	194.0	4.1	30.1	Note b
Current Machine Av.			194.2	4.2	30.1	

<sup>a</sup> Maximum speed at minimum tension for this roll was 400 f.p.m.  
<sup>b</sup> Maximum speed at minimum tension for this roll was 500 f.p.m.

TABLE IX

SUMMARY OF TEST RESULTS FOR MACHINE H  
 September, 1959

H-1	7-19-59	1567	195.6	1.2	31.9	1-1/2
H-2	7-20-59	1589	196.4	1.1	31.9	1-1/2
H-3	7-29-59	2406	197.1	1.3	33.9	1-1/2
H-4	8- 4-59	233	196.4	1.7	36.1	1-1/2
H-5	8-14-59	1069	197.5	1.7	36.1	1-1/2
H-6	8-15-59	1138	196.5	1.7	32.2	1-1/2
H-7	8-30-59	2572	197.4	1.6	32.1	1-1/2
Current Machine Av.			196.7	1.5	33.5	

TABLE X

SUMMARY OF TEST RESULTS FOR MACHINE I  
 September, 1959

Code	Date Made	Mill Roll No.	Caliper, pt.	Caliper Difference Between Consecutive Flutes, points	Single-Face Flat Crush, p.s.i.	Runability, (Maximum Tension at 600 f.p.m.) lb./in.
I-1	8-23-59	308	193.9	1.4	32.4	1-1/2
I-2	8-24-59	309	195.0	1.4	33.6	1-1/2
I-3	9-13-59	310	195.9	2.2	33.1	1-1/2
I-4	9-15-59	311	197.0	1.4	33.6	1-1/2
Current Machine Av.			195.4	1.6	33.2	

TABLE XI

SUMMARY OF TEST RESULTS FOR MACHINE J  
 September, 1959

J-1	7-23-59	1634	195.7	1.6	30.7	1-1/2
J-2	7-31-59	2222	196.8	1.7	35.3	1-1/2
J-3	8-11-59	783	196.5	1.7	34.2	1-1/2
J-4	8-15-59	993	196.2	1.7	31.1	1-1/2
J-5	8-27-59	1915	196.8	1.3	33.9	1-1/2
Current Machine Av.			196.4	1.6	33.0	

TABLE XII

SUMMARY OF TEST RESULTS FOR MACHINE K  
 September, 1959

K-1	9- 2-59	179	198.9	2.0	29.9	1
K-2	9- 2-59	180	197.3	1.4	30.4	1-1/2
Current Machine Av.			198.1	1.7	30.1	

TABLE XIII

SUMMARY OF TEST RESULTS FOR MACHINE L  
 September, 1959

L-1	8-13-59	--	197.1	2.1	35.3	1/2
L-2	8-17-59	15	195.7	2.1	39.1	1/2
L-3	8-19-59	513	195.4	1.6	38.2	Min.
L-4	8-20-59	--	196.3	1.5	37.8	1/2
L-5	8-24-59	18	196.0	2.5	37.4	1
L-6	9- 8-59	18-110	196.3	2.6	34.8	Min.
L-7	9-21-59	18-110	197.2	2.0	34.1	1-1/2
Current Machine Av.			196.3	2.1	36.7	

TABLE XIV

SUMMARY OF TEST RESULTS FOR MACHINE M  
 September, 1959

Code	Date Made	Mill Roll No.	Caliper, pt.	Caliper Difference Between Consecutive Flutes, points	Single-Face Flat Crush, p.s.i.	Runability, (Maximum Tension at 600 f.p.m.) lb./in.
M-1	8-21-59	497	195.8	1.8	40.4	1-1/2
M-2	8-25-59	498	197.2	1.9	35.1	1-1/2
M-3	8-28-59	499	198.0	2.6	36.3	1
M-4	9- 1-59	500	198.9	2.6	35.2	1-1/2
M-5	9- 4-59	501	196.3	1.6	36.5	1-1/2
M-6	9-11-59	502	198.3	2.2	37.5	1-1/2
M-7	9-11-59	503	197.7	1.6	37.7	1-1/2
M-8	9-15-59	504	197.3	2.5	36.0	1-1/2
M-9	9-18-59	505	197.7	2.2	36.0	1-1/2
Current Machine Av.			197.5	2.1	36.7	

TABLE XV

SUMMARY OF TEST RESULTS FOR MACHINE N  
 September, 1959

N-1	8-11-59	320	198.4	1.6	37.6	1-1/2
N-2	8-13-59	378	195.6	3.1	41.1	Note a
N-3	8-21-59	625	197.7	1.3	38.1	1
N-4	8-31-59	918	198.8	1.3	34.8	1-1/2
N-5	9- 4-59	104	195.7	1.6	41.7	Min.
N-6	9-11-59	284	195.5	2.9	39.6	Min.
Current Machine Av.			197.0	2.0	38.8	

<sup>a</sup> Maximum speed at minimum tension for this roll was 525 f.p.m.

TABLE XVI

SUMMARY OF TEST RESULTS FOR MACHINE O  
 September, 1959

O-1	8-13-59	--	194.4	1.6	31.8	Min.
O-2	8-17-59	15	195.3	2.3	34.4	1/2
O-3	8-19-59	--	195.1	1.6	33.0	Min.
O-4	8-20-59	--	194.7	2.0	33.1	Min.
O-5	8-24-59	18	195.6	1.5	40.4	1
O-6	8-28-59	536	196.7	2.1	34.5	1

(Continued on following page)

TABLE XVI--CONTINUED

SUMMARY OF TEST RESULTS FOR MACHINE O  
 September, 1959

Code	Date Made	Mill Roll No.	Caliper, pt.	Caliper Difference Between Consecutive Flutes, points	Single-Face Flat Crush, p.s.i.	Runability, (Maximum Tension at 600 f.p.m.) lb./in.
O-7	8-31-59	18-110	197.4	1.8	35.2	1-1/2
O-8	9- 8-59	18-110	195.7	2.5	31.3	1/2
O-9	9-14-59	15	196.7	1.4	35.6	1
O-10	9-15-59	100	198.4	1.9	31.8	1
O-11	9-16-59	200	197.3	1.6	34.3	1
O-12	9-21-59	C	196.5	1.9	32.7	1-1/2
O-13	9-21-59	18-110	196.6	2.0	34.1	1
O-14	9-22-59	20G	196.3	1.7	33.4	1-1/2
O-15	9-23-59	20G	196.4	2.8	32.2	1-1/2
Current Machine Av.			196.2	1.9	33.9	

TABLE XVII

SUMMARY OF TEST RESULTS FOR MACHINE P  
 September, 1959

P-1	8-16-59	193	197.3	1.7	36.0	1-1/2
P-2	8-21-59	194	197.0	1.6	34.9	1-1/2
P-3	8-24-59	195	197.0	1.1	37.4	1-1/2
P-4	8-25-59	196	197.4	1.9	36.4	1-1/2
P-5	8-26-59	197	197.0	1.9	36.9	1-1/2
P-6	8-27-59	198	197.8	2.2	35.1	1-1/2
P-7	8-28-59	199	197.2	2.0	33.9	1-1/2
P-8	9- 1-59	200	197.8	1.3	35.5	1-1/2
P-9	9- 4-59	201	197.9	1.4	36.1	1-1/2
P-10	9- 8-59	202	198.0	1.7	33.9	1-1/2
P-11	9-11-59	203	197.9	1.8	34.5	1-1/2
Current Machine Av.			197.5	1.7	35.5	

THE INSTITUTE OF PAPER CHEMISTRY

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