

Founders' Day, 1950

Feb. 13—Founders' Day, celebrated in the Memorial Hall at 8.30 p. m.

Following were the high-
lighting programme. The
Day Address by the dis-
tinguished Principal and Vice-
Principal and Vice-
Principal of Queen's University,
Wallace, the payment of
of one penny to the
Mayor of New Brunswick,
L. McLaren, P.C., who
prior to the university on
His Majesty, the King;
and a one act play
of "Hahalaba" by Lord
which it is understood
of three professors and
t.

NOTICE

The graduate write-ups
for the 1950 year book have been
received. However for those who
have not yet written their write-ups
to either their class collectors or to
the year book committee, we are
the deadline to the end
of the year.

This deadline is definite
and no extension photos will be in
at this time. Only those
who have an accompany-
ing photo will be used in the
year book.

Year Book Committee

LEAD OF NIGHT

LEAD OF NIGHT, produced by
the famous Somerset
film QUARTET, in that
of a series of stories
only by the psychology
lived. One of the stars
of the film is Michal
who plays the part of a
man who is obsessed by
his dummy is a real
that he himself is only

ture is an adventure in
of the type that has made
famous. It will be en-
joyable for all who see it.

HT" LE-LION

7.30 P. M.

rise

MEMBER—
WITH WETPROOF PAPER
BACK TO YOUR LIPS
RETTES

ENGINEERING-AS APPLIED TO THE MANUFACTURE OF NEWSPRINT

by Jack Flowers

Editors Note—Although this is not the winning paper of the annual
Technical Report Contest held each year by the Engineering Society,
it is among the better ones. It has been printed due to its wider scope
of interest.

The 131 pulp and paper mills now in operation in Canada
constitute an industry that stands first in employment, in
wages paid, in value of production, in capital investment, and
as a buyer of goods and services. The industry makes Canada
the largest exporter of pulp and paper in the globe, and pro-
duces three of every five newspaper pages in the world. It
accounts for the fifth of all exports—the largest item in Can-
ada's foreign trade—and for more than a third of all exports to
the United States. It uses half the electric power generated
for all Canadian industry. It's the largest user of transporta-
tion services, and accounts for more than one of every ten freight
cars loaded in Canada. The pulp and paper industry is the
largest contributor to national wealth, and generates, at a mini-
mum, ten percent of the total annual value of all Canadian goods
and services. It manages and conserves its forests, and uses
less than one fifth of the annual wood consumption of Canada.
In view of current national interest in the sale abroad of goods
manufactured from Canadian pulpwood, this paper will deal
with one particular phase of the industry—the manufacture of
newsprint.

Newsprint Paper, as manufactur-
ed at Dalhousie, New Brunswick,
is made from spruce and balsam
wood. The wood is delivered to
the mill by water, with the bark
still on it, in four-foot lengths.
These are made up into booms, and
logs from the booms are fed to a
hydraulic pack-ladder, and dropped
on to a conveyor.

The conveyor carries the logs to
a set of barking drums. These
measure twelve feet in diameter,
are forty-five feet long, and revolve
about in a horizontal axis at four-
and-a-half revolutions a minute.
The logs enter at one end of the
barking drums, and tumble and rub
against each other until all the
bark is removed. By this time they
have reached the other end of the
drum, and as they tumble out, they
pass through a water shower, which
washes them clean of bark and
dirt. These logs are now ready for
use, either in the mill, or for stor-
age in the yard, to be used through-
out the winter months when water
is frozen.

The bark from the logs is dried,
and burned in a special bark-burn-
ing plant, which produces from this
waste material one-tenth of the
total steam used throughout the
plant.

The cleaned wood, to be used
right away, is then divided: 20%
goes to the sulphite pulp mill, and
80% to the groundwood pulp mill.
We will now follow the path of the
wood through the two mills, and
describe the different treatment
given to each percentage.

The manufacture of groundwood
pulp is exactly what the name im-
plies. It's a mechanical separation
of the fibres, one from the other, by
abrasion. There are several kinds
of machines used for this work, but
they all operate on the same prin-
ciple. The type of machine used
in Dalhousie is a magazine load-
ing grinder, made by Waterous
Ltd. of Brantford, Ontario. The
grinding-wheel used is artificial,
and is composed of blocks of car-
borandum grit of different sizes;
these blocks are bound and cement-
ed on a metal frame, to form a cyl-

inder 64 inches in diameter and 54
inches long. Two of these grind-
ing wheels are mounted on one 10
inch shaft, one on each side of a
motor; thus, it's possible to run
two grinders from the one motor.
The motors used are 2400 and 3600
horsepower, and run at 225 rev-
olutions per minute. The rough
surface, so essential for the grind-
ing wheels is maintained by a hy-
draulically operated sharpening de-
vice, on which is mounted steel
burrs; these move constantly across
the face of the grinding stone.

Above the grinding wheels, sup-
plying them with a constant flow
of logs, in the magazine—a metal
box measuring 51 inches by 45 in-
ches. As the wood is fed into the
magazine, it passes through to the
bottom, to be mechanically placed
against the grinding stones below
—the axis of the log lying in the
same line as the axis of the stone.
Fresh wood is then piled into the
magazine to ensure it is constantly
charged and full of logs.

Meantime, a large metal shoe,
operated by a hydraulic ram, forces
the wood against the rough surface
of the grinding stone. There are
two hydraulic rams for each grind-
er, mounted on either side of the
grinding stone; by grinding logs on
both sides of the stone, full use
is made of the grinding surface.

Under each grindstone are water
showers, which wash the pulp fibre
from the stone into a shallow pit,
in which the stone is submerged
three or four inches; the tempera-
ture of the water is regulated at 180
degrees Fahrenheit, to ensure ef-
ficient absorption of heat generated
into the wood by friction against
the stone.

After the pulp fibre is washed
from the grinding stone, it flows
through canals to coarse screens,
called Bull screens. These screens
are rotating cylinders with 3/16ths
of an inch perforated plates mount-
ed on the outside surface. The
stock enters the cylinder at one end,
and rejected stock is passed through
to the other end; this rejected stock
is further refined, and used to

make coarse wrapper paper. The
accepted stock passes through the
fine screens. Here it goes through
perforated plates, is washed off,
collected in tanks, and pumped to
yet another process of elimination.
The accepted stock is separated
from rejected stock by centrifugal
screens. The perforations in these
screens are .065 inches, and only
stock which comes through these
plates is used to make newsprint
paper; the rejected stock is, once
again, passed on to the wrapper
mill.

The accepted stock is run over
filters, or deckers, which remove
some of the water, and thus in-
crease the consistency of the stock.
The stock thus thickened, is then
stored in large tanks, with propel-
lor agitators to keep it constantly
in motion, until it is needed on the
paper machines.

The logs that were sent to the
sulphite mill are treated chemical-
ly. They are prepared for this pro-
cess by feeding them into a mach-
ine called a clipper, which is a
heavy revolving disc equipped with
four or more long heavy knives.
These knives slice off the ends of
the logs so quickly that a stick is
reduced to chips within three sec-
onds. The chips are pieces of
wood about one inch long, and an
eighth of an inch thick. It is nec-
essary that the wood be in this
form for the chemical treatment,
so that the cooking liquor can pen-
etrate the wood easily and digest,
dissolve, the sugars, and lignin or
binding material between the wood
fibres, without trouble or subse-
quent waste.

After passing through the clip-
per, the chips are screened; all the
large pieces are removed, crushed
and rescreened, and the sawdust
and other dirt is removed as waste.
This sawdust waste goes to the
bark-burning plant mentioned pre-
viously, where it is burned. The
good wood or chips are then elav-
ated to large bins located under
the roof of the digester building,
and stored there until dumped into
the cooking boilers or digesters
with the cooking acid. The cook-
ing acid is produced in the mill by
a chemical process involving sul-
phur in the form of brimstone, and
limestone. The digestors are large
steel boilers lined with brick into
which the chips are dropped until
the digester is full; the spaces be-
tween the individual chips are fil-
led with cooking acid. The digest-
or is then closed, and steam is
forced in at the bottom. The tem-
perature rises, and a pressure of
steam and sulphur dioxide is built
up. This pressure is relieved at
the top of the digester—the excess
gas being expelled through special
pipes.

After 7½ hours of steaming or
cooking, the wood in the digester
has been reduced to a pulp by the
acid dissolving the lignin or bind-
ing material between the wood
fibres; the end of the cooking pro-
cess is noted by testing some of
the liquor in the digester. This
liquor contains only .3% of total
SO2 gas, and is a waste. It con-
tains sugars, lignins and resins
amounting to almost half the
weight of the dry chips. Some mills
use this waste for the manufacture
of yeast, and others for alcohol
while still others make a paste or
glue with it. The digester con-
taining the finished cooked wood is
blown by pressure being released
through a ten-inch valve and pipe
line at the bottom. When the di-
gestor is empty, all of the pulped
wood is in this blow-pit. Now clean,
fresh water is run in, until the top
of the pulp is completely covered.
The liquor drains out of the per-
forated bottom, and the water fil-
ters through the pulp, washing prac-
tically all traces of this liquor
away.

The stock thus left is unscreened
sulphite pulp. This material is
then sluiced into a chest, and

pumped to coarse screens or knot-
ters, where the large chunks of
wood are removed; then it flows to
centrifugal screens, where the sul-
phite fibres are screened again
through thousands of 1/16th inch
diameter holes, perforated through
copper plates. These machines are
called fine screens. The slivers
and small uncooked chips are re-
moved here, and are a waste. The
total waste from screening amounts
to about 4½% of the pulp made,
and is used in the wrapper paper
mill. The good stock from these
fine screens contains a lot of water,
which is removed by filters; the
thickened pulp drops into chests
for temporary storage, where it is
treated with a solution of alum
dissolved in water. . . this elimi-
nates the pitch, or any stickiness of
the pulp resulting from improper
removal of the liquor when the pit
was washed. The alum also hard-
ens and prepares the pulp, so that
it will flow onto the paper mach-
ines without any trouble.

All the logs have now been turned
into groundwood pulp, and sul-
phite pulp, ready for the paper
machines.

The fibres of the sulphite pulp
are long and slender—almost a
quarter of an inch long, and very
fine. This long length ensures
strength to a sheet of paper, as
these fibres mat together in a
criss-cross manner, forming a
screen on which the shorter ground-
wood fibres are caught and lie,
closing up the sheet of paper when
it is formed on the paper machines.
The sulphite pulp, and the ground-
wood pulp, are pumped to a mea-
suring machine, where the exact
amounts of both pulps are allowed
to pass, after which they mix to-
gether with broke paper: broke
paper is the name given to paper
which was not properly made—it's
mixed with water, and returned to
be made over again. Some colour-
ing dye is also added to colour the
finished paper any colour desired,
and the whole lot is mixed with
water, resulting in liquid paper.

This liquid paper is allowed to
flow through a box, so that there
are no eddies or surging, and then
through a wide nozzle, which ex-
tends the full width of the machine
—in the Dalhousie Mill this mea-
sures 223 inches, or slightly more

than eighteen and one half feet.
This nozzle is open about half an
inch, so that we have a rectangular
opening half an inch high, and
and eighteen and one foot long. The
liquid paper flows through this
opening out to a continuous wire
screen, known as Fourdriner wire.
The excess water drains through
the wire, and the fibres form a
criss-cross screen on the wire. The
short ground-wood fibres give the
paper bulk, while the long sulphite
fibres bind the mass together, and
give it strength.

Since it costs a lot of money to
evaporate the water, as much water
as possible is removed before stock
goes to the dryers, so vacuum
boxes, placed under the wire are
designed to draw off excess mois-
ture. The web of paper is then
pressed between rolls in a manner
similar to a large clothes' wringer.
A continuous woolen blanket felt
carries the wet web of paper be-
tween the nip of these rolls, and pro-
tects the paper from damage, while
helping to remove even more of the
water. After passing through two
sets of rolls like this, the wet web
of paper still has 66% of water in
it, and then runs into the dryer
section of the machine. This sec-
tion is made up of fifty drying cyl-
inders five feet in diameter, and nine-
teen feet wide. These revolve on
horizontal axes, in roller bearings,
and can attain a peripheral speed
of fifteen hundred feet per minute.
Steam is injected into these drying
cylinders, which are placed in two
rows, one above the other, in such
a manner that the cylinders in the
top row come between the cylind-
ers in the bottom row. The pen-
ner runs round a top drying cylinder,
then down to a bottom drying cylind-
er, and so on, to the end of the
rows. Long, continuous canvas dry-
er felts follow the progress of the
paper, over these dryers; their
function is to hold the web of
paper against the dryer, to help in
the quick drying process, and stop
any possibility of bulging.

In the Dalhousie mill the paper
machines have operated at speeds
slightly over 1400 feet per minute,
which is among the highest rates
of speed which paper is being
made. In order to carry the wet
web of paper through the dryers
(continued on page seven)

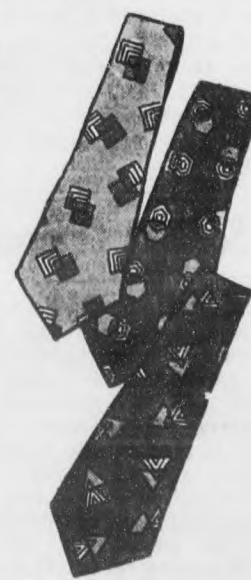


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