

SN: 244

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INNOVATION IN THE FLOUR MILLING INDUSTRY

The present research programme is based on the need for a greater knowledge of the process of innovation within the capital equipment industry, and your technical expertise can be of great value in furthering this area of study; your assistance will be greatly appreciated. The information given will be regarded as STRICTLY CONFIDENTIAL and will only be seen by G. Hayward, M.Sc., ~~and~~ ~~Dr. J. H. H. (now at the University of Cambridge)~~. An addressed envelope is enclosed for return of the completed questionnaire.

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DANBURY.  
Chelmsford.  
Essex CM3 4AT.

GENERAL

Name of Company .....

Address of Company .....  
.....  
.....  
.....

Name of Respondent and  
Position in Company .....  
.....

Capacity of Flour Mill in sacks per hour. Please place a tick in the appropriate box.

- Up to 15 sacks per hour
- 16 to 30 sacks per hour
- 31 to 45 sacks per hour
- 46 to 60 sacks per hour
- Over 60 sacks per hour

Question 1.

If you have installed any of the five innovations listed below since May 1970, I should be grateful if you would write the date of installation in the appropriate column. The dates shown are those which you provided during my previous research; should any of these be incorrect I would be obliged if you could make the necessary correction. (If you did not complete the previous questionnaire it would be of great assistance if you would write in the dates on which you installed any or all of the various innovations).

	Pneumatic Conveying	Bulk Flour Outloading	Bulk Flour Silo	Short Surface Milling System	Reverse Air Jet Filter D.C.
Year of Installation ..					

Question 2.

Were you as an individual responsible in any way for the decision to proceed with any of the following innovations? Please place a tick in the appropriate column.

	Fully Responsible	Partially Responsible	Not Responsible at all.
Pneumatic Conveying	....	....	....
Bulk Flour Outloading	....	....	....
Bulk Flour Silo	....	....	....
Short Surface Milling System	....	....	....
Reverse Air Jet Filter D.C.	....	....	....

Question 3.

Would you please place a tick against the Flour Milling Engineer responsible for the provision or installation of the innovations currently in your mill?

Engineer	Simon	Robinson	Turner	Hiag	Buhler	Others (please specify)
Innovations						
Pneumatic Conveying	.....	.....	.....	.....	.....	.....
Bulk Flour Outloading	.....	.....	.....	.....	.....	.....
Bulk Flour Silo	.....	.....	.....	.....	.....	.....
Short Surface Milling System	.....	.....	.....	.....	.....	.....
Reverse Air Jet Filter D.C.	.....	.....	.....	.....	.....	.....



In accordance with the examples set out on page 3, would you please examine the attributes and circle the figure (1 to 5) which you feel equates with their degree of significance when considering the installation of pneumatic conveying.

PNEUMATIC CONVEYING:

Low initial cost	1	2	3	4	5	n/a
Low running costs	1	2	3	4	5	n/a
Short pay-off period	1	2	3	4	5	n/a
Considerable saving of time	1	2	3	4	5	n/a
Considerable reduction in dust	1	2	3	4	5	n/a
Considerable reduction in noise	1	2	3	4	5	n/a
Considerable mechanical advantage	1	2	3	4	5	n/a
Much easier to operate	1	2	3	4	5	n/a
Much greater flexibility	1	2	3	4	5	n/a
Easily tried on a small scale	1	2	3	4	5	n/a
Very reliable in operation	1	2	3	4	5	n/a
Very easy to understand	1	2	3	4	5	n/a

Please list any other attributes which you consider are important when considering the installation of pneumatic conveying, and circle the degree of importance.

.....	1	2	3	4	5	n/a
.....	1	2	3	4	5	n/a
.....	1	2	3	4	5	n/a
.....	1	2	3	4	5	n/a
.....	1	2	3	4	5	n/a

In accordance with the examples set out on page 3, would you please examine the attributes and circle the figure (1 to 5) which you feel equates with their degree of significance when considering the installation of bulk outloading bins.

BULK OUTLOADING BINS:

Low initial cost	1	2	3	4	5	n/a
Low running costs	1	2	3	4	5	n/a
Short pay-off period	1	2	3	4	5	n/a
Considerable saving of time	1	2	3	4	5	n/a
Considerable reduction in dust	1	2	3	4	5	n/a
Considerable reduction in noise	1	2	3	4	5	n/a
Considerable mechanical advantage	1	2	3	4	5	n/a
Much easier to operate	1	2	3	4	5	n/a
Much greater flexibility	1	2	3	4	5	n/a
Easily tried on a small scale	1	2	3	4	5	n/a
Very reliable in operation	1	2	3	4	5	n/a
Very easy to understand	1	2	3	4	5	n/a

Please list any other attributes which you consider are important when considering the installation of bulk outloading bins and circle the degree of importance.

.....	1	2	3	4	5	n/a
.....	1	2	3	4	5	n/a
.....	1	2	3	4	5	n/a
.....	1	2	3	4	5	n/a
.....	1	2	3	4	5	n/a

In accordance with the examples set out on page 3, would you please examine the attributes and circle the figure (1 to 5) which you feel equates with their degree of significance when considering the installation of a bulk flour silo.

BULK FLOUR SILO:

Low initial cost	1	2	3	4	5	n/a
Low running costs	1	2	3	4	5	n/a
Short pay-off period	1	2	3	4	5	n/a
Considerable saving of time	1	2	3	4	5	n/a
Considerable reduction in dust	1	2	3	4	5	n/a
Considerable reduction in noise	1	2	3	4	5	n/a
Considerable mechanical advantage	1	2	3	4	5	n/a
Much easier to operate	1	2	3	4	5	n/a
Much greater flexibility	1	2	3	4	5	n/a
Easily tried on a small scale	1	2	3	4	5	n/a
Very reliable in operation	1	2	3	4	5	n/a
Very easy to understand	1	2	3	4	5	n/a

Please list any other attributes which you consider are important when considering the installation of a bulk flour silo and circle the degree of importance.

.....	1	2	3	4	5	n/a
.....	1	2	3	4	5	n/a
.....	1	2	3	4	5	n/a
.....	1	2	3	4	5	n/a
.....	1	2	3	4	5	n/a

In accordance with the examples set out on page 3, would you please examine the attributes and circle the figure (1 to 5) which you feel equates with their degree of significance when considering the installation of a short surface milling system.

SHORT SURFACE MILLING SYSTEM:

Low initial cost	1	2	3	4	5	n/a
Low running costs	1	2	3	4	5	n/a
Short pay-off period	1	2	3	4	5	n/a
Considerable saving of time	1	2	3	4	5	n/a
Considerable reduction in dust	1	2	3	4	5	n/a
Considerable reduction in noise	1	2	3	4	5	n/a
Considerable mechanical advantage	1	2	3	4	5	n/a
Much easier to operate	1	2	3	4	5	n/a
Much greater flexibility	1	2	3	4	5	n/a
Easily tried on a small scale	1	2	3	4	5	n/a
Very reliable in operation	1	2	3	4	5	n/a
Very easy to understand	1	2	3	4	5	n/a

Please list any other attributes which you consider are important when considering the installation of a short surface milling system and circle the degree of importance.

.....	1	2	3	4	5	n/a
.....	1	2	3	4	5	n/a
.....	1	2	3	4	5	n/a
.....	1	2	3	4	5	n/a
.....	1	2	3	4	5	n/a



In accordance with the examples set out on page 3, would you please examine the attributes and circle the figure (1 to 5) which you feel equates with their degree of significance when considering the installation of a reverse air jet filter dust collector.

REVERSE AIR JET FILTER DUST COLLECTOR:

Low initial cost	1	2	3	4	5	n/a
Low running costs	1	2	3	4	5	n/a
Short pay-off period	1	2	3	4	5	n/a
Considerable saving of time	1	2	3	4	5	n/a
Considerable reduction in dust	1	2	3	4	5	n/a
Considerable reduction in noise	1	2	3	4	5	n/a
Considerable mechanical advantage	1	2	3	4	5	n/a
Much easier to operate	1	2	3	4	5	n/a
Much greater flexibility	1	2	3	4	5	n/a
Easily tried on a small scale	1	2	3	4	5	n/a
Very reliable in operation	1	2	3	4	5	n/a
Very easy to understand	1	2	3	4	5	n/a

Please list any other attributes which you consider are important when considering the installation of a reverse air jet filter dust collector and circle the degree of importance.

.....	1	2	3	4	5	n/a
.....	1	2	3	4	5	n/a
.....	1	2	3	4	5	n/a
.....	1	2	3	4	5	n/a
.....	1	2	3	4	5	n/a



Question 6.

Please answer this question only for the innovations not as yet installed, indicating your future plans by placing a tick in the appropriate column.

INNOVATIONS	DECISION ALREADY MADE TO INSTALL	DECISION TO INSTALL LIKELY IN :-			NOT LIKELY TO INSTALL THIS PRODUCT
		1-2 yrs.	3-5 yrs.	6-10 yrs.	
Pneumatic conveying	.....	.....	.....	.....	.....
Bulk Outloading	.....	.....	.....	.....	.....
Bulk Flour Silo	.....	.....	.....	.....	.....
Short Surface Milling System	.....	.....	.....	.....	.....
Reverse Air Jet Filter D.C.	.....	.....	.....	.....	.....

Question 7.

If you have changed your principal milling engineer since 1945, would you please state:-

Who or what influenced the change?

.....  
 .....  
 .....  
 .....

If you have changed milling engineers, what major advantages did the new engineer(s) possess?

.....  
 .....  
 .....  
 .....

Do you choose between milling engineers for each new item of plant, or do you purchase consistently from one engineer?

.....  
 .....

Thank you once again for your kind co-operation: please feel assured that the information will be treated in STRICT CONFIDENCE.

*G. Hayward*  
 George Hayward.

CARD/COLUMN	VAR. No.	TITLE	CODES	MARGINALS
1/1-3	1	Identification of observations (code numbers of all mills)	3 digit figure	
1/4-5		U N U S E D	U N U S E D	
1/6		U N U S E D	U N U S E D	
		Attributes and their importance:-		
1/7	2	Low initial cost	1 Strongly agree with statement 2 Agree with statement 3 Neither agree nor disagree with statement 4 Disagree with statement 5 Strongly disagree with the statement 6 Consider that the statement is not applicable	38 51 130 60 76 4
1/8		U N U S E D	U N U S E D	
1/9	3	Low running cost	1 Strongly agree with statement 2 Agree with statement 3 Neither agree nor disagree with statement 4 Disagree with statement 5 Strongly disagree with the statement 6 Consider that the statement is not applicable	120 97 86 36 16 4
1/10		U N U S E D	U N U S E D	
1/11	4	Short pay-off period	1 Strongly agree with statement 2 Agree with statement 3 Neither agree nor disagree with statement 4 Disagree with statement 5 Strongly disagree with statement 6 Consider that the statement is not applicable	43 57 143 58 42 16
1/12		U N U S E D	U N U S E D	

CARD/COLUMN	VAR. No.	TITLE	CODES	MARGINALS
1/13	5	Considerable saving of time	1 Strongly agree with statement 2 Agree with statement 3 Neither agree nor disagree with statement 4 Disagree with statement 5 Strongly disagree with statement 6 Consider that the statement is not applicable	151 85 41 11 20 51
1/14		U N U S E D	U N U S E D	
1/15	6	Considerable reduction in dust	1 Strongly agree with statement 2 Agree with statement 3 Neither agree nor disagree with statement 4 Disagree with statement 5 Strongly disagree with statement 6 Consider that the statement is not applicable	141 88 58 12 22 38
1/16		U N U S E D	U N U S E D	
1/17	7	Considerable reduction in noise	1 Strongly agree with statement 2 Agree with statement 3 Neither agree nor disagree with statement 4 Disagree with statement 5 Strongly disagree with statement 6 Consider that the statement is not applicable	24 49 96 28 87 75
1/18		U N U S E D	U N U S E D	
1/19	8	Considerable mechanical advantage	1 Strongly agree with statement 2 Agree with statement 3 Neither agree nor disagree with statement 4 Disagree with statement	138 90 77 18

CARD/COLUMN	VAR. No.	TITLE	CODES	MARGINALS
1/19	8	Contd.	5 Strongly disagree with statement 6 Consider that the statement is not applicable	16 20
1/20		U N U S E D	U N U S E D	
1/21	9	Much easier to operate	1 Strongly agree with the statements 2 Agree with the statement 3 Neither agree nor disagree with the statement 4 Disagree with the statement 5 Strongly disagree with the statement 6 Consider that the statement is not applicable	170 107 51 15 9 7
1/22		U N U S E D	U N U S E D	
1/23	10	Much greater flexibility	1 Strongly agree with the statements 2 Agree with the statement 3 Neither agree nor disagree with the statement 4 Disagree with the statement 5 Strongly disagree with the statement 6 Consider that the statement is not applicable	88. 74 75 55 39 28
1/24		U N U S E D	U N U S E D	
1/25	11	Easily tried on a small scale	1 Strongly agree with the statements 2 Agree with the statement 3 Neither agree not disagree with the statement 4 Disagree with the statement 5 Strongly disagree with the statement 6 Consider that the statement is not applicable	60 43 51 20 116 69

CARD/COLUMN	VAR. No.	TITLE	CODES	MARGINALS
1/26		U N U S E D	U N U S E D	
1/27	12	Very reliable in operation	1 Strongly agree with the statements 2 Agree with the statement 3 Neither agree nor disagree with the statement 4 Disagree with the statement 5 Strongly disagree with the statement 6 Consider that the statement is not applicable	176 105 56 12 3 7
1/28		U N U S E D	U N U S E D	
1/29	13	Very easy to understand	1 Strongly agree with the statements 2 Agree with the statement 3 Neither agree not disagree with the statement 4 Disagree with the statement 5 Strongly disagree with the statement 6 Consider that the statement is not applicable	149 115 66 13 7 9
1/30	14	Innovation:-	0 Not adopted 1 Adopted	98 261
1/31-32	15	Year of adoption 1945-73 and projections	2 Dinit Figure	
1/33-34	16	Range of value of capacities	1 Up to 15 sacks/hr 2 16 - 30 " 3 31 - 45 " 4 46 - 60 " 5 61 - 75 " 6 76 - 90 " 7 91 -105 " 8 106-120 " 9 121-135 " 10 136-150 " 11 151-165 " 12 166-180 " 13 181-195 " BLANK Not answered	73 110 49 38 35 9 5 5 10 0 10 0 5 10

CARD/COLUMN	VAR. No.	TITLE	CODES	MARGINALS
1/35	17	Engineer who installed the innovation (Most respondents seemed very sensitive about this and were reluctant to answer. This column should not be included in analysis)	BLANK Not answered R Robinson S Simon Engineering M M I A G B Buhler O Others T No information	123 44 83 7 11 84 7
1/36-58 1/59	18	UNUSED Code for innovations	UNUSED P - Pneumatic conveying B - Bulk Bins F - Flour Silos S - Short Surface System R - Reverse Jet Filter Dust Collectors	73 74 75 70 67
1/60	19	Code for Mill groupings:	A - Allied Flour Mills R - Rank, Hovis, McDougall S - Spiller French I - Independents	90 104 0 165
1/61-80		UNUSED	UNUSED	