Experimental milling to evaluate tempering aids for commercial applications

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What to look for in a tempering additive

- Relatively cheap compared to wheat cost
- Easy to apply in liquid form
- Produce a measureable increase in milling efficiency

How do we define milling efficiency?

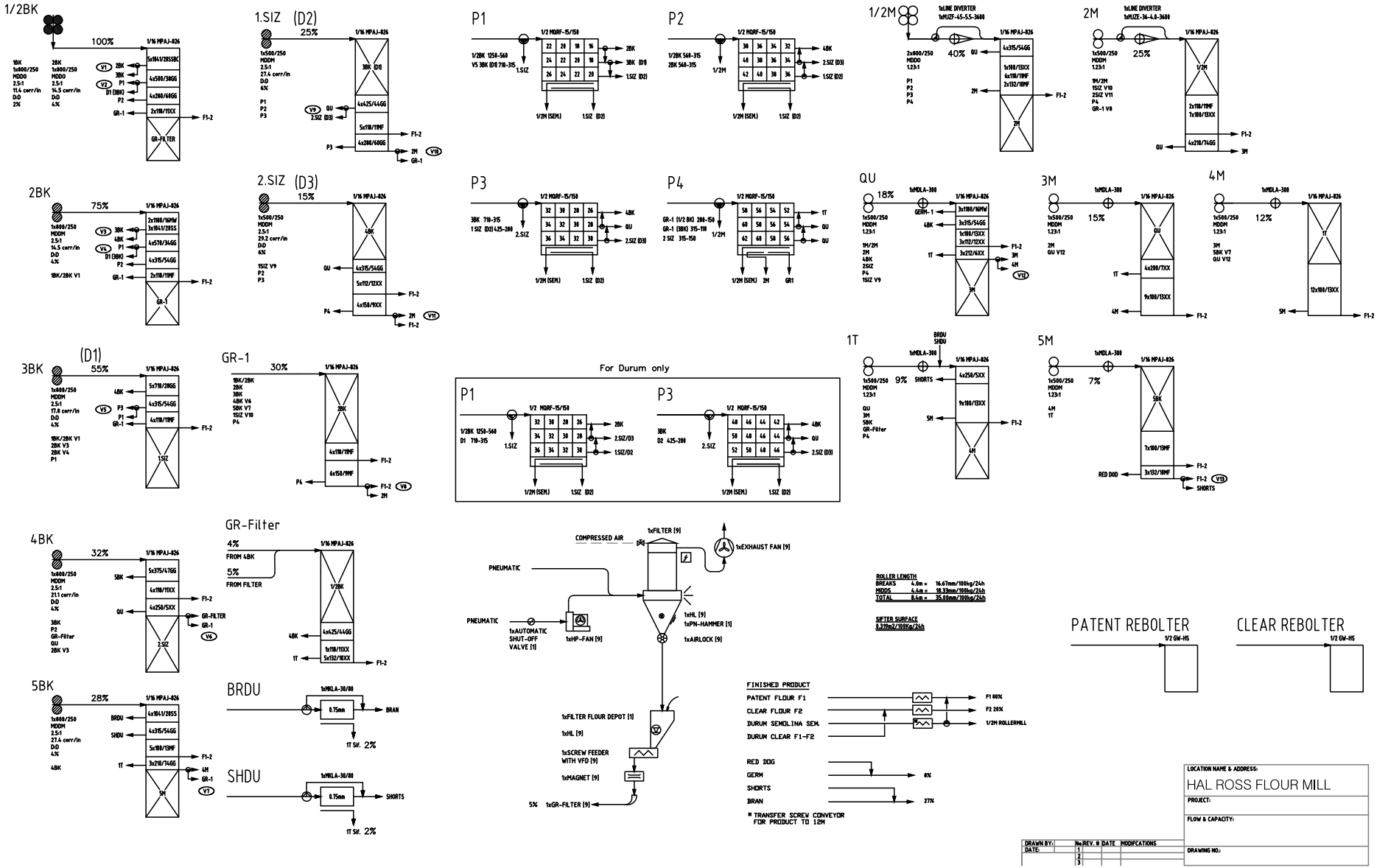
- Increased flour extraction
- Decrease flour ash
- Increase extraction at equal flour ash
- Energy reduction
- Increase baking quality
- Constant quality with lower cost wheat

Why Tempering Treatment

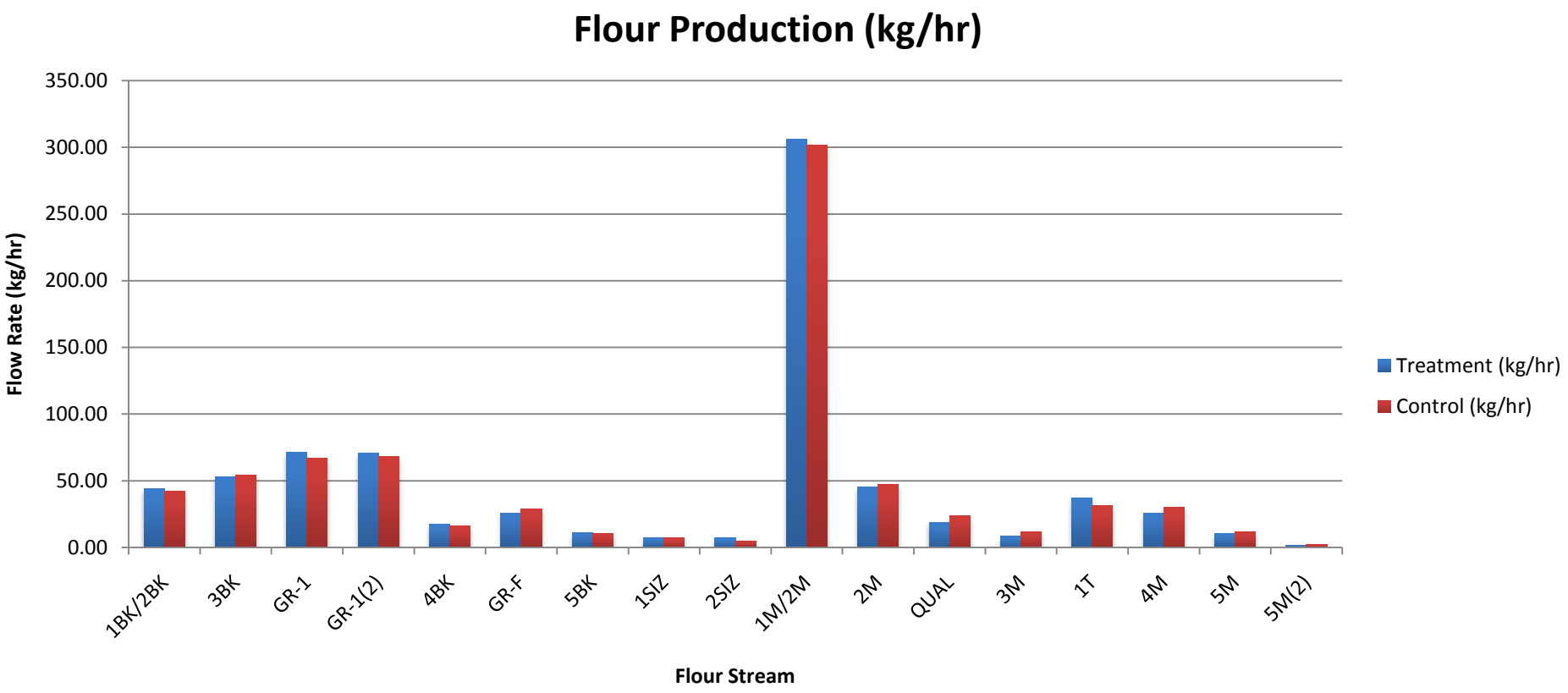
- The flour milling industry is more efficient today than ever before.
- Modern tempering systems have improved flour quality and consistency.
- Bran dusters ensure clean extraction.
- Proper air handling ensures minimal moisture loss.
- We are reaching the theoretical limit of extraction from the wheat kernel.

Why Tempering Treatment

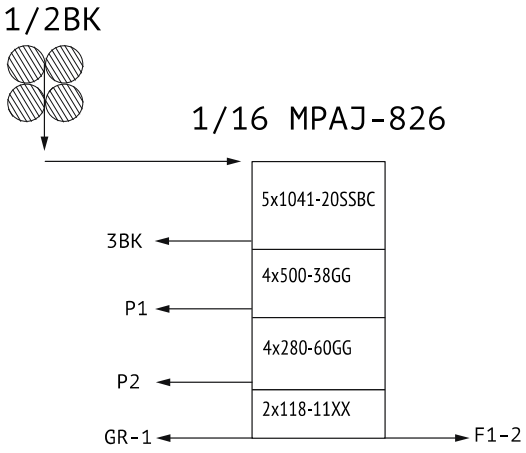
- We remain to leave 20-30% residual starch attached to bran after milling.

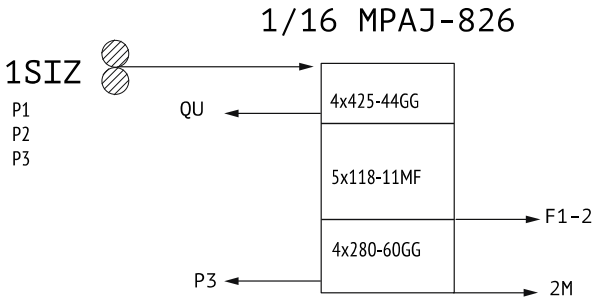

1/2BK
100%
1.SIZ (D2)
25%
P1
P2
1/2M
2M
2BK
75%
2.SIZ (D3)
15%
P3
P4
QU
18%
3M
4M
3BK (D1)
55%
GR-1
30%
For Durum only
1T
9%
5M
7%
4BK
32%
GR-Filter
4%
5%
5BK
28%
BRDU
SHDU
COMPRESSED AIR
PNEUMATIC
1xFILTER [9]
1xEXHAUST FAN [9]
1xAUTOMATIC SHUT-OFF VALVE [1]
1xHP-FAN [9]
1xHL [9]
1xPN-HAMMER [1]
1xAIRLOCK [9]
1xFILTER FLOUR DEPOT [1]
1xSCREW FEEDER WITH VFD [9]
1xMAGNET [9]
1xGR-FILTER [9]
ROLLER LENGTH
BREAKS 4.0m = 16.67mm/100kg/24h
MDDS 4.4m = 18.33mm/100kg/24h
TOTAL 8.4m = 35.00mm/100kg/24h
SIFTER SURFACE
0.319m2/100Kg/24h
FINISHED PRODUCT
PATENT FLOUR F1
CLEAR FLOUR F2
DURUM SEMOLINA SEM.
DURUM CLEAR F1-F2
RED DOG
GERM
SHORTS
BRAN
F1 80%
F2 20%
1/2M ROLLERMILL
8%
27%
* TRANSFER SCREW CONVEYOR FOR PRODUCT TO 12M
PATENT REBOLTER
CLEAR REBOLTER
LOCATION NAME & ADDRESS:
HAL ROSS FLOUR MILL
PROJECT:
FLOW & CAPACITY:
DRAWING NO.:
DRAWN BY:
DATE:
No. REV. # DATE MODIFCATIONS

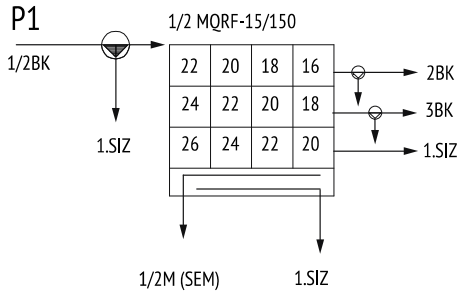
Flour Production by Stream

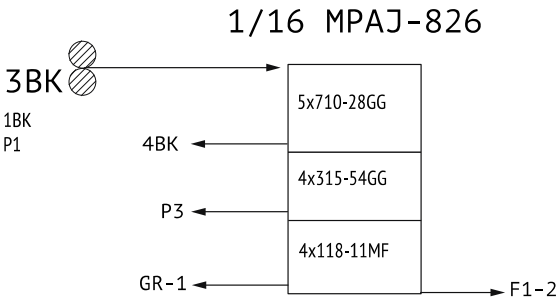


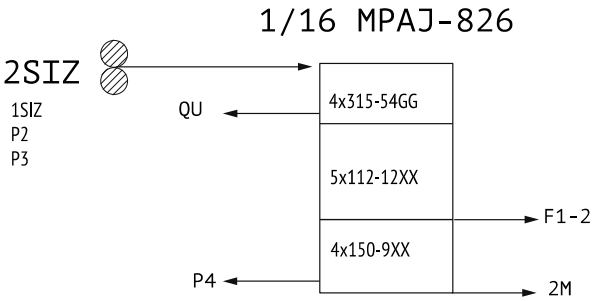
65% of total flour production within one grinding step from 1BK

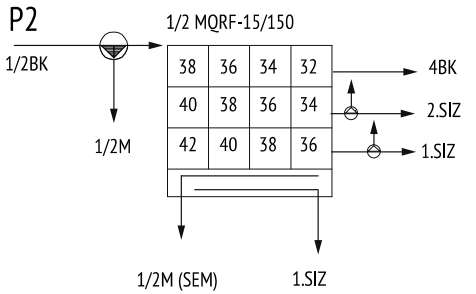


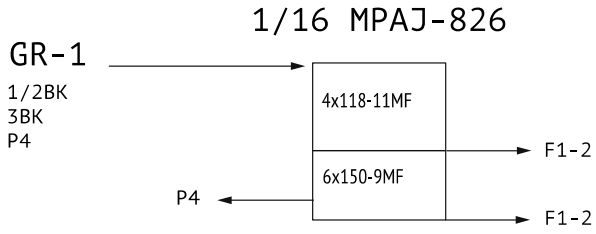


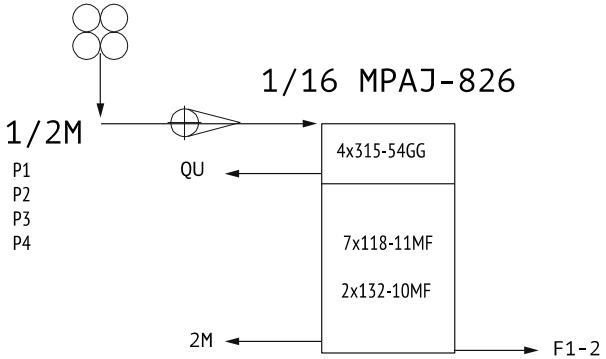








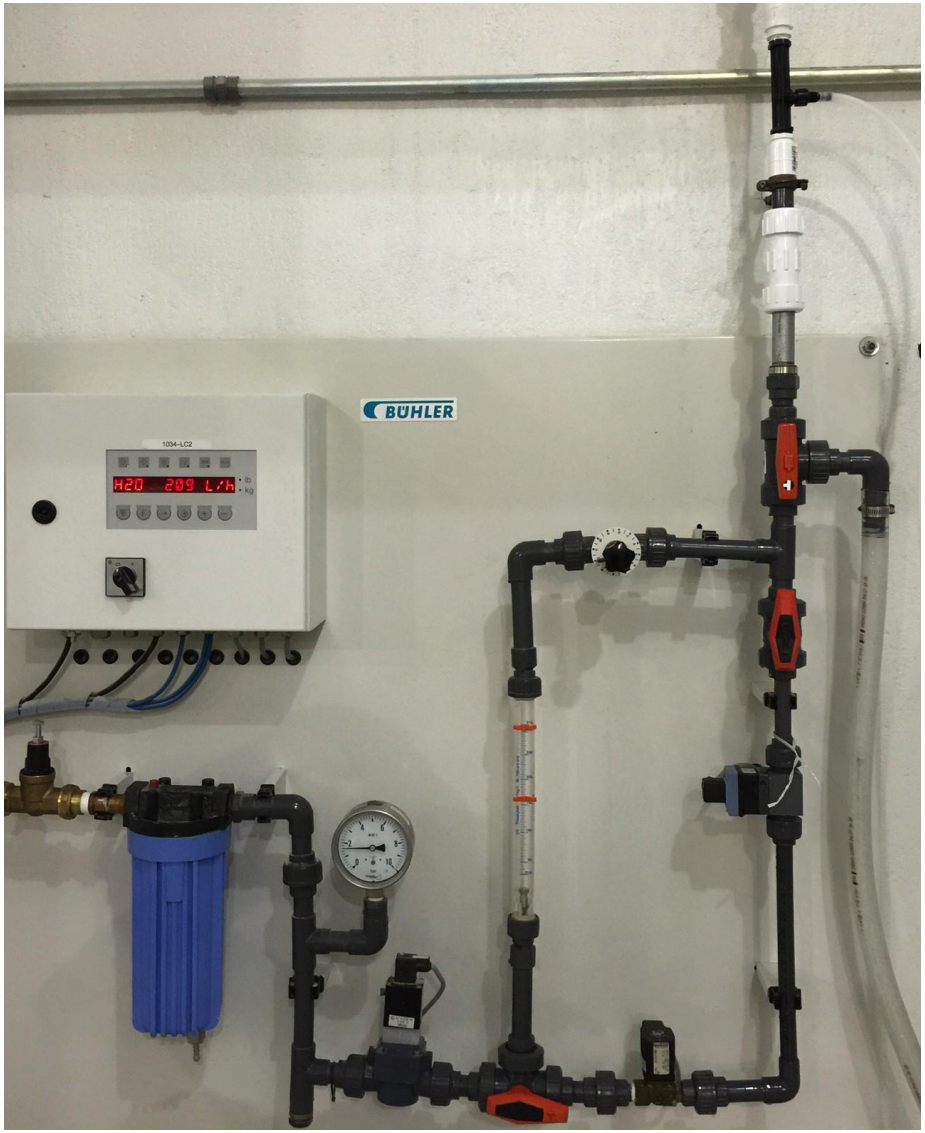


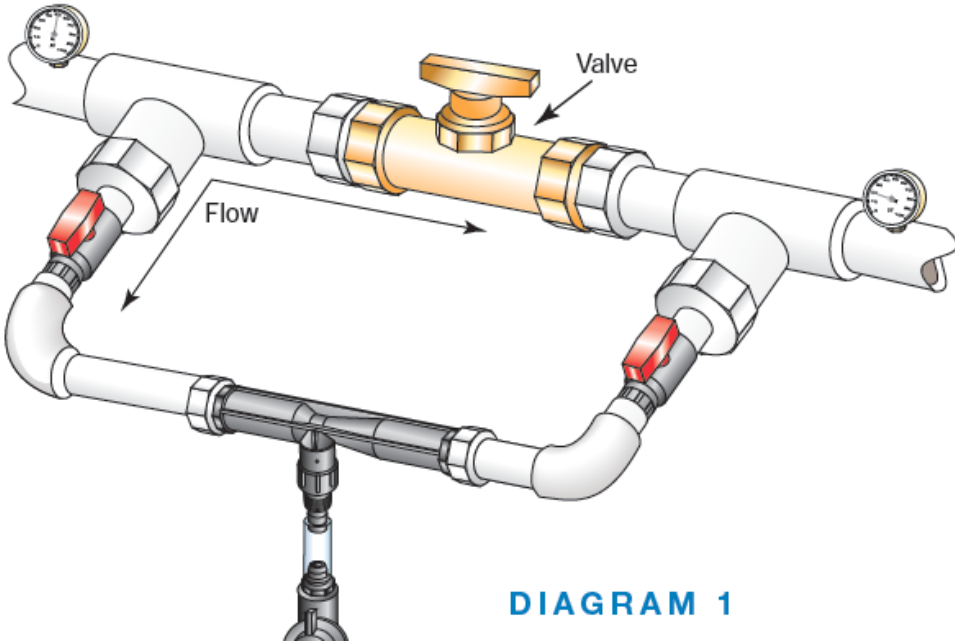


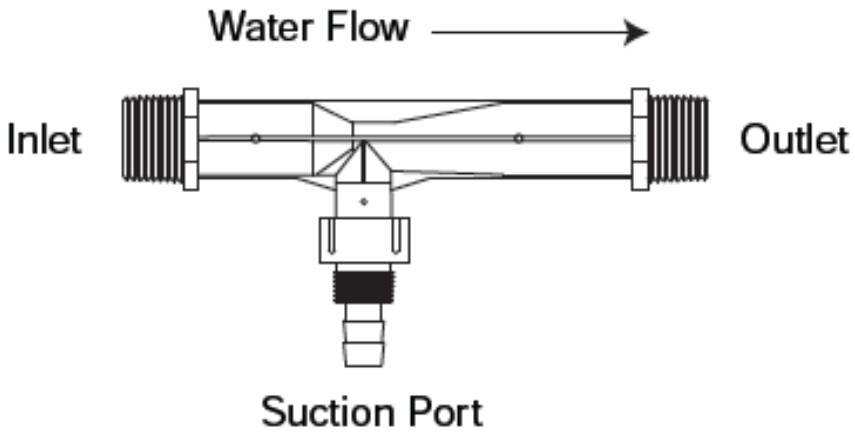
Treatment Case Study

- Hal Ross Flour Mill
  Kansas State University
- 1MT per hour
- Hard Red Winter Wheat
- Target Moisture 16.5%
- Temper Time 16hrs
- Additive- Engrain extraX
- Dose rate 150ppm

Liquid Dosing with MYFC

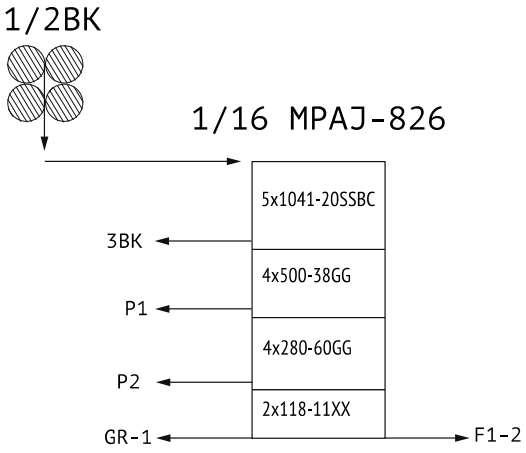


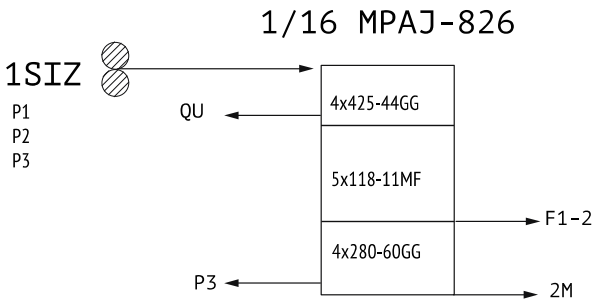


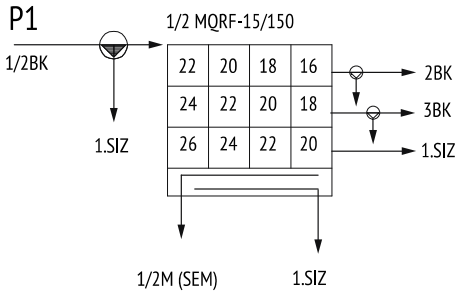


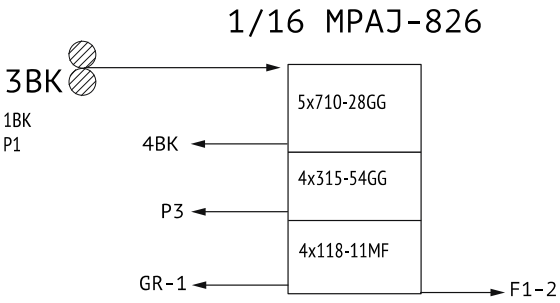
Hal Ross Flour Mill Roll Floor

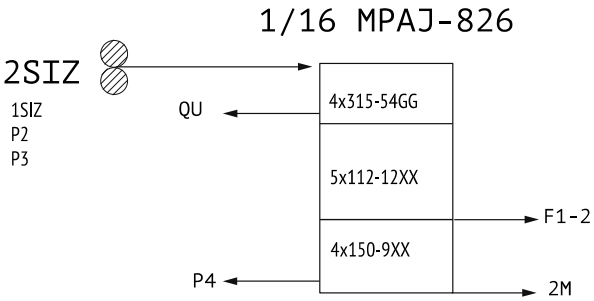
Flour Collection

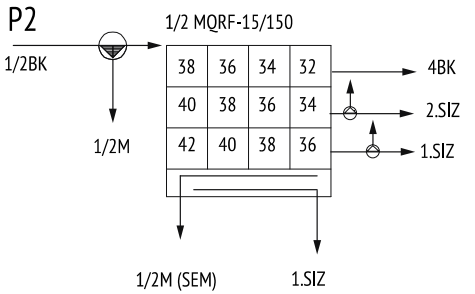

1/2BK
1/16 MPAJ-826
5x1041-20SSBC
3BK
4x500-38GG
P1
4x280-60GG
P2
2x118-11XX
GR-1
F1-2

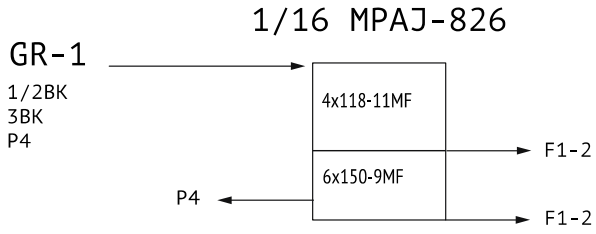

1SIZ
P1
P2
P3
1/16 MPAJ-826
QU
4x425-44GG
5x118-11MF
F1-2
4x280-60GG
P3
2M

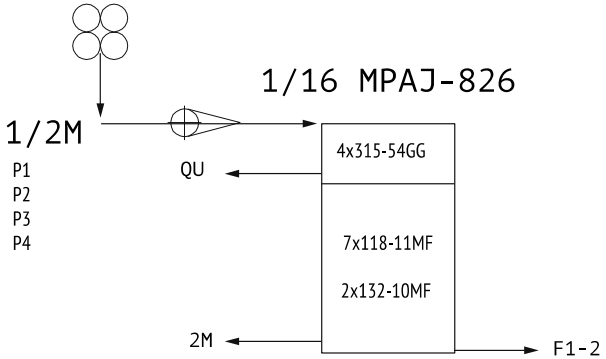

P1
1/2BK
1/2 MQRF-15/150
22 20 18 16
24 22 20 18
26 24 22 20
2BK
3BK
1.SIZ
1.SIZ
1/2M (SEM)
1.SIZ


3BK
1BK
P1
1/16 MPAJ-826
5x710-28GG
4BK
4x315-54GG
P3
4x118-11MF
GR-1
F1-2

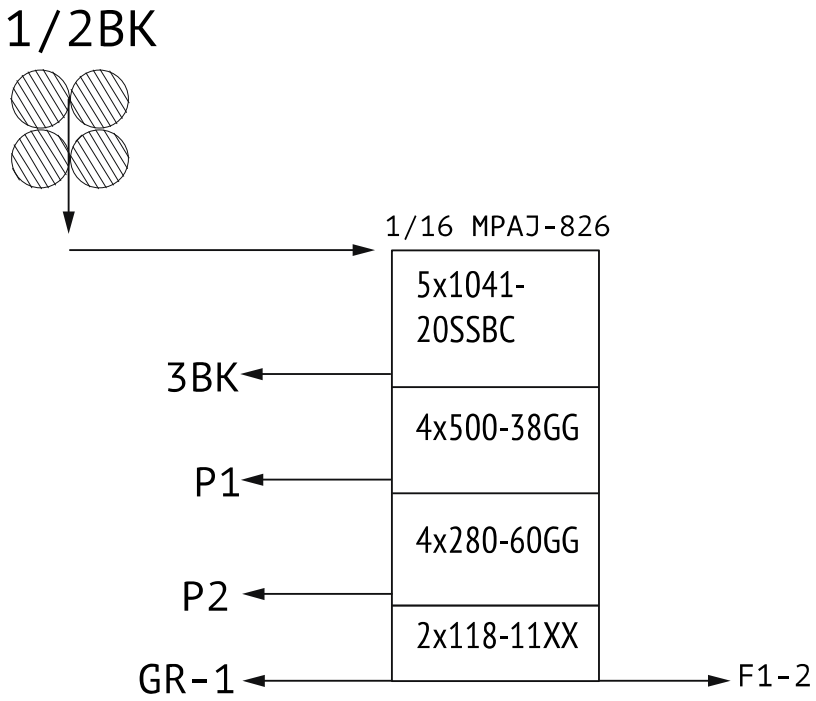

2SIZ
1SIZ
P2
P3
1/16 MPAJ-826
QU
4x315-54GG
5x112-12XX
F1-2
4x150-9XX
P4
2M


P2
1/2BK
1/2 MQRF-15/150
38 36 34 32
40 38 36 34
42 40 38 36
4BK
2.SIZ
1.SIZ
1/2M
1/2M (SEM)
1.SIZ


GR-1
1/2BK
3BK
P4
1/16 MPAJ-826
4x118-11MF
F1-2
6x150-9MF
P4
F1-2


1/2M
P1
P2
P3
P4
1/16 MPAJ-826
QU
4x315-54GG
7x118-11MF
2x132-10MF
2M
F1-2

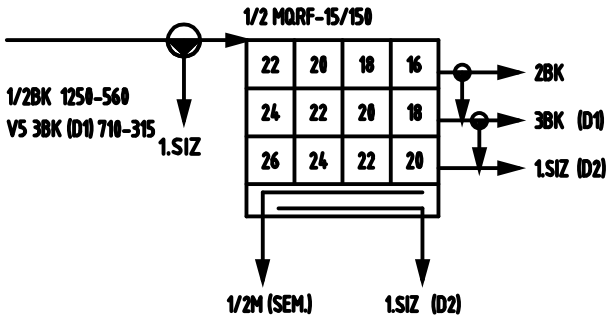
Break Analysis



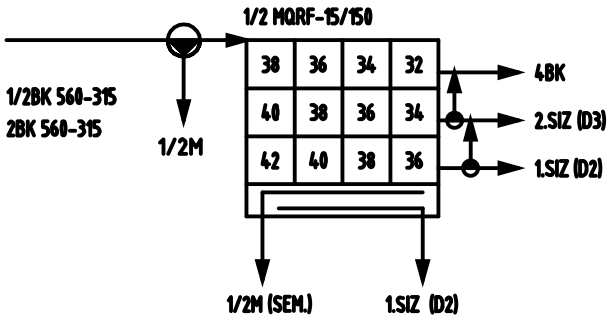
	Control	Treatment
	% of Total	% of Total
+1041 To 3BK	37.5%	35.4%
+500 To P1	26.1%	25.0%
+280 To P2	21.9%	23.1%
+118 To GR-1	10.7%	11.9%
1BK Flour	3.9%	4.5%

Purifier Evaluation

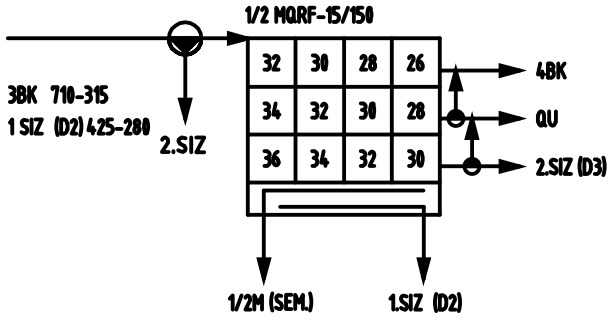
P1



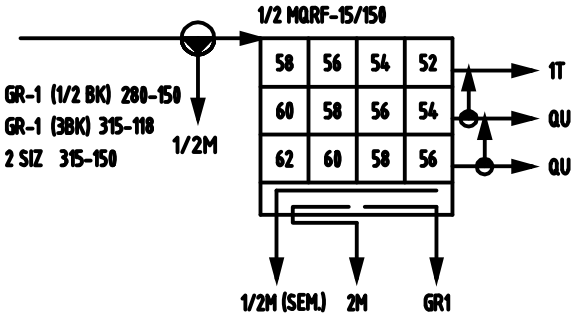
P2



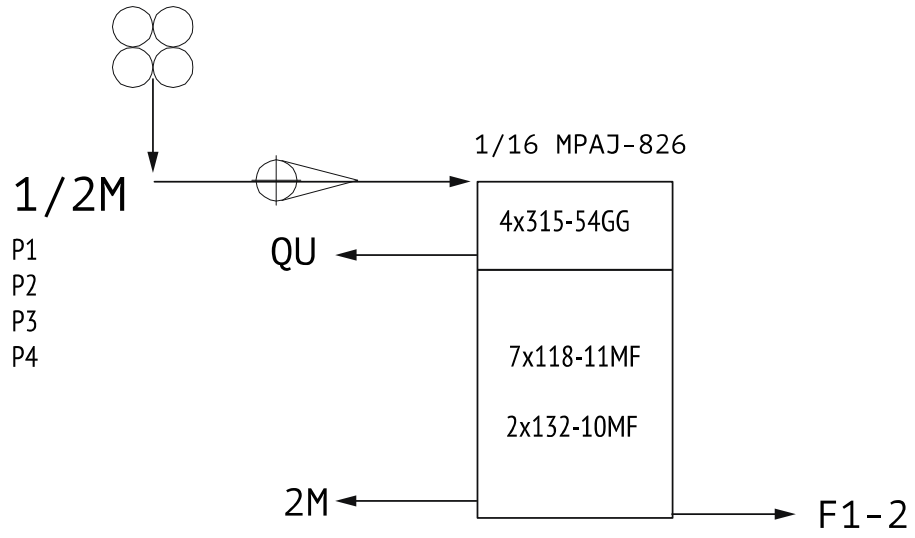
P3



P4



Semolina to 1M/2M



	Control	Treatment
Flow Rate (kg/hr)	362.89 kg/hr	373.6 kg/hr
Moisture	15.06%	14.7%
Ash 14% MB	0.375%	0.373%

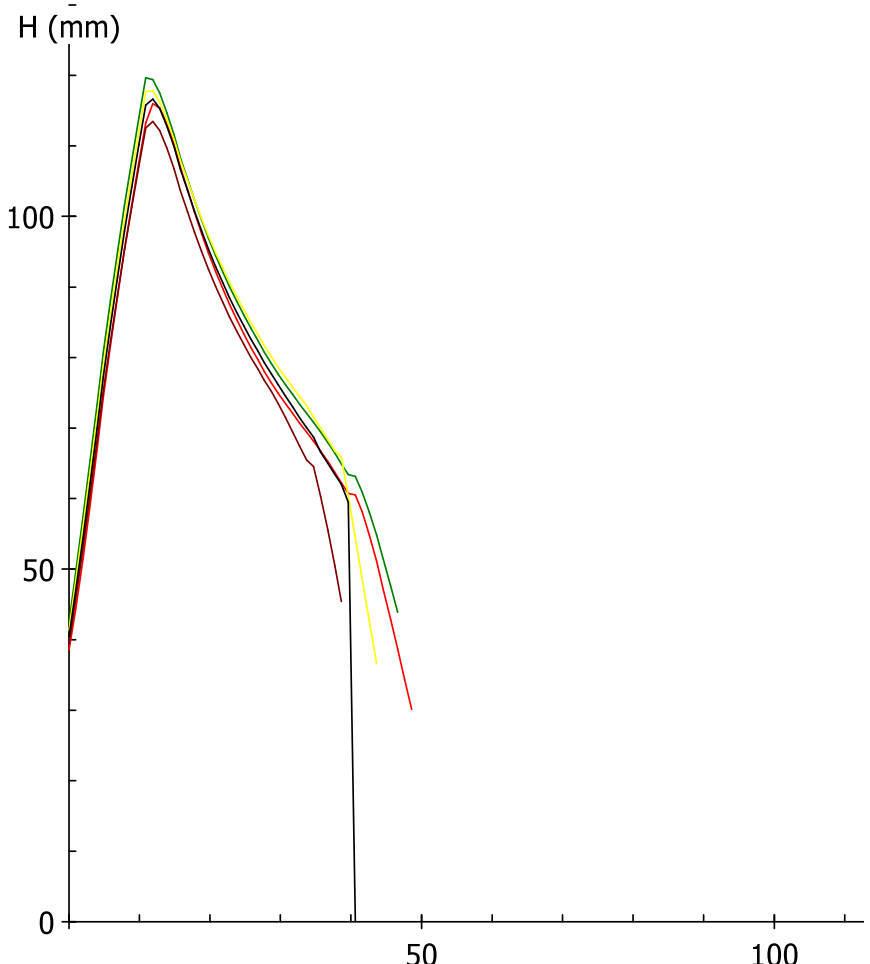
Flour Quality Results

Control Treatment

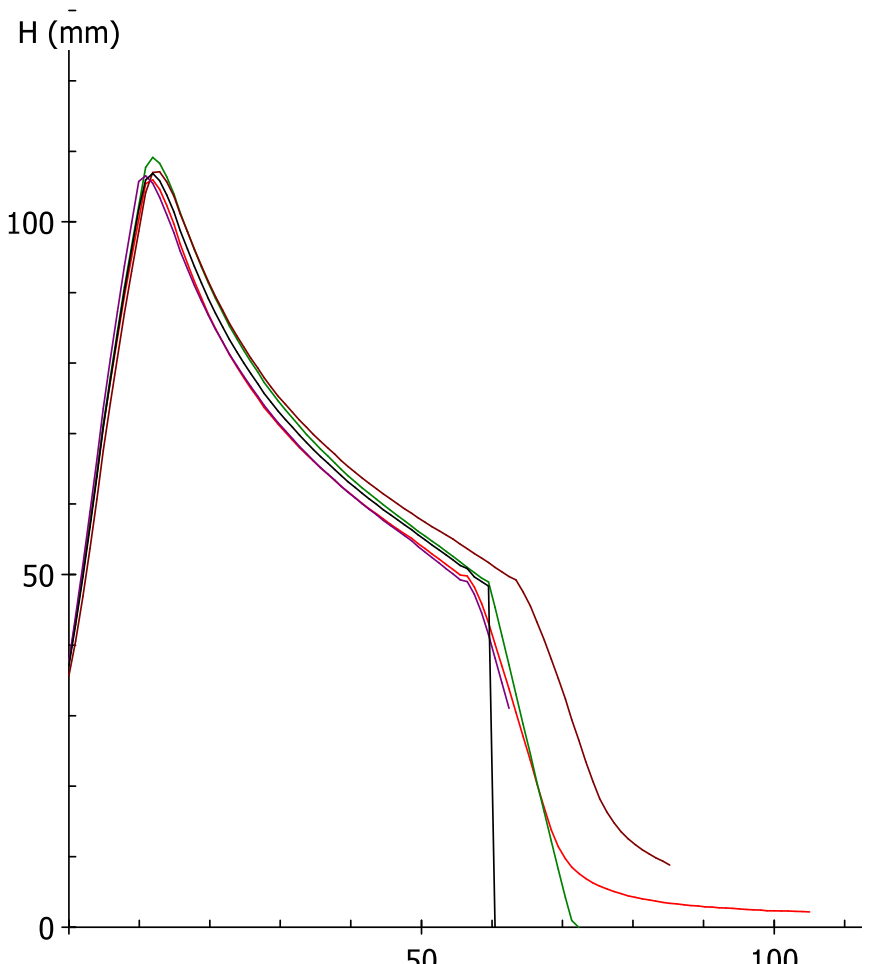
	Control	Treatment
Straight Grade Flour Extraction	75.8%	75.9%
Moisture	14.16%	13.55%
Ash (14%MB)	0.537%	0.517%
Falling Number	539 sec	547 sec
Loaf Volume	2062cc	2200cc

Alveogram

Control- P/L 3.2



Treatment- P/L 1.97



Conclusion

- Tempering treatments can be evaluated using laboratory and pilot scale experimental milling.
- Liquid additives can be applied using cost effective and accurate dosing systems.
- Tempering additives can provide measureable improvement in milling efficiency.