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Flour Correction through Additives at the Mill Level
and the Cost of Treatment

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Purposes behind Flour Correction

- Nutritional Enhancements
- Appearance
- Product Performance Modification

Nutritional Enhancements

- Thiamin
- Niacin
- Riboflavin
- Iron
- Folic Acid
- Other



Typically in the
\$1.50 - \$2.00 /
MT range.



Added as required by government
regulation. Often added as a blend.
Typically in the 125-200 ppm range.

Appearance (Color Enhancement)

- “Bleaching”
 - **BENZOYL PEROXIDE** (BPO is an organic peroxide).
 - **Bleaching products using** a wheat flour bleach premix. Optimum bleaching of the naturally occurring carotenoid pigments found in flour typically results from the addition of 150 grams per 1000 kg.’s of flour.



Product Performance Additives

- Heat
- Gas
- Oxidizing Agents
- Wheat Based Concentrates
- Enzymes

Heat as an Additive in Flour

- Applications
 - Soups & Sauces
 - Natural way to modify starches to thicken
 - Batters / Breading
 - Modified starch can help adhesion
 - Cakes
 - Similar to chlorine treatment
 - Stabilize High Fat or High Microbe Streams



\$4.50 - \$20.00 / MT as an additive

Gasses as Additives to Flour

- Chlorine
 - Lower's pH
 - Modifies starch and protein
 - Aids in mold growth, as well as functional modification
- Ozone
 - Similar to Chlorine gas

Oxidizing Agents

- Ascorbic Acid
- ADA (azodicarbonimide)
- Potassium Bromate
- Calcium Peroxide
- React at differing temperature / moisture levels
- Are chemical ways to speed up natural oxidation
- Help to improve the performance of weak flour in bread applications



\$0.35 - \$0.85 / MT as an additive

Wheat Based Concentrates

- Wheat Based Additives – Clean Label
 - Modified Wheat Starches
 - Vital Wheat Gluten

\$6.00 - \$82.00 / MT as an additive



Enzymes

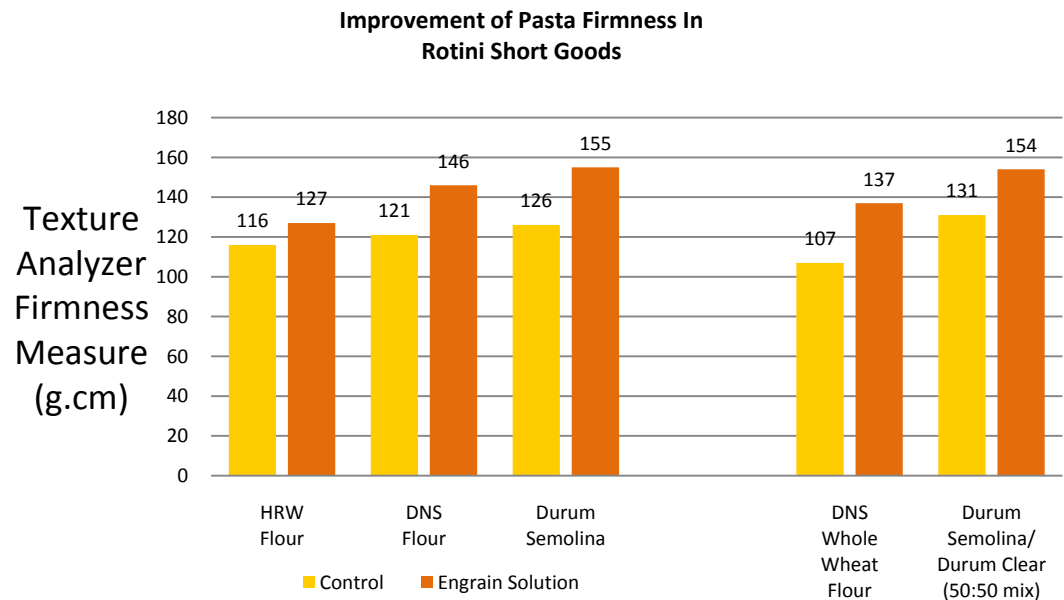
- Plant
 - Malted Barley Flour
 - Sprouted Wheat
- Fungal
- Bacterial



\$0.47 - \$3.60 / MT as an additive

Enzyme – Natural Proteins with many specific applications

- Weaken the Gluten
- Strengthen Gluten
- Hydrolyze Cellulose Material
- Create Sugar
 - Yeast Food
 - Crust Browning



Summary of Costs

Additive	Use	Cost \$ / KG	Cost \$ / MT Flour Treated	Dosages
Vitamins	Nutrition	\$12.00 - \$15.00	\$1.50 - \$2.00	100-200 ppm
Bleach (BPO)	Color	\$3.00 - \$4.00	\$0.15 - \$0.40	50 -100 ppm
Heat	Performance	0.90 – 1.00	\$4.50 - \$20.00	0.5% -2.0%
Chlorine Gas	Performance	\$1.00	\$1.25 - \$1.60	0.8 – 1.5 kg/ MT
Oxidizers	Performance	\$7.00 - \$8.50	\$0.35 - \$0.85	50 -100 ppm
Enzymes	Basic Performance	\$4.75 – \$5.50	\$0.47 - \$0.55	100 ppm
	Custom Performance	\$28.00 - \$36.00	\$2.80 - \$3.60	100 ppm
Vital Wheat Gluten	Protein Replacement	\$1.85 – \$2.75	\$9.25 - \$82.50	0.5% – 3.0%
Wheat Starch	Blending Aid	\$0.60 – \$0.90	\$6.00 - \$45.00	1.0% – 5.0%

Summary

- There are more ways than ever to modify flour with additives.
- The solutions are as simple or as complex as the problem they attempt to solve.
- Engrain has access to all additive technologies available to the miller today.
- Our hands-on support and consultation will always keep you ahead of market and technology trends!

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