



The Whole Story of Wheat Flour Milling

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Wheat Cleaning

- There are two simple objectives in wheat cleaning
 1. Remove non-wheat material
 2. Remove wheat not fit for milling



Material to Be Removed

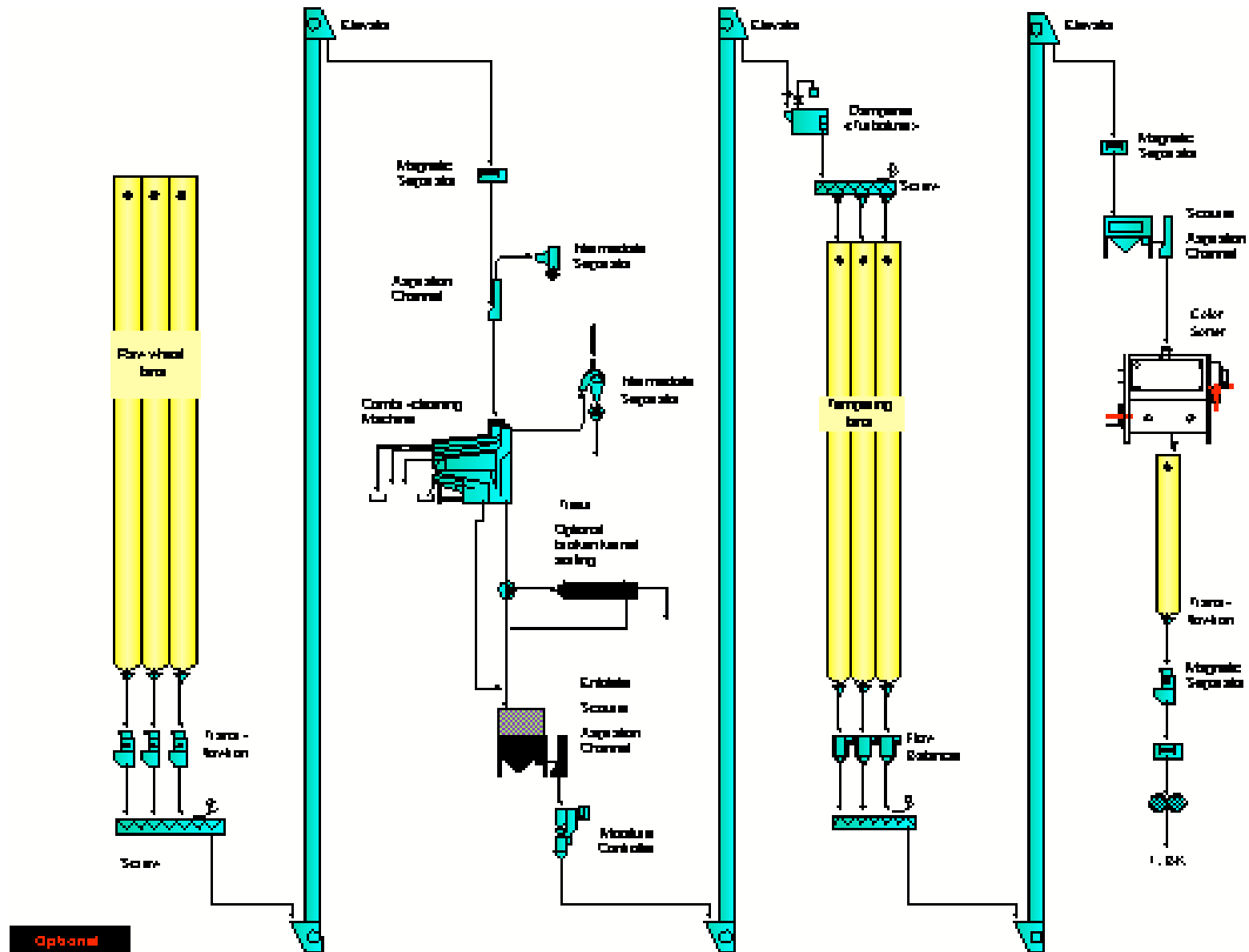
Non-grain Material Grain

- Trash
- Rodents
- Sticks
- Straw
- Other grains
- Stones
- Tramp metal
- Insects
- Dirt/Dust

Wheat Not Suited for Milling

- Shrunken
- Broken
- Insect damaged
- Small
- Low density
- Infested
- Diseased

Wheat Cleaning System



Color Contaminates



The color sorter can make an optical separation based on the grain color

Wheat Conditioning

- **Mellowing of the endosperm**
 - Flour extraction can be increased
 - Power consumption / noise level of the Rollermills reduced and
 - Flour ash content reduced
- **Toughening of the bran**
 - Bran tends to break up less and remains in bigger pieces
 - Large bran flakes can effectively be cleaned by the corrugated rolls
 - Less small bran specks in the Flour
- **Adjustment of the Flour moisture content**
 - Constant moisture level = constant milling conditions
 - Constant moisture level = constant baking conditions

Wheat Conditioning

Recommended tempering time

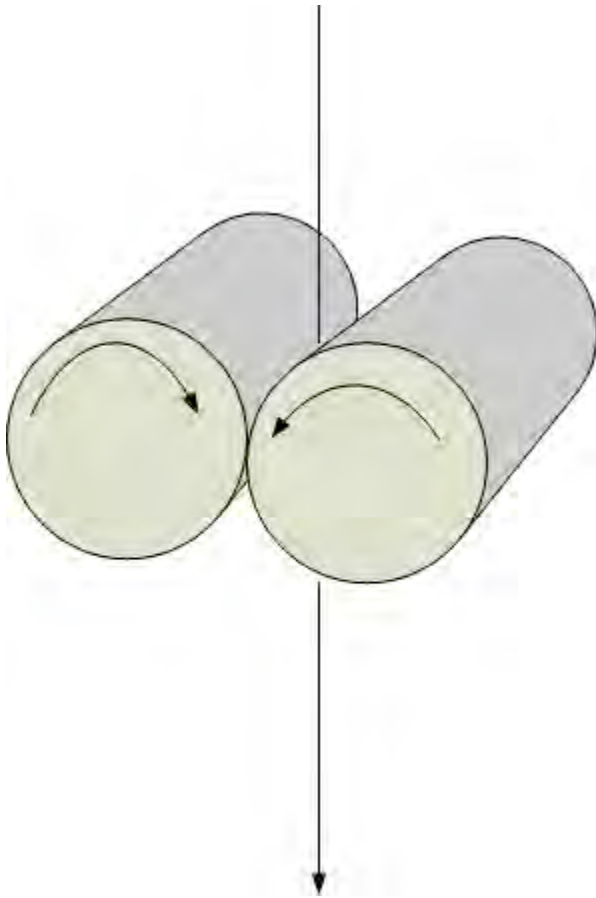
1BK moisture:

- Durum Wheat: 24 – 36 (48) hours 16.0 – 17.0% (17.5%)
- Hard Wheat: 18 – 24 hours 15.5 – 16.0%
- Soft Wheat: 6 – 12 hours 14.5 – 15.0%

The maximum moisture content on 1st Break is influenced by:

- Hardness of the Wheat
 - energy needed for grinding and moisture loss
- Maximum moisture content of the flour
 - government or end user specifications
- Maximum moisture content of the bran
 - storage problems
- Operational problems
 - sifting performance / mold development

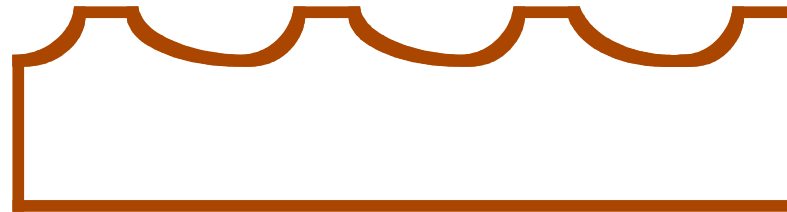
Roller Mill Grinding



- Stock is ground between two rolls of a roller mill
- Depending on which step the rolls could be corrugated or smooth

Corrugations

Grooves cut into a roll chill to change the grinding action.



Lift



Sift



Flour

Purify

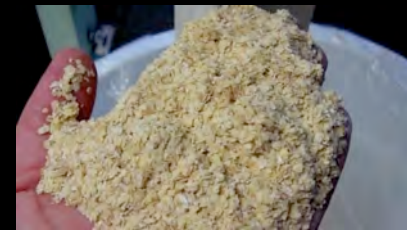


Co-products

Grind



Repeat



Bran Proximate Analysis

- Proximate analysis of bran after flour milling.



<u>Attribute</u>	<u>Percent of Bran</u>
Moisture	12 %
Ash	5-7 %
Protein	14.5%
Lipid (fat)	3 %
Fiber	11%

Wheat Germ Proximate Analysis



<u>Attribute</u>	<u>Percent of Germ</u>
Moisture	12 %
Ash	4.2%
Protein	26.6%
Lipid (fat)	9.2%
Fiber	2.3%

Shorts

Proximate Analysis



<u>Attribute</u>	<u>Percent of Germ</u>
Moisture	12 %
Ash	4.1%
Protein	13.0%
Lipid (fat)	3.0%
Fiber	7.0%

Red Dog

- Proximate Analysis

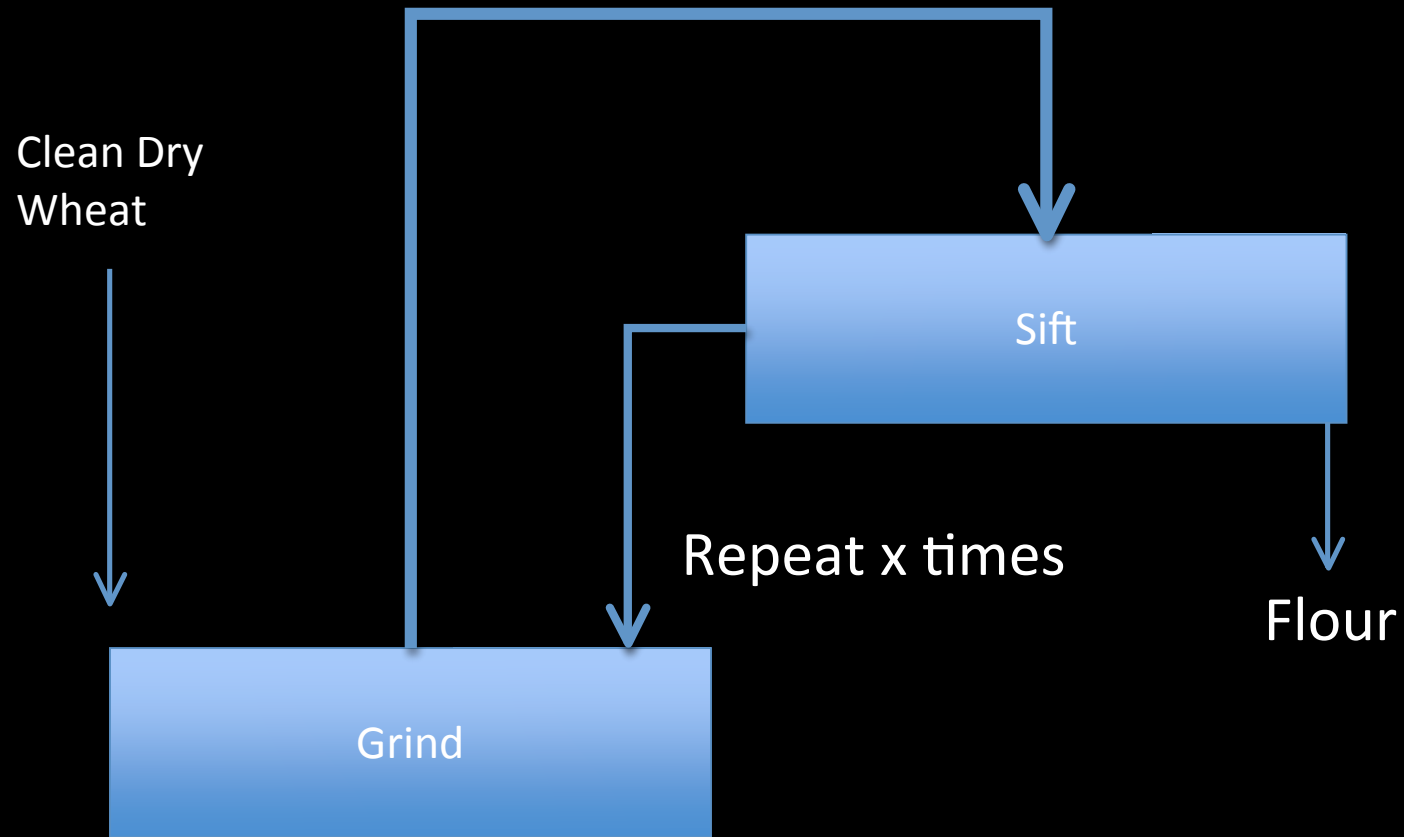


<u>Attribute</u>	<u>Percent of Germ</u>
Moisture	12 %
Ash	5.5%
Protein	15.0%
Lipid (fat)	3.0%
Fiber	4.0%

Stone Ground Whole Wheat Flour



Simplified Process Flow



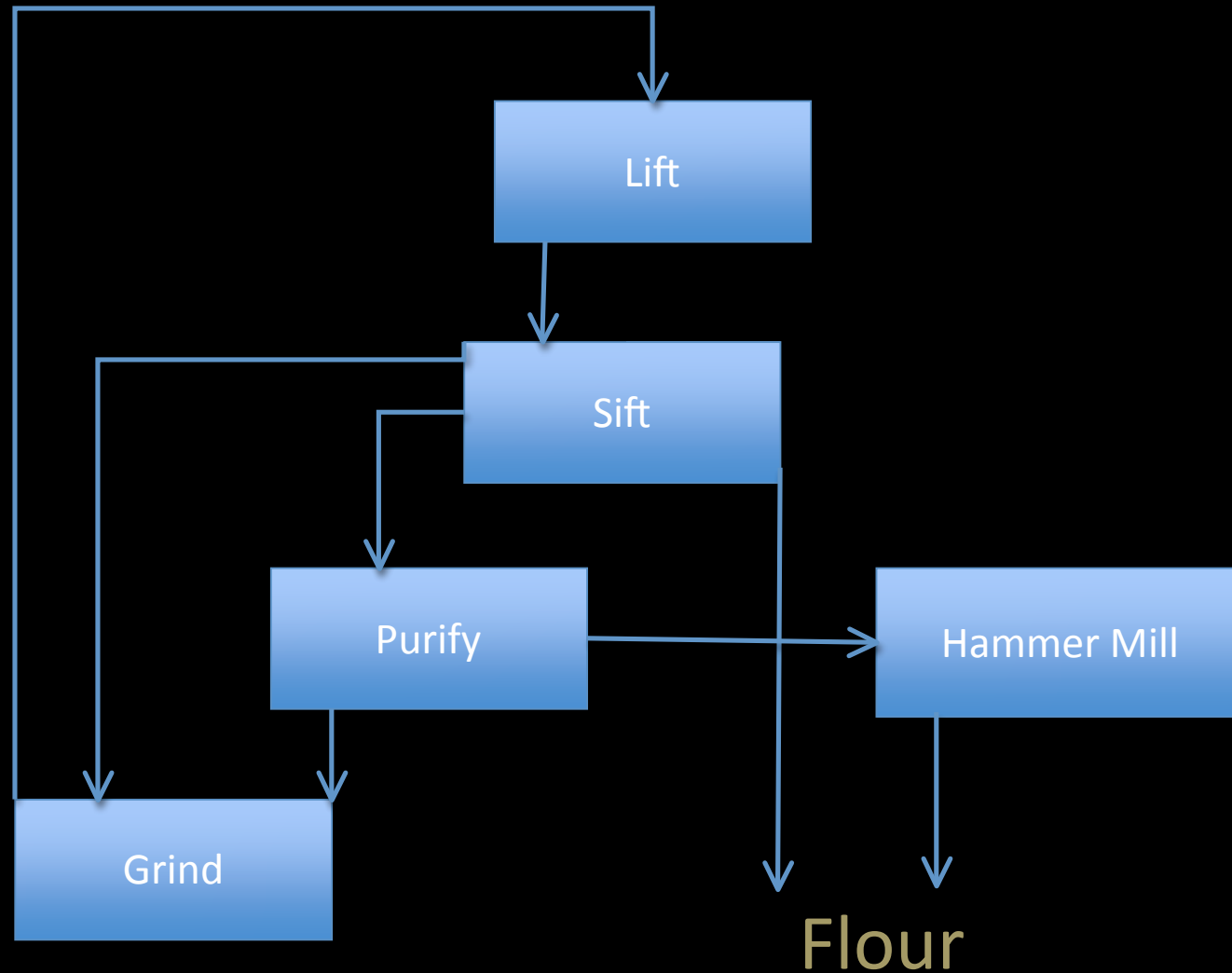
Modern Stone Mill



Roller Mill Whole Wheat Flour

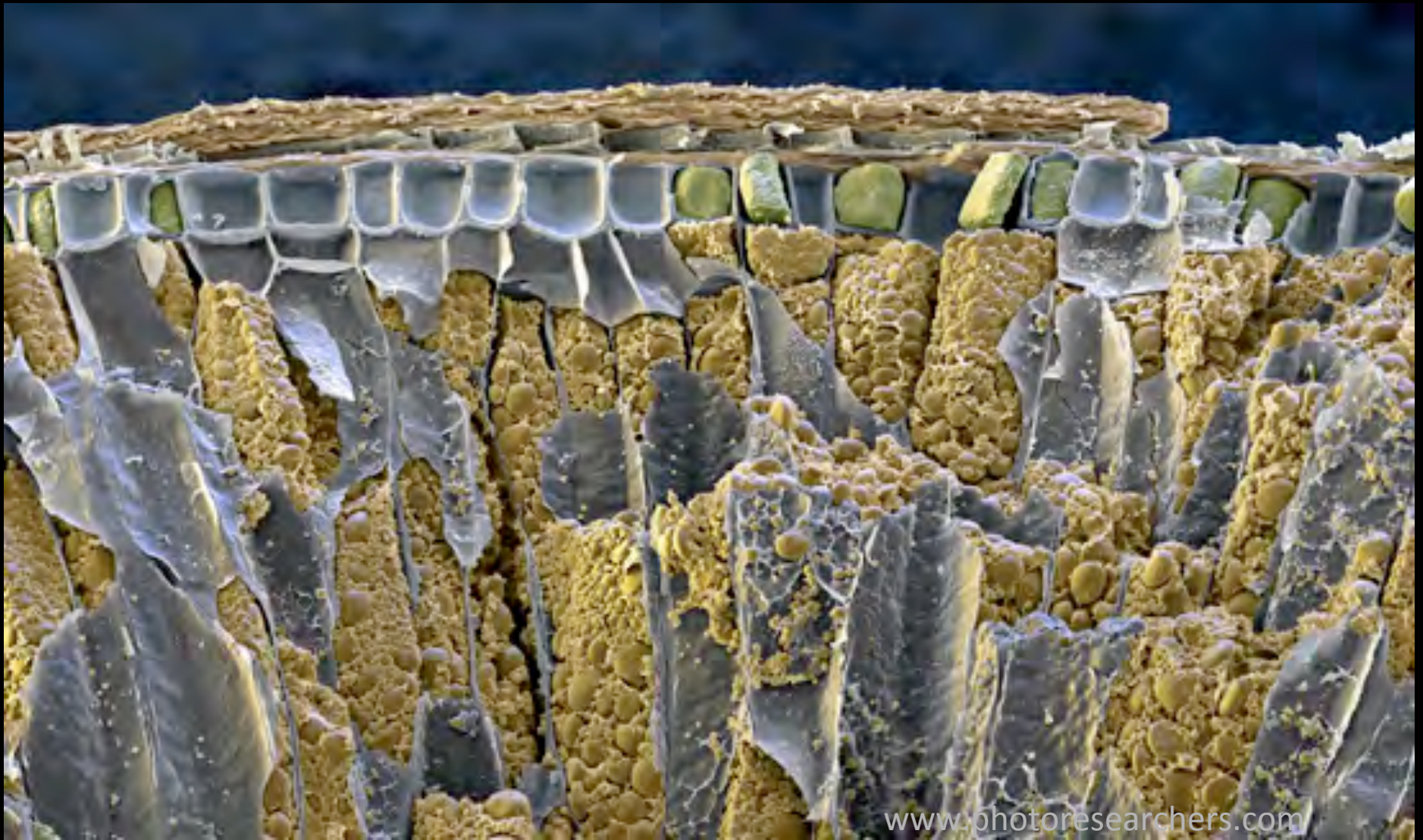
- Similar to bread flour process.
- Bran and germ ground separately using hammer mill or other grinding system.
- May use partially tempered wheat or dry wheat.

Co-Products Ground Separately



How is it Whole?

- All components of the wheat kernel are present and accounted for.
- Roller milling will result in higher moisture loss than stone ground processes.
- Whole wheat flour is produced on-stream, meaning that flour and co-product streams are reintroduced immediately after grinding.
- Any “lost” material would be in the form of dust, which is also lost in all other types of grinding and sifting operations.



Thank You!