The Farm to Table Movement
Re-localizing Flour Milling

UNIFINEMILL.COM
Whole Grain & Tawny White™
REVOLUTIONARY FLOURS
LOCAL MILLING PURITY
Locally Grown... Locally Milled

The durable, low maintenance, high speed, rotary

UNIFINE FLOUR MILL
MILLING SYSTEM

is ideally suited for the cost effective, local milling of commercial quantities of <u>both</u> high quality whole grain and functional "Tawny White" reduced bran flour.

*The 2015 Model Unifine Mill**

- 1,000 TO 10,000 LBS/HOUR OUTPUT
- MINIMAL MAINTENANCE, LONG TERM DURABILITY.
- ONE PASS EFFICIENCY PRODUCING COMMERCIAL VOLUMES OF HIGH QUALITY FLOUR
- LESS SUPPORTING INFRASTRUCTURE THAN OTHER SYSTEMS
- VARIABLE SPEED FOR CUSTOMIZED MILLING
- DRAMATIC REDUCTION IN THE COST OF PRODUCTION COMPARED TO CENTRALIZED INDUSTRIAL FLOUR MILLING SYSTEMS

***Patent Protected**

The "farm to table" movement has had limited access to the locally milled flour that consumers are increasingly seeking. A key limiting factor has been the reality that while whole grain flour demand is ascendant, recent data confirms that well over 90% of U.S. commercial flour production is still nutritionally benign, but more functional "white" flour. The complexity of white flour "roller" milling systems has, over the years, resulted in the centralization of the milling of flour dominated by conglomerates, relegating the local farming economy to just shipping their raw product. New, locally milled Unifine "Tawny White" reduced bran flour is the new, functional "white flour that isn't white". It's cost effectively produced by removing just the larger particles from the Unifine whole grain flour. Artisan bakers who prefer the functionality of white flour have given new reduced bran Unifine "Tawny White" rave reviews, not just for functionality, but for superior nutrition and taste as well. The local farming economy formally focused on shipping grain can now add the flour profit center by cost effectively producing both whole grain and refined "Tawny White" flour. It follows that the local manufacturing of baked products is sure to follow.

LOOKING FOR GREAT WHOLE GRAIN FLAVORS?
THEN FOLLOW THE NUTRITION TRAIL...

According to the Whole Grain Council 2015 report, over 90% of commercially milled flour is still refined white flour, devoid of **both** the nutrition and those great flavors and aromas of the bran and germ elements. Preference for functionality still overwhelmingly trumps flavor and nutrition.

Tawny White™ is milled by simply sifting only the largest bran particles out of the very fine Unifine whole grain flour. The nutrition, great flavors and aromas of the germ and most of the bran is retained. Artisan bakers agree, "Tawny White performs like white flour, but provides a more nutritious, flavorful loaf of bread."

U80* BREAD FLOUR
Ingredients: Sifted Hard Red Wheat Flour largest 10% of particles removed.

*U80 means that in addition to micronutrient retention, at least 80% of the whole wheat dietary fiber remains in the Unifine milled *Tawny White*™ bread flour. In comparison, the USDA estimates only 22% of the whole wheat dietary fiber is retained in refined white flour.

COMPARED TO WHOLE GRAIN FLOUR
WHAT PERCENT IS LEFT AFTER MILLING?

Nutrient	Tawny White Flour*	Traditional White Flour**
Dietary Fiber	83%	22%
Phosphorus	72%	33%
Potassium	75%	31%
Magnesium	67%	18%
Manganese	71%	17%
Zinc	78%	25%

**Source: USDA National Nutrient Database (2004)*
***Medallion Labs (www.medallionlabs.com)*

THE CONSENSUS OF ARTISAN BAKERS WHO HAVE BENCH TESTED *TAWNY WHITE*™

Tawny White™ *is unlike any flour we've baked with before. It performs like white flour, but provides a more nutritious loaf of bread–– with the visual appearance, textures and volumes of standard artisan fare!"*

This booklet focuses on the merits of holistic whole wheat milling at the source of grain production. The Unifine flour mill that is referenced in this booklet is also a fabulous rice milling machine as the "gritty" element that is common with most milling systems is virtually eliminated when rice is milled on the Unifine Mill.

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Overview:

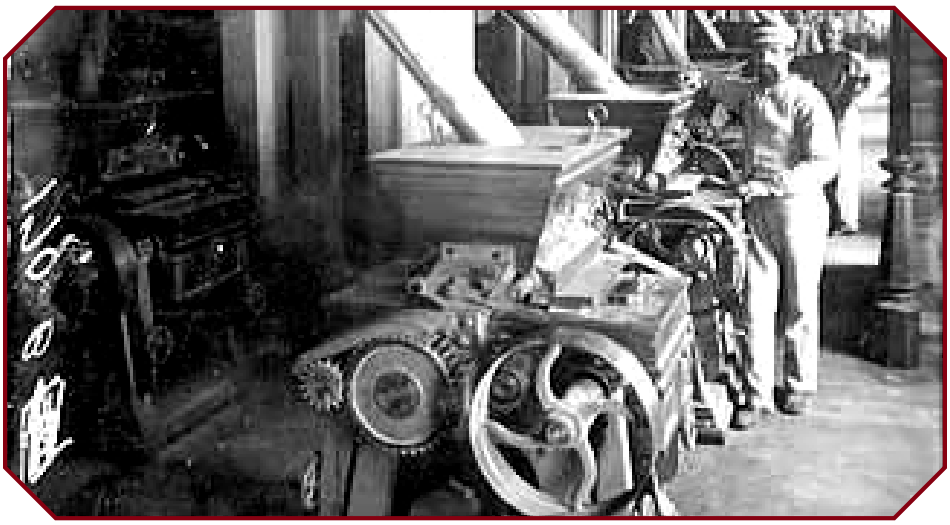
Introducing locally "Unifine" milled ***TAWNY WHITE***™ *that will replace the world's centrally milled "white" flour*

9000 years ago a human ground grain between two rocks and the first "stone milled" flour was produced. As the "stone milling" of flour evolved, it was gradually determined that there were three elements to the kernel of grain. The white starchy "endosperm" represents 80% of the volume, the outer "bran" shell represents 17%, and the germ represents 3% that will otherwise sprout and consume the endosperm in the process of turning into a plant.

A significant amount of the stone milled bran particles are oversized, puncturing the bubbles in the rising dough. Oblivious to the nutritional issue, millers discovered that the white (endosperm) flour they were able to separate out, produced a "fluffier" product with superior volume, texture and appearance. Even though the white endosperm represented 80% of the volume, stone millers could only sift out about 25% of the volume and fetch a premium price for their efforts.

And so it went until the 1800's when a brilliant engineer by the name of John Stevens developed the eclectic "roller mill" system that accomplished 100% extraction of the bran and the germ. By first hydrating the grain, this complex, ingenious system then repetitively "rolls and sifts" the mash, effectively peeling the bran and the germ off the softened endosperm.

The Roller mill system proved to be so efficient that over a period of about a quarter of a century, most of the world's flour milling shifted to the roller mill and that remains the case today. According to the U.S. Whole Grains Council 2015 report, still less than 6% of commercially milled U.S. flour is whole grain. While that's a dramatic increase from what it was a few years ago, functionality still trumps nutrition. With that reality in mind, it was inevitable that the significant compromise of sifting the very fine whole grain flour output of the Unfine (impact) flour mill would be discovered. The likely impact of the introduction of ***Tawny White***™ reduced bran flour on the world's flour milling industry cannot be understated.



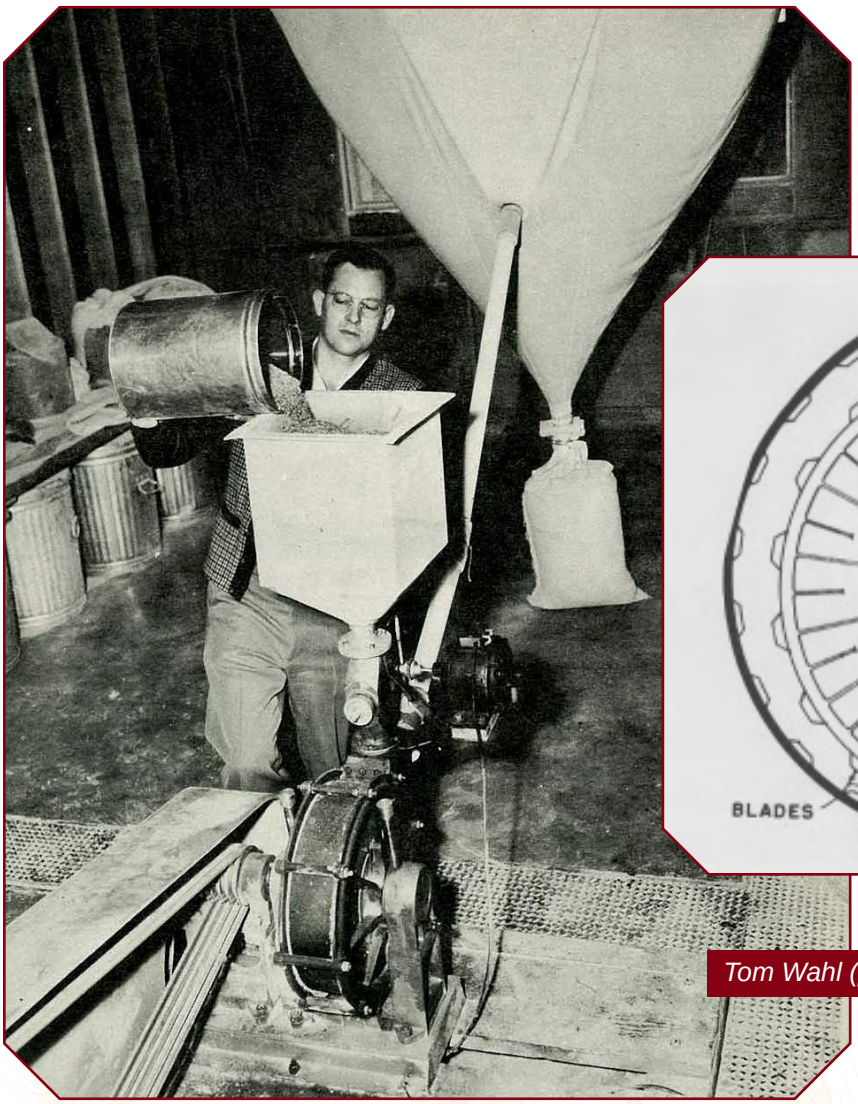
One of the original Roller Mill flour factories, late 1800's

Firstly, the production and carbon footprint factor dramatically favors re-localized milling of superior quality ***Tawny White***™. The multiple elements contributing to this obvious cost savings reality absolutely assures the inevitable transformation of the world's flour industry to the Unifine system. Secondly, about ten percent of the flour volume is sifted out to match the white flour particle size and approximate functionality. This compares very favorably to the roughly 20% sifted out in the production of roller milled pure white flour. Thirdly, compared to the dramatic nutritional loss in white flour, most of the fiber and micronutrients and virtually all of the germ is retained in ***Tawny White***™. Finally, multiple artisan bakers have done side/by/side bench tests and "agree that Unifine milled ***Tawny White***™ is unlike any flour (they'd) worked with before, it performs like white flour, ---with the visual appearance, textures and volumes of standard artisan fare."

This booklet has been prepared to document the fascinating development of the Unifine (impact) flour mill that's taken place over the past sixty years. Enjoy the read and welcome aboard. You're now part of the Unifine flour milling revolution.

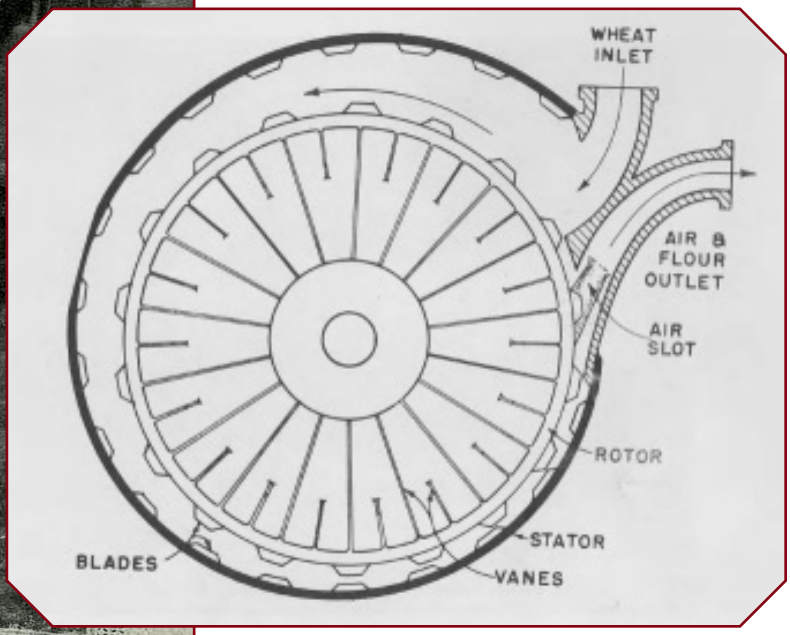
The First Unifine Mill

Working prototype, late 1940's



Tom Wahl (pictured) at the Mill

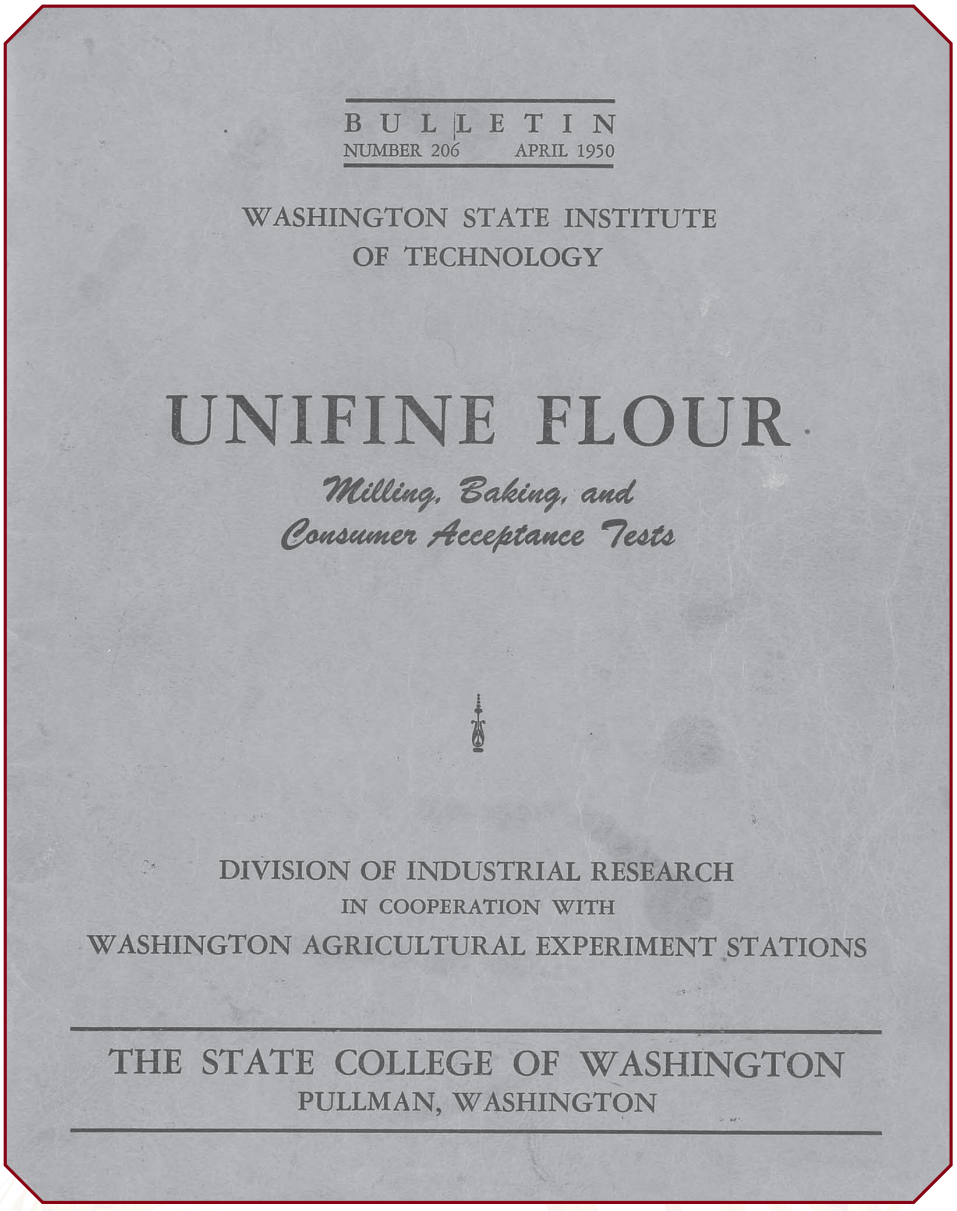
Drawing from the original mill literature illustrating the basic working principle of the impact milling method.



After World War II, an Englishman by the name of John Wright came to the United States with a compelling story and a vision of a milling system that would revolutionize the world's flour milling industry. He claimed that this milling system had been built and performed successfully, but that it was destroyed, along with much of London, during the war. Unable to find resources to begin anew, he ventured to the United States and ended up before Washington State College President Compton, who personally referred him to the school's Department of Industrial Technology. Finding employment as a janitor, Wright made ends meet while he shared the somewhat incomplete details of this new approach to flour milling. University engineers were convinced to pursue the tedious fabrication of a mill prototype with an anticipated output of 150 pounds of flour per hour. Quoting from a speech focused on the revolutionary potential of the mill made at the 1947 International Miller's Convention by college representatives, "A near miracle happened, the mill prototype performed flawlessly from the outset".

Unifine Mill

Bulletin 206 May 1950



BULLETIN
NUMBER 206 APRIL 1950

WASHINGTON STATE INSTITUTE
OF TECHNOLOGY

UNIFINE FLOUR

Milling, Baking, and
Consumer Acceptance Tests

DIVISION OF INDUSTRIAL RESEARCH
IN COOPERATION WITH
WASHINGTON AGRICULTURAL EXPERIMENT STATIONS

THE STATE COLLEGE OF WASHINGTON
PULLMAN, WASHINGTON

The complete text of Bulletin 206 can be found at www.unifinemill.com

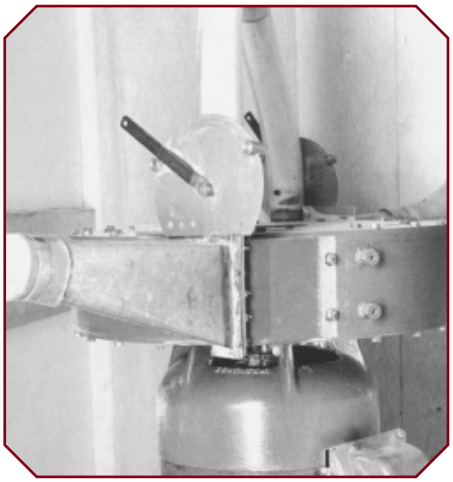
In May of 1950, scientific Bulletin 206 was published and drew the attention of a broad international audience. Fascination spread over the promise of a milling system capable of pulverizing the entire grain kernel to a satisfactory fineness for adequate loaf volume. Serious inquiries poured into the Pullman WA campus, including on-campus visits from several foreign countries and communication from diverse corporations (including the Boeing Company) and virtually every state in the union. Serious consideration was given by Senator Hubert Humphrey's Foreign Aid efforts that prompted additional inquiries, including a 1960's letter from the Afghanistan U.S. embassy. However, the publicity generated stiff resistance from the flour milling industry centered around the centralized production of white flour. This resulted in the college department heads who had been outspoken about the potential of this milling system being directed to keep their remarks to the function of the mill and leave its promotion to the private sector. Interest in the milling system waned until a local farmer, Mr. Leonard Fulton, stepped in. He was Secretary of the Washington State Grange and personally funded the fabrication of three commercial mills.

Leonard Fulton

Commercialization - *1955*

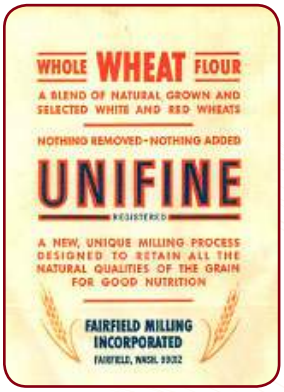
First Commercial Mill Fabricated

Leonard Fulton was an active regional farmer, serving on the Boards of various farming organizations. In the early 1950's he was the Secretary of the Washington State Grange. In 1953, the State Grange Board initially voted to contribute just over $4,000 (which equates to over $50,000 in 2015 dollars) to fund taking the mill from the prototype stage to produce three commercial Unifine flour mills. However, under pressure from the commercial flour industry, at the last minute, the majority of the State Grange Board voted to withdraw their support. The original receipt with the Washington State Grange crossed out and "Leonard Fulton" written in was found in the WSU archives. Fulton wrote his personal check. The three mills were operational in early spring 1955.



Rather than continue the vertical design of the prototype, engineers switched to the horizontal "two port" design, enlarged the rotor and envisioned correctly a mill that would produce 500 lbs. of flour per hour.

The "if you build it they will come" principle did not work in this case. The mills languished at the college for six years until Fulton took it upon himself to enlist his local farming cooperative to proceed with a joint venture. Fulton and his associates operated the Unifine flour mill from 1961 until 1988. While he distributed the flour throughout the Pacific NW, it remained a novelty with production never exceeding 200,000 pounds of flour per year, even though the mill was capable of producing over 1,000,000/year. Lacking an aggressive marketing program, there simply wasn't enough consumer interest in whole grain flour yet, even flour that offered an unusually fine particle size. The venture did not ultimately accomplish what Fulton and his associates had hoped it would: promote re-localization of flour milling and expand consumption of whole grain flour. (see regional news release on page 5)



On May 1, 1975, Ms. Mary Corbett Stevens wrote Fulton a card:

Dear Sir, This is a long overdue letter as I have been wanting to come and see your operation for a long time. In 1948, I was the lucky graduate student at Washington State University who was assigned to the Unifine Flour project. My thesis, completed in 1949, "A Study of Unifine Flour," dealt with baking characteristics, a study of the chemical and physical characteristics and the biological value of Unifine Flour. My advisor on the faculty, Dr. Barbara McLaren left Pullman about 1954 and now lives in Toronto. I have lived in Pullman since 1948 and am a housewife with four grown daughters. Would it be possible to visit your mill next Wednesday May 7 and talk with you about it?

Yours sincerely, Mary (Corbett) Stevens.

Ms. Stevens went on to form another venture with five other women, who each contributed $5,000, called "Flour Girls," in 1981. They operated successfully for over fifteen years and, according to sources, eventually achieved a yearly distribution of nearly 500,000 lbs. of this ultra-fine whole grain flour. However, they ceased operations in 1996 and were itnot for the curiosity of an eccentric and unique food cooperative, Azure Standard, the Unifine Mill story may have ended here.

Unifine Flour Hits The Market!

Unifine Flour Gives Bread Taste Like It Used To Have!

The following story is reprinted from "GRAIN," a News Review published by North Pacific Grain Growers, Inc., 400 Lewis Bldg., Portland 4, Oregon.

Pictures were taken by John R. Ulrich, Free Lance Associates, Great Western Bldg., Spokane.

Stockland Market News and Views felt it important enough to bring you this timely story as many persons, both city and rural, have long pondered the problem of bread that tastes like powdered air sacks. Whether or not Unifine flour will catch on is a good question. The public has condemned bread for a long time, but continues to buy the tasteless stuff found most often. At the same time most persons have griped about the taste of it.

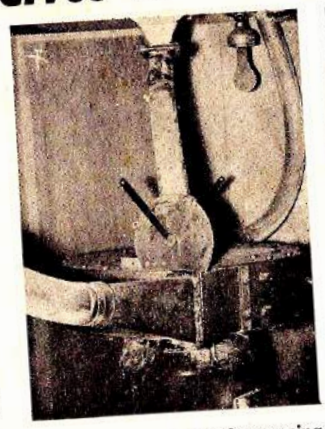
One thing for sure and that is Unifine gives bread a flavor that is nutty and simply makes you want to go after another slice. We hope it will catch on as we happen to like good bread.—THE EDITOR.

Not too long after World War II came to an end an Englishman, John Wright, came to Washington State University's division of industrial research with a request that they build him a flour mill.

He had been a biscuit (cracker) maker in England and the mill he wanted built was no conventional roller mill, but an apparatus in which the grain was driven against a series of sharp teeth at high speed by the action of a rotor.

Flour from the mill was fawn-colored and it contained all of the wheat kernel.

Washington State technicians built a mill, esperimented and improved, ran tests of flour. The home economists did baking tests with the flour and Silver Loaf baking company in Spokane even did commercial consumer acceptance tests with bread baked from the flour.



Wheat is fed into the fast-turning stator from the tube at top center and after a half turn the flour is blown out the two side tubes.

Leonard Fulton, president of Fairfield Milling Co., pulls handle to allow Unifine flour to flow into bag.

Three sizes of Unifine flour bags are shown here—25, 10 and 5 pounds. Note the 5-pound sack of rye flour. Any type of grain can be made into flour in Unifine mill.

They called the flour UNIFINE because of the fact that the flour contained the entire wheat berry ground to a uniform fineness never found in common whole-wheat flour.

Consumers who tried the bread liked its nutty whole wheat flavor and in the commercial tests it sold 11 per cent of the market tested—about equal to the demand for wholewheat bread.

The technicians issued a report in 1950 and then for 10 years no one heard much about Unifine flour. The Englishman was reported in Seattle where he tried to interest a miller in the process with no success, but then he, too, seemed to disappear.

And then just about two years ago Unifine came out of oblivion with a brief story in the Spokane Chronicle and Portland's Commercial Review announcing that a new company had been incorporated to mill it.

The firm is Fairfield Milling, Inc., and its mill, wheat bins, scouring equipment and sacking department are housed in a section of Fairfield Grain Growers seed house at Fairfield, Wash. Fairfield Grain Growers, a local member of North Pacific Grain Growers, in addition to leasing building space to the new firm also provides wheat cleaning services.

Fairfield Milling company's incorporators include Leonard Fulton, president; Joe Fulton, vice president; Julius Spielman, secretary-treasurer, and W. B. Temple, Spokane Technical and Vocational school cooking instructor.

The people who did the original work on the Unifine mill might not recognize it at first glance today. The original was a Rube Goldberg device of wheels and pulleys and belts and the rotor housing, about 15 inches in diameter, stood on its side. The mill built for Fulton at WSU is almost twice as large as the original and the stator drum (actually the mill itself) sits horizontal atop an 80-horsepower motor to which it is directly coupled. The original mill was fed from one inlet on a point on the outside surface of the stator and the wheat made one revolution of the mill's circumference coming out by air pressure at a point just short of where it entered.

"We discovered one thing in experimenting with the Unifine mill," Fulton says today. "The wheat does not have to make a complete revolution. It is ground by the time it's only half-way around."

As a result, Fairfield Milling's Unifine mill has two feed tubes and two outlet tubes and where the original experimental mill started overloading when it reached a capacity of 275 pounds per hour, the new mill will do 650 to 700 pounds an hour without strain.

Marketing of Unifine is handled directly by the company with Fulton doing most of the delivering himself. His routes include Moscow-Pullman to the south, Kettle Falls-Colville north, Coeur d'Alene to the east and "a little bit into Othello and Moses Lake." The flour is packaged in 5, 10, 25 and 50-pound bags, the last being for several small commercial bakeries which are baking bread from Unifine. Milling is gauged to demand.

Fulton, who lives on the same farm on which he was born east of Fairfield, experiments with wheat varieties for Unifine and has himself succeeded in growing Montana hard wheats of 14-16 protein. He has tried Gaines in one blend and finds it works beautifully.

"But the thing to remember with the Unifine mill is that we are after quality, not quantity," Fulton points out.

Azure Standard

1995-Present

The food cooperative Azure Standard is committed to the non--retail distribution of organic and otherwise holistic food products. They distribute direct to the consumer using consumer middlemen or drop off points for their semi-trucks that distribute to 29 western states. The Stelzer family runs this eclectic operation and Mr. Albert Stelzer is the patriarch. He had "been pestered" by an associate of Mr. Fulton's about the merits of the Unifine flour mill, contending that it was the perfect holistic system to process their grain. He became aware that Fulton's mill languished in the corner of a building at the Fairfield Grain Grower's site, and for a modest sum acquired the mill and supporting infrastructure in 1995.

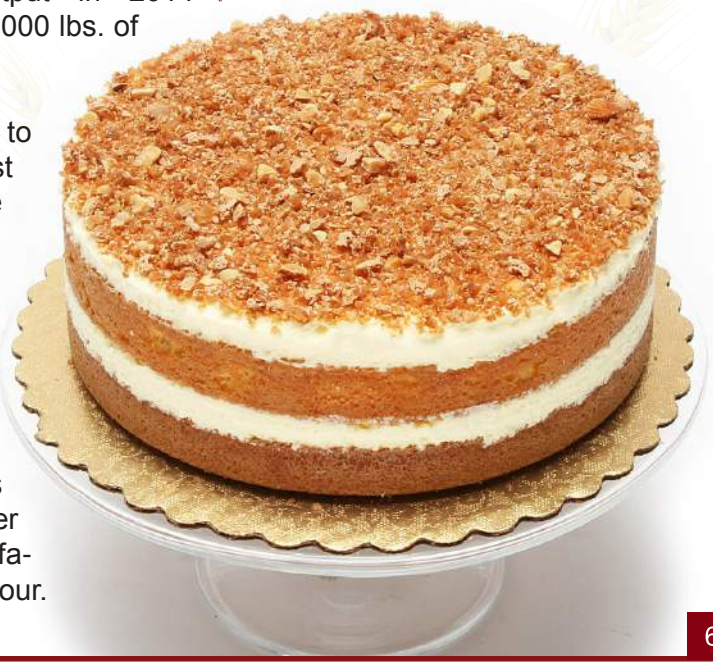
Stelzer reassembled the mill at their Dufur, Oregon site and even though it had been operated for over twenty years, found that it was still quite adequate at producing flour. They used the mill for four years, producing 400,000 lbs. of flour/year. In 1999, at a substantial expense, they had it reverse engineered and fabricated three new mills. They attempted to promote the quality of the flour produced by the mill, but they had more success with consumer word of mouth promotion.

While Azure Standard has not aggressively promoted the merits of Unifine milled flour, demand has steadily increased. Output had risen to over 600,000 lbs. per year when, in 2006, Fulton's grand nephew Steve happened to do a Google search for Unifine. He discovered they were using the term Unifine to describe their mill and attributes about the flour it produced that could only be attributed to this milling system. Unaware that they had acquired his Uncle's mill and/or reverse engineered the fabrication of three new mills, Steve Fulton reached out to the Stelzer family, and a new chapter in the Unifine story began.

The demand for Azure Standard Unifine flour has continued to increase with output in 2014 approaching 2,000,000 lbs. of flour/year.

It is significant to note that when first offered, their whole grain pastry flour for cakes and cookies initially sold one to every two bags of hard red wheat bread flour to their home bakers. That has increased to over three to one in favor of the pastry flour.

Consumers are finding that Unifine mills not only are outstanding for bread flour, but the very fine whole grain pastry flour can be adapted for cake, cookies and other pastries. They not only get adequate "fluff" that consumers prefer, but-they are discovering the same thing that artisan bakers are finding with whole grain bread flour; the "nutty" tastes and smells that come along with whole grain are so much more lively and exciting when the soul of the kernel hasn't been removed. A passionate artisan whole grain baker made the observation that baking with white flour is comparable to wine made from grapes that first had the skin removed. Whole grain baking is not a new concept, but it does pose manageable challenges for a baker who is trained in white flour baking. These changes are worth the effort though, as the increasing number of whole grain converts can testify to.



A Personal Reflection;

Re-engaging Washington State University and the world... the future???

"I was born in 1948, a year after (then) Washington State College Director E. B. Parker made the key note address at a regional Operative Miller's convention. He extoled the "miraculous" potential of the Unifine Mill prototype developed at the College. At that time, the Spokane, WA Silver Loaf Baking Company was conducting successful regional consumer and campus student acceptance tests of bread baked with fine whole grain Unifine milled flour. The next year, Graduate Student Mary Corbett Stevens published her thesis "A Study of Unifine Flour" and that was followed by the release of the WSC multi-department Unifine Mill Scientific Bulletin 206. Inquiries concerning the mill began coming into the campus from a variety of companies including the Boeing Company, Walgreen's, Gerber and Crissey. International inquiries were numerous and delegations actually traveled to the campus to see the mill from as far away as the country of Turkey. In addition to substantial coverage in regional newspapers, articles discussing the mill appeared in national publications including the Farm Journal and Baker's Digest speculating on the potential "revolutionary" impact of the mill upon "an old industry".

I was five years old in 1953 when my Great Uncle Leonard Fulton funded the fabrication of three commercial Unifine Mills, taking the invention from the prototype stage to a commercial mill. However, with the "Wonder Bread Builds Strong Bodies Eight Ways" theme playing in the background, the commercial (white) flour industry successfully muted efforts to promote the mill and its whole grain flour output.

On the one hand, Mr. John Wright, the English inventor who brought the concept to WSU with direct support of WSC President Compton commended the college's "admirable example of progress towards the protection of health & alleviation of hunger". He expressed his "concern to see the principle established, devoid of commercial interest." However, it wasn't long until President Compton complained of the "wrangling with milling companies" whose correspondence to the College unapologetically professed that the "principle utilization of wheat is in the form of baked goods made from white flour" and that "the promotion of Unifine flour is…short sighted, to say the least and most unworthy of the State College of the great wheat producing state of Washington".

WSC President Compton

I was fifteen years old in 1963 when my Uncle collaborated with regional farming leaders and our local farming cooperative. The first Unifine mill was placed in operation at Fairfield WA with considerable fanfare. For the next 26 years, that mill operated with my father often driving the delivery truck throughout the region, promoting the flour to grocery store manager's generally reluctant to put whole grain flour on their shelves. My mother worked with the recipes developed by Dr. Barbara McLaren's staff at the Home Economics Department at WSU and published several small Unifine recipe pamphlets. (Email me at unifine.mill@gmail.com and I'll send you one!)

I was a 30 year old manager with Pacific Northwest Bell in Seattle, enjoying life with my wife and three small children when Mary Corbett Stevens and her four associates started the second Unifine mill under the "Flour Girls" label. They had substantial regional support for their vision to promote the merits of whole grain flour and

the functionality of the very fine flour output of the Unifine mill. Launched in 1980, their marketing effort was a bit more successful than my Uncle's, but interest in the nutrition and the sensory experience of whole grains was anemic in the 1980's and early 1990's. The current break through of sifting this very fine whole grain flour to match white flour functionality was never considered. Their Flour Girls operation ended in 1996, six years after my Uncle's Unifine mill stopped distributing flour.

None of any of the followers of the Unifine milling were aware that entrepreneur, scientist, farmer, spiritualist and head of the successful collective "Azure Standard"; Mr. Albert Stelzer followed up on a tip he received from an associate of my uncle's. In the mid 1990's he contacted the Fairfield Grain Growers who were happy to quietly sell him the entire system my Uncle had operated for nearly thirty years for a modest sum. Mr. Seltzer's family set the mill up and, amazed at the quality of the output, stopped using their stone mill. After four years (at 400,000 lbs. /year) Azure Standard spent a substantial sum to reverse engineer the worn out mill. As stated earlier in this booklet, in 2015, with output approaching two million pounds/year they and their constituents have been obviously very pleased with the very fine flour output from their Unifine Mill.
In a chance random 2007 internet search, I happened to discover Azure Standard was using the "Unifine milled" phrase along with the hype I was familiar with to promote Unifine milled flour. I promptly sent an email to Mr. David Stelzer, President of Azure Standard with a "tongue in cheek" threat to have my ancestors haunt him. Mr. Stelzer soon informed me he was sleeping like a baby because Azure Standard, in fact, had acquired my Uncle's system (where it remains today, reverently stored at their facility). That began a very warm relationship that ran from 2008 through 2015. During that time, I reacquainted various WSU Departments and the USDA Wheat Lab with their legacy with this invention. Three WSU Design Clinic teams were funded to work with private sector specialists (primarily highly respected Wisconsin based flour milling engineer Guy Arkin of Arkin Sales). A multi-year comparative functionality and quality test involving scientists from the USDA Wheat lab and WSU staff was also conducted with their scientific paper (see poster on page 18) presented at the 2012 AACC International convention. The results were generally favorable to the very fine whole grain flour output of the Unifine system compared to that of stone and roller mills.

Anxious to get consideration of this unique system back on track, I happily invested some of my inheritance funding much of the research done at WSU. I have to acknowledge that the USDA Wheat Lab staff and various representatives from several departments have been incredibly gracious, receptive and sacrificially supportive of (not to mention patient with….) my enthusiasm. Ultimately, Oregon based Associated Welding and Machining who had fabricated the mills for Azure Standard were retained to fabricate a mill with some new (patent protected) modifications that have improved performance and output. Our friends at Azure were not only gracious enough to take the new mill and a fully updated milling system in for testing, but did a significant remodel of their milling facility in the process. The yearlong operational test was a success and, since that time, our milling system has been removed for relocation. Azure has opted to develop their own system design using in house expertise and their own consultants. We wish them well and will support them in any way possible.

In concert with the research and developmental efforts on the mill itself, in multiple meetings spanning several months, discussions were held with the WSU campus trademark office, Creamery, Food Science and the USDA Wheat lab in consideration of a proposal to Unifine mill "Cougar Golden" flour on campus. "Cougar Golden" Unifine flour was to complement our campus produced "Cougar Gold" cheese and Ferdinand's ice cream. Ultimately the logistics were too daunting and, instead "Unfine Flour Brands" was given the license for "Cougar Pride" to provide royalties to the University for flour products Unifine milled off campus.

"Cougar Pride" pancake and waffle mix is being sold at campus and commercial outlets in Pullman, WA. In 2015, Unifine Mill LLC will be partnering with a regional farming cooperative, providing the milling system in a joint venture to expand our "Cougar Pride" product line with both a whole grain flour and the revolutionary "Tawny White" white flour replacement.

Re-localization is already underway. Here at "Farm Ground FLour" in upstate New York, a local farmer was offloading grain for milling when I stopped by for a visit.

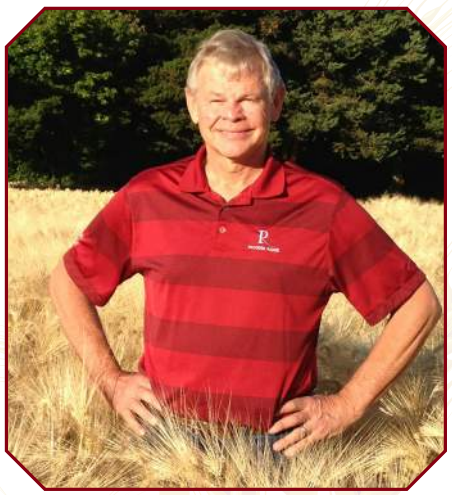
As mentioned in an earlier article, even with ascendant demand for whole grain products, commercial white flour still represents 94% of the commercial flour produced in the U.S. Targeting that market is truly a significant milestone in the evolution of the "re-localized" vision that is a key element of the holistic Unifine flour milling system. The development of a revolutionary new white flour replacement, produced more cost effectively and offering the consumer a more nutritious and tasty flour is huge! It puts massive momentum to the rural profit centers of both commercial flour milling and baking.

As of this writing, we are working with a Royal City, WA venture that will be launching a five Unifine Mill modular system fall of 2015. First year whole grain, organic output is anticipated to exceed ten million pounds of Unifine milled whole grain, organic flour. At the same time, we're seeking a joint venture in the Palouse region, using our mill that successfully operated for the past year. The latter joint venture will produce WSU licensed, royalty producing "Cougar Pride" flour that will be milled at this facility, providing well-deserved royalties to the University to be distributed throughout the region and, ultimately, nationwide.

We look forward to the profit centers of flour milling and related baking enterprises being added back to the world's farming economy. We also look forward to upgrading the primitive milling systems in the developing world, a roll the durable Unifine mill has long been anticipated to undertake for over a half century. Senator Hubert Humphrey's U.S. Congress Foreign Relations committee seriously considered inclusion of the mill in the 1950's in our Foreign Aid program and as mentioned earlier in this booklet, U.S. Embassy's, including Afghanistan speculated on the significant impact this durable system will have on the primitive flour milling infrastructure that still dominates the developing world.

I'd like to close with a "clarification of intent". I'm now the sole member of Unifine Mill LLC and echo Mr. Wright's sentiment that my enthusiasm is "devoid of commercial interest". In addition to updating the research and development of this unique mill, I've "patent protected" unique upgrades to this system and those patents have been issued. Myself and fellow inventors have submitted another round of patents and anticipate their approval, coming under the protection of Unifine Mill LLC.

The patent effort was solely to assure the cost effective proliferation of this unique holistic milling system. The reality that this movement should continue to anticipate resistance was underscored by the hacking of my email account in early 2015. With key addresses in hand, my efforts with Unifine were subjected to a slanderous hoax conducted by a private investigator that doesn't exist, employed by a firm that is also non-existent. I share this in this public forum as we've attempted to expose this hoax, but to those we have not reached, I assure you that my motives are pure and I appreciate your objective interest.



Steve Fulton
Grand Nephew of Leonard Fulton
President, Unifine Mill LLC and
Unifine Flour Brands LLC

The *EVOLVED* Unifine Milling System

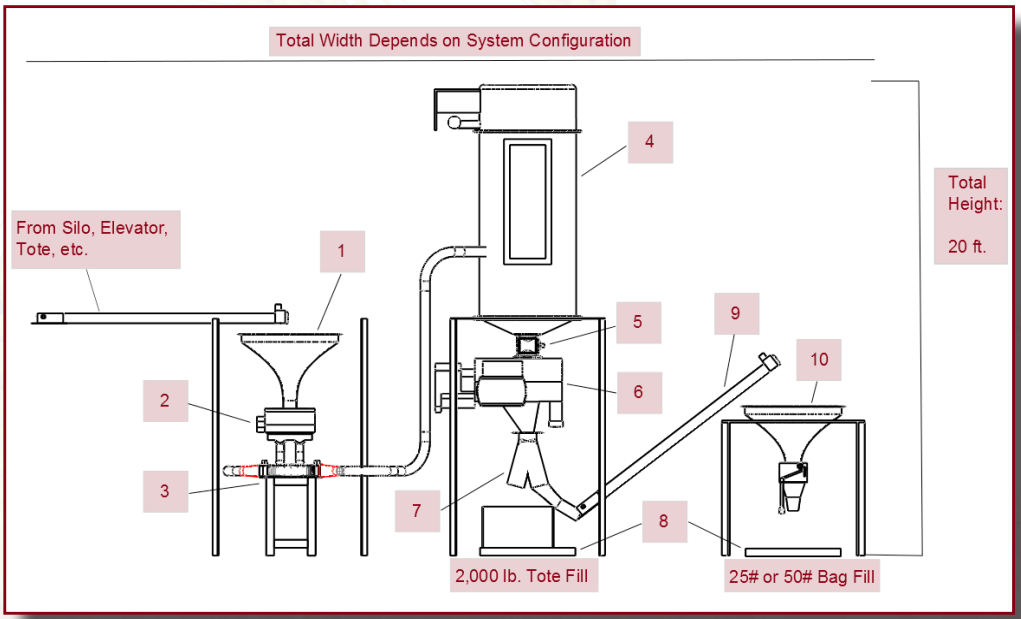
It became obvious working with the Fall 2012 semester Washington State University Engineering Design Clinic team that a number of customers wanted a total solution: a complete system of matched components that would feed the mill and efficiently transport ground flour to a packaging line.

This warranted yet another Design Clinic Team tasked to work with industry experts to identify equipment from other manufacturers that would fully optimize the whole grain production of the Unifine Mill. The challenge was to find components that matched the mill's performance and met design goals for low cost, safety, ease of use, simple assembly, low maintenance, and a small footprint.

The students and our team worked closely with Guy Arkin and his team at Arkin Sales. They were ultimately retained to fabricate two "towers" containing the supporting infrastructure they recommending for a modularized system. These towers were delivered to a completely updated milling facility at the Azure Standard facility in Dufur, OR in January of 2014. The Azure Standard team had the experience to install this system on their own, with some "localized" modifications. They began using this new system in March of 2014 and are giving it very favorable reviews as of this publication in April of 2014.

A unique feature of the Unifine mill is the massive amounts of air volume the rotor action generates propelling the flour from the mill and away from the "mill tower" that receives the raw grain and delivers it to the mill. As mentioned in the outline, this air volume is not only useful to bleed of the harmful heat that milling systems naturally generate but propels the grain to the "milling tower". The filter receiver that receives the grain from the mill is able to much more efficiently draw the grain from a Unifine mill than other whole grain milling systems that mainly engage the force of gravity to disgorge the flour from the mill. While most other systems each require a separate filter receiver, it's anticipated that the filter receiver we've selected for our system will be able to support up to ten Unifine Mills.

The modularity that the air volume generated by the Unifine mill makes possible is a distinct advantage for the Unifine system. In a fairly small production space, a milling tower supporting one to ten mill towers, each with its own Unifine mill, has a production range of two million to four million lbs. of flour/year for one mill on an eight hour production shift to a high of twenty to forty million pounds of



Item #	Name
1	Surge Hopper
2	Rotary Feeder
3	Unifine Mill
4	Filter Receiver
5	Rotary Airlock Feeder
6	Rotary Sifter
7	"A" Valve
8	Floor Scale
9	Screw Conveyor
10	Bagging Scale

flour/year if ten Unifine mills are engaged. It's important to note that this theory has not actually been put into practice, but the air volume statistics required to keep the flour in suspension clearly support this outcome.

The mill tower contains a surge hopper, a rotary feeder, and the Unifine Mill. The surge hopper utilizes level indicators to control the flow of grain into the hopper to ensure a constant supply of grain for the mill. The rotary feeder maintains a regulated, consistent feed rate to optimize the mill's performance, and also contains a Bliss Industries 10" heavy-duty plate magnet to remove metal debris that may still be present in the raw grain. The Unifine Mill receives the clean grain through two stainless input ports and discharges finely ground flour through two stainless output ports. The grain entering the mill immediately collides with the mill's blades rotating over 22,000 lineal feet per minute. The high speed of rotation and engineered tolerances within the mill cause the grain to "explode" instantly into a fine flour. The grinding process further refines the flour for another 180 degrees until it exits the mill in as little as 30 milliseconds.

The milling tower contains a filter receiver, rotary airlock, sieve, and "A" valve. The highly efficient filter receiver separates air from the flour with a 99.96% efficiency rate, eliminating the additional cost incurred by other solutions that require piping to exhaust the discharged air outside. The filter receiver also utilizes a variable speed fan to create a vacuum that draws flour from the mill, eliminating the flour dust emissions and explosion hazards inherent with pressurized systems. The flour than passes through an 8x8 rotary airlock which maintains a consistent flow rate from the pressurized filter receiver to the sieve operating at atmospheric pressure. The sieve enables farming cooperatives to further reduce the particle size for more demanding customers, which is becoming an even more critical issue with the flour needs of the health and gluten-free industries. The output of the sieve is fed into an "A" valve, which can be switched to drop the flour directly into a 2,000 pound tote or onto a conveyor to feed the end-user's packaging line.

What Unifine Mill LLC is offering is just the Unifine Mill and we are recommending Arkin Sales as our preferred vendor for the complete milling system solution. They have over thirty years of experience finding flour milling system solutions and offering new and used milling system equipment that they independently warrantee and support. To reduce installation time and cost, component wiring is performed by Arkin Sales at their factory. Wiring for each device runs to a single electrical panel which contains all the controls for the mill, including relays. All you need to provide is a building, a 440V 3-phase power source, equipment to feed grain into the surge hopper, and 2,000 pound totes and/or a conveyor to transport the finished flour to your packaging line.

These systems are designed to mill both a 100% whole grain flour product and a whole wheat "extracted" product with roughly half the bran sifted out. The latter flour, described previously in the booklet as a "T-85" product is aimed directly at the commercial and residential baking market that prefers the functionality of baking with white flour. This locally milled extraction flour not only offers similar functionality but includes the great sensory experience and nutrition of all the germ and roughly fifty percent of the bran elements of the grain.

The cost appeal of the Unifine milling system is very favorable. On that point, we'd appreciate your contacting us directly for more a detailed quote. However, the primary benefits of the system are the attributes of the Unifine mill itself. Alternative milling systems include "hammer mills" and "stone mills". Hammer mills grind the grain with rotating hammers and utilize a screen to keep the grain in the mill until the particle size is small enough to pass through the screen. Over time, the hammers wear and, during operation, the screens clog, increasing down time and operating costs. Stone mills have dramatically improved in functionality over the years, but their end product remains course. Furthermore, stone mills utilize two rotating millstones that require redressing at regular intervals to maintain efficiency. Fully dressing a pair of stones can take 3 days. Therefore, when compared to other mills the ultra-fine particle size of Unifine milled flour has always, of course, been the key attraction. However, beyond affordability and the "turnkey" appeal of the Unifine Mill LLC system, an additional general key benefit of the Unifine Mill itself is lower operational cost and significantly lower long-term cost-of-ownership due to its unmatched durability and low maintenance.

Unifine Mill, LLC
www.unifineflour.com
(for the Unifine mill sales)

Arkin Sales Inc.
P.O.Box 415 • 2575 Cady Drive
Reedsburg, WI 53959
ArkinSalesInc.com

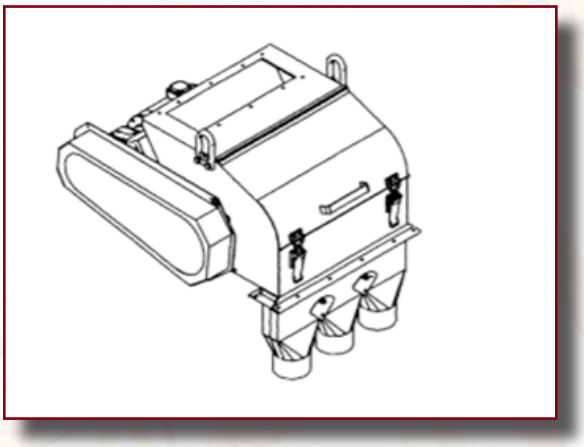
Pre-Mill Surge Hopper

Description: The pre-mill surge hopper stores grain before it flows into the rotary feeder. Grain flows from the current storage unit (tote, grain silo, conveyer, etc.) into the surge hopper. The flow of grain into the surge hopper is controlled by a level monitor, which in turn controls the speed of the conveyor. This allows for a constant volume of grain available to the next piece of equipment, the rotary feeder.

Dimensions: Total dimensions are 4' tall and 3' in diameter.

- 75 cubic feet total volume

Rotary Feeder



Description: The Bliss Industries rotary feeder is used to control and split the flow of grain into the Unifine Mill. It uses a gear motor to power a rotor in the path of the grain. The grain flows from the surge bin above through the rotary feeder and into the Unifine Mill, at a consistent and uniform rate, which increases the productivity of the mill. Included in the rotary feeder is a Bliss Industries 10" HD plate magnet. The plate magnet removes any ferrous metal debris that may be present before milling.

Dimensions: The overall dimensions of the rotary feeder are 12" wide, 30" long and 25 ¼" tall.

- The rotary feeder has two 4" output ports (shown as three in diagram).
- 1 HP motor

Evolved Unifine Mill*

Description: The Unifine Mill* utilizes an efficient, holistic, one-pass, dry impact milling process. It instantly produces an ultra-fine whole wheat flour with a particle size comparable to nutritionally benign white flour and, unlike white flour, preserves the wonderful aromas and great tastes provided by the bran and germ elements. Grains flow from the rotary feeder above the mill into two stainless inlet ports. In one pass the grain is pulverized into flour and exits the mill through two stainless outlet ports. The ground flour then flows into the next device, the filter receiver.

Dimensions: The overall dimensions of the Unifine mill are 4' wide, 4' long by 4.5' tall.

- 30 HP Hp explosion proof motor
- Stainless steel covers and ports for durability and easy cleaning
- Hardened steel blades and stator for prolonged durability
- Dynamically balanced for smooth operation.
- Adjustable air gates for precise adjustment of airflow to accommodate a variety of grains

*Patents Pending

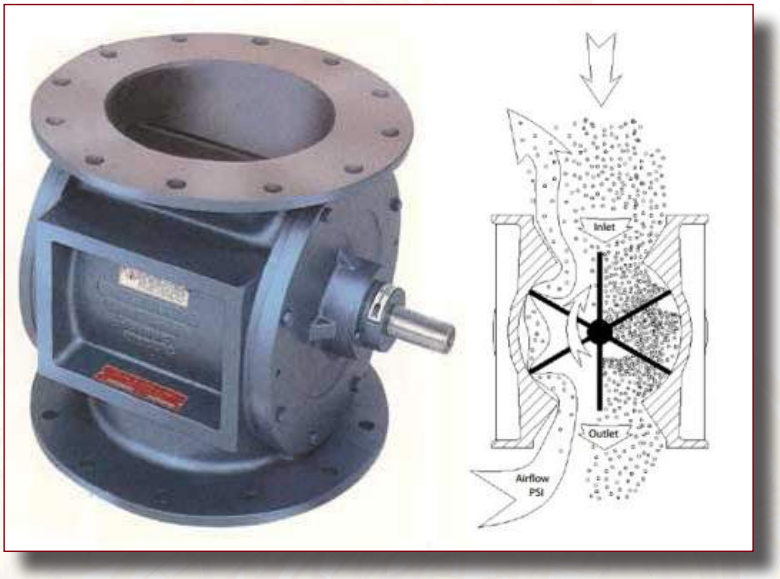
Filter Receiver

Description: The Kice VenturiJet filter/receiver model VR-16 separates the milled flour from the airstream. The filter contains a number of bags which trap and direct the flour. High pressure (80-100 PSIG) compressed air continuously cleans the bags to keep the filter clog free. The filter receiver feeds into the Meyer & Sons rotary airlock feeder.

Dimensions: Overall dimensions of the product are 119” tall (plus mounting stand height if required) by 48” diameter.

- Contains 16 tubes, each at a length of 94”
- Total filter area of 149 square feet
- 3 HP motor

Rotary Airlock Feeder



Description: The Meyer & Sons Model SDR 8x8 rotary airlock feeders are used in the bulk processing industry to allow material to flow accurately and in consistent, standard flow rates, from one pressurized area to an area of different pressure. For the Unifine Milling system, it allows the flour to flow from the pressurized Kice filter/receiver to the Kemutec centrifugal sifter.

Dimensions: The overall dimensions of the rotary feeder are 13 ½” diameter by 12” tall.

- Internal diameter of 8”
- 8-hole bolt pattern
- ¾ HP motor

Rotary Sifter

Description: The Kemutec centrifugal sifter model K650 SS is designed to receive the flour from the rotary airlock feeder and sift it before it enters the gravity splitter “A” valve. The sifting process removes any particles that are too big or not meant to be in the flour, which results in a uniform, consistent flour size and quality. The sifter is the final stage in the flour processing chain. The Unifine mill produces a fine particle size that is perfect for most ground products. The sifter allows a manufacturer to create one or more “premium” products aimed at connoisseurs willing to pay for a fineness not found anywhere else in the industry.

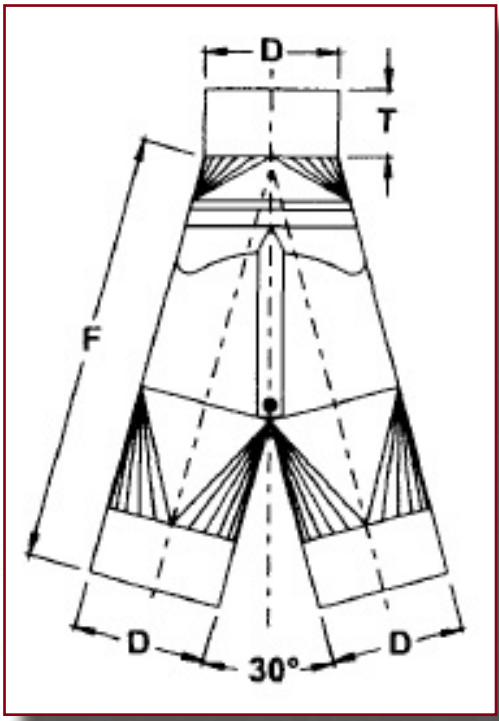
Dimensions: The overall dimensions of the centrifugal sifter are 64” long, 23” wide and 34” tall.

- 5 HP motor

“A” Valve

Description: The Kice industries “A” valve part number 51A8 receives flour from the Kemutec sifter, and allows the option of diverting the flour to either a bulk tote on a floor scale, or to the Schlagel U-Trough and Conveyer. This “A valve” is manually operated.

Dimensions: The overall dimensions of the “A” valve are 8” in diameter (dimension D), with a total pipe length of 23” (dimension F).



Floor Scale

Description: This generic floor scale is used to measure the weight of the tote or bulk bagging packages.

Dimensions: Overall dimensions unavailable. (generic unit)

Screw Conveyor

Description: The Schlagel screw conveyor rotates the processed flour from the “A” valve to the Post-Mill Surge Hopper.

Dimensions: The U-Trough is 9 inches wide, length is 10 feet.

- 1 HP motor

Post-Mill Surge Hopper

Description: The post-mill surge hopper stores flour before it flows into the rotary bagging scale. Grain flows from the conveyer into the surge hopper.

Dimensions: Total dimensions are 4’ tall and 3’ in diameter.

- 75 cubic foot total volume

Bagging Scale

The S2200 Electronic Screw Valve Packer is designed to simultaneously fill and weigh multi-wall or plastic valve bags with a wide range of dry materials. This unit is a single speed packer designed to bring to customers an economical auger packer with electronic weighing. The S2200 valve bag filler is economical, accurate, and a reliable valve bagger.

Standard Features

- Platform bag chair
- Pneumatic bag clamp assembly
- Stainless steel screw and filling tube
- P.C. Digital controller for accurate weighing, user friendly

Optional Features

- Stainless steel construction
- Manual pivot bag chair
- Automatic start switch

Conveyor & Bag Sealer

Description: The optional Chatland Exit conveyer and bag sealer is located after the JEM Bagging Scale, and allows the transfer of material from the bagging scale to a bag sealer. There are various options available for bag sealing, depending upon your needs. These include valve-pack bagger, heat seal bagger, and sew bagger, along with an optional stretch wrapper unit, which automatically wraps a full pallet of filled bags for storage and shipping.

Dimensions: Overall dimensions are approximately 10’ long, 2’ wide and 4’ tall.

- 1 HP motor

Additional Items

Nordfab Quick Fit Ducting

- Used for all piping between individual components
- Stainless steel

EMS Autoload Minder Control

- Controls the Bliss Industries rotary feeder
- Allows an amperage ceiling limit to be set for the rotary feeder
- Ensure consistent flow to minimize clogging

Flex Connectors

- Allows ease of system testing during installation
- Reduces installation time and cost
- Not used for final installation, replaced with Nordfab Quick Fit ducting

Monitor Level Indicators

- Monitors the level of grain and flour in hoppers and bins
- Integrates with the EMS Autoload minder control system
- Eliminates the possibility of an overflow or underflow condition
- Warns operator if flow is interrupted and hopper is low or empty

Influences of Mill Type on Baking Properties and Lipid Oxidation of Whole Grain Wheat Flour During Storage

B.-K Baik[1], E.P. Fuerst[1,2], T. Harris[1], E.A. Wegner[2], and S. Fulton[4]

[1]Department of Crop and Soil Sciences, Washington State University, Pullman, WA
[2]USDA-ARS Western Wheat Quality Laboratory, Pullman, WA
[4]Unifine Flour, LLC, Arlington, WA

Abstract

Whole grain wheat flour from hard red and soft white wheat varieties was prepared using a stone mill, a Unifine (impact) mill, and a roller mill, and characterized for particle size, starch damage, lipid oxidation, and bread baking quality during storage. Roller-milled whole wheat flour was produced by blending white wheat flour with bran re-ground using a pin mill. Stone-milled whole wheat flour had a much coarser particle size distribution, whereas particle size distribution was similar for Unifine- and roller-milled flours. Stone-milled whole wheat flour also exhibited greater starch damage than Unifine- and roller-milled flours in both hard and soft wheat. Fat acidity and hexanal content, indicators of rancidity, were lower in stone-milled whole wheat flour compared to Unifine and roller-milled flours during storage up to 24 months. Unifine-milled whole wheat flour exhibited lower hexanal content than roller-milled flour in both hard and soft wheat, despite similar particle size distributions. No apparent differences in mixograph water absorption and mixing time of whole wheat flours were observed among mill types and storage durations. Unifine-milled whole wheat flour tended to produce greater bread loaf volume than stone- or roller-milled flours when baked with or without addition of gluten to attain 18% protein after storage for 6 to 18 months.

Introduction

Whole grain foods are receiving increased attention from consumers and food manufacturers due to the health benefits associated with the increased content of dietary fiber, vitamins, minerals and bioactive phytochemicals compared to refined grain products. Whole grain wheat bread has become the most popular consumer food, yet our understanding of the optimal method of milling wheat grain to obtain whole wheat flour is limited. Milling methods could have tremendous impacts on processing and product quality as well as nutrient availability of the resulting whole wheat flour. Various milling processes used for preparation of whole wheat flour could impart uniquely different physical stresses on the wheat grain and flour particles, thus resulting in variation in functional properties. We investigated the effects of three different milling methods on physical characteristics, lipid oxidation and baking quality of whole wheat flours.

Materials & Methods

Wheat grain

- Hard red wheat cultivar 'Hank' 9.3% moisture
- Soft white wheat cultivar 'Stephens' 10.9% moisture

Whole wheat flour specifications

- 80% of flour passed through #70 sieve (212 μm) and <10% retained over #20 sieve (850 μm)

Milling and storage of whole wheat flour

- Stone Mill: 'Europemill EM-25/250', 25 cm diam, horizontally mounted; flour was run over a #70 sieve and overs were re-milled; after the third pass, whole wheat flour specifications had been met; grain was not tempered.
- Unifine Impact Mill: Manufactured by Azure Standard; single pass through the mill; whole wheat flour specifications were met; grain was not tempered.
- Roller Mill: 'Miag Multomat' (3 break, 5 reduction); bran fractions were re-milled on a 'Blendtec Kitchen Mill' pin mill and then blended with refined flour; whole wheat flour specifications were met. Prior to milling: hard red wheat tempered to 14.5%; soft white wheat tempered to 13%.
- Storage of whole wheat flour: 0, 6, 9, 18 & 24 months at 23°C.

Functional properties of WWF

- Particle size: Determination of proportion of flour particles <125, 125-210 & >210 μm using a ATM sonic sifter
- Starch damage: Approved Method 76-31 of AACCI
- Lipid oxidation: Approved Method 02-02A of AACCI
- Pan bread baking: Approved Method 10-10.03 of AACCI

Results

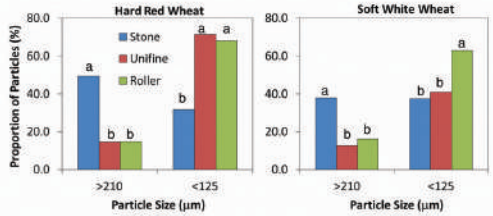


Figure 1. Effect of mill type on proportions of whole wheat flour particles >210 μm or <125 μm. Bars with different letters indicate significant differences at $P<0.05$.

Stone-milled whole wheat flour contained a much higher proportion of coarse particles (>210 μm) and a lower proportion of fine particles (<125 μm) than Unifine- and roller-milled whole wheat flours.

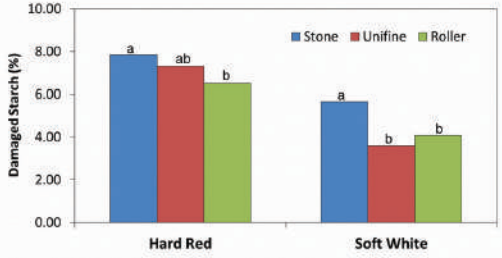


Figure 2. Effect of mill type on whole wheat flour starch damage. Bars with different letters indicate significant differences at $P<0.05$.

Stone-milled whole wheat flour had greater starch damage than Unifine- and roller-milled whole wheat flours for both hard red and soft white wheat. Unifine-milled whole wheat flour exhibited intermediate starch damage in hard red wheat and lowest starch damage in soft white wheat.

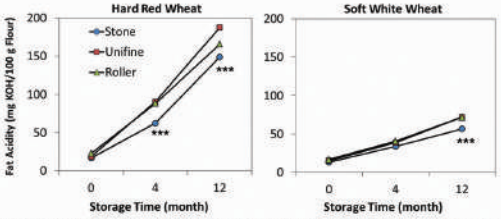


Figure 3. Effect of mill type and storage time on whole wheat flour fat acidity as an index of lipid oxidation during storage. ***indicate significant differences at $P<0.001$ between mill types.

Unifine- and roller-milled whole wheat flours exhibited higher fat acidity than stone-milled whole wheat flour after 4 and 12 months of storage in both hard red and soft white wheat. Fat acidity was much higher in hard red than in soft white whole wheat flour after 4 and 12 months of storage.

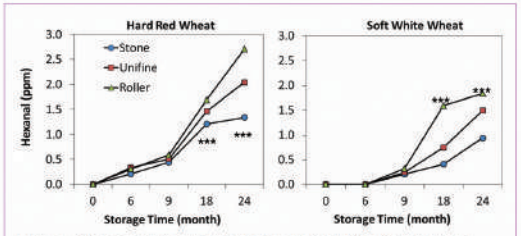


Figure 4. Effect of mill type and storage time on whole wheat flour hexanal content as an index of lipid oxidation. ***indicates significant differences at $P<0.001$ between mill types at the specific storage time.

Hexanal is a major lipid oxidation product and an indicator of rancidity. Hexanal content of whole wheat flour was similar among mill types through 9 months of storage, but showed differences at 18 to 24 months of storage. Hexanal content was highest in roller-milled, intermediate in Unifine-milled and least in stone-milled whole wheat flour.

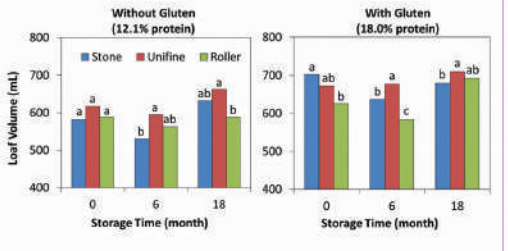


Figure 5. Effect of mill type and storage time on whole wheat bread loaf volume. Bars with different letters indicate significant differences at $P<0.05$.

Unifine-milled whole wheat flour tended to produce greater loaf volume than stone- and roller-milled flours during storage for 6 to 18 months, both with and without added gluten.

Conclusions

- The stone mill produced more coarse particles and fewer fine particles of whole wheat flour than Unifine and roller mills.
- The stone mill caused greater starch damage than the Unifine and roller mills.
- The Unifine and roller mills exhibited higher fat acidity of whole wheat flour than the stone mill after four months of storage.
- Roller milled whole wheat flour was highest in hexanal content was after storage for >18 months.
- Unifine-milled whole wheat flour tended to produce slightly greater bread loaf volume than stone- and roller-milled whole wheat flours.
- This study indicates that mill type has significant effects on properties of whole wheat flour and the quality of whole wheat products.

Acknowledgements

Azure Standard (Dufur, OR) kindly prepared the Unifine-milled hard red and soft white whole wheat flours for this study.

For More Information

Visit our website **www.unifinemill.com**

For current Unifine news go to
www.unifinerevolution.com

Notes: