

## SWECO Separators family of machine sizes

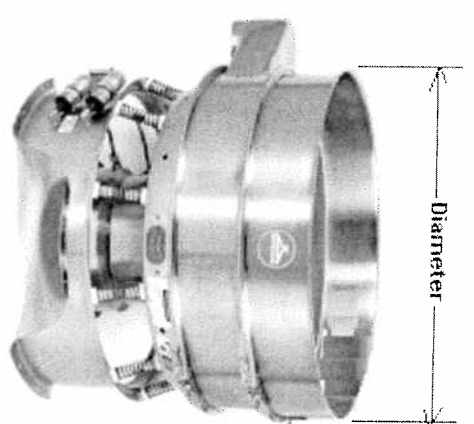
Machine Diameter	Spout diameter	Square feet of screen surface area*	Motion Generator Horse Power	Maximum Discharge Spout Capacity** in Cubic Feet per Minute (CFM)	Theoretical spout discharge capacity for a free flowing material weighing 45 lbs per cu ft in lbs/min(ppm)	Actual discharge capacity for stone ground wheat based on the 2-6-09 tested rate of 13.5 lbs per minute through 4 mesh (4.75 mm opening)
18"	3"	1	0.25			13.5 ppm(=0.3 cfm)
24"		2	0.33			
30"	6"	4	0.5	2.1 cfm	95 ppm	54 ppm (=1.2 cfm)
40"	8"	6	0.5	2.9 cfm	131 ppm	81 ppm (=1.8 cfm)
48"	8"	10	2.5	3.2 cfm	144 ppm	135 ppm (= 3 cfm)
60"		15	2.5			
72"		23	5			

\*NOTE: screen capacity is a limiter function of screen surface area:  
for example; if 30" can do 4 lbs per minute, a 40" will do 6 lbs, and a 48" 10 lbs

\*\*NOTE: this spout discharge capacity rating is for bulk solids that are dry and very free flowing and where the coarsest particle in the feed distribution is at least 4x smaller than the screen opening

\*\*\*NOTE: these are maximum theoretical capacity ratings.

Other ingredients, especially those that are cohesive (ex., brown sugar) will flow through the screen much more slowly. Except for the most free flowing materials the screen is usually more of a bottleneck than the discharge spout.



Wash Area

Bakery Ovens

Bread Line

Hopper

OLD scaling Area

Wegman's

Bakery Optimal

layout with Sifter(s).

Hot Dogs Area

Bakery Racks & Pans

Existing Equipment

Sifter 1

Sifter 2  
(if necessary)

1

Mixers

2

8/20/09 Wegmans

Ingredient #	Ingredient Name	Sift (Y/N)	Allergent (Y/N)
72175	Gran Sugar	Y	N
88740	1/2 Grain Blend	Y	N
297837	B&V Flavor	Y	N
72388	Breadmate	Y	N
82917	Breadmate	Y	N
82583	Brown Sugar	N	
247068	Buttermilk Blend	Y	N
82919	Buttermilk Blend	Y	N
72375	Canadian Oat Base	Y	N
82921	Caravan Rye 1/2 Base	Y	N
72386	Cinnamon	Y	N
20510	Corn Sugar Seeds	Y	N
80853	Course Cracked Wheat	Y	N
72411	Dakota Specialty		
281070	DM		
282329	DM	Y	N
18029	DOH Conditn AA	Y	N
18047	DOH Conditn AA	Y	N
84853	Double Spice		
72278	Dry Dmat Non Diastatic	Y	N
84892	Dry Dmat Non Diastatic	Y	N
72407	Dry Molasses	Y	N
72275	Dry Molasses	Y	N
82551	EZ Kaiser Base		
72274	EZ Potato Base	Y	N
19125	EZ Potato Base	Y	N
10872	EZ Sour	Y	N
722251	EZ Sour	Y	N
72242	Gran Sugar		
84795	Ground Caraway	Y	N
82605	Hearty Bread Base	Y	N
84794	Hearty Bread Base	Y	N
72378	Med Granulated Sugar	Y	N
72190	NF	Y	N
72316	NF	Y	N
72319	Non-Fat Dry Pro (Promix)		
72925	Non-Fat Dry Pro (Promix)		
291834	Ooessa Pump Base		
262510	Omega 3 Powder		
72175	Potato Base (Vanderburgh)		
88140	Salt Superior		
297837	Salt Superior	Y	N
72388	Seasoning (For seasoned stuffing bread)		
82917	Soy Flour		
82583	Specialty Stoneground	Y	N
247068	Specialty Stoneground	Y	N
82919	Stay Soft W	Y	N
72375	Stay Soft W	Y	N
82921	Stoneground	Y	N
72386	Stoneground	Y	N
20510	Ultra Grain	Y	N
80853	Vital Wheat Gluten	Y	N
72411	Vital Wheat Gluten	Y	N
18029	Watson Honey Bran Base		
72407	Watson Lite Wheat Base		
82551	Watson Lite White Base		
10872	Watson Lite White Base		
84795	Watson Oat Bran Base		
9213	White Rye Flour	Y	N
82401	Whole Caraway Seeds		
10882	Yeast		
72414	Yeast		

unflower seeds  
464-4600

326!

Lee / safety  
container

Non Dairy Toix Y/N

Malted Y/N

whole wheat Y/N

GL 7 Y/N

Non Rye Y/N

cornmeal 1/4  
wheat 1/10  
cra 1/10  
caraway, seeds 1/4  
pump base 1/10  
EZ p.c.a 1/10

stone, bran base 1/4  
lipo flour 1/4  
wheat Berry stem 1/4

## Statement of Design Objectives

The purpose of this design study is to create an air handling system to reduce dust and airborne particulate density. The result of the design study will be utilized for picking out an existing machine system that can be purchased off the shelf for Wegmans. The design will be completed while meeting all OSHA safety regulations and Wegmans company regulations.

**Preliminary Risk Assessment**

The purpose of this document is to identify any potential issues that could hinder on the completion of the project. Once the risks are identified, they are ranked with severity and probability. Likely causes as well as preventive actions are pointed out in the case that the risks materialize.

Date: 3/24/2020

Project: **Bread and Roll Sealing Room**  
Submitted by: **Grant Garbach and Andrew Tsai**

**Risk Level**  
1 - Low  
2 - Medium  
3 - High

State Action	Potential Problem	Severity	Probability	Likely Cause	Preventive Action	Contingent Action
1	Team member availability	2	3	Company interviews, schedule changes, personal emergencies	Advance notice to the team	Other team members will pick up the work load
2	Turbulent air in facility	1	1	High shear forces (Viscous)	Flow quality improvements (expensive)	Redesign to account for turbulence
3	Access to needed resources	1	2	RIT or Wegmans does not have needed resources available	Determine needed resources and alternatives	Use one of the alternative resources
4	Access to necessary data from Wegmans	2	3	Data or statistics are not available or do not exist	Determine what information is available or needs to be collected	Make appropriate assumptions based on knowledge learned in classes
5	Access to Wegmans employees/engineers	1	1	Employee too busy or has schedule conflict	Establish a standard schedule	Find other employees within Wegmans who possess the same skills
6	Inproper assumptions for calculations	2	2	Assumption was made with current best practices	Check assumption during reviews	Make changes to the assumptions and re-perform the analysis
7	Customer doesn't like/improve initial design	3	2	Wegmans cannot accommodate equipment	Check with customer for major design decisions that impact facility	Make adjustments to design as necessary
8	Not enough time for equipment designing and analysis	3	2	Analysis becomes more in depth, algorithms are too long	Calculate estimate equipment load based on best assumption	Facility intervention
9	Facility does not accommodate machine needs	3	1	Wegmans' growth projection is too aggressive	Reconfirm Wegmans' growth projection	Recommend increased storage area
10	Equipment solutions cannot meet ergonomic needs	2	1	Fat reaching, or bending is required	Adjust control location	Investigate other solutions that would be closest to optimal
11	Safety of machinery	3	1	Did not consider safety during equipment / concept selection	Add in safety as one of the criteria for selectors	Talk with sales rep regarding safety concerns
12	Supplier product don't work and not responding to questions	3	2	Did not consider supplier service during selection	Add in supplier service during selection	Wegmans prefer to deal with existing supplier, which reduces the chance of supplier service issue
13	Machinery not performing up to spec	3	1	Did not perform testing before ordering machinery. Supplier send a different machinery	Perform testing before ordering machinery. Fill out order form correctly.	Work closely with sales rep.

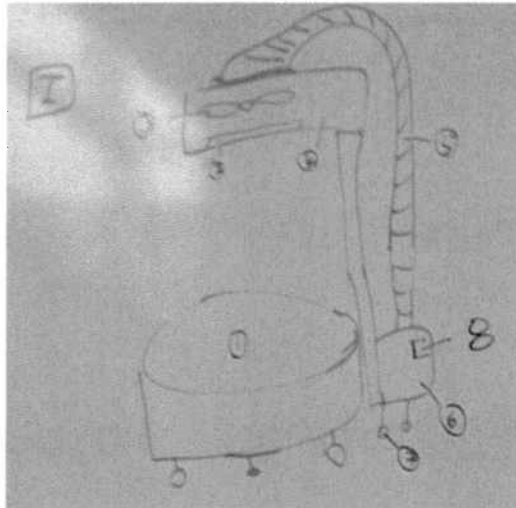


## **Performance Goals and Specifications**

The performance goals are: Increasing the air quality in a given space. Reducing the air particulate density levels below an appropriate threshold of  $.5\text{mg}/\text{m}^3$ . Increasing the time between cleanings to 480 minutes due to the reduction of airborne particulate. A major design goal is to minimize the room the proposed design to occupy. The design should meet all OSHA standards. The unit should be compatible with the current manufacturing facilities power systems. The proposed design will meet all safety requirements of the Wegmans Corporation. The unit should not interfere with current processes at the facility. The unit should be able to be cleaned and maintained easily while meeting all Wegmans and OSHA regulations and guidelines.

## Concept Documentations:

### I. MOBILE UNIT



#### **Descriptions:**

This will be a stand-alone unit that is on wheels. The fan will be located on top of the sifter to ventilate the mushroom cloud created by dumping the ingredients into the sifter. The dust will travel through the pipe and be collected at the bottom where the vacuum bag is located. The exhaust will exit through the bottom as well. The number on the picture is corresponded as follow.

1. Sifter
2. Screen
3. Fan
4. Stand (backbone of the structure)
5. Piping
6. Motor and vacuum bag
7. Wheels
8. On and off switch
- 9.

#### **Good:**

- Small
- Mobile
- Easy to use

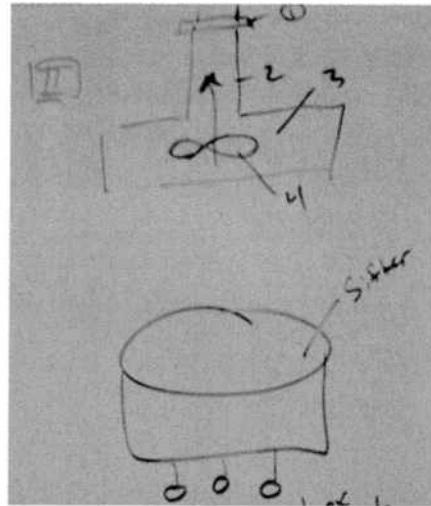
#### **Bad:**

- Concept includes stagnation points
- Creates turbulence
- Noise concern
- Tip corners (unstable?)
- Weight?



- Exhaust on the ground could kick up dust into the air contaminating the ingredient batch

## II. STRAIGHT UP



### **Descriptions:**

This machine is similar to the ventilation system used in the kitchen. The dust will be collected at a central location and the exhaust will exit out of the factory. The number in the picture is corresponded as follow.

1. Filter
2. Fluid transport (piping)
3. Intake
4. Fan

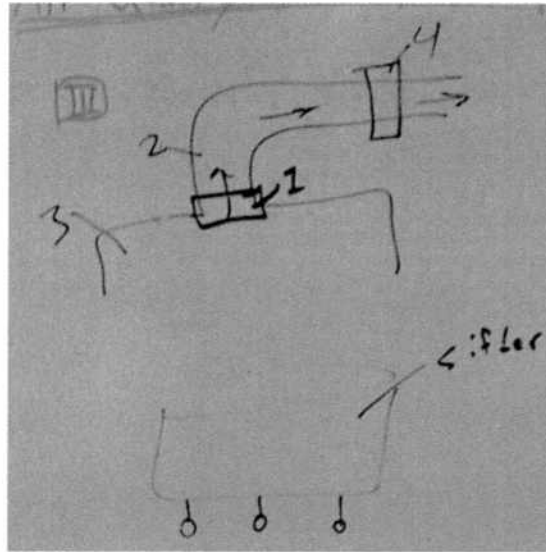
### **Good:**

- Centralized system will save space
- Could utilize more power
- Wider area of intake

### **Bad:**

- Not mobile
- Hanging vacuum could be a safety concern
- Will need more power to operate

### III. RIGHT TURN



#### **Descriptions:**

Similar concept as the previous one, but this one has a turn at the top. The number in the picture is corresponded as follow.

1. Filter
2. Fluid transport (piping)
3. Intake
4. Fan

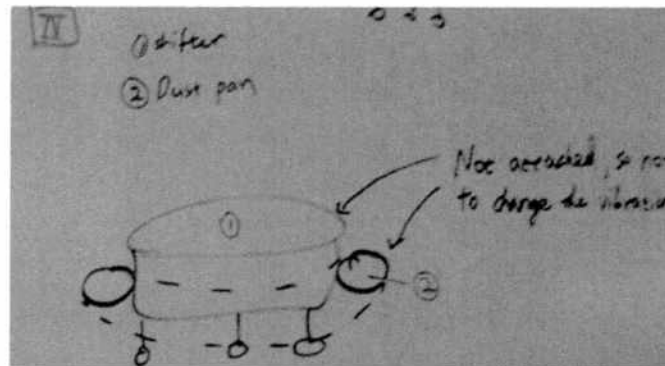
#### **Good:**

- Centralized system will save space
- Could utilize more power
- Wider area of intake

#### **Bad:**

- Not mobile
- Hanging vacuum could be a safety concern
- Will need more power to operate

## VI. DUSTPAN



### **Descriptions:**

This is just a dustpan that surrounds the sifter. It will wait until the dust cloud settles and collects the dusts. The number in the picture is corresponded as follow.

1. Sifter
2. Dustpan

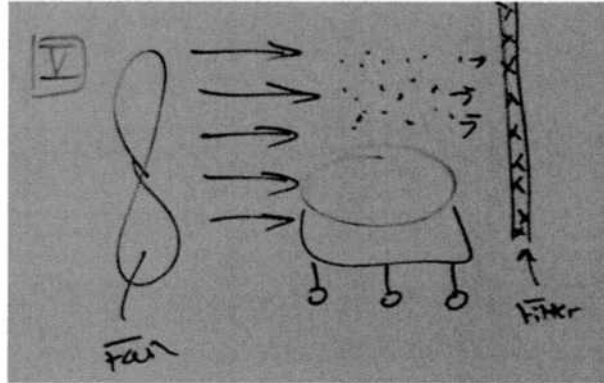
### **Good:**

- Cheap
- Easy to use
- Simple design
- Mobile

### **Bad:**

- How to attach to sifter?
- Weight (Vibrates with the machine? Change the vibration of the machine?)
- Does not actively collect the dust cloud
- Obstruct worker's movement

## V. BIG FAN



### **Descriptions:**

This design uses a fan to blow the dust clouds past the sifter through the filter.

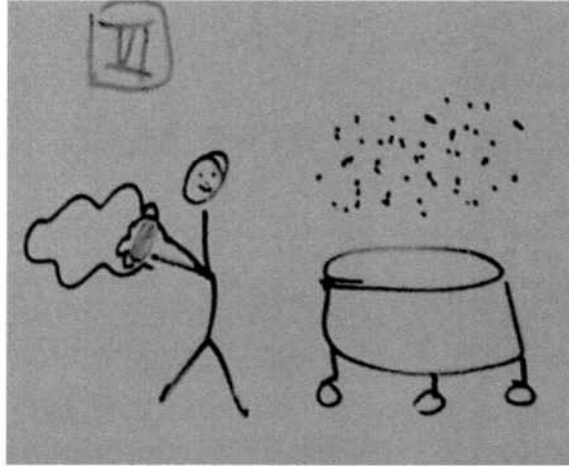
### **Good:**

- Outside the box design
- Simple

### **Bad:**

- Not practical to have that large of a fan blowing during process
- Obstruct worker's movement
- No filter that large
- Creates turbulent in the air flow creates safety issue
- Will end up blowing dust everywhere

## VI. BAG



### **Descriptions:**

Basically this is where one worker will wave a butterfly net through the dust cloud to collect the dust.

### **Good:**

- No design required
- Will be reliable (no machinery down time)
- Parts are cheap

### **Bad:**

- Extra labor cost
- Slow down the process
- Safety issue

## VII. WATER



### **Descriptions:**

The water will spray from fire hose like system. The water will cling to the dust particulates and be pulled down. The cone shaped part on top of the sifter will keep the water out and there will be a slow blowing fan to blow the dust upward. The fan will not disturb the water particles outside the cone.

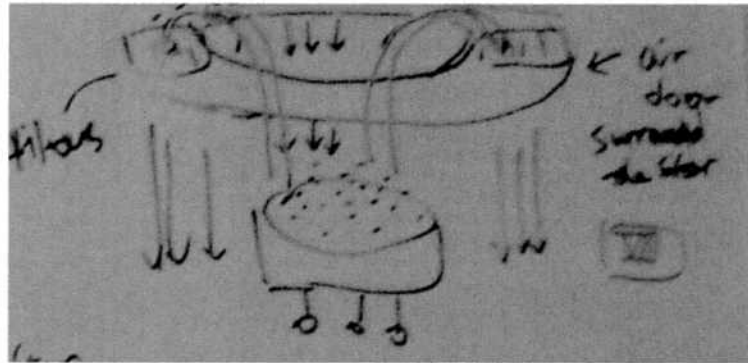
### **Good:**

- Will definitely clean the air
- Easy to design
- Keep itself clean

### **Bad:**

- Water everywhere causing safety issue
- Disrupt workers in the area
- Waste water

## VIII. WAL-MART



### **Descriptions:**

This is similar to the air door design at the store that keeps the outside air from entering. This design will collect the dust cloud through air intake and filter up top and sends the clean exhaust downward to create the air door.

### **Good:**

- Innovative
- Isolates the area (create a clean room like environment inside)

### **Bad:**

- The design will not work base on simple engineering analysis
- Cost
- Disturb more particles in the air
- Increase contamination



		Concepts			
		Mobile	Straight up		
		1	2		
		Segment			
Selection Criteria	Weight	Rating Notes	Wtd	Rating Notes	Wtd
Size	9%	9	0.81	9	0.81
Go/No Go*	30%	9	2.70	9	2.70
Cost	30%	3	0.90	3	0.90
Reduce Particulate size	9%	3	0.27	9	0.81
Increase time between Cleanings	9%	9	0.81	9	0.81
Meets OSHA standards	9%	9	0.81	9	0.81
Safety Engineers Rating of design feasibility	9%	9	0.81	9	0.81
	15%	3	0.45	9	1.35
Total Score		7.56		9.00	
Rank		2		1	
Continue?		No		Yes	

Scale	
1	Worst
3	
9	Best

\*Note: Go no go criteria includes, servicability, ability to change filters, steel grade geometric discontinuities, ability to stay laminar, mobile and washable.

q=4.587	(kg m <sup>3</sup> )/sec								
rho=1.27	kg/m <sup>3</sup>								
Option	A1	A2	V1	V2	K	Hlm	% difference		
1	1.4864	0.1652	3.0859	27.7730	0.9	107.131			
2	1.4864	0.1652	3.0859	27.7730	0.4	47.614	125.00		
4	1.1675	0.1297	3.9289	35.3610	0.04	7.7187	516.87	1287.941	

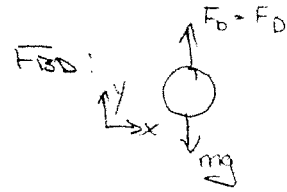
This fluid results table summarizes the results from custom design 1, 2 and 3. Their values were calculated in the spreadsheet called "fluid problem." It gives a summary of how the fluid flow behaves at the inlet and exit of the system. It also shows a computation of the headloss and its percent difference between the different design iterations and the ideal iteration and the base design (first iteration). All values are in standard metric.

# Wegman's Creeping Flow Problem

$$\rho_{\text{air}} = 1.2 \text{ kg/m}^3 \quad \rho_{\text{flour}} = 700 \text{ kg/m}^3 \approx 4 \text{ kn} \quad (4816/\text{ft}^3)$$

$$C_D \frac{1}{2} \rho V^2 A + \rho V g \quad \leftarrow \text{Derived From FBD}$$

$$V = \sqrt{\frac{2(\rho_p - \rho_{\text{air}})g \frac{V}{A}}{C_D \rho_{\text{air}} A}} \quad A = \frac{\pi D^2}{4} \quad V = \frac{\pi D^2}{6}$$



$$\sum F_y = F_D + F_B - mg$$

$$\text{height} = 2.5 \text{ m} = 8.2 \text{ ft}$$

$$V = \sqrt{\frac{2(700 \text{ kg/m}^3 - 1.2 \text{ kg/m}^3)(9.81 \text{ m/s}^2)(\frac{V}{A})}{(24)(1.81 \times 10^{-5})(1.2)(\frac{2(0.0001)}{3})}}$$

$$V = \frac{(\rho_p - \rho_{\text{air}}) a D^2}{18 \mu} = \frac{(700 - 1.2)(9.81)(0.01 \times 10^{-3})}{(18)(1.81 \times 10^{-5})} = 0.0001 \text{ m/s}$$

$$V = DT \quad 0.0001 \text{ m/s} = 2.5 \text{ m}(t)$$

$$t = \frac{0.0001}{2.5 (\text{sec})} \left( \frac{60 \text{ sec}}{1 \text{ min}} \right) \left( \frac{60 \text{ min}}{1 \text{ hr}} \right) = \boxed{1.44 \text{ hrs}}$$

Dust particle settling time



Addison Precision Mfg.  
 500 Avis Street  
 Rochester NY  
 14615

Phone: 585.254.1386  
 Fax: 585.254.5342

**Quote Number: 42773**

**QUOTE**

Page: 1

Please refer to this quote number when placing an order.

<b>Quote To:</b> Grant Garbach Rochester Institute of Technology 1 Lomb Memorial Drive Rochester NY 14623	Date: 04/16/09 Expires: 05/16/09 Reference: Sales Person: House Account Quoted By:  Refer Technical Questions To:
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Phone: 585-269-8988

Line	Part Number	Description	Revision	Drawing
1	W689000	Wegmand Squarehood1	None	
			Lead Time: 8 weeks	
		<i>Quoted using 316SS</i>		
		<u>Quantity</u>	<u>UM</u>	<u>Unit Price</u>
		1.00	EA	2,295.00000
				<u>Extended Price</u>
				\$2,295.00
2	W689000-001	Wegmand Squarehood1, Fan Box	None	
			Lead Time: 6 weeks	
		<i>Quoted using 316SS</i>		
		<u>Quantity</u>	<u>UM</u>	<u>Unit Price</u>
		1.00	EA	495.00000
				<u>Extended Price</u>
				\$495.00
3	W689000-002	Wegmand Squarehood1, Filter Box	None	
			Lead Time: 6 weeks	
		<i>Quoted using 316SS</i>		
		<u>Quantity</u>	<u>UM</u>	<u>Unit Price</u>
		1.00	EA	495.00000
				<u>Extended Price</u>
				\$495.00
4	W690000	Wegmans SS Round 1, Nozzle Intake	None	
			Lead Time: 10 weeks	
		<i>Quoted using 316SS Round</i>		
		<u>Quantity</u>	<u>UM</u>	<u>Unit Price</u>
		1.00	EA	4,925.00000
				<u>Extended Price</u>
				\$4,925.00

APM reserves the right to revise order pricing as a result of inflation and/or fluctuations in the materials market.

**\$8,210.00**

**Grand Total:**

**IQ Air:**  
 Company Name – IQ Air  
 Product Model – GCX AM  
 Price – \$2239.00

**Technical Information**

Specifications		GC Series	GCX Series	Dental Series
<b>Maximum air delivery *</b>		260 cfm	300 cfm	260 cfm
<b>Air delivery for all six fan speeds (in cfm) *</b>		15, 70, 130, 140, 170, 260	45, 85, 130, 170, 210, 300	15, 70, 130, 140, 170, 260
<b>Dimensions (W x D x H)</b>		15" x 16" x 28"	15" x 16" x 40"	15" x 16" x 28"
<b>Weight (incl. filters &amp; cartridges)</b>		from 39 to 46 lbs.	from 59 to 74 lbs.	from 41 to 42 lbs.
<b>Power requirements</b>		120 Volt / 60 Hz		
<b>Maximum energy consumption</b>		215 w		
<b>Fan motor</b>		790 cfm, 2750 rpm, centrifugal, backward curved, UL/CSA registered		
<b>Control panel</b>		4 key touch pad with 32 character LCD display		
<b>Air intake</b>		dual arches at base of unit		
<b>Air outlet</b>		320° EvenFlow™ diffuser		
<b>Color of main housing / locking arms</b>		light grey / blue	light grey / blue	light grey / white
<b>Housing material</b>		non offgassing, impact resistant, UV stabilized ABS		
Performance				
<b>Performance certification</b>		every system is factory certified and issued with individual Certificate of Performance		
<b>Certified filtration efficiency</b>		greater than 99% for particles > 0.3 microns (um)		
<b>Certified air delivery</b>		± 10% (± 30 cfm) of specified air delivery		
<b>Leak tested</b>		yes		
Filter / Cartridge Configuration				
<b>Pre-filter</b>	Type: Purpose: Media type: Surface area:	High efficiency HEPA fine dust pre filter: control of coarse and fine dust particles, protection of subsequent filters HEPA class H13, prepleated with solvent free separators		
		30 sq.ft.	39 sq.ft.	33 sq.ft.
<b>Gas &amp; odor filter (Set of 4 cartridges)</b> (weights are approx.)	Type: Purpose: Media type:	gas and odor control cartridges control of specific odors and chemical contaminants		
		<b>MultiGas:</b> 12 lbs granular activated carbon & impregnated alumina <b>YOC:</b> 10 lbs granular activated carbon <b>Chemisorber:</b> 13 lbs granular impregnated alumina (with KMnO <sub>4</sub> impregnated) <b>AM:</b> 11 lbs granular impregnated carbon	<b>MultiGas:</b> 2 lbs granular activated carbon & impregnated alumina <b>YOC:</b> 17 lbs granular activated carbon <b>Chemisorber:</b> 31 lbs granular impregnated alumina (with KMnO <sub>4</sub> impregnated) <b>AM:</b> 21 lbs granular impregnated carbon	<b>Pro:</b> 11 lbs granular impregnated activated carbon <b>Hg:</b> 11 lbs granular impregnated activated carbon
	Chemical and odor control:	<b>MultiGas:</b> wide range of gaseous organics and inorganic chemicals <b>YOC:</b> volatile organic compounds, solvents, etc. <b>Chemisorber:</b> formaldehyde, hydrogen sulfide, sulfur dioxide, etc. <b>AM:</b> ammonia and amines compounds		aromatic vapors and formaldehyde, insect vapors, formaldehyde, alcohol, acetone, combustion particles, plastic fumes, aerosols, paint fumes, tissue vapors and fine dust powder particles etc.
<b>Post-filter sleeves (Set of 4)</b>	Type: Purpose: Media type: Surface area:	post filter sleeves fine dust post filtration electrostatically charged fiber		
		6.5 sq.ft.	13.2 sq.ft.	6.5 sq.ft.
<b>Average Filter Life</b> <small>Based on 10 hours usage per day on speed setting 3</small>		Pre-filter: 6 - 18 months Gas & odor filter: 1 - 3 years Post filter sleeves: 1 - 3 years	Pre-filter: 6 - 18 months Gas & odor filter: 2 - 4 years Post filter sleeves: 2 - 4 years	Pre-filter: 6 - 18 months Gas & odor filter: 1 - 3 years Post filter sleeves: 1 - 3 years
Control Panel Features				
<b>Display languages</b>		English (default), French, German, Spanish		
<b>Features</b>		intelligent filter life monitor, filter life status LED, programmable timer (hourly/daily), 2 speeds timer status LED		
Accessories				
<b>Standard</b>		remote control (batteries included) set of casters	remote control (batteries included)	remote control (batteries included) set of casters Honeywell SecureCast™ kit
<b>Optional</b>		wall mount bracket, pre-foam high performance dusting, coarse dust pre filter		
Warranty				
<b>Warranty period</b>		1 year on parts and labor (excluding filters)		

All technical specifications are subject to change without prior notice.

\* Minimum: 110 lbs, 110 sq.ft.

www.iqair.com

Figure 1 -- Model Information from the Company

**Honeywell:**  
 Company Name – Honeywell  
 Product Model – 50250-N  
 Price – \$199.99

Home > Our Brands > Honeywell > Air Purifiers > True HEPA > 50250 Permanent True HEPA Air Purifier

**Honeywell**  
 50250 Permanent True HEPA Air Purifier

Model Number: 50250-N  
 Owner's Manual, Download Here (Get Acrobat Reader)    Availability: In Stock  
 Price: \$199.99

[Add to Cart](#)

**Now featuring permanent filtration!**

Great for large rooms! Honeywell True HEPA air purifiers are the best choice for reducing airborne allergens. In fact, surveys show that more doctors recommend Honeywell *envisera*® air purifiers to their patients than any other brand\*. It offers outstanding air cleaning performance with a permanent HEPA filter. The True HEPA filter removes 99.97% of common airborne pollutants as small as 0.3 microns from the air passing through it such as dust, pollen, tobacco smoke, mold spores and cat dander. In addition, it also helps reduce airborne viruses and bacteria.\*

The Honeywell glass fiber HEPA material helps remove airborne particles, viruses & bacteria without the use of chemicals or other treatments. It also includes an activated carbon pre-filter to help remove larger airborne particles and reduce common household odors. The patented 360 degree air intake and discharge maximizes efficiency, circulating and filtering the air up to 5 times an hour.\*

The permanent HEPA filter is easy to clean - simply vacuum about twice a year (depending upon use). No more expensive HEPA filters to replace! The Intelli-Check™ electronic filter indicator reminds you when to clean the HEPA filter and when to replace the carbon pre-filter. This model is most effective for large size rooms up to 374 sq ft.

- 3 speeds
- SurroundSeal™ Technology helps minimize air leaks and insure that the air passes through the filter capturing particles
- Recommended Room Size (LARGE - 17' x 22' (374 sq ft.))
- AHAM CADR Rating: 250 (Smoke)
- Replacement Pre-filter: 38002
- Made in the USA

\*As tested in accordance with ISO 16899. From the air that passes through the filter, 99.97% of particles is removed by every filter, including the amount of air processed, the pollution level and if the pollutant introduced air into the environment. Based on AHAM CADR certification in recommended room size.

Figure 2 – Model Information from the Company

**Shick:**

Company Name – Shick

Product Model – 9SF009A

Price – \$15,000

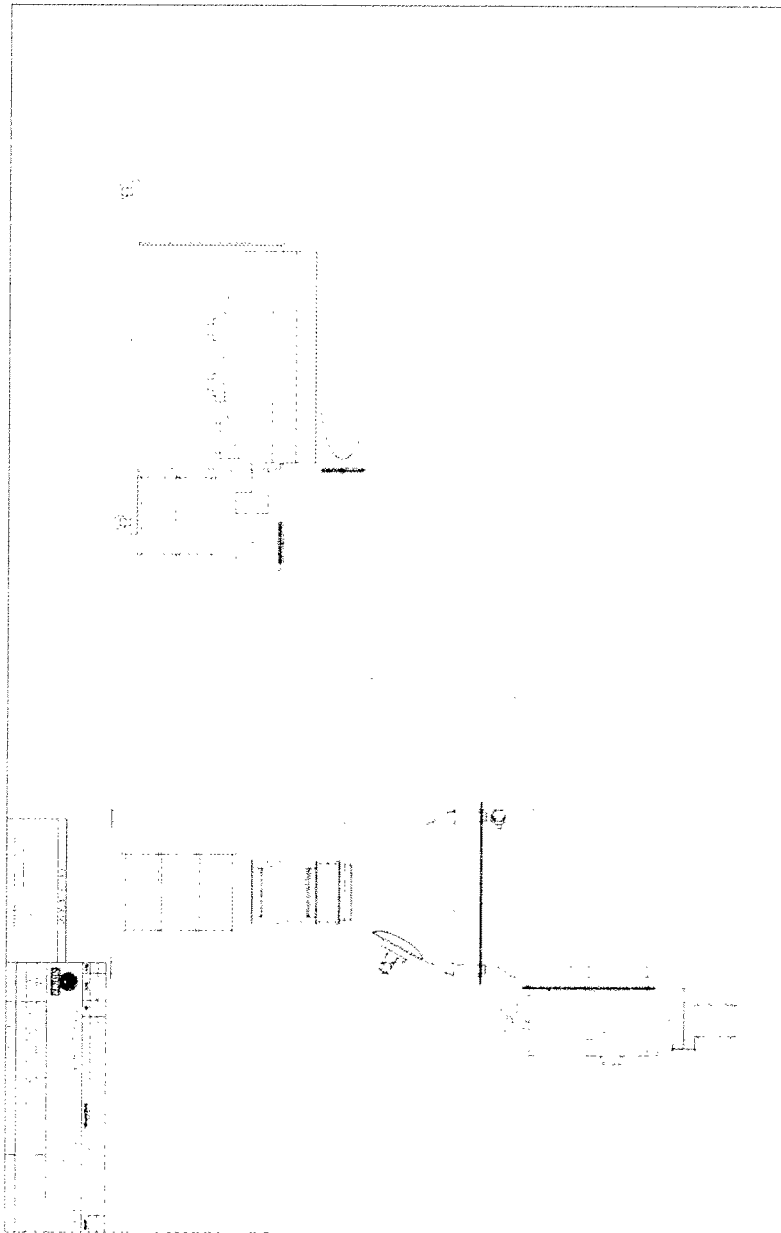


Figure 3– Model Drawing from the Company

**Kason:**

Company Name – Kason

Price – \$7277.00

Product Description – To provide the dust hood with an integral dust collector, including two  $\square$  filter cartridges, exhaust fan, and reverse pulse cleaning for the  $\square$  filters with Nema 4X control box.

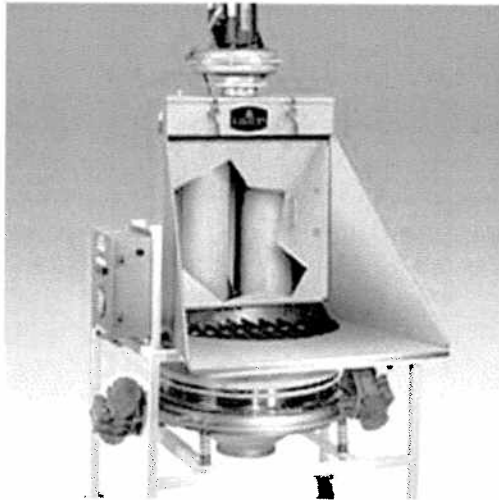


Figure 4 – Model Picture from the Company



### Air Handling Equipment Selection Matrix

### Concepts

Selection Criteria	Weight	Segment											
		IQ Air	Honeywell	Shick	Kason								
		Rating	Notes	Wtd	Rating	Notes	Wtd	Rating	Notes	Wtd			
Size	9%	9		0.81	9		0.81	1		0.09	9		0.81
Go/No Go*	30%	3		0.90	3		0.90	9		2.70	3		0.90
Cost	30%	9		2.70	9		2.70	1		0.30	3		0.90
Reduce Particulate size	9%	9		0.81	9		0.81	9		0.81	9		0.81
Increase time between Cleanings	9%	3		0.27	1		0.09	9		0.81	3		0.27
Meets OSHA standards	9%	3		0.27	3		0.27	9		0.81	9		0.81
Safety	9%	3		0.27	3		0.27	9		0.81	9		0.81
Engineers Rating of design feasibility	9%	3		0.27	3		0.27	9		0.81	3		0.27
Total Score		6.30		6.12		7.14		5.58					
Rank		2		4		1		3					
Continue?		N		N		Y		N					

Scale	
1	Worst
3	
9	Best

\*Note: Go no go criteria includes, servicability, ability to change filters, steel grade geometric discontinuities, ability to stay laminar, mobile and washable.



**Preliminary Risk Assessment**

The purpose of this document is to identify any potential issues that could hinder on the completion of the project. Once the risks are identified, they are ranked with severity and probability. Likely causes as well as preventive actions are planned out in the case that the risks realize.

This file is the same as the risk assessment posted on EDGE. The purpose of this file is to show that at the end of the Senior Design II period most of the risk did not realize and are therefore ignored at the completion of the project. The three risks that did not get crossed out are risks that could still occur if Wagnans decided to purchase this equipment. The preventive actions as well as control plan are detailed below if those risks realize.

Date: 3/24/2008

**Risk Level**  
1 - Low  
2 - Medium  
3 - High

Project: Broad end Roll Scaling Room  
Submitted by: Grant Garbisch and Andrew Tsai

Serial Action	Potential Problem	Severity	Probability	Likely Causes	Preventive Action	Contingent Action
1	Team member availability	1	1	High strain forces (Muscular)	Advance notice to the team Flow quality improvements (expensive)	Other team members will pick up the work load The equipment recommended for this task can handle turbulent air at mid
2	Turbulent air in facility	1	2	DIY or Mfg-grade steel not high enough resources available	Determine needed resources and alternative Estimate what information is available or needs to be collected	Use one of the alternative resources Make appropriate description based on knowledge learned in classes
3	Access to needed resources	2	2	Equipment too heavy to be moved in facility	Estimate what information is available or needs to be collected Check dimensions during reviews	Make appropriate description based on knowledge learned in classes Find other employees within Wagnans who possess the same skills
4	Access to Mfg-grade employees/craftspeople	1	4	Accession was made with current best practices	Check with customer for mfg design decisions that impact facility Make adjustments to design as necessary	Make adjustments to design as necessary
5	Inappropriate assumptions for calculations	2	2	Mfg-grade cannot accommodate equipment	Calculate estimate of equipment load based on best description priorities	Facility intervention
6	Customer doesn't like approve initial design	2	2	Analyze customer more in depth, adjust time and too long	Reconfirm Wagnans' growth projection	Recommend smaller unit as an addition to accommodate the growth
7	Not enough time for equipment designing and analysis	3	1	Wagnans' growth projection is too aggressive	Adjust control location	Set up procedure to outline ways for better work flow and ergonomics
8	Facility does not accommodate machine needs	2	1	Fer reaching or bending is required	Adjust in early phase of the estimate for adjustments	Talk with sales rep regarding safety concerns
9	Equipment solutions cannot meet ergonomic needs	2	4	Did not consider safety during equipment assessment selection	Add in safety phase of the estimate for adjustments	Wagnans prefer to deal with existing supplier, which reduce the distance of supplier services issue
10	Equipment solutions cannot meet ergonomic needs	2	4	Did not consider safety during equipment assessment selection	Add in safety phase of the estimate for adjustments	Work closely with sales rep
11	Supplier product don't work and not responding to question	3	2	Did not perform testing before ordering machinery. Supplier send a different machinery	Perform testing before ordering machinery. Fill out order form	
12	Supplier product don't work and not responding to question	3	2	Did not perform testing before ordering machinery. Supplier send a different machinery	Perform testing before ordering machinery. Fill out order form	
13	Machinery not performing up to specs	3	4	Did not perform testing before ordering machinery. Supplier send a different machinery	Perform testing before ordering machinery. Fill out order form	

## **Air Handling Equipment Test Plan**

The purpose of this test plan is to evaluate the performance of the equipment as compared with the supplier specs and Wegmans expectations.

The actual testing of air particles are done by third party vendor due to the high cost of the testing equipments needed.

Wegmans contacts a third party vendor (Bella Associates) to test the air quality at the bread making facility. This is done on a set schedule with selected vendor. During the test, air quality for the air ventilation system can be tested to verify the equipment spec. A representative from Shick should be present while the air quality tests are being performed. Wegmans should pay Shick after a successful test is completed and satisfactory results bases off specifications are documented.

The air quality should be such that the air particles will be smaller than 0.3 micron.

## **System Level Design Review For Air Handling Equipment**

The Wegman's Bakery Facility poses a safety and allergen hazard in the work place. The dust that is generated by the scaling operation and the movement of product contaminates product and is everywhere. Wegmans must constantly clean the room floor to make it safe for employees to walk. Also many employees choose to wear a dust mask to prevent "bakers lung" which is commonly caused by the breathable dust found in the facilities air. Poor circulation allows the air to hold a visible dust cloud, which is a safety concern for both employees and their working conditions. Individuals can reduce their risk of "bakers lung" by wearing the dust masks, but the contamination of product still remain an issue as well as the cleanliness of the floor. As the floor has more products deposited on its surface it becomes increasingly easier to slip and have an accident.

The implementation of a dust collection and air handling system would greatly reduce the risks of "bakers lung," contamination and dirty floors. The optimal solution of the Shick air handling system with filter would reduce the amount of the airborne particulates. The air handling system would allow workers to work without the use of a dust mask and reducing the issue with product on the floor. While dust masks are a great solution to the "bakers lung" problem it does not address or solve other safety, allergen and contamination issues. The Shick air handling system will address safety, allergen and contamination issues resulting in an improved quality in the work area. The Shick system is expandable, so when Wegmans grows another unit can be added.

There were four designs that were analyzed against customer specifications and performance criteria. The four designs were narrowed down so that there were only two acceptable designs. After doing a concept selection the Shick design being the best design based off the criterion. The Shick design was then analyzed using a detailed engineering analysis that confirmed the design is suitable for Wegmans.

**WEGMANS FOOD MARKETS INC.  
CENTRAL BAKERY OPERATIONS  
SANITATION STANDARD OPERATING PROCEDURES (SSOP's)**

This document contains trade/secret confidential commercial information pursuant to 5 U.S.C. sec. 552 (b) (4).

<b>AREA:</b> Bread Dept.	Date of original development: 5/02/09	Revision Number: 1	Supersedes:	Procedure Number: E.xxxxx Page 1 of 1
<b>EQUIPMENT:</b> Sweco Sifter	Revision author: Grant Garbach Revision Date: 5/02/09		Approved By: Date:	
<b>PRODUCT</b> Zep FS Chlor  Zep Apex Chlorfoam 14	<b>CONC.</b> Powder  2-4 oz. per gal.	<b>CLEANING PROCEDURE</b> <b>(OSHA Lockout Program must be used!)</b> (Refer to MSDS prior to use of any chemical product)		
<b>REQUIRED SAFETY EQUIPMENT</b>		<b>Cleaning procedures for Bread Mixers</b>		
Goggles/Face Shield	X	<ol style="list-style-type: none"> <li>1. Brush dust from sifter.</li> <li>2. With screen removed, scrape dust from bowl.</li> <li>3. Raise bowl until lip is chest high and add 0.1 gal. of Zep FS Chlor powdered cleaner.</li> <li>4. Rinse with hot water at the sink.</li> <li>5. It may be necessary to repeat cycle to get interior of bowl clean.</li> <li>6. Cover motor and control panel with plastic and secure with masking tape.</li> <li>7. When cycle is complete and bowl is clean, <b>disconnect power and perform lockout procedure to mixer.</b></li> <li>8. Rinse exterior of mixer with water hose. Apply Zep Apex Chlorfoam to mixer using portable foamer, and scrub with yellow brew tank brush</li> <li>9. Rinse with water hose.</li> <li>10. <b>Remove lockout</b> and restore power to sifter.</li> <li>11. Rinse interior of sifter with water hose.</li> <li>12. After sifter has dried, apply sanitizer using wall mounted spray application.</li> <li>13. Remove plastic from motor and panel.</li> </ol>		
Rubber Boots	X			
Gloves	X			
Lockout/ Tagout	X			
<b>TEST KITS</b>		<div style="text-align: right; margin-bottom: 10px;"> ←</div>		
Alkaline- Zep FS Chlor Powder	Zep Apex Chlorfoam 14			
<b>CLEANING FREQUENCY</b>				
Daily				
<b>CLEANED BY</b>				
See master list in Sanitation office				
<b>SPECIAL PRECAUTIONS</b>				
<i>Always wear proper protective clothing. Never add water to chemical, always add chemical to water. Place plastic bag on any electrical motor, plug, Etc. Report all accidents immediately!</i>				
<b>TOOLS AND EQUIPMENT</b>				
Scraper Putty Knife	Dust Pan Labeled Chemical Bucket			
<b>Legend</b>				
=Safety Concern! =Allergen Concern!				
<b>Wegmans Bakery</b> <b>1500 Brooks Avenue</b> <b>Rochester, N.Y.</b>				