IIoT and Remote O&M in the Food Industry

Webinar August 2, 2017

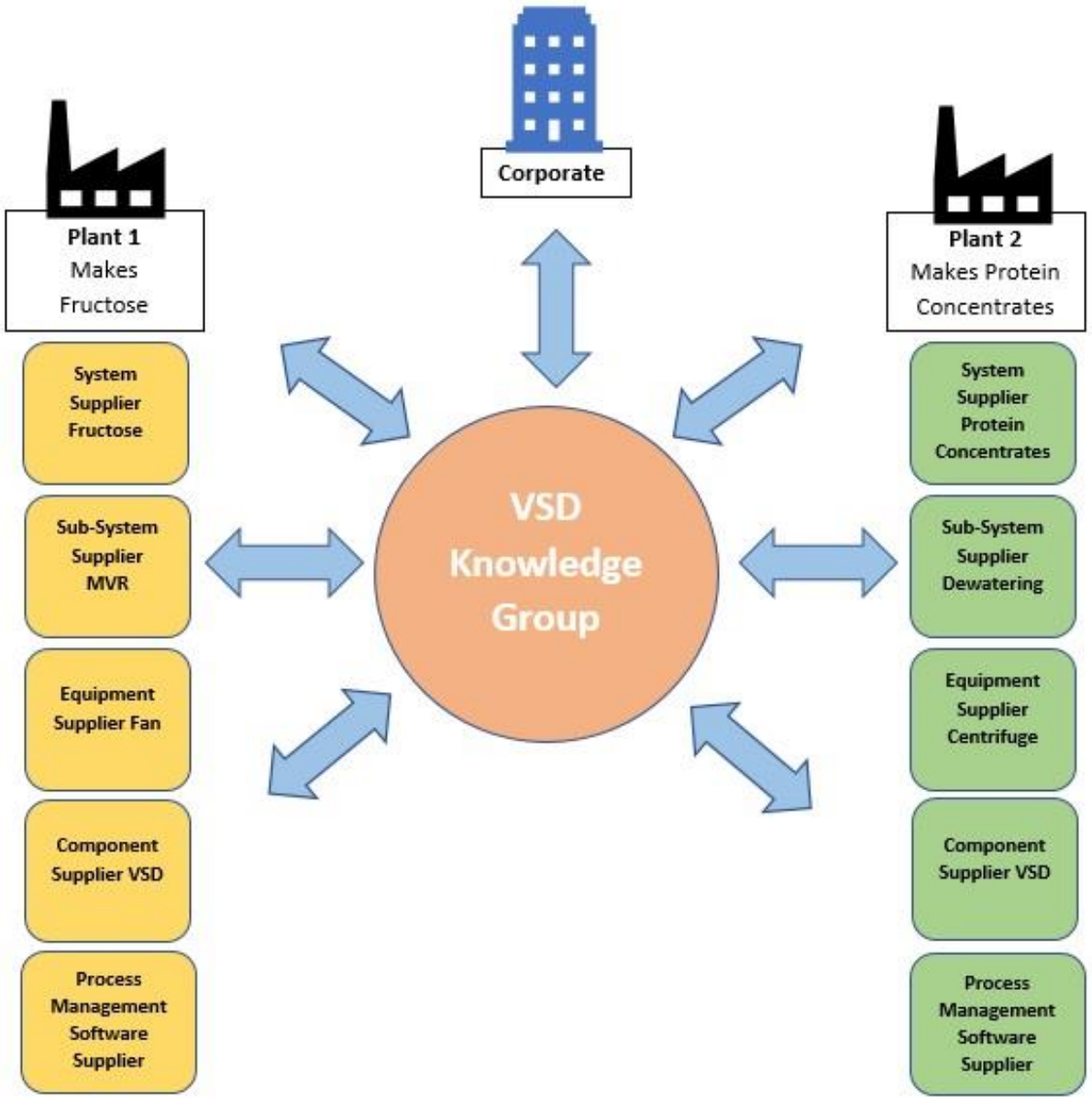
McIlvaine Company
Northfield, IL

Overview

- This webinar will briefly display the many slides in this deck and focus on a few presentations by suppliers.
- One purpose is to show the depth of research in the McIlvaine IIoT and Remote O&M analysis in each industry. This provides a unique resource to project IIoT markets
- Another purpose is to show the interconnection between components and process control systems.
- An important purpose is to establish the value of IIoW (wisdom) to empower IIoT.
  - The food industry has many processes and each has many components
  - Improvements in valves, sensors, filters, centrifuges, pumps, fans, robotics, drives etc. are needed to make process management systems more valuable and cost effective.
  - IIoW is maximized by deep analysis of each major food manufacturer and systems to allow interconnection between personnel in the plants with each other and with suppliers.
  - Process management systems will provide the equivalent of of white papers about each component. With data analytics the superior performance of better products will become clear. But what about superior products which are not already in the plants or process changes which would change the performance of the components?
  - The Food manufacturer benefits through leveraging IIoW to empower IIoT with wise crowd decisions through organized focus groups
  - Here is an example using variable speed drives

Wise Crowds for each component

The conglomerate corporate group will increasingly specify variable speed drives (VSD's). Knowledge about those drives resides with the plants, suppliers of centrifuges and fans as well as the suppliers of process, dewatering and MVR systems. A group comprising all these knowledge sources plus the process management software providers can be in continuous communication and share their knowledge



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Markets

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The food industry will accelerate its expenditures in IIoT and Remote O&M from $9 billion last year to $56 billion by 2030 based on a 13% growth rate throughout the period. East Asia will show the biggest growth. These forecasts include software and components which would not have been purchased absent IIoT and products sold through different channels due to IIOT

Food - $ billions

World Region	2016	2018	2020	2022	2024	2026	2028	2030
Total	9	12	15	19	24	33	44	56
Africa	0.36	0.47	0.59	0.75	0.95	1.30	1.74	2.21
CIS	0.38	0.51	0.64	0.81	1.03	1.41	1.88	2.39
East Asia	2.75	3.67	4.59	5.81	7.34	10.10	13.46	17.13
Eastern Europe	0.21	0.28	0.35	0.44	0.55	0.76	1.01	1.29
Middle East	0.47	0.63	0.79	1.00	1.26	1.74	2.32	2.95
NAFTA	2.07	2.76	3.45	4.38	5.53	7.60	10.13	12.89
South & Central America	0.59	0.79	0.99	1.25	1.58	2.17	2.89	3.68
West Asia	0.65	0.87	1.09	1.38	1.74	2.39	3.18	4.05
Western Europe	1.51	2.01	2.52	3.19	4.03	5.54	7.38	9.39

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Food Manufacturers: World Rankings 1-3

1. Nestlé: Switzerland: Revenue: $81.16 billion

Nestlé is the global leader in the food and beverage industry with revenues of $81.16 billion in 2015. From its modest beginning 150 years ago, the Swiss multinational now operates in 189 countries and boasts 335,000 employees globally. With more than 2,000 brands in segments such as baby foods, bottled water, cereals, chocolate & confectionery, coffee, culinary, chilled & frozen food, dairy, and drinks, Nestlé has established itself as a global household name. Growth in recent times has been driven by its drinks business such as Nescafé and Nespresso, which accounts for 21.68% of its revenue.

The company has in recent years shifted its focus on improving the nutritional, health and wellness needs of its customers. In this regard, Nestlé Health Science recently entered into a partnership with Aimmune Therapeutics to invest $145 million towards the development of solutions for people with food allergies such as Cow's Milk Protein Allergy (CMPA), which cause allergic reactions in some infants that consume cow milk.

2. PepsiCo, Inc: United States: Revenue: $63.06 billion

With a portfolio of 22 iconic brands including Pepsi, Lays, Gatorade, and Tropicana, PepsiCo is the second-largest food and beverage company in the world today with revenues of $63.06 billion. The company's origin dates back to the late 1980s when founder Caleb Bradham developed a cola recipe to rival Coca-Cola. The name PepsiCo, Inc was later adopted in 1965 when the company merged with snack giant Frito-Lay.

Recently, the company has shifted its focus on improving the nutritional and health value of its products as consumers pivot away from traditional junk foods. The company has publically announced its intention to cut down the sugar and saturated fat content in its products without sacrifice taste. PepsiCo also entered into a partnership with TB Alliance, a non-profit organization committed to advances in tuberculosis treatment, which will see PepsiCo deploy its research expertise to develop unique flavors and recipes that would neutralize the unpleasant taste of TB drugs.

3. JBS: Brazil: Revenue: $61.11 billion

JBS is the world's largest meat (beef, pork, and chicken) processing and exporting company with over 300 production units in more than 15 countries, generating a revenue of $61.11 billion. Headquartered in São Paulo, JBS has grown from a local beef company into a global leader in the meat production industry, serving 350,000 clients in over 150 countries. The company has seen phenomenal growth in recent years, with sales growing at 35.2% annually, driven largely the U.S., which account for 48% of total sales.

Mcilvaine is tracking IIoT and component expenditures for th 100 largest food manufacturing companies

World Rankings 4-8

4. The Coca-Cola Company: United States; Revenue: $44.29 billion

Founded in 1886 by pharmacist John Pemberton, Coca-Cola has since evolved into an iconic global brand, whose drinks are consumed 1.7 billion times daily in more than 200 countries. The Atlanta company operates under a business model where it only produces the cola syrup concentrate as it franchises the bottling, sale, and distribution of the finished product to bottling companies across the globe.

As a part of its plan to focus more on its profitable concentrate production, Coca-Cola sold some its bottling operations in China for $1 billion. In the U.S., it has already entered into agreements to divest a significant share of its bottling investments and plans to complete the process by the end of 2017, as it looks to cut costs in light of falling soft drink sales.

5. Anheuser-Busch: Belgium: Revenue: $43.60 billion

Anheuser-Busch InBev was formed in 2008 through a merger between three giant brewing companies: Belgium-based Interbrew, Brazillian-based AmBev, and American company Anheuser-Busch. Now operating out of Belgium, the company has since grown to become the largest brewer in the world with more than 200 brands generating a total revenue of $43.60 billion. Some of its popular drinks include Budweiser, Corona, Stella Artois, Beck's, Hoegaarden and Leffe, Bud Light, Skol, Brahma, and Antarctica. InBev also employees more than 155,000 people in 25 countries.

In 2016, InBev acquired rival brewer SABMiller in a massive $107 billion purchase, sealing a deal that combines the world's biggest brewers into a company that now controls about half the industry's profit. The Belgian company has also set its sights on acquiring Coca-Cola according to CEO Carlos Britto.

6. Tyson Food: United States: Revenue: $41.37 billion

Tyson Foods is the largest beef producer and exporter in the United States and one of the largest in the world. From 111 facilities, of 107 of which are located in the U.S., Tyson products including chicken, beef, pork and processed foods are distributed in 130 countries. The Arkansas-based company also employees over 113,000 people who work at its facilities and plants worldwide.

Tyson Foods recently acquired a 5% stake in Beyond Meat, a company that specialises in producing plant-based meat, which is believed by experts to be a healthier alternative to animal meat. As such, Tyson is looking to be a forerunner in the U.S meat industry with regards to this new meat produce, which Microsoft founder Bill Gates has described as the "future of food."

Many of the food companies are based in the U.S. and are expanding operations in other countries. Due to IIoT purchasing will become centralized. This means considerable business for companies who will obtain the order in the U.S. but deliver overseas

World Rankings # 7 to 10

7, Archer Daniels Midland Compan: United States: Revenue: $37.62 billion

The Archer Daniels Midland Company (ADM) is one of the largest food processing company in the world today, serving customers in 140 countries. The Illinois company also boasts 33,000 employees who work in more than 460 crop procurement locations and 340 other facilities worldwide where it manufactures ingredients that are used to make food, animal feed, industrial, and energy products.

In a recent effort to improve returns, ADM recently sold its global cocoa business to Olam International for $1.2 billion, as it hopes to improve operational efficiency and focus on driving growth in its more profitable product segments.

8. Mars: United States: Revenue: $33 billion

Founded over a century ago, Mars is a global food processing company owned by the Mars family. Headquartered in Virginia, the family-owned business has evolved into one of the largest food processing company in the world, earning $33 billion in 2015. Mars has a product portfolio that spans across some diverse segments including chocolate, pet care, food, drinks, and symbioscience.

As a result of growing competition from healthier confectionery products, Mars recently completed the buyout of its subsidiary, Wrigley from billionaire Warren Buffet's Berkshire Hathaway. This move is expected to consolidate the company's dominance in the global confectionery market, of which it controls 13.5%.

9. Mondelez International: United States: Revenue: $29.64 billion

Founded in 2012 when Kraft Foods split into two separate companies, Mondelēz has since grown into one of the largest snacks companies in the world with almost 100,000 employees serving customers across 165 countries. The company's product portfolio include iconic brands such as Cadbury, Trident gum, Nabisco, and Oreo biscuits, which, alongside 44 other brands, generate millions of dollars in sales.

As the world's largest snacks maker, Mondelēz also dominates in various product segments. It controls the largest market share in biscuits, chocolate, and candy production while it occupies second place in gum production. The Illinois-based company has in recent years poured money into infrastructure, spending over $1.5 million into production plants since 2012.

10. Cargill, United States, Revenue: $28.90 billion

Cargill is a multinational family-owned business that boasts an astonishingly long list of products and activities including food, agriculture, financial and industrial products, and services. The Minnesota-headquartered company is wholly controlled by the Cargill and MacMillam families who collectively own more than 90% of the business. With over 150 years of experience in agricultural production & export and meat production under its belt, Cargill is now the largest private company in the U.S., with over 150,000 employees serving customers in 70 countries.

Although it made total sales of $120.39 billion in 2015, revenue from its food related services was only $28.90 billion (24% of total sales), revealing that a larger percentage of its revenue came from non-food related business activities. Still, Cargill has managed to rank as the 10th largest food and beverage company in the world.

Seven of the top ten food companies are U.S. based making the U.S. the largest purchaser at the corporate level

U.S. Food Manufacturer Rankings as of 2015

This Year	Last Year	Company	2015 Food Sales	2014 Food Sales
1	2	Tyson Foods Inc. (10/3/15)	40,132	36,077
2	1	PepsiCo Inc.	37,943	37,241R
3	3	Nestle (U.S. & Canada)*	27,659	27,978
4	5	Coca-Cola Co.	21,784	21,462
5	8	Kraft Heinz Co.	21,670	NA
6	4	JBS USA *	20100 C,E	20,000 C,E
7	6	Anheuser-Busch InBev*	15,603	16,093
8	9	Smithfield Foods Inc.	14,005	14,580R
9	10	General Mills Inc. (5/31/16)	11,931	12,502
10	7	Conagra Brands Inc. (5/31/16)	11,643	15,832
11	11	Mars Inc.	11000 E	11000E
12	13	Kellogg Co.	9,094	9,499
13	15	MillerCoors LLC	8,822	8,990
14	14	Hormel Foods Corp. (10/25/15)	8,729	8,782
15	16	Cargill Inc. (5/31/16)	8700E	

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Nearly Half Food Processors are moving Forward with IIoT

According to a recent survey of *Automation World* readers in the food and beverage industry, nearly half (49 percent) have either implemented IIoT initiatives or are planning to do so. After years of struggling to pull data from legacy systems that don't talk to each other and aren't synced up to the rest of the business, the opportunity for IIoT is all about gaining that next level of visibility, according to Reid Paquin, industry analyst for food and beverage at GE Digital.

"IIoT really just allows you to get more connected to what's going on the plant floor and throughout all your processes and machines," says Paquin, citing the ability to eliminate guesswork and understand, for example, exactly why a filler isn't operating at peak efficiency or track why waste is occurring with a particular piece of packaging equipment. "You have to connect all of these areas before doing that and manage the data."

As the architecture changes enable connected systems, food and beverage manufacturers can do things they couldn't before and, most importantly, eliminate cumbersome and error-prone manual processes. "Historically, people have gone around with clipboards, reading stuff off of meters, and entering data into spreadsheets," explains John Dart, senior industry consultant for Rockwell Automation. "[IIoT] technology makes real-time data available, but also contextualizes it with data in other systems, giving manufacturers the ability to improve operations.

Though food and beverage manufacturers have been leveraging sensors to collect data for years, they've historically been limited to what they could achieve given the high cost associated with deployment. "The cost of sensors has gone down so much, now huge volumes of manufacturers can afford to have sensors everywhere, on transportation trucks or refrigerators in the plant," says Aravind Yarlagadda of Schneider Electric

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IIoT needs to be Justified Based on Food Equipment Effectiveness

- "Cost justification remains a big issue with real operational data and objective results unavailable to justify investment in IIoT systems," says Roy Greengrass, corporate engineering, Del Monte Foods, Inc. "If the price for IIoT goes down considerably, food companies may be able to justify these systems."
- Despite the cost, one key manufacturing metric that can be impacted by IIoT is overall equipment effectiveness (OEE). One way manufacturers measure the availability, performance and quality of their manufacturing operation is calculating the OEE and using that measure to improve processes. "OEE is the best initial key performance indicator to look at; it is the gateway to optimizing your process. OEE is almost plug in play" says Katie Moore of GE Digital " You have the information at your fingertips,"
- But, the true value of OEE comes from understanding the underlying losses: availability loss, performance loss and quality loss.. "We monitor OEE with visual displays to reduce downtime and improve operating efficiencies. Pushing this information to those who need it allows issues to be addressed immediately," says Greengrass. "Improvements and early detection of quality defects, as well as better insights into the root cause of manufacturing issues, are major benefits. These improvements, as well as the reduction of machine failures and downtime, result in cost savings."

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Forecasts for all Combust, Flow and Treat Products and Services for 75 Food Processors

Separate forecasts have been generated for food industry and large purchaser revenue forecasts for

- Pumps
- Valves
- Liquid filtration belt presses, filter presses, leaf filters etc.
- Cross flow membranes: RO, UF, MF
- Fabric filter equipment, media, bags
- Scrubbers, adsorbers, absorbers
- Clarifiers, centrifuges, DAF, thickeners, cyclones
- Liquid cartridges: non woven, string wound, membrane , ceramic
- Compressors : screw, rotary etc. and fans: axial, centrifugal, turbo
- Treatment chemical: coagulants, anti-scalants, corrosion inhibitors etc.
- Process Control systems
- Process instrumentation
- Continuous Emission Monitoring Systems
- HVAC –filters etc.

ConAgra and World Food Pump Purchases $ millions, 2018

Product	Scope	World	Americas	EMEA	ASIA
Centrifugal	All	850	262	220	368
Centrifugal	ConAgra	1	1		
Reciprocating	All	101	26	24	51
Reciprocating	ConAgra	0.2	0.2		
Rotary	All	237	72	62	103
Rotary	ConAgra	0.4	0.4		
Diaphragm	All	170	47	46	77
Diaphragm	ConAgra	0.3	0.3		
Total	All				
Total	ConAgra	1.9	1.9		

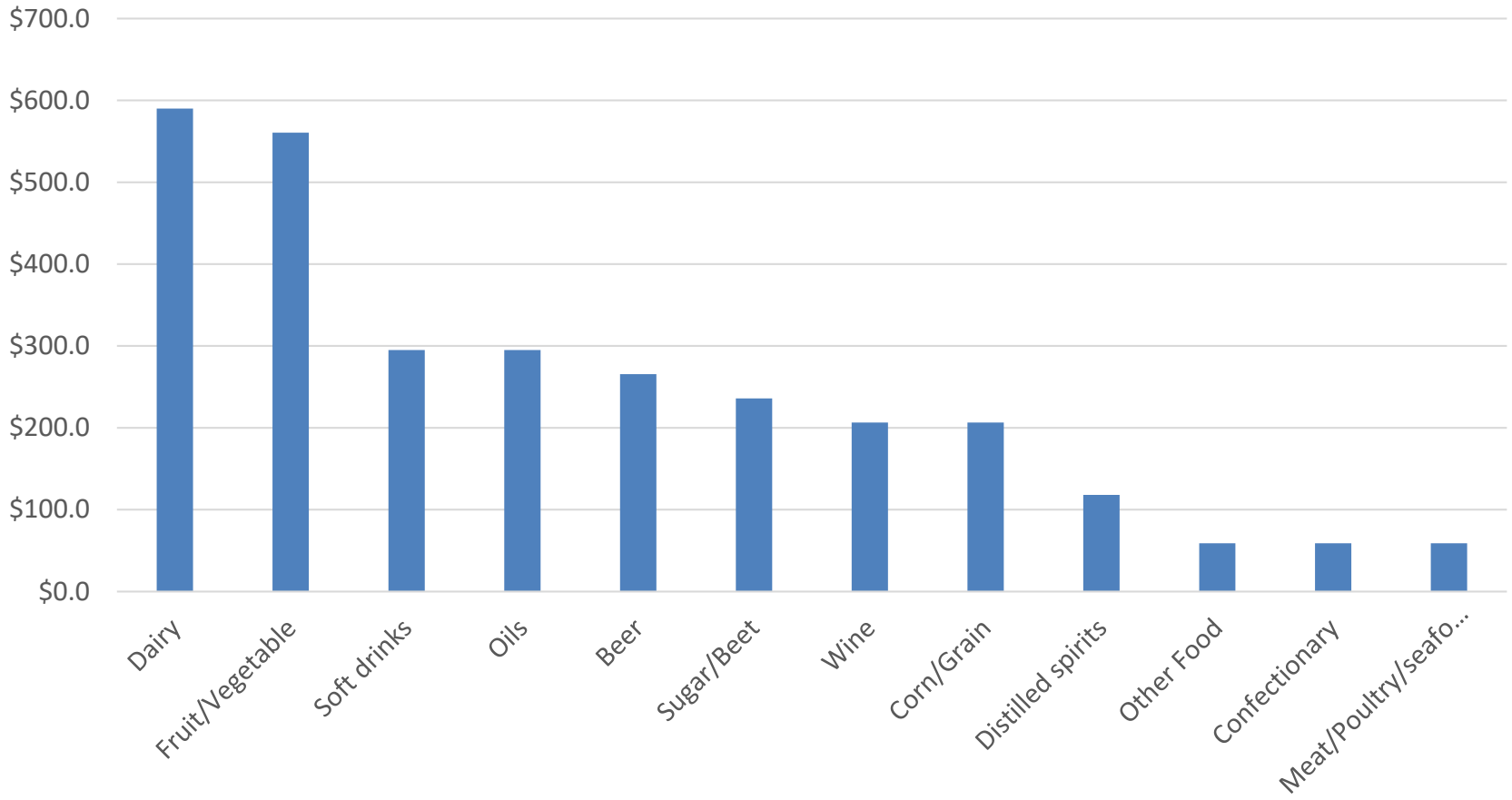
Control Valves – Food Industry $ millions

Subject	2014	2015	2016	2017	2018	2019	2020	2021
Total	287.39	297.13	307.71	319.10	331.28	344.33	358.23	373.06
Ball	23.87	24.68	25.56	26.50	27.52	28.60	29.75	30.99
Butterfly	65.31	67.53	69.93	72.52	75.29	78.25	81.41	84.78
Check	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gate	4.55	4.70	4.87	5.05	5.24	5.45	5.67	5.90
Globe	187.11	193.46	200.35	207.76	215.69	224.19	233.24	242.89
Industrial Plug	1.70	1.76	1.83	1.89	1.97	2.04	2.13	2.21
Other	3.13	3.23	3.35	3.47	3.60	3.75	3.90	4.06
Safety Relief	1.72	1.77	1.84	1.91	1.98	2.06	2.14	2.23

On – Off Valves – Food Industry $ millions

Subject	2014	2015	2016	2017	2018	2019	2020	2021
Total	1,131.66	1,170.05	1,211.71	1,256.53	1,304.52	1,355.89	1,410.65	1,469.04
Ball	453.54	468.92	485.62	503.58	522.81	543.40	565.35	588.75
Butterfly	121.30	125.42	129.88	134.69	139.83	145.34	151.21	157.46
Check	33.95	35.10	36.35	37.70	39.14	40.68	42.32	44.07
Gate	222.68	230.23	238.43	247.25	256.69	266.80	277.57	289.06
Globe	62.37	64.48	66.78	69.25	71.89	74.72	77.74	80.96
Industrial Plug	32.30	33.40	34.59	35.87	37.24	38.70	40.27	41.93
Other	173.03	178.90	185.27	192.12	199.46	207.31	215.69	224.61
Safety Relief	32.50	33.60	34.79	36.08	37.46	38.94	40.51	42.18

Forecasts by Type of Food Product
$ millions - Filtration



This chart represents the total filtration revenue for both equipment and consumables for each food type.

Typical Processes

Each process has major components and sub systems which have to be optimized. Many food manufacturers have multiple complex processes.

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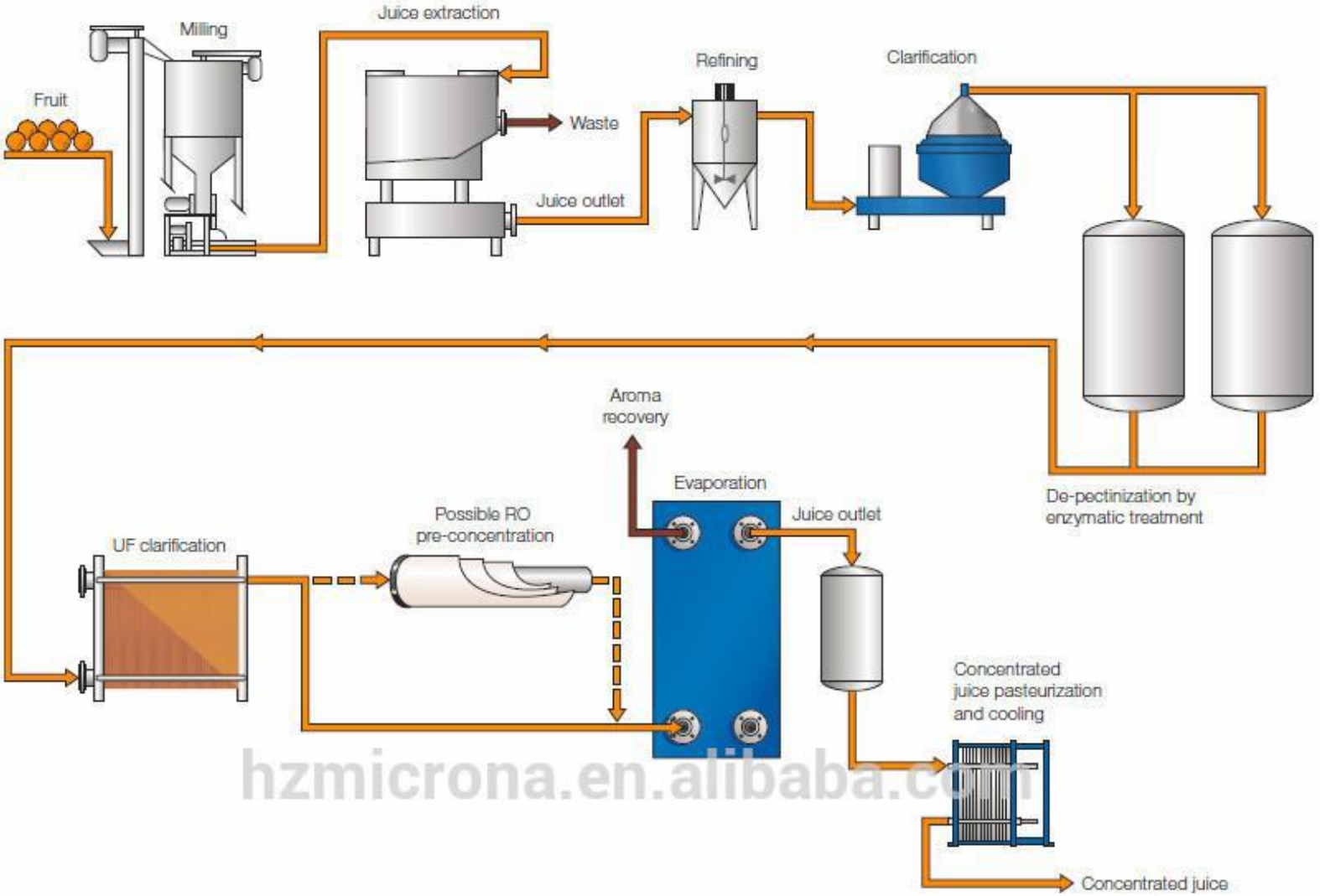
Juice Processing



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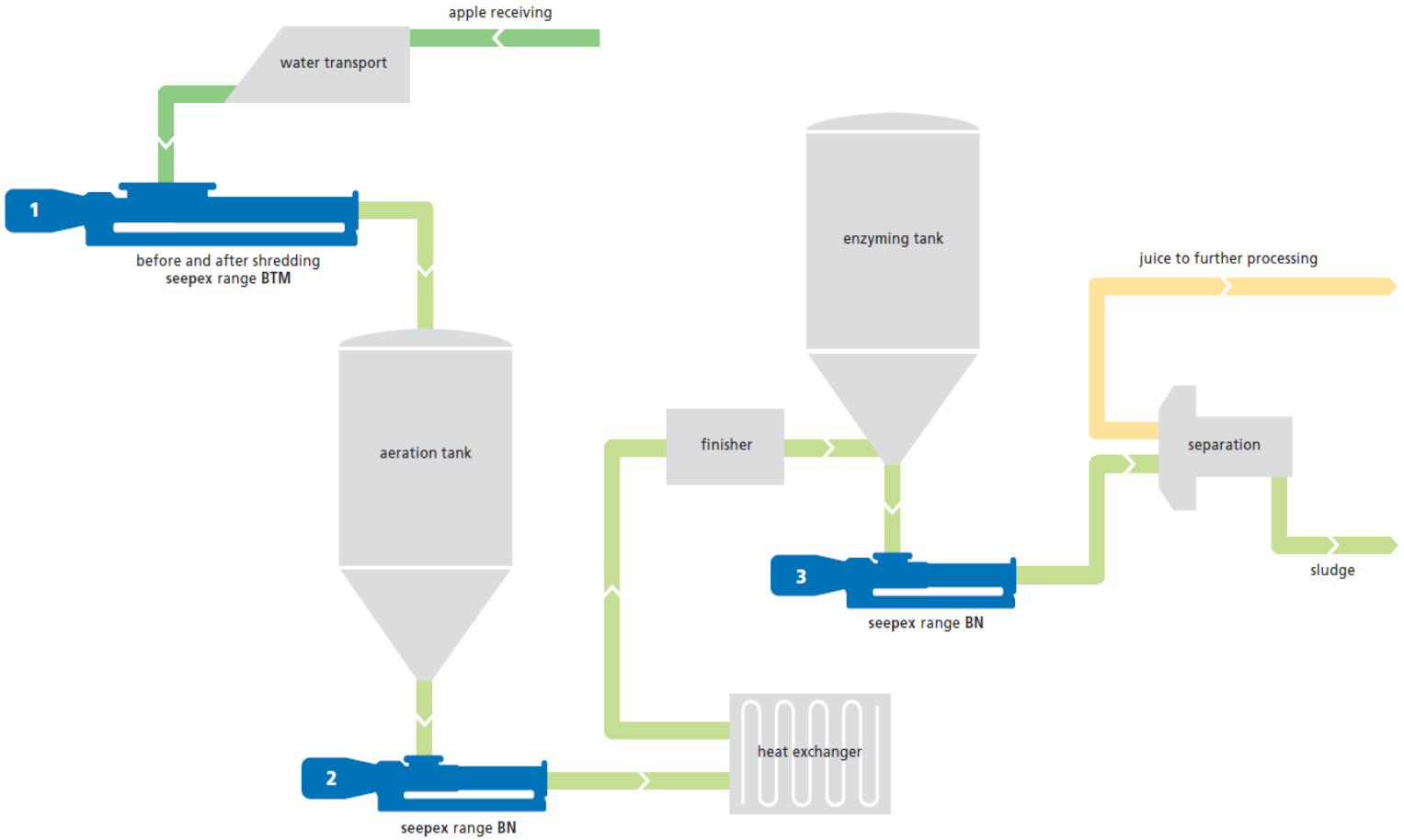
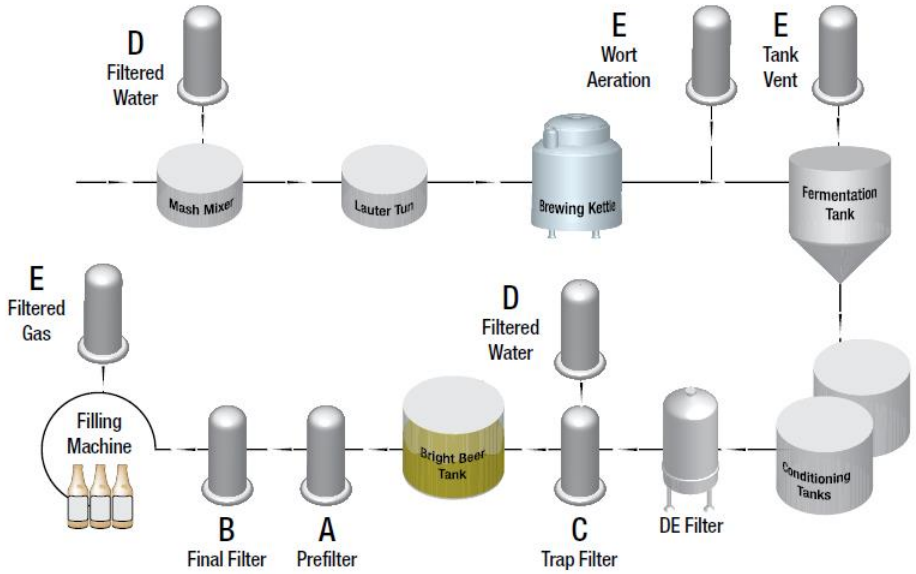
Fruit and Vegetable Processing - Seepex Pumps



Beer Processing, 3M Purification

3M Purification and Brewing



A. *Zeta Plus™: The Flagship of Beer Filtration.*
Convenient and cost effective clarification and bioreduction filtration using the Zeta Plus cartridge concept.

B. *Sterile Filtration: Zeta Plus™ & LifeASSURE BA™ Series Membrane Filtration Reduce Pasteurization.*
By combining the economy of the premier depth filter, Zeta Plus, with the assurance of a bacteria retentive membrane filter, LifeASSURE BA series, 3M Purification provides brewers with the ultimate in sterile filtration options.

C. *Trap Filtration: Reliable particle control with the innovative Betapure™ NT-T cartridge filter.*
By employing a novel, multilayer construction with flow distribution layers and critically positioned flow channels, Betapure NT-T filters deliver consistent retention and long service life.

D. *Water Filtration: Quality Water, the Building Block of a Quality Beer.*
Since not all breweries are located near a sediment-free mountain spring, 3M Purification provides filters for brewing and blending water preparation, bottle and keg washing water, and sanitizing water.

E. *Air & Gas Filtration: Why Risk Your Beer by Using Anything Else but LifeASSURE™ PFS Series Hydrophobic Membrane Filters for Sterile Air and Gas Filtration?*
Airborne bacteria, molds and spores can quickly destroy a perfect batch. Hydrophobic PTFE LifeASSURE PFS series membrane filters are ideal for sterile filtration of wort aeration, tank venting and filtration of compressed gasses.

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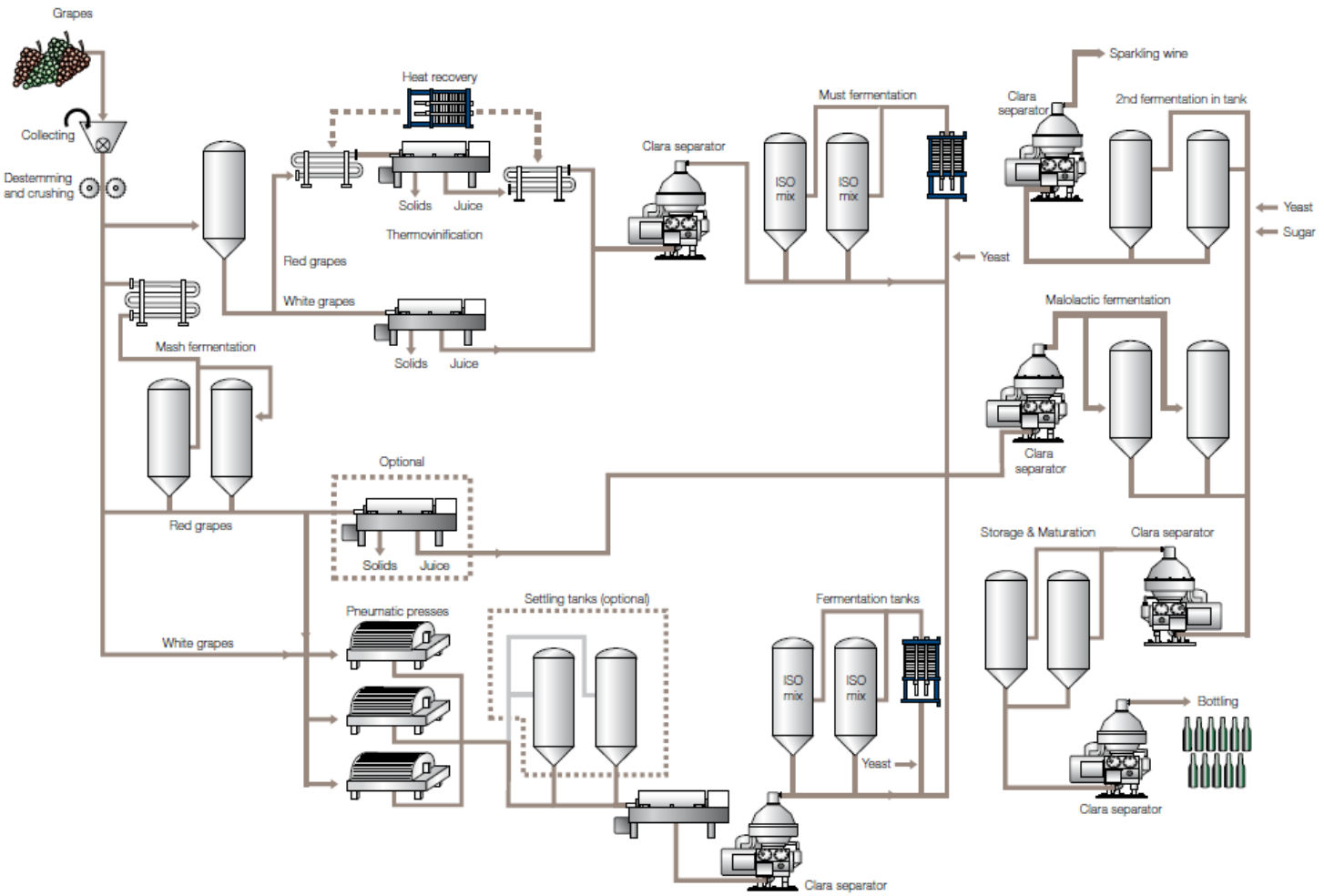
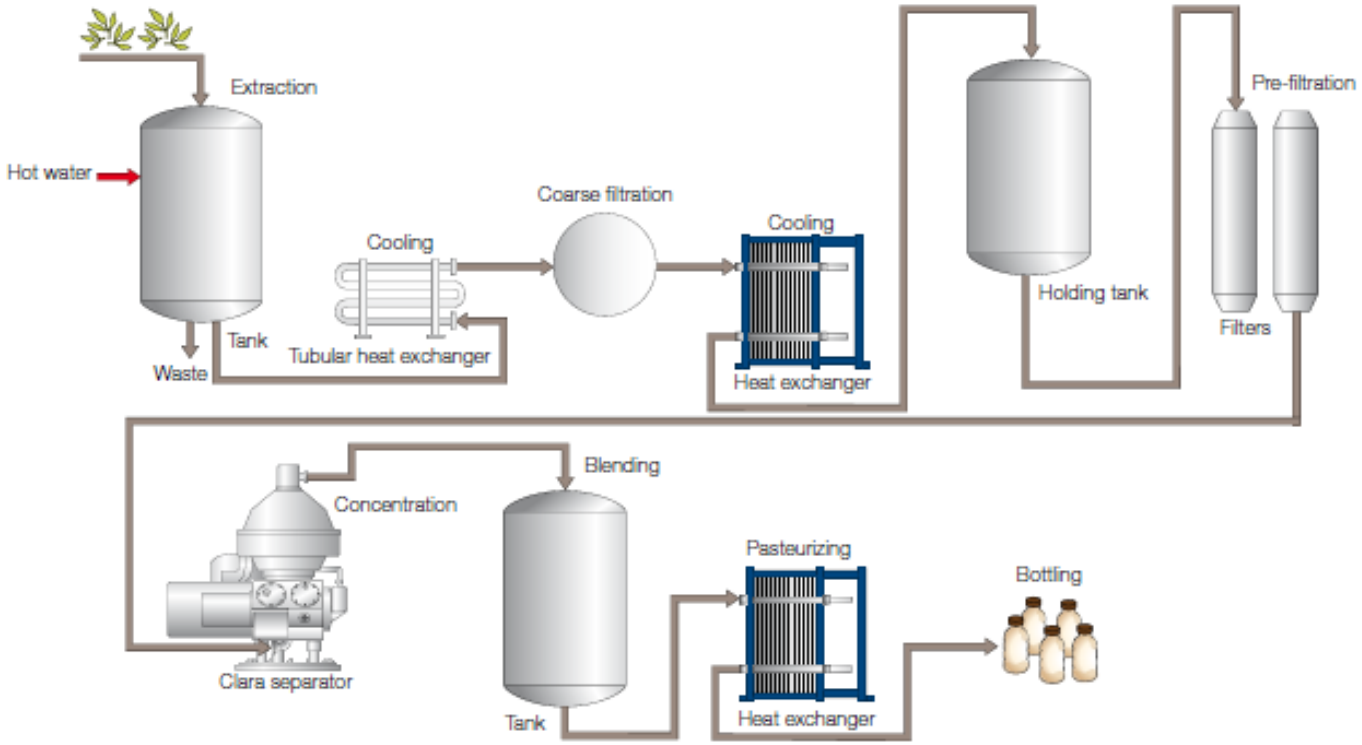
Wine Processing, Alfa Laval

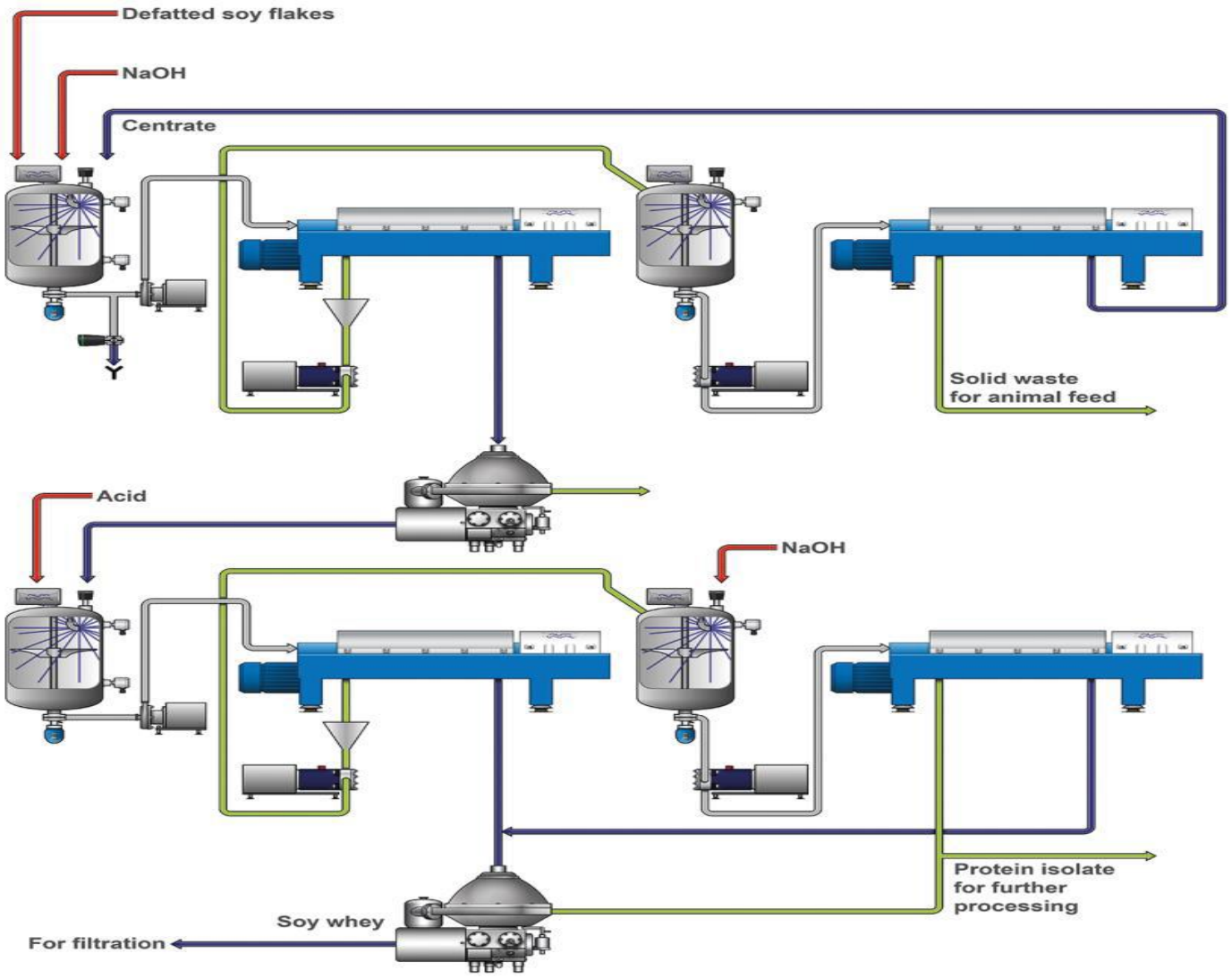


Tea Processing, Alfa Laval

RTD tea process



Soy Processing, Alfa Laval



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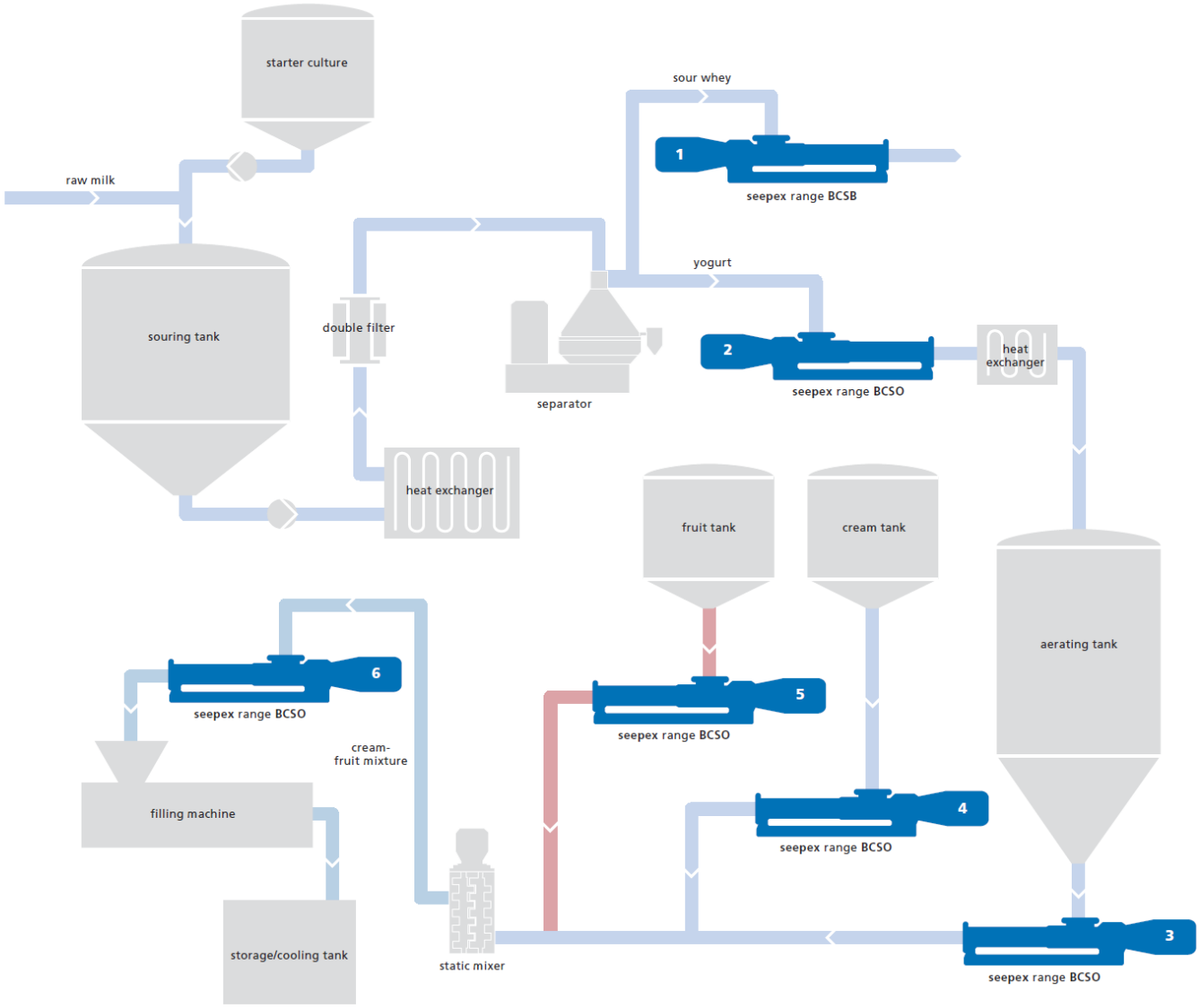
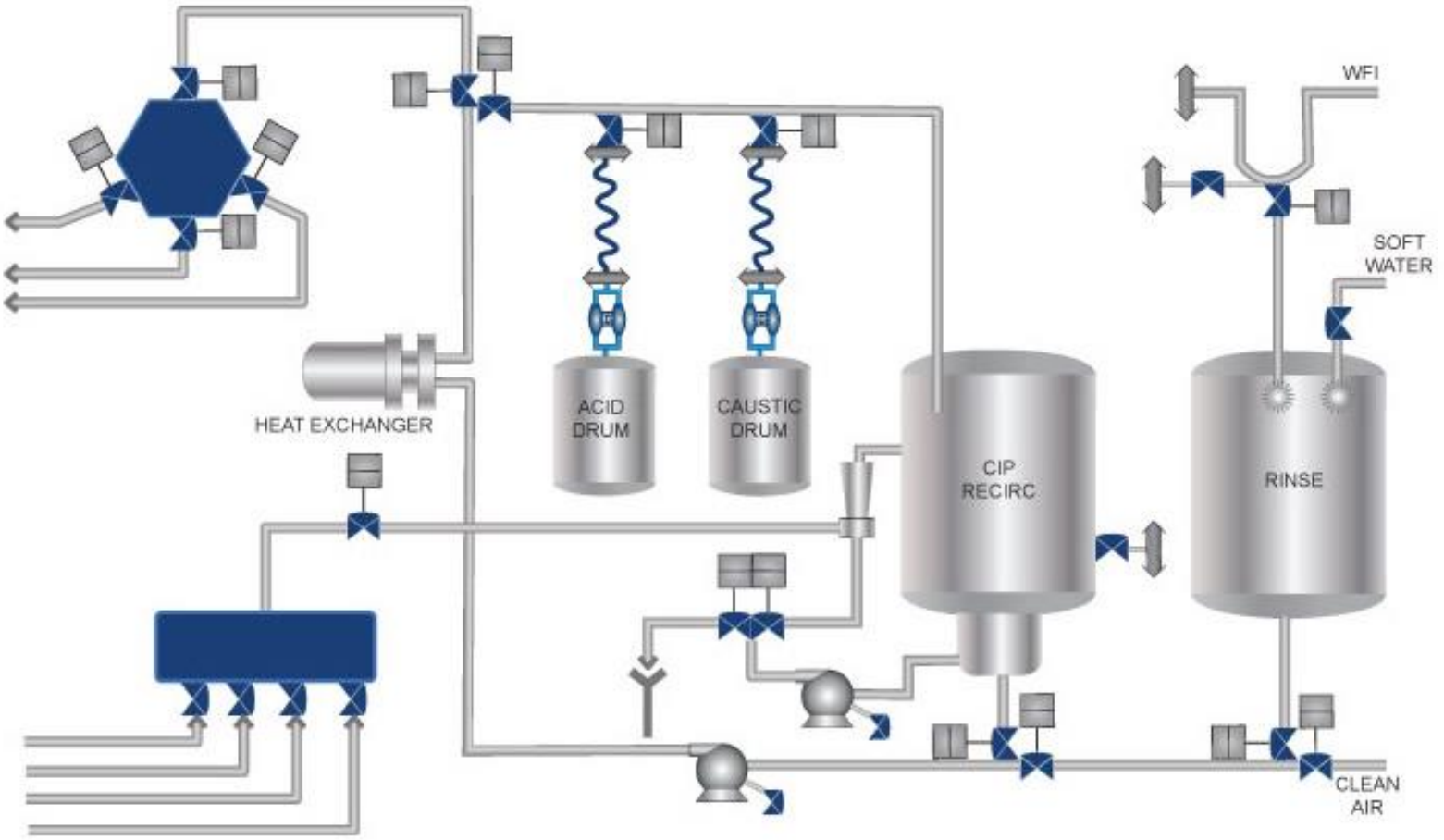
Seepex Pumps in the Dairy Industry



Crane Clean in Place System with Valves and Pumps



ConAgra-Lamb Weston

The two companies have been split but are treated as one $11 billion company ranking # 10 in the U.S. The following analysis is representative of the deep analysis undertaken for the top 75 food companies

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ConAgra Split into Two Public Companies

- ConAgra Foods, Inc. separated into two independent public companies: one comprising its robust consumer portfolio of diverse and leading brands and the other comprising its market leading foodservice portfolio of innovative frozen potato products.
- The consumer brands business was renamed ConAgra Brands, Inc. and the frozen potato business will operate under the Lamb Weston name.
- “The decision to separate into two pure-play companies reflects an ongoing commitment to implementing bold changes in order to deliver sustainable growth and enhanced shareholder value,” said Sean Connolly, president and chief executive officer, ConAgra Foods. “We carefully considered a variety of strategic alternatives, and believe that the separation of our Lamb Weston specialty potato business from our consumer brands business is the best way to drive shareholder value.
- The separation will enable each company to sharpen its strategic focus and provide flexibility to capitalize on the unique growth opportunities in its respective market. Shareholders will gain direct exposure to more focused consumer and commercial foods businesses, each with distinct customer bases and investment profiles. We are confident that this separation will best position each company to compete and win while creating compelling long-term value for shareholders and delivering benefits to employees, customers and other key stakeholders.”

Overview of Lamb Weston

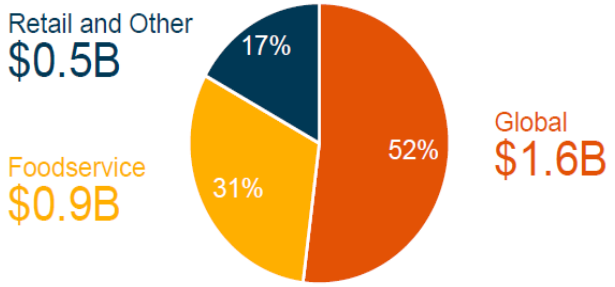
Key Facts

FY 2016 Financials	• Net sales: $3B in a $13B category • Adjusted EBITDA: $593m[1]
Position	• Number 1 in NA frozen potato category • Number 2 in global frozen potato category (volume and dollars)
Manufacturing[2]	• 22 factories in NA, Europe and China • 1 factory in Russia under construction
Unconsolidated Joint Ventures	• Lamb Weston Meijer (LWM) – European JV; 50% ownership • Lamb Weston RDO – US JV: 50% ownership
Organization	• 6,000+ employees • HQ: Eagle, ID

Segment Breakdown

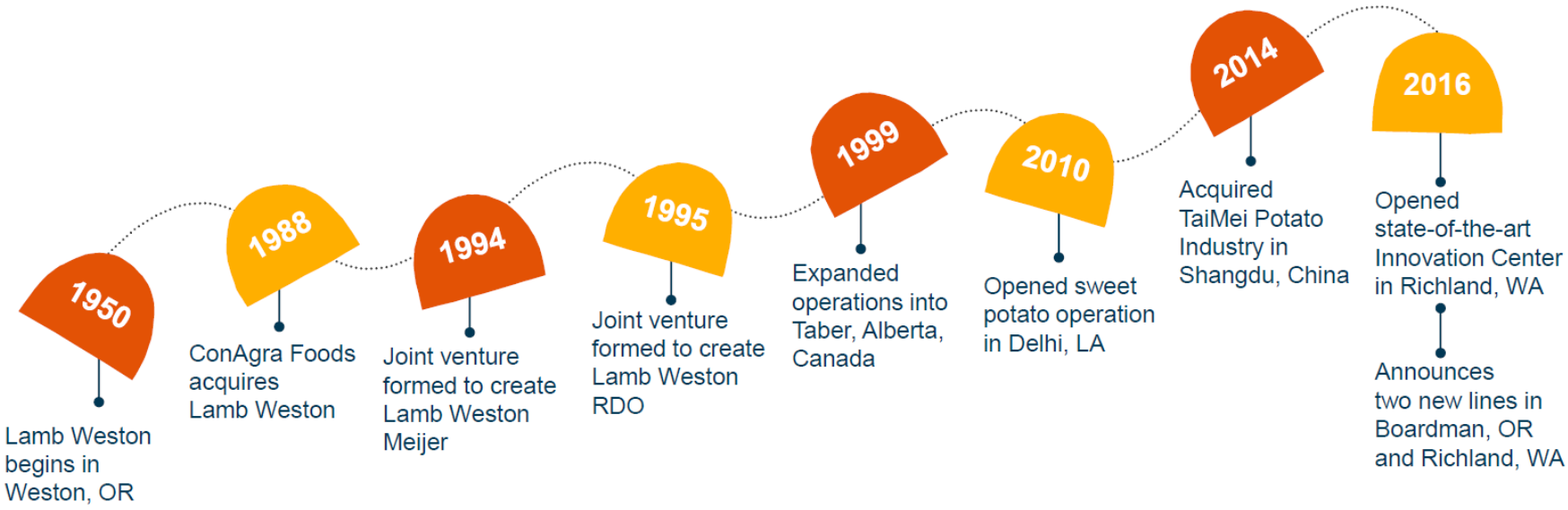
Global	Large US-based chain restaurants and all Lamb Weston's international businesses
Foodservice	Smaller regional chain restaurants, independents, non-commercial establishments, plus domestic foodservice distributors
Retail	Retail potato products including *Alexia*, licensed brands and retail private label
Other	Vegetables, dairy and other

2016 Net Sales by Segment



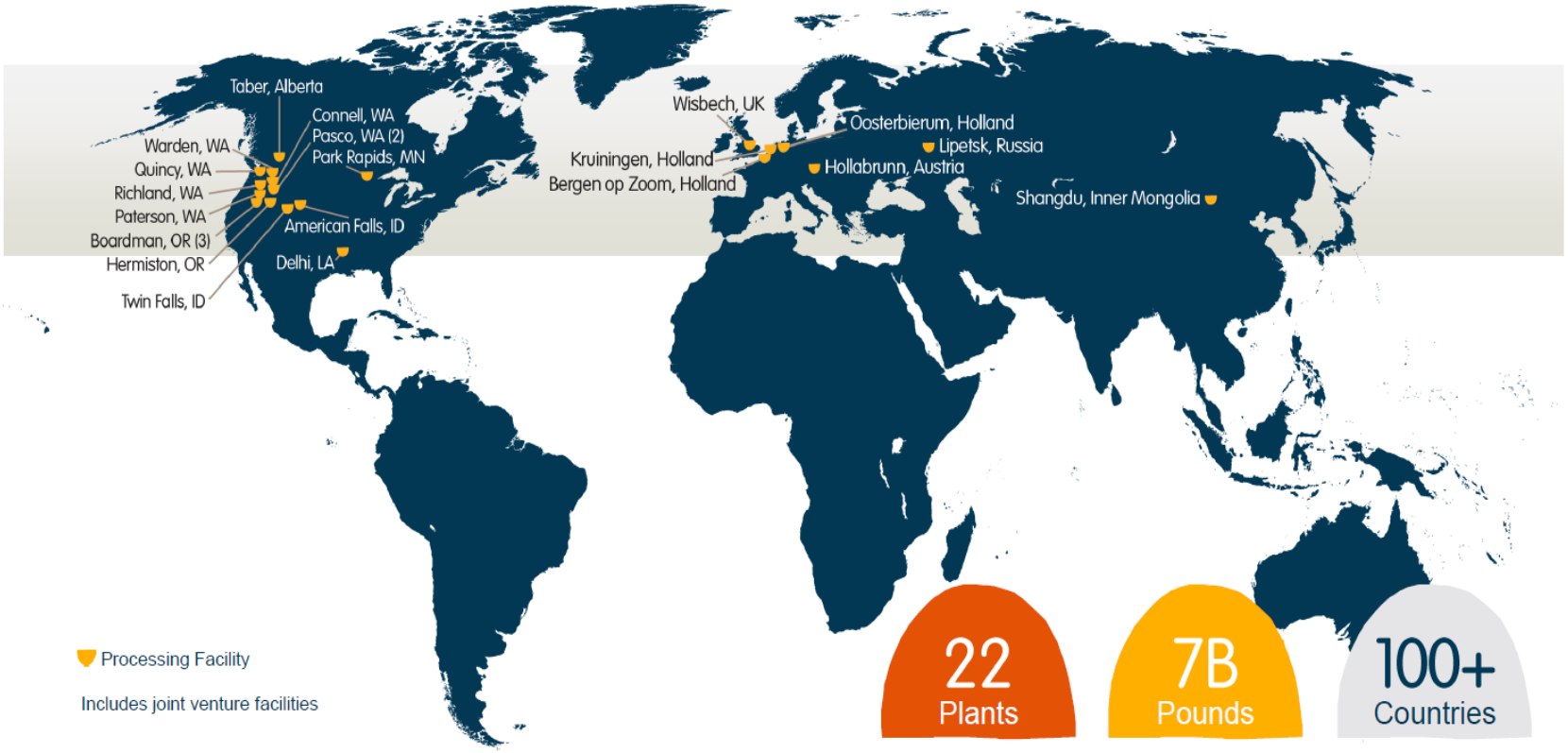
[1]Refer to reconciliations in Appendix [2]Includes factories operated through joint ventures
Tables that reconcile non-GAAP to GAAP disclosure are included in the Appendix.

60 years of continuous expansion



Positioned for the future with our global footprint

Global footprint in prime growing regions sets foundation for efficiency



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ConAgra Brands

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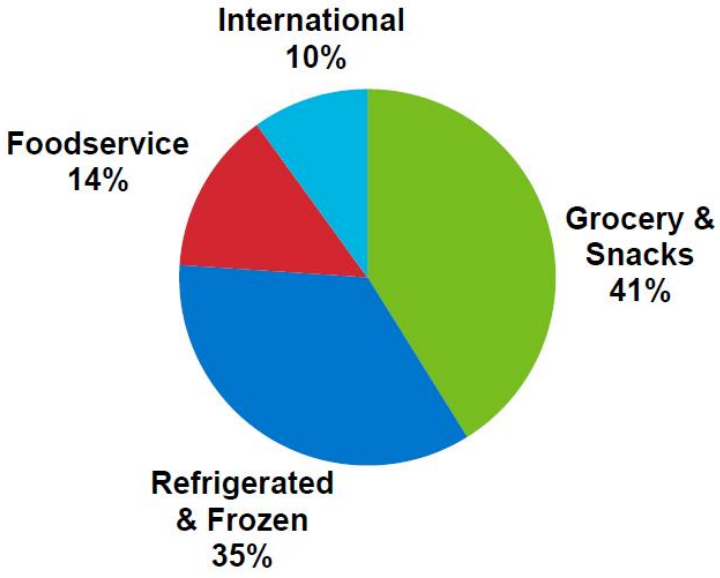
$8B Business with Iconic, Leading Brands

FY16 Net Sales by Segment



#1 or #2 Share Brand Examples[1]

Hunt's · Slim Jim · Marie Callender's · Reddi-wip · Peter Pan · PAM · Swiss Miss · egg beaters · David · Chef Boyardee · Hunt's Manwich · Rosarita · Tennessee Pride Real Country Sausage · Van Camp's · Crunch 'n Munch · Wolf Brand Chili

CONAGRA BRANDS

[1] IRI Market Advantage TTL US MULO+C, FY16

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Embedding New Portfolio Management Principles (PMPs)

Essential to consistent growth

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Innovation is a Primary Driver of Market Growth

Category	Category Growth	Category Growth excl. Innovation
Frozen Breakfast Food	3.1%	-3.4%
Frozen Dinners/Entrees	-0.2%	-4.7%
Meat Snacks	8.1%	-9.0%
Salty Snacks	3.4%	-7.7%
Snack Nuts/Seeds	4.0%	-2.1%

47 Source: IRI, Market Advantage, Total US MULO+C, Dollar Sales, 52 Weeks Ending 12/27/15

CONAGRA BRANDS

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Driving Trade Productivity – $100MM

Leveraging advanced analytics to improve trade ROI for the mutual benefit of Conagra and the customer

SEGMENTATION | **OPTIMIZATION** | **REALLOCATION**

CONAGRA BRANDS

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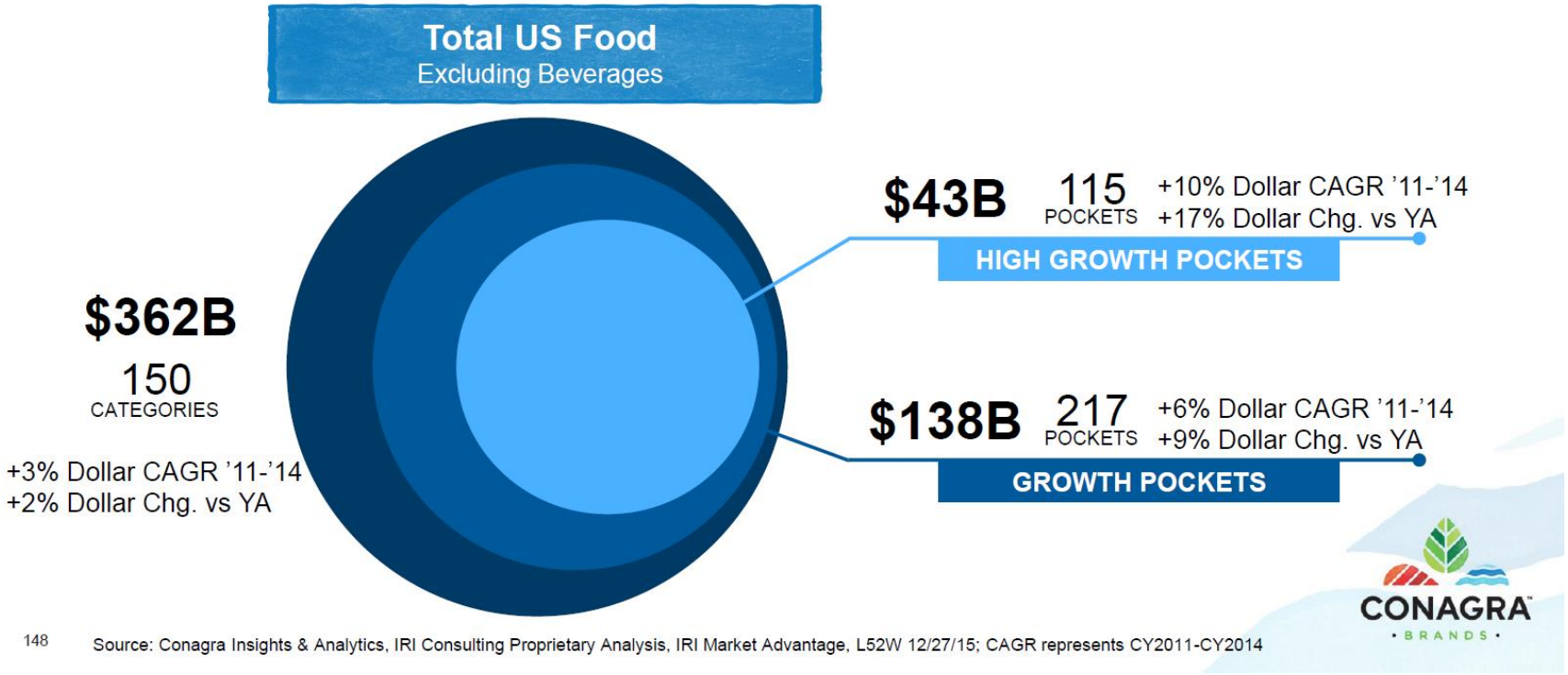
Granular View Reveals Accessible Growth Pockets



148 Source: Conagra Insights & Analytics, IRI Consulting Proprietary Analysis, IRI Market Advantage, L52W 12/27/15; CAGR represents CY2011-CY2014

CONAGRA BRANDS

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…and Our Supply Chain is Undergoing Significant Change as the Company Evolves

	Legacy ConAgra Foods	Conagra Brands
SKUs	22,000	4,500
Sales	$15.8B	$8.2B
Plants	95	36
Co-mans	116	75
Warehouses	300	150
Suppliers	11,000	6,000

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Despite These Changes, Our Supply Chain Remains Complex

Complex Portfolio

- 4,500 SKUs across 52 brands
- 25% of SKUs generate 83% of sales

Complex Product Designs

- 2,300 ingredients of which 480 are unique (>20%)
- Multiple variants of similar ingredients

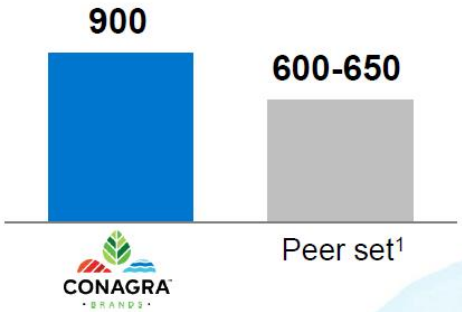
Complex Manufacturing Network

- 36 plants, ~90% of products single sourced
- 14 major distribution centers

Complex Logistics Design

More miles shipped than peers

Average miles per shipment



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[1] Internal company analysis

Historical Approach to Measuring Productivity

Old Approach: Gross Productivity

Methodology

- Detailed tracking and reporting of all savings efforts (small to large)

Issues/Limitations

- Gray areas on what was counted as savings
- Tremendous effort to track/report
- Did not capture offsets to productivity (only the "good")

Outcomes

Although strong commitment and focus on cost savings:

- Difficulty to reconcile stated savings number to P&L
- Drove inefficient activity/silo behavior
- Inflation became "catch all" for all other costs

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We Have Moved to New Productivity Measure

New Approach: "Realized" Productivity

Methodology

- Realized Productivity: combine gross productivity with "operational offsets"
  - » Note: "operational offsets" excludes volume/absorption, product investments, and inflation

Enabler

- New best in class tool/capability (Right Angle): accurate/real time market inflation

Outcomes

- True view of how productivity is realized on the P&L
- Resources redirected to improvement vs tracking
- True inflation picture to support pricing decisions
- More transparency and focus on improving productivity, and decreasing productivity offsets

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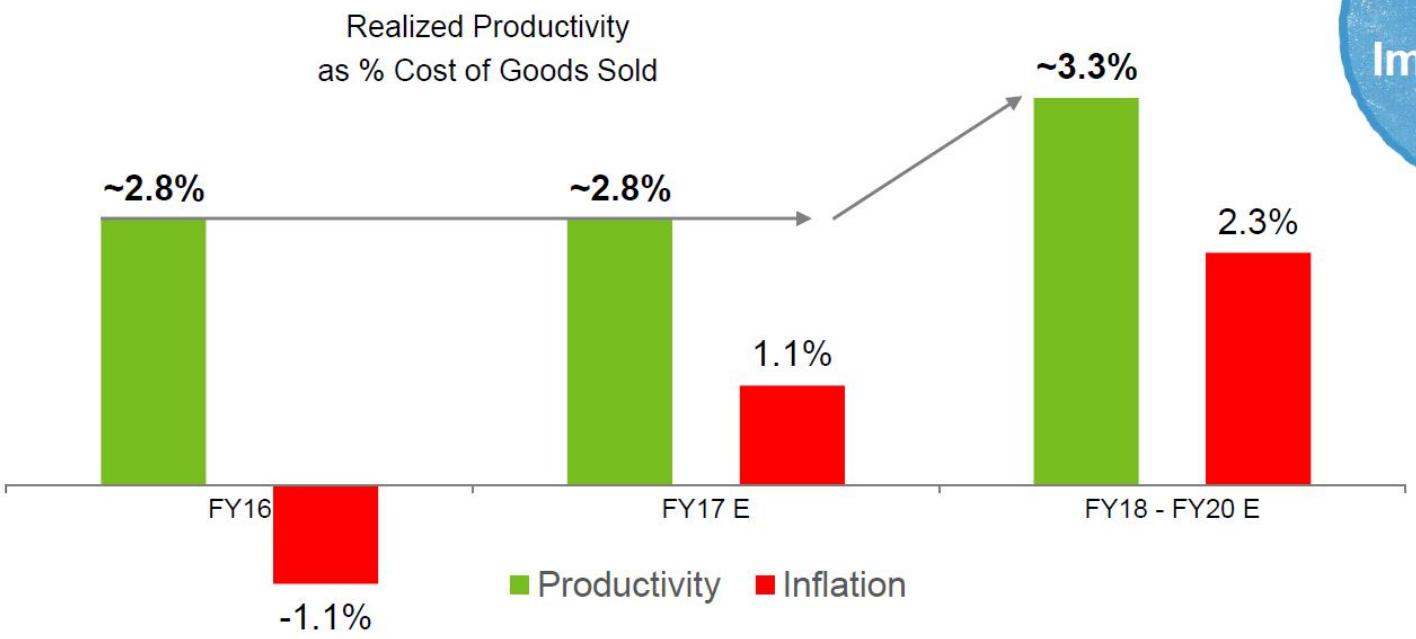
Our Plan is to Increase Realized Productivity by 15-20%



15-20% Improvement

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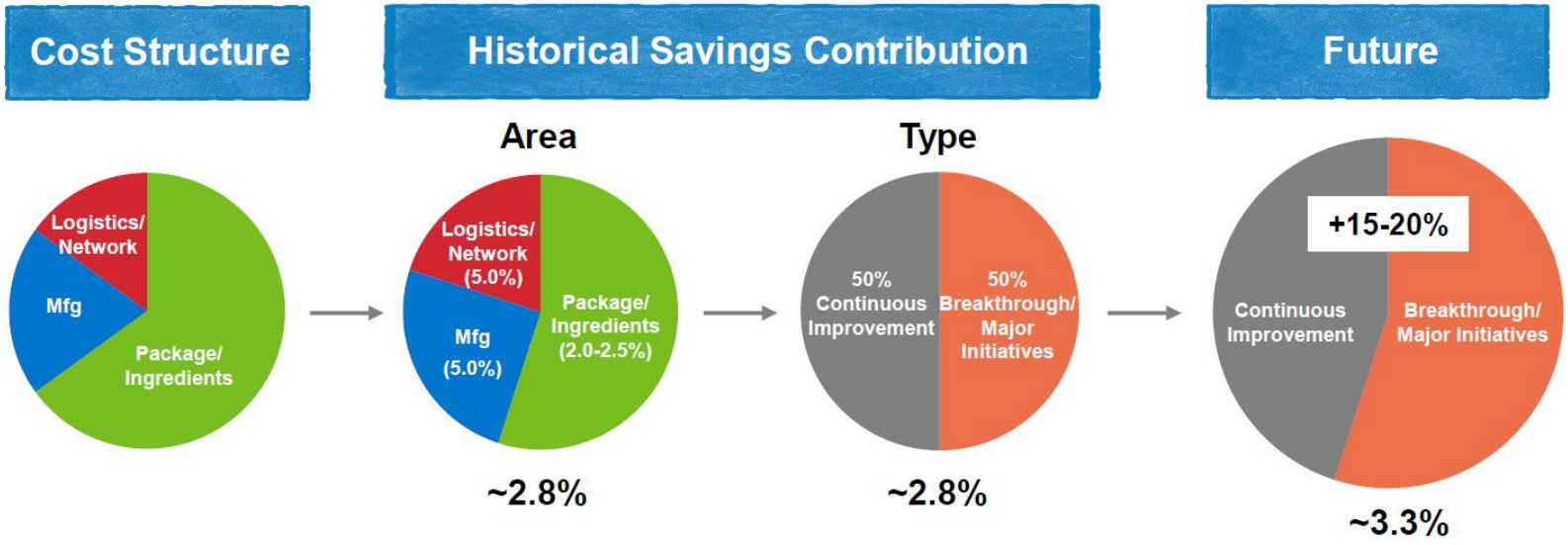
Our Model for Driving Productivity/Margin



Keys to Success:

- Maintain continuous improvement, increase breakthrough/major initiatives
- Clear accountability and ownership
- Optimize cross-functionally (no silos)

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New Reporting Segments

Conagra Brands

(dollars in millions)	FY16		
	Net Sales	Adj. Op. Profit	Adj. Op. Margin
Grocery & Snacks	$3,377	$695	20.6%
Refrigerated & Frozen	2,868	441	15.4%
Foodservice	1,105	97	8.8%
International	847	69	8.1%
Corporate Expense	-	(250)	-
Total	**$8,196**	**$1,052**	**12.8%**

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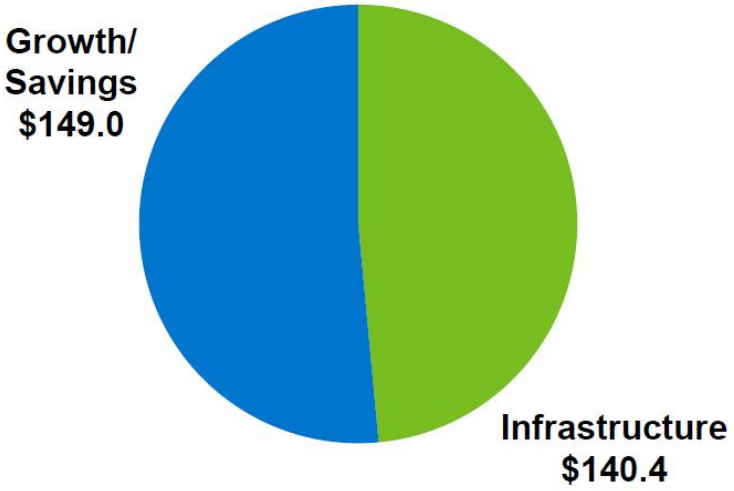
CapEx Balanced Between Infrastructure and Growth/Savings

FY16 CapEx
(dollars in millions)



FY17-FY20 Outlook

- 3% to 4% of Net Sales

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One ConAgra Plant Discharges more than 6 million Gallons of Treated Wastewater per day

Mcilvaine has this type of information on all U.S. food plants

Company Name: CONAGRA POULTRY CO.-NATCHITOCH
Address1: ES LA
Address2: HIGHWAY 1 SOUTH BYPASS
City: NATCHITOCHES
State: LA
ZIP Code: 71457
county: NATCHITOCHES

Telephone Number:
Official Representative: JOE MORAN, COMPLEX MANAGER
Official Representative Telephone Number: 3183529600

Mailing Company Name: CONAGRA POULTRY CO.
Mailing Address1: NATCHITOCHES PLANT
Mailing Address2: P.O. BOX 1008
Mailing City: NATCHITOCHES
Mailing State: LA
Mailing ZIP Code: 71457

SIC Code: 2015
SIC Description: POULTRY SLAUGHTERING & PROCESS
Flow Rate: 6.12
Industrial Classification: R
Industrial Classification Description: ON EFFLUENT

Company Name: CONAGRA POULTRY COMPANY
Address1: CO ROAD 636
Address2:
City: ENTERPRISE
State: AL
ZIP Code: 36331
county: COFFEE

Telephone Number: 3343470515
Official Representative: DIVISION MANAGER
Official Representative Telephone Number: 5018631600

Mailing Company Name: CONAGRA POULTRY COMPANY
Mailing Address1: P O BOX 311267
Mailing Address2:
Mailing City: ENTERPRISE
Mailing State: AL
Mailing ZIP Code: 36331

SIC Code: 2015
SIC Description: POULTRY SLAUGHTERING & PROCESS
Flow Rate: 0.019
Industrial Classification: R
Industrial Classification Description: ON EFFLUENT :

McIlvaine Toxic Water Emission Data at each ConAgra Plant

- CONAGRA FOOD INGREDIENTS - CAROL STREAM, IL
- CONAGRA FOOD INGREDIENTS MILLED INGREDIENTS OMAHA B-MILL - OMAHA, NE
- CONAGRA FOODS - ALTON, IL
- CONAGRA FOODS - HIGHSPIRE, PA
- CONAGRA FOODS - JUNCTION CITY, KS
- CONAGRA FOODS - KANSAS CITY, KS
- CONAGRA FOODS - LONGMONT, CO
- CONAGRA FOODS - MARSHALL, MO
- CONAGRA FOODS INC - ALIX, AR
- CONAGRA FOODS INC - CHESTER, IL
- CONAGRA FOODS INC - MACON, GA
- CONAGRA FOODS INC - RUSSELLVILLE, AR
- CONAGRA FOODS INGREDIENTS - MARTINS CREEK, PA
- CONAGRA FOODS PACKAGED FOODS - BOARDMAN, OR
- CONAGRA FOODS PACKAGED FOODS CO INC PASCO FACILITY - PASCO, WA
- CONAGRA FOODS PACKAGED FOODS CO INC. - CONNELL, WA
- CONAGRA FOODS PACKAGED FOODS CO INC. - TWIN FALLS, ID
- CONAGRA FOODS PACKAGED FOODS CO INC. RICHLAND FACILITY - RICHLAND, WA
- CONAGRA FOODS RETAIL PRODUCTS CO - MACON, MO
- CONAGRA FOODS RETAIL PRODUCTS CO - MENOMONIE, WI
- CONAGRA FROZEN FOODS COUNCIL BLUFFS - COUNCIL BLUFFS, IA
- CONAGRA REFRIGERATED FOODS - SAINT JAMES, MN

Details on Boilers at all ConAgra and U.S Industrial Plants

Facility Name: ConAgra Foods

Address: 540 East Broadway
Newport, Tennessee 37821 **County:** Cocke

Primary Contact Name: Michael Evans Safety Manager
Telephone: 423-625-3277
Fax: 423-625-3262
E-mail: michael.evans@conagrafoods.com

Unit ID: Boiler #6 (30.3 MM BTU/hr)
Classification: Boiler
Year Installed: 1973
Capacity Mil Btu/hr: 50.3
Operating Hrs/Yr:
Fuel: Natural gas

Unit ID: Boiler #3 (50.3 MM BTU/hr)
Classification: Boiler
Year Installed: 1978
Capacity Mil Btu/hr: 50.3
Operating Hrs/Yr:
Fuel: Natural gas

Idaho Water Reuse Permit has Good Info

Type of Facility	Potato Processing (Fry Plant and dehydration lines)	
Facility Contacts	Robert Schutte, Plant Manager Carl Coombes, Engineering Manager Toby Ripplinger, Industrial Engineer	ConAgra Foods Lamb Weston Inc. PO Box 489 American Falls, ID 83211 208-226-2301
USGS Quad	American Falls SW/Neeley	
Type of Waste	Potato processing (fry preparation & dehydration lines)	
Method of Treatment and Process Description	• In-plant pre-treatment including gross filtration, primary clarification, and cavitation air flotation. • Final treatment via land application for beneficial re-use. • A 16-pond system for treatment and evaporative/leaching loss. Slow Rate Land Application – 220.3 irrigated acres, 92.44 acres 16 Pond System – 240.6 acres (+/-)	
Domestic Sewage System	On-site facultative lagoon	
Domestic Water Supply System	On-site production and potable water supply wells	
Soils on Site (sprinkle irrigation site)	Somewhat excessively drained sandy loams, sand, well-drained fine sandy loam and sandy-clay-loam including Feltham and Quincy types.	
Depth to Ground Water	20-25 feet (perched ground water in land application area) 30 to 80 feet to shallow groundwater	
Beneficial Uses of Ground Water	Agriculture, Industrial, Domestic	
Nearest Surface Water	Snake River (ca. ½ mile south-southeast from pond system)	
Beneficial Uses of Surface Water	Primary and secondary contact recreation, Agriculture	

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82 Sustainable Development Projects reduce Water, Waste, Energy and Costs at ConAgra

ConAgra Foods 2015 Sustainable Development program achieved the following:

- Eliminated waste by 58,700 tons
- Optimized and improved packaging, while using 15 million pounds less material
- Conserved more than 97 million gallons of water
- And reduced greenhouse gas emissions by more than 11,500 metric tons;
- Delivering more than $70 million in savings, these projects exhibit the economic value of a company's commitment to sustainable development. This year's applications amounted to the largest single year savings the company has seen to date. Many of these applications were driven by the imagination and engagement of employees. The awards program recognizes that employees can make a big impact by coming together to do what's right for both the environment and the business.

ConAgra Foods started the Sustainable Development Awards program in 1992 to encourage and reward employees to find ways to eliminate waste, save water and reduce energy through process innovation and engagement.

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Sweet Potatoes Processed with Most Efficient use of Water

- The Delhi facility is the first frozen food manufacturing plant worldwide to earn LEED Platinum certification, the highest distinction available to green buildings. The design, construction and operations at the Delhi processing facility were all developed with environmental impact and sustainability in mind. The plant primarily processes sweet potatoes from Louisiana and the surrounding states--prime sweet potato-growing regions--and was built from the ground up using the newest and best processing and packaging technologies. Operations began in September 2010.
- The state-of-the art equipment featured in the plant was uniquely designed to process sweet potatoes in the most efficient and environmentally responsible way--key for long-term, economic sustainability. The plant will eventually convert fresh sweet potatoes into many different consumer and restaurant products prepared from frozen. Efficient operations mean more efficient use of natural resources within the community, including energy and water. Employees also benefit from the green building design; it is climate-controlled throughout to enhance productivity, safety and comfort.
- "We had an opportunity to build something from scratch and set out to build a great sustainable plant because it was right for the business and who we are as a company," said Rick Martin, vice president for manufacturing at Lamb Weston. "We've been producing quality sweet potato products for the past 10 years, which allowed us to bring the best of what we've learned during this time to the design and construction of the Delhi plant." To earn this distinction as the first LEED Platinum frozen food manufacturing plant in the world reflects the entire project team's hard work and ConAgra Foods' investment in innovation and excellence.

Delhi Produces Biogas

Contacts at Engineering Companies

- Biogas, produced by treating process waste water, is piped back to the plant boilers to produce steam. This process is expected to offset approximately 20% of the annual natural gas demand of the plant, and prevents methane, a harmful greenhouse gas, from entering the atmosphere.
- Project partners included Fisher & Sons Design/Build, a leading design and construction firm with expertise in the food industry based in Burlington, Wash., and Paladino and Company, a Seattle, Wash.,-based sustainability and green building consulting firm at the forefront of the green building movement.
- "We are proud to have worked alongside the team at ConAgra Foods Lamb Weston to bring this project from the drawing board to a reality," said Jerome Fisher, CEO of Fisher Companies. “
- About Paladino and Company: Paladino and Company, Inc. is an internationally recognized sustainability and green building consulting firm that helps organizations align business growth with the long term health and vitality of the planet.

Additional Flow/Treat Projects

- Hermiston improved freezing capability by installing a Velocity Air Stack to better direct air flow in their freeze tunnel. The project resulted in the elimination of a 500-horsepower compressor, reducing electricity use by 4.3 percent.
- Water Resources: Conservation & Wastewater Management – ConAgra Foods' Grocery Facility in Helm, Calif. Faced with one of the most severe droughts on record in California, Helm focused their attention on reducing fresh water use during tomato fresh pack. By maximizing the use of water reclaimed from tomatoes, the facility reduced fresh water use by over 40 percent conserving 22 million gallons.

- Solid Waste Reduction & Recycling – ConAgra Foods' Lamb Weston Potato Facility in Twin Falls, Idaho. Twin Falls explored opportunities to minimize frozen waste while ensuring the same product quality, testing frozen grader screens with fewer holes in their screening process. Installation of screens with 66 percent fewer holes provided the same quality product while eliminating over 1,000 tons of potato waste.
- Sustainable Business Innovation – ConAgra Foods' Lamb Weston Meijer Potato Facility in Bergen op Zoom, Netherlands. After a successful pilot test, Bergen op Zoom applied a new technology to fundamentally change how potatoes are preheated in preparation for cutting. This technology reduced water use by 18.5 million gallons, increased frozen recovery by 1 percent, and reduced greenhouse gas emissions by over 900 metric tons.

- Waterloo previously landfilled packaged pudding produced during flavor changeovers, sending high-quality pudding – albeit uniquely flavored – to waste. This project eliminated over 1,000 tons of packaged food waste by successfully identifying a market for a blended pudding SKU.

Lots of Environmental Projects

- Solid Waste Reduction & Recycling – ConAgra Foods' Lamb Weston Potato Facilities in Hermiston, Ore. and American Falls, Idaho
- Food oil recovery and reuse is an important part of Lamb Weston's process. To meet customer specifications, as well as maximize the amount of recovered oil utilized, the Hermiston and American Falls facilities started an exchange program, reducing the amount of fresh oil purchased and saving transportation miles.
- The project eliminated 629 tons of waste oil previously sent out as animal feed supplement or fuel production.

Marsh-McBirney Flow Meter at Sidney Facility

- When ConAgra Foods Inc.- Frozen Foods Group located in Sidney, OH had a requirement to monitor their facility's wastewater flows, the local municipality recommended that they take a look at a new flowmeter manufactured by Marsh-McBirney, Inc. (MMI). ConAgra's Frozen Foods Group produces and markets packaged frozen foods for grocery, foodservice, and special market customers such as club stores and supercenters. Popular brand name products include Banquet, Morton, Chun King, Patio, Marie Callender's and Healthy Choice, just to name a few. ConAgra is a Fortune 100 company and is one of the largest and fastest-growing frozen foods companies in America. Acclaimed as one of the 'first' in frozen food offerings with the introduction of the Banquet Pot Pie in 1953, ConAgra continuously receives recognition for their award winning innovation and state-of-the-art techniques utilized in the frozen meals industry.
- Joe DePetro of Chesley Associates, MMI's local representative, recalls meeting with the City of Sidney about the Flo-Dar flowmeter. The city in turn recommended that ConAgra take a look at this flowmeter for their new sewage monitoring application. A compelling requirement for the project was the need for a highly accurate flowmeter since the collected flow data would be used for billing purposes. ConAgra would need to provide the city with flow readings for wastewater discharges leaving their facility for processing at the city's wastewater treatment plant (wwtp). In turn, the city would use the flow readings to determine sewage treatment fees owed by the ConAgra facility. One of MMI's latest flowmeter innovations, the Flo-Dar flowmeter, provides a revolutionary approach.

Milton provides Anaerobic Treatment of ConAgra Wastewater

- The Milton Regional Sewer Authority (MRSA) Wastewater Treatment Plant (WWTP) currently serves six municipalities in Northern Northumberland County. The facility's largest customer is ConAgra, the industrial food producer behind Chef Boyardee and Healthy Choice products among others.
- In order to reduce operation and maintenance costs associated with the WWTP while also meeting Chesapeake Bay nutrient effluent limitations, Herbert, Rowland & Grubic, Inc. (HRG) designed a complex facility upgrade fueled by anaerobic treatment of the ConAgra wastewater. The state-of-the-art technology works together to generate electricity, incorporate biosolids drying utilizing waste heat, and produce a high level of wastewater treatment. Referred to as the Wastewater to Energy (Ww2E) Project, construction of the Ww2E upgrade expands the MRSA's wastewater treatment capacity from 3.42 MGD to 4.25 MGD and doubled its organic capacity to nearly 49,900 pounds per day.

Milton using Westfalia Centrifuge and Cummins Engines

- New 2.4 MGD Anaerobic Treatment Process (ADI Systems, Inc.)
- New 5 MGD Headworks Facility (IPEC fine screens, Hydro International grit removal)
- Enhanced 0.25 MGD Trucked-In Waste Facilities (Lakeside)
- New 4.25 MGD Verticel Biological Nutrient Removal Facilities (Evoqua)
- New UV Disinfection Facilities (ENAQUA)
- New Odor Control Systems (Evoqua)
- New Direct Heat Sludge Drying (Andritz)
- New 2 MW Cogeneration Equipment (Cummins)
- Secondary Clarification (EVOQUA)
- Sludge Thickening and Aerobic Digestion Facilities
- Dewatering Equipment (Westfalia centrifuge, Ashbrook belt filter press)

Evoqua - ADI Furnished Reactors at Milton

- Constructed in 2009, the upgraded plant included two 7.5 million gallon ADI-BVF reactors to anaerobically treat the influent ConAgra wastewater. In addition, the strength of the ConAgra wastewater was increased by 30 percent through removal of the company's pretreatment screening and settling processes. The ADI-BVF reactors reduce the wastewater strength by 90 percent while creating usable biogas as a by-product of the reaction. The biomass yield is low at 0.11 lb VSS per pound BOD applied, roughly 80 percent less than a typical aerobic process.
- It should be noted that Milton does benefit from the temperature of the Con Agra discharge, which is on the order of 105° F. (near the center of the mesophilic methanogenic range). Methane production does occur at much lower temperatures than that and the acid forming phases of anaerobic treatment occur at even lower temperatures, so the presence of warm industrial wastewater is not necessarily required to allow the cost effective application of anaerobic treatment technologies. For example, an anaerobic reaction ending at the acid production phase without methane production could result in an effluent idealized as a methanol addition substitute for biological nitrogen and phosphorus removal

Contacts from Milton

- E. Charles Wunz, P.E., DEE, is the executive vice president of Herbert, Rowland & Grubic. He has extensive experience in the planning, design, and construction of water and wastewater treatment facilities and is the project manager in charge of designing the Milton Regional Sewer Authority's new treatment plant. He is also a nationally recognized expert witness in cases related to water and wastewater infrastructure improvements and their impact on user rates. He can be reached by email at ecwunz@hrg-inc.com. Christopher Graf, P.E., is a project engineer at Herbert, Rowland & Grubic. with seven years of experience designing water and wastewater systems infrastructure. He may be contacted at cgraf@hrg-inc.com

Gordon Rupp Pumps at Russellville

- A large ConAgra food processing plant is located in Russellville, Arkansas. Engineers from ConAgra and City Corporation joined forces to find ways to enhance performance. Their design work resulted in the addition of a 300,000 gallon concrete equalization tank at the head of the treatment process. It was determined that this would help even the flow rates to the plant's 450-sq ft dissolved air flotation (DAF) units.
- The wastewater from ConAgra contains grease, vegetable oils and starches. The grease and oils do not readily come to the surface where they can be skimmed off like motor oil. The oil is forced out of the water by using a compressed air system which creates bubbles that the oil clings to and then is brought to the top of the tank. It's then mechanically skimmed from the surface."
- After the equalization tank was completed, three Gorman-Rupp self-priming, solids-handling centrifugal pumps were installed to transfer the ConAgra waste stream from the tank to the DAF units. Only one pump is used at a time, and they are alternated on a weekly basis..

ADI chosen for Mexican Plant

- ConAgra Foods processes many types of foods including salsas, canned vegetables, and popcorn at its processing plant in Irapuato, Mexico. Popular brand names include Hunt's®, Del Monte®, and Act II®.
- **The Client's Needs:**
  The type and amount of production at ConAgra's processing plant in Mexico varies greatly, depending on the season. Correspondingly, the plant generates variable wastewater flows and loads through the year. Fluctuations in the influent flow rate and variability of the raw wastewater characteristics considerably increase treatment difficulties. ConAgra Foods was faced with the decision of how best to implement an on-site wastewater treatment system.
- **The Solution:**
  ConAgra Foods chose ADI Systems' anaerobic technology to treat the wastewater at its production plant. Based on its many years of experience in the food processing industry, ADI Systems proposed its proprietary low-rate anaerobic ADI-BVF® reactor to treat ConAgra's wastewater. ADI Systems knew it would be a reliable, robust wastewater treatment system for ConAgra. It achieves high removals of organic load and converts the majority of the chemical oxygen demand (COD), including total suspended solids (TSS) and fats, oils, and grease (FOG), into green energy in the form of biogas.
- The BVF® reactor is the first step of treating the process wastewater, followed by aerobic polishing to meet final effluent discharge standards. The main components of the biological treatment train include a duplex influent pump station, a 12,500 m^3 (3.3 MG) anaerobic BVF® reactor, a gen-set system for biogas utilization, an aeration basin, a secondary clarifier, and a chlorine disinfection system.

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ConAgra uses ABB Dodge Ball Bearings at all its Plants

- ConAgra Foods' Lamb Weston plant in Connell, Washington, makes French fries and other potato products primarily for the commercial marketplace.
- In 2010 the plant launched a major project to increase equipment uptime. A corporate team studied two years' worth of operating data to identify the equipment that caused most downtime. They looked at failures and determined whether the downtime was due to operational issues, or mechanical or electrical failure. It soon became clear that one of the least reliable pieces of equipment was the roll sizer.
- The roll sizer sorts cleaned and peeled potatoes by size, dropping them into flumes which carry them to the knives to be cut into fries. Most of the failures were related to the machine's bearings, of which there are 22 - one on each end of 11 tapered rollers. Sealing problems led to bearing failures, and these sometimes caused knock-on damage to other drive components. The team found that the bearings were always at different states of wear, causing uneven wear on sprockets, and failures with drives and chains.
- The roll sizer is a tough application for bearings, with a lot of vibration in a wet environment. Applied Industrial Technologies, which supplies industrial products to Lamb Weston, identified poor sealing as the primary factor in the bearing failures.
- They recommended Dodge ULTRA KLEEN stainless steel ball bearings, which have a triple-lip sealing system plus a cage design that holds in the grease, preventing it from being washed out.
- All the bearings on the roll sizer were replaced with the new ABB´s Dodge products. The results were dramatic – the machine went from the least reliable to the most reliable in the plant. It has since been completely removed from the plant's tracking list, allowing maintenance staff to focus on other issues.
- ConAgra Foods was so impressed with the success of the bearing replacement at Lamb Weston that it decided to standardize on Dodge mounted ball bearings at all of its facilities in North America.

ConAgra using Infosys Information Automation Platform

- In fiscal 2016, Infosys (INFY) was chosen by ConAgra Foods (as a strategic partner for a multiyear managed services deal that will support the latter's application, infrastructure, and information security systems. ConAgra is one of North America's leading packaged food companies.
- This solution will leverage Panaya and the IAP (Information Automation Platform), which will help the client to reduce total effort in support, upgrades, and testing. It is also expected to drive innovation, improve service levels and reduce operating costs. Panaya is an Israel-based automation technology firm that was acquired by Infosys in 2015. Panaya is building a lineup of products, making automation for large customers efficient and cost-effective.

Pilgrim pays ConAgra $54k/month to treat Chicken Wastewater at Batesville

1. ConAgra shall operate and maintain the Facility in such manner as ConAgra deems appropriate, provided that ConAgra shall comply with allapplicable laws, regulations or orders of any governmental authorities in operating the Facility, and provided further that ConAgra shall accept for treatment and disposal all wastewater from the Poultry Operations subject to the terms and conditions set forth herein.

2. ConAgra understands and agrees that Buyer shall have the right during the term of this Agreement to discharge an average daily flow of up to 900,000 gallons per day of wastewater from the Poultry Operations into the Facility, or discharge of the same average daily flow as calculated over the past six months, whichever is greater, and ConAgra shall accept, treat and

dispose of all or any part of the wastewater discharge from the Poultry Operations, up to 900,000 gallons per day, or discharge of the same average daily flow as calculated over the past six months, whichever is greater, subject to the terms and conditions set forth in this Agreement.

3. Buyer shall pay ConAgra for the services provided herein, on a monthly basis, at the rate of $54,000 per month. Payment shall be made within fifteen (15) days of the last business day of each month during the term of this Agreement.

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Terra Demand sensing Software used by ConAgra

- Terra Technology, provider of demand sensing and inventory optimization software for consumer products companies, says ConAgra Foods has signed a North American license for Terra's Multi-Enterprise Demand Sensing (MDS) solution to reduce inventory and improve customer service.
- According to Steve Vielmetti, vice president of demand planning and supply chain optimization for ConAgra Foods, the company chose the software "to improve short-term forecast accuracy, reduce inventory and improve cash flow. MDS will help enable us to more capably predict changes in consumer behavior, helping us reduce safety stock by up to 15 percent and reduce costs in our supply chain."
- More accurate forecasts save money, lower inventory, improve customer service and decrease waste. Terra's solutions use downstream data, like point of sale (POS) data, to improve supply chain performance, reducing forecast error up to 50 percent and inventory up to 20 percent. Multi-Enterprise Demand Sensing reconciles daily demand signals from all participants in the supply chain. MDS uses pattern recognition mathematics to decipher which information is predictive and, in a recent pilot, the software reduced forecast error by 40 percent for all retail items.
- Robert F. Byrne, president and CEO of Terra Technology , said, "MDS will enable ConAgra Foods to use POS [point of sale] data to respond quickly and efficiently to shifts in consumer preferences, improving cash flow and reducing costs for the company.“
- ConAgra Mills makes 800 different kinds of flour for its customers. It uses
- “Building Smarter Manufacturing With The Internet of Things” Copyright Lopez Research LLC **8**
- predictive tools and services to forecast pricing, capacity requirements and
- customer demand. This allowed the company to maximize revenues through
- improved margin decisions and increase production capacity utilization by 5%.
- Three of the five largest consumer packaged goods companies, and some of the world's best-known brands, use Terra's software, including Procter & Gamble, Unilever, Kraft Foods, ConAgra Foods and Campbell Soup.

ConAgra using IBM Software with SignalDemand Enterprise Optimizer

- ConAgra Mills, , is using IBM's Smarter Commerce-based solution and its predictive analytics capabilities to increase supply chain efficiency and help bakers and other small businesses succeed in today's fast changing economic climate. ConAgra Mills, the third largest miller in North America and a grain industry leader, offers the most comprehensive selection of premium multi-use flours in the industry. The business is also at the forefront of ingredient development, price risk management and customer service. Aware of the challenges facing its customers, ConAgra Mills sought to enhance its overall customer experience by developing a solution capable of more efficiently delivering these businesses a greater variety of products but at a fraction of the cost.
- ConAgra Mills needed a tool with predictive capabilities in order to be more responsive to both market changes and customer needs up to 18 months in advance. Turning to a joint offering that combines IBM software with SignalDemand's EnterpriseOptimizer solution, this Smarter Commerce-based supply chain solution allows ConAgra Mills to deliver customers the products they need, when they need them and at a price they can afford to ensure their continued business success.
- "Our customers operate in an increasingly complex and volatile market environment," said Bill Stoufer, president of ConAgra Mills. "The solution from SignalDemand and IBM is part of our effort to use science-based solutions for our customers so that we can eliminate pain points and allow them to succeed in the new economic realities of today's market."
- IBM's Industry Solutions group was first introduced to SignalDemand through the IBM Venture Capital Group in 2010. IBM and SignalDemand's relationship gained momentum late that year, thanks to the Venture Capital Group which helped to deepen this partnership through cross-IBM alignment and execution across the Software Group industry solutions and Services groups.

Rockwell Automation System at ConAgra-Omaha with Systems Integration by Concept Systems

Who is Concept Systems

Rockwell Automation

- Concept Systems is a control systems integrator with a national presence. We solve even your most difficult manufacturing automation challenges. We listen to the concerns of your stakeholders, develop a plan, and implement a solution that mitigates risk and integrates the right technology to support both the vision of your business and the technical detail of your manufacturing process. Whether they're building planes, making french fries, or tagging steel, our customers trust us to become an extension of their teams, time and again.

CONCEPT SYSTEMS Inc

#PSUG

PlantPAx Process Automation System

McILVAINE

Who is Concept Systems

Rockwell Automation

- Rockwell Automation Solution Provider – **Controls** & **Process**
- Offices in Oregon, Washington, Colorado, & North Carolina
- Certified Member of the CSIA (Control System Integrators Association)
- Control Engineering Magazine System Integrator Hall of Fame Member
- 2014 Integrator Giant

Rockwell Automation Solution Partner

csia www.controlsys.org control system integrators association

Control Engineering System Integrator

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Business Challenge

Rockwell Automation

- Provide A Process Control Solution For A Greenfield Facility
- Abandon "One Off" Homegrown Solutions
- Create A More Sustainable Support Model
- Mainstream Commonly Supported Tools
- Use A Project Structure That Leverages Best Practices

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PlantPAx
Process Automation System

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Customer Requirements

Rockwell Automation

Accelerated implementation of new potato processing line

- Incorporate lessons learned from recent greenfield implementation
- Common Development Platform
- Widely Supported and Standardized Toolkit
- Full simulation and testing
- Accelerated Design, Development and Commissioning
- Integration partner that follows the Lead Integrator model

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Solution

Rockwell Automation

Accelerated implementation of new potato processing line

- Utilize a Lead Integrator model
  - Early engagement with the Process Design Team
  - Detailed Functional Design Documents (FDD)
  - Exhaustive Factory Acceptance Testing (FAT)
  - OEM Acceptance Testing
  - Subcontractor management
  - Rockwell Automation Solution Partner for Process & Controls – Concept Systems

- Rockwell Automation Platform
  - PlantPAx®

Lead Integrator + PlantPAx = Accelerated Startup + Reduced Cost

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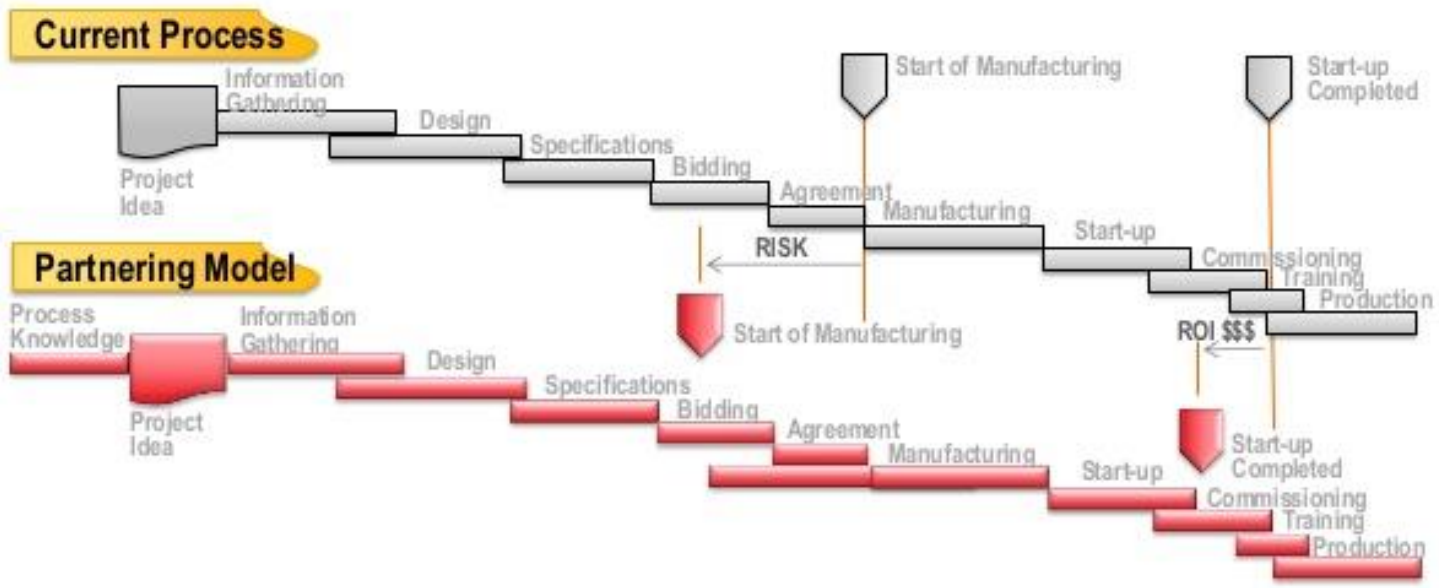
Solution – Lead Integrator Model

Rockwell Automation



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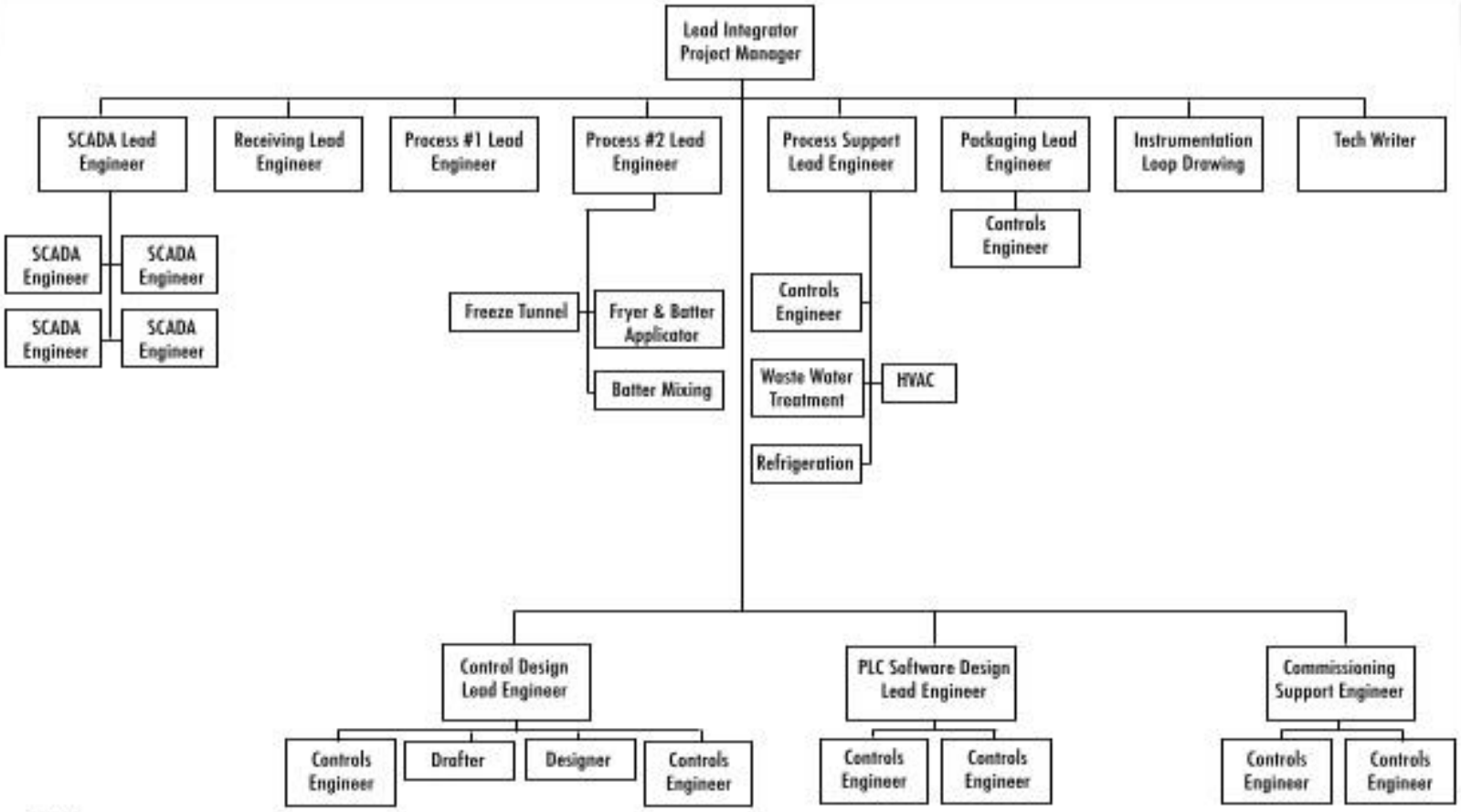
Solution – Lead Integrator Model

Rockwell Automation



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New Projects - Deep Process Knowledge Needed

Hoerning of ConAgra

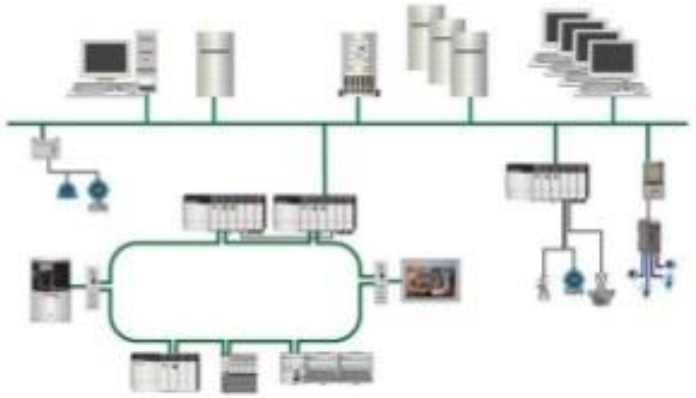
Successful implementation of a new plant startup is based on a number of factors. Dean Hoerning, director of engineering for ConAgra, Omaha lists three important factors

- Careful planning with knowledge support
- Virtual project management simulation with a systems integrator who has a deep understanding of the process
- Onsite support through the startup period based on proper training protocols

Solution

Rockwell Automation

What the controls look like.



- SCADA
  - FactoryTalk View SE
  - 2- PASS Servers, Redundant
  - 30- Operator Workstations
- Area Controllers
  - 6- ControlLogix® PAC's
  - Distributed I/O over Ethernet/IP
- Motor Control
  - IntelliCENTER® MCC's with DeviceNet over EtherNet/IP
  - 800 Buckets, 520 Motors, 165 VFDs

#PSUG

PlantPAx Process Automation System

Solution

Rockwell Automation

What the controls look like.

- Instrumentation
  - Endress+Hauser instruments with Hart, 580 transmitters
- Control Valves
  - Fisher & A-T Controls, 80 positioners
- Discrete Valves
  - Numatics controllers over EtherNet/IP, 30 banks, 400 valves
- OEM Control Systems
  - Waste Water, Process Support, Packaging, Air Handling
  - Common platforms - Rockwell Automation Logix and PanelView™

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PlantPAx Process Automation System

Results and Benefits

Rockwell Automation

Why Concept Systems & PlantPAx?

- Smoothest startup ever
- Developed a standard template for future projects
- Better Tools For a Fledgling Plant Support Staff
- PlantPAx Tools Resonate With The “Point-N-Click” Trends

$1 Up front = $10 in blood & treasure saved at startup!

#PSUG

PlantPAx
Process Automation System

McILVAINE

Summary

Rockwell Automation

Why Concept Systems & PlantPAx?

- The Lead Integrator model works
  - Engage your Integrator partner early
  - Find an Integrator partner that will walk the path with you
- PlantPAx significantly benefits the bottom line
  - Reduces development time
  - Standard look and feel
  - Readily adopted by both operators and technicians

Skeptics of early engagement & standardization are now believers

#PSUG

PlantPAx Process Automation System

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Dunbar Mechanical performs ConAgra Upgrades

ConAgra Archbold
The plant has been a most valuable customer for Dunbar Mechanical for approximately 15 years. Work Dunbar has successfully performed for Archbold includes:
Renovation of wines and ingredients systems.
Load cells and piping modifications to cook kettles.
New cooling tower water system.
Soup line ingredient system including bin dump, tanks, pumping systems and instrumentation.
New master kitchen.
New dry ingredient handling system.
New Clean-In-Place system.
Cooker heat recovery system.
Rice noodle fryer replacement.
Ladders, platforms modifications.
New fresh meat line.
New air compressor.
Steam injector replacement

ConAgra - Fullerton, California
T-100 evaporator capacity expansion installed.
Manwich® line.
ConAgra - Helm, California
75,000 pound per hour steam boiler installation.
Tomato paste pouch systems.
Various utility piping systems.
Process evaporator.
ConAgra - Marion, Ohio
Miscellaneous piping and material handling projects to improve the efficiency of the prop corn
plant operations.
ConAgra - Memphis, Tennessee
New line for Wesson Oil.
Piping systems.
Packaging and conveying systems.
ConAgra - Newport, Tennessee
Contractor for the complete renovation of this facility.
Responsible for the following aseptic systems:
- Vinegar system
- Sucrose system
- Batch deck, tanks and pumps
- Hopper/blender systems
- Clean-In-Place system
- Paste recovery system
- Paste unloading

McILVAINE

Dunbar Mechanical - More ConAgra Plants

ConAgra - Oakdale, California
T-200 Evaporator and all associated equipment installation.
New and modified bin fill system.
Material handling systems.
Pneumatic control system.
Sauce line.
Installation of temporary boilers with pipe modifications.
Miscellaneous process piping.

ConAgra - Perrysburg, Ohio
Mechanical maintenance and small project provider for pudding plant.
Installed all five Snak-Pak® pudding lines.
Clean-In-Place system.
Milk storage and delivery system.
Tomato paste storage and delivery system.
Tomato product packaging lines.
Ammonia refrigeration for pudding lines and spiral freezer.
Steam boilers for powerhouse.

ConAgra (Orville Redenbacher) - Rensselaer, Indiana
All process piping, manufacturing equipment and material handling for new
popcorn plant.

ConAgra (Orville Redenbacher) - South Bend, Indiana
Installation of new popcorn line.

ConAgra (Orville Redenbacher) - Valparaiso, Indiana
Production line renovation and retrofit.
Oil storage and delivery system.
New microwave popcorn line installation

McILVAINE

8600 Contacts at ConAgra on LinkedIn

There are 1000 important contacts among the 8600 listed LinkedIn ConAgra employees. This includes corporate management and purchasing, plant managers, engineers, maintenance people and staff people involved with the environment, air pollution, water pollution, safety and quality control.
Wisdom is achieved through the 4A's Alerts, Answers, Analysis, and Advancement. Individuals within corporate and at each of the plants who have involvement in automation, data analytics, or specific products such as valves, pumps, conveyors, fans, scrubbers, filters, centrifuges etc. should have access to the 4A's. The suppliers of these components and systems can contribute to the Alerts, provide case histories to provide answers, white papers to provide analysis, and be available to help train and advance the plant personnel.
These individuals are increasingly relying on digital technologies for their answers and analysis. YouTube presentations and on line webinars will be increasingly popular.

This program creates a whole new marketing approach. Suppliers do not wait for a request for proposal or sales lead. They are working throughout the year with all the plants in the corporation and participate in the specifications for new purchases

IIoT Components in Food Manufacturing

McILVAINE

ABB ECS System at Wander

- The production of the Ovaltine and Caotina drink mixes has long been controlled by ABB's automation platform System 800xA. The need to increase production efficiency and flexibility led Wander to implement a Manufacturing Execution System (MES). With the introduction of ABB's MES, Enterprise Connectivity (ECS), Wander now also has complete horizontal and vertical integration — from the delivery of raw materials, to production, to finished products, and from Enterprise Resource Planning (ERP) system to plant floor.

  The integration of the business system layer with the control system layer enables the synchronization of the production processes, transparency of all plant activities, as well as production improvement and optimization
- Modernization without major interruptions
- The implementation of the MES system was part of a larger modernization project that also included changes in the physical building and higher level of automation in the logistics operations (eg, connecting the high rack warehouse to the production and automated guided vehicles). The major challenge for the parties involved was to maintain the production and logistics operations without major interruptions. The constant changes through the individual projects required optimal coordination and fine-tuning. The high standards of product quality, hygiene and service delivery also had to be adhered to at all times.

Automatic Weighing, Dosing, and Mixing at Wander

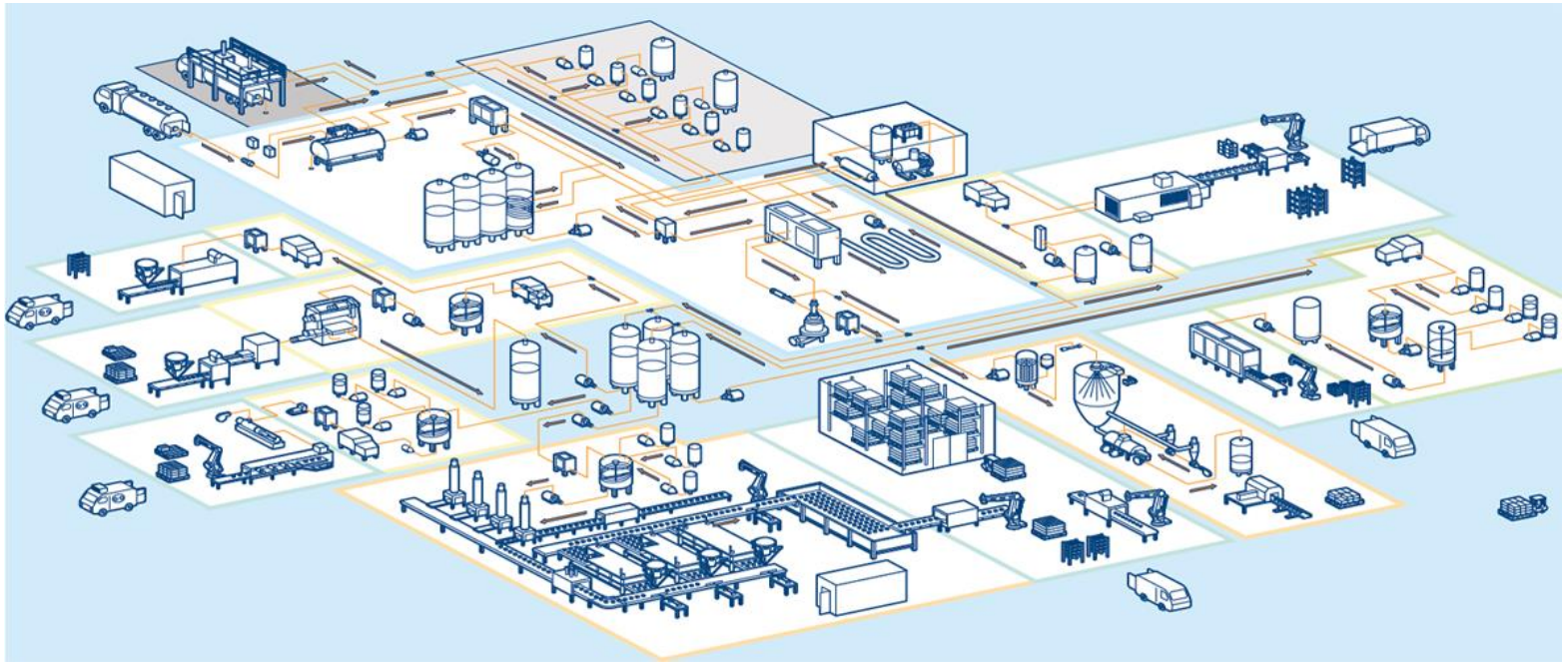
- New silos for raw and bulk products play a key role for optimal production processes. It is now possible to control material flows and to track production processes, thanks to an accurate and automatic data acquisition of the MES. Manual and paper-based pre-production steps, such as pre-weighing of raw material, are now also supported by the system. Operators are guided through the weighing using ergonomic workplaces and barcode scanners, thereby ensuring an accurate and efficient process at all times.

- Automated formulation: The new system now controls the work order picklists of the individual products. When the production order is downloaded from the ERP system, the MES system starts the batches and calls the necessary raw material, which is delivered via a driverless fork lift (AGV) from the high rack warehouse. Another part of the raw materials comes from the day silos. The required ingredients in the dry mix are then combined, mixed dry or wet depending on the recipe, and then dried, granulated and bottled as a dry mixture.

  The system thus controls the overall formulation — from the weighing of raw materials to the actual mixing process, including automatic dosing of all components supplied. With automation, error rates are reduced as the system instantly detects and interrupts the weighing or mixing process when any deviations are detected.
- Raw materials handling and inventory: Other improvements that were realized with the new system include raw material handling. Before the project, whey powder and cocoa were delivered in 25kg bags. Today, these ingredients are stored in silos with a daily capacity of 5,000kg, which are filled by big bags. The changed formats mean savings for Wander in terms of filling and raw materials input, as well as a significant reduction of handling. A key functionality of the MES system is the seamless and complete traceability of all materials, equipment and persons involved in the production process. It is now possible to instantly view the genealogy of the products, all the way down to the mixing layers of powders in the silos.

  Inventory is another area that has seen improvements. As material usage is booked back in to ERP as it is consumed, inventory is always up-to-date and correct. This enables timely material reordering and avoids corrective actions and unplanned downtime.

ABB Manufacturing Execution System (MES) raises Productivity for DSM Nutritional Products



DSM Nutritional Products is a major supplier of vitamins and carotenoids (natural colorants) for the cosmetics, pharmaceutical, and food and beverage industries. The company operates a major plant in Village-Neuf in Alsace (France) where vitamins and carotenoids and produced and mixed. The site, which also includes laboratories and research installations, employs around 500 people. About 70 of these work in the domain of premixing vitamins. Premixes are manufactured in direct response to customer orders. There is thus no actual storage of premix on-site.

Shipments must leave the works within a maximum of four weeks following order reception, including the time to deliver the necessary analysis certificates. At the Village-Neuf site, more than 1,000 recipes can be assembled from around 200 raw ingredients. Seven different mixers are available with capacities from 240 up to 8,000 L. The plant's operation requires reliable planning. The traceability of each production step must be assured and logistics must be accurate.

DSM achieving Double Digit Efficiency Improvement

- Until 2013, the premix plant used a tailor-made process-control system, which required a strictly sequential execution of process steps. To improve efficiency and to be prepared for future demands, various MES offerings were evaluated.

  An MES represents the process control layer located between the business level of the plant with its ERP system and the local process control level with its SCADA system.

  DSM Nutritional Products chose ABB from among four competing suppliers and ordered the company's cpmPlus Enterprise Connectivity System (ECS). This system provides standardized interfaces to the customer's ERP system according to the ISA95 standard as supported by SAP for the vertical integration of process automation.
- Some steps of the production process can now be performed in parallel. For example, in the past, all raw materials required for a production lot needed to be available on-site at the same time for production to begin. Now weighing and portioning can begin as soon as the first components are unpacked. This massively increases the flexibility of scheduling at the weighing stations, and thus alleviates bottlenecks

- The plant estimates that its efficiency increase is in double digits "With the new MES, we now have realtime information about the entire process, which is furthermore more reliable and transparent," explains Gilles Nodot, product manager. "We know at any time how much of what material is at which process step. This permits a detailed planning process with much reduced demands for storage of raw materials."

ABB supplies MES as well as Process Control Systems and Products

Manufacturing Execution System

MES Highlights
Production management including electronic work instructions, quality management, weigh and dispense, genealogy, labour, materials, downtime management, etc
Paperless manufacturing
Equipment optimization
Energy management

Decathlon software
Decathlon Services:
View | Report | Connect | History
Decathlon Apps
Software Development Kit

Process Control Systems

800xA Highlights
ProBase engineering libraries for F&B operations
Batch Management
Smart Client - access through office workspace
Asset Management
Electrical control system
High Integrity Safety System
Connectivity to 3rd party DCS, PLC, ERP, etc
Freelance Highlights
Freelance engineering saves programming effort
Freelance Formulation for recipe management
or 800xA Batch add-on
Information management

Process Control Products

Compact Product Suite Highlights
Best products for control system engineering
- combined into one solution or stand-alone:
DCS controllers, I/Os, HMI and operator panels
PLC controllers, I/Os and operator panels
Panel-mount process controllers and indicators
Paperless and circular chart recorders
Independent High Integrity
Measurement Products Highlights
Temperature
Flow, level and pressure
Valve positioners
Data acquisition, signal converters

ABB 800xA DCS Connection with ERP increases Productivity of AAK

AarhusKarlshamn manufactures high-value-added specialty vegetable fats. Its products are used as substitutes for butterfat and cocoa butter, trans-free solutions for fillings in chocolate and confectionary products, and in the cosmetics industry.

The company has production plants in several countries and is organized in three business areas: Chocolate & Confectionery Fats, Food Ingredients & Technical Products and Feed.. Its hydration plant is where the fats' melting points are determined according to intended application.

The information, from customer order through production planning, was previously entered manually by the operators. This naturally increased the risk of human error and sometimes resulted in us running out of material, with a production stop as the inevitable consequence. One of the major goals of the automation project has thus been to minimize manual operations as much as possible

Following a risk analysis of the plant's old control system, ABB did extensive work to adapt its System 800xA to AAK's total operational needs. The obvious solution was integrating their business system with System 800xA. In January 2010, it was ready for commissioning and the many benefits were soon apparent to all concerned.

Improvements: Seamless information flow - AAK operators utilize an unbroken chain of information from customer order to production planning to process control

Automatic feedback - Since System 800xA also reports in real time which product has been manufactured and how much, as well as which ingredients have been consumed and in what quantities

Reduced downtime - Previously, a reporting delay of just a few hours resulted in missing materials for subsequent batches and production stopping

Costly interruptions are now a thing of the past and process flexibility is much improved.

ABB Sensors, Transmitters, Positioners, Signal Converters in F&B-General

PRODUCT LINE:	Pressure	Temperature	Level	Valve Auto	
Product Name (If Any):	Transmitters & Sensors	Transmitters & Sensors	Transmitters & Sensors	Positioners	Signal Converters
Model #S:	2600T	TTF300 TTF350	KM26	TZIDC AV	I/P
Applications					
General Applications					
Clean-in-place	X				
Cold Storage		X			
Heat Exchange	X	X		X	
Mixing/Blending	X	X	X	X	
Pasteurizer	X	X		X	X
Process Steam	X	X	X	X	X
Process Water		X	X	X	
Retort Control	X			X	X
Storage Silos		X	X		

ABB Sensors, Transmitters, Positioners, Signal Converters in F&B - Sugar

PRODUCT LINE:	Pressure	Temperature	Level	Valve Auto	
Product Name (if any):	Transmitters & Sensors	Transmitters & Sensors	Transmitters & Sensors	Positioners	Signal Converters
Model #s:	2600T	TTF300 TTF350	KM26	TZIDC AV	I/P
Sugar industry					
CO2 to juice purification		X			
Condensate		X	X		
Evaporators	X	X	X	X	X
Fresh water	X	X			
Lime milk		X		X	
Raw juice			X	X	
Thick juice				X	

The fast and accurate information provided by sensors is the basic need of a process control system. Components Matter

McILVAINE

ABB I/P Signal Converter solves Enzyme Plant Valve Problem

- In an enzyme production plant the process fluids contain cellulose particles with a size of approx. 8 mm. When the valve is quickly settled, it may be blocked. This effect occurs in conjunction with positioners.
- The ABB solution is An I/P signal converter used for controlling the position of a small diaphragm valve with 15 mm stroke. This valve controls the flow in a range of 50 to 2000 liters/h and with an accuracy of +/- 3 ... 5 liters/h. The used “open-loop” I/P signal converter TEIP11-PS provides for quick control on the setpoint side, but responds rather slowly on the process value side. As a result, short-time position deviations of the valve caused by cellulose particles passing the valve remain unconsidered. This ensures that the valve is not blocked, even when it is opened only a little bit.
- The reduction of unplanned plant downtimes results in a decreased loss of production. Cost savings combined with an increased plant availability are the benefits.

Valves are the foot soldiers of process management systems.
Components matter

McILVAINE

ABB LM80 Laser Level Transmitter solves Molasses Measurement Problem

- The LM80 Laser level transmitter has been successfully applied to a Sugar refinery in the USA. The application involves measurement of a viscous, un-refined molasses used in the process of making sugar and is similar to another product called magma.
- The measurements of molasses and magma offer several challenges to traditional level control products because the product is thick, very sticky and is constantly being stirred by large paddles. The paddles are typically 3 meters (10 feet) in diameter and rotate slowly (approximately 3 RPM) constantly mixing the product to keep it fluid.
- The temperature is in excess of 40°C (100 degrees F). In this particular installation the tank was more u-shaped with an open top and a drive shaft that turns the mixing blades, which runs the length of the "pan". The depth of the "pan" is approximately 4 meters (14 feet) and typically 7 to 10 meters (25 to 35 feet) long. To further complicate matters the structure is baffled every 1 to 2 meters (4 to 6 feet).
- The customer had tried unsuccessfully to mount an ultrasonic level transmitter above this narrow compartment but there was too much dispersion of the ultrasonic signal to allow a reliable reflection. The customer then tried a Radar level transmitter which was also unsuccessful.
- This type of fluid is very dark brown or black but this has no measurable effect on the LM80 laser level transmitter performance. The LM80 was mounted three feet above the surface of the chamber and aimed down into the chamber.
- The results were excellent and the LM80 responded with the correct measurement. This problem is generic to many sugar making processes.

Accurate level measurement is important to process control. Components matter

McILVAINE

Malteurop selects ABB Bearings and Motors

- Malteurop acquired U.S.-based ADM Malting in 2008, including a malting facility in Milwaukee, Wisconsin. Soon after, work began to upgrade the facility, including one of the large malt houses at the plant. All 12 malting beds needed to be upgraded, replacing aging equipment with more reliable and more efficient technology.
- The Malteurop team selected Dodge Imperial roller bearings because of the patented triple-lip contact sealing system that prevents water and other contaminants from entering the bearing. The team is also pleased with the adapter mounting system that makes these bearings easy to install and remove
- Malthouse Project Engineer Dave Hinners says they chose a Baldor•Reliance RPM AC® motor for the travel drive because it meets the unique requirements required for the application. When the travel drive is moving back and forth turning the barley, it moves just under two feet per minute. But during the unload, it moves nearly 100 feet per minute. “That’s over a 60-to-1 ratio, and we needed a motor that could handle that wide range of speed with the torque that we needed,” says Hinners. “Because the RPM AC motor offers continuous constant torque to zero speed, it’s the perfect choice for this machine.”
- *The wide speed range allows an ABB process control system to optimize operations and is one more demonstration of the fact that components matter.*

McILVAINE

ABB VSD allows Energy Reduction with Safety Protection

- The food and beverage industries employ a wide variety of machinery in processes from raw material handling to pumping and conveying of ingredients; from processing by mixing and cooking; as well as during packing and storage. However diverse the application, they all rely on one common factor – the low-voltage (LV) electric motor in both AC (alternating current) and DC (direct current), and including the latest permanent magnet and synchronous reluctance motors.

  Pumps, fans and even decanters can be controlled very successfully by running their LV motors at full speed and adjusting their output by relatively crude mechanical methods, such as gears or throttling. However, in the past 30 years we have seen the adoption of a more elegant and energy efficient approach based on variable speed drives (VSDs).
- ABB LV AC drives support operation of machinery and process safety. Drives offer a wide selection of safety functions either as a standard or integrated into drives optional safety functions module. The option of certified safety functions in a drive, reduces the need for external safety add-ons such as contactors and safety relays as well as the wiring which these would require.

  Perhaps the most essential of safety functions is safe torque off (STO), which brings the machine safely into a no-torque state and/or prevents it from starting accidentally. This function allows the safe cleaning and mechanical maintenance of food processing machinery. Alternatively, it can allow an operator to reposition product while the drive is paused in standby mode, ready to resume operations with the minimum of interruption to production. The drive's internal diagnostic functions also run during the shutdown, making it possible to analyze such events afterwards, a feature which can be hugely beneficial when optimizing a process.

- *Variable speed drives allow a process control system to achieve maximum energy savings. Components matter*

McILVAINE

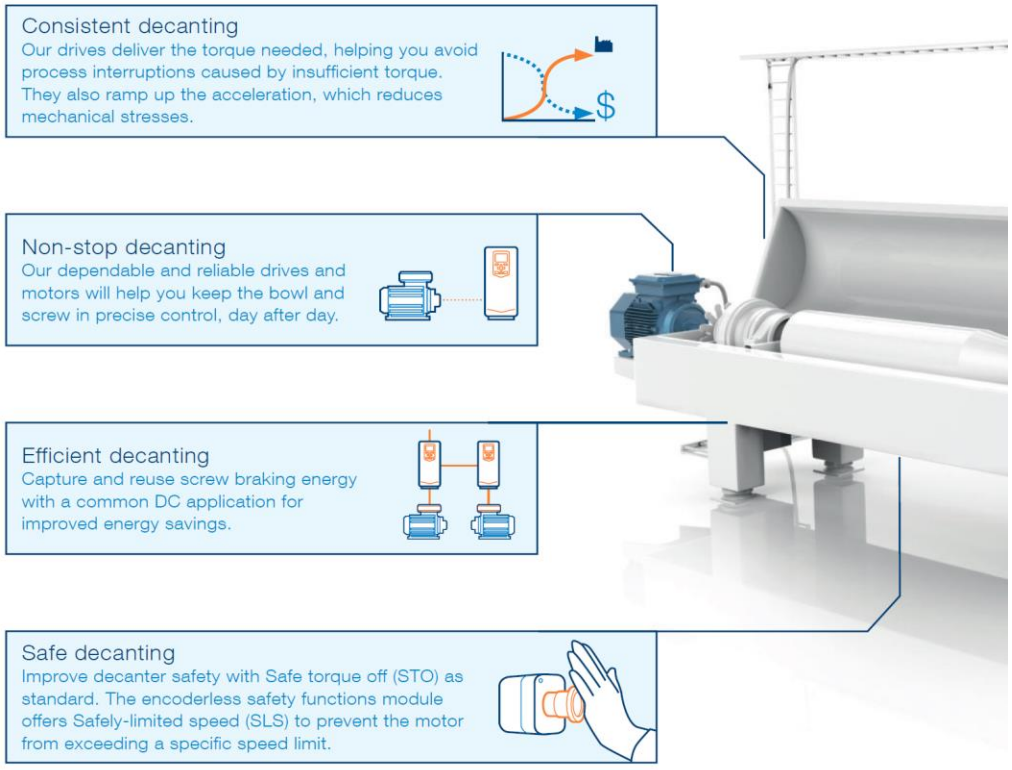
ABB Drives for Food Decanters

ABB understands the needs of centrifugal separation in the food industry. The torque control features of the drives provide consistent decanting to address product variables. Screw breaking energy can be recovered thus providing higher energy efficiency for the operation.

Components Matter

Reliability. Productivity. Efficiency. Safety. Everything counts.

Whether you are producing juice, wine, beer or edible oil, our extensive portfolio of drives, motors and automation products are the perfect solution for your decanter. Torque control, accuracy, reliability, everything counts to keep your decanter running smoothly and efficiently.



2 Decanter centrifuge | **ABB Drives and Controls**

ABB PLC for Food Decanters

PIC'S, operator panels and Automation Builder Software allow the operator to optimize the control and to most efficiently utilize energy with a design which allows the power to flow from the screw drive to the bowl drive. These features have been incorporated based on a long history of working with suppliers of the decanters. IIoW is maximized when there is the broadest collaboration between component suppliers, system designers, and end users.

Components Matter

Improve the speed difference control between the bowl and the screw with decanter control program of a drive.

When the recipe needs more complex control, our PLCs and operator panels along with Automation Builder software allow you to develop any range of control needed.

The ready-made, decanter-specific program in a drive is designed to perform practical programmable sequences in the separation process.

The control program lets you control the speed differences in a two-shaft decanter, which affects the composition of the end product and speeds up the process. In addition, the control program has valuable features for maintenance work and for cleaning the decanter.

Use the rotational forces efficiently.

- The decanter control program has ability to use common DC functionality when several drives are used. This enables power to flow from the screw drive to the bowl drive equalizing the energy consumption of the drives.
- By connecting the drives with a common DC application you are able to reduce the need for low voltage main circuit components and simplify electrical installation.
- The drive's Direct torque control (DTC) ensures accurate decanter control, even at high starting torque and across the entire speed range.

We have a portfolio of global services to meet your needs. No matter where your decanters are installed or used, our wide channel partner network and global service is always local. You choose the services that fit your needs, from classroom training to customized Drive Care contracts.

ABB Robotics in the Food Industry

ABB robots are becoming widely used in many applications in the high risk processing areas of food production. Examples of this are ultra sonic cutting of cheeses, cakes and gateaux, water jet cutting of bread rolls, collating meat and fish products into packing formats prior to primary packaging, de-panning of various bakery products and numerous applications in the confectionary and biscuit segments.

ABB robots, some available in washdown variants and with IP 67 or IP 69K protection continue to add value and enhance profits in this key area of the manufacturing process.

Robotics advance process control systems. Components Matter

McILVAINE

Accenture Analytics allows Global Food and Beverage Company to improve Tactical and Strategic Analysis

Faced with rising retailer and consumer demands, and a cost-conscious culture, a global food and beverage company turned to Accenture Analytics to collaborate on a new analytics strategy, roadmap, governance, and technical environment that would help deliver analytics capabilities and value quickly with robust return on investment. Accenture and senior leadership collaborated to:

- Identify opportunities to realize significant economic value by executing specific projects.
- Build the analytics foundation for the company.
- Create two pilot programs to prove out the new analytics capabilities.

This company's analytics investment has historically been in foundational business intelligence (BI) capabilities and technologies. In order to develop a sustainable competitive advantage in analytics, investment needs to shift towards more agile and global capabilities as well as in fostering a new culture that thrives on fact-based decision making. The company called on Accenture Analytics to help develop a transformational analytics strategy and foundational technical capabilities to support the company's vision.

Following the implementation of the new organizational structure, Accenture teamed with the company to define and build the technical architecture needed to create a global data marketplace leveraging SAP BW on HANA.

The team enabled a data discovery platform using Hadoop, Alteryx and R to expand advanced analytics capabilities. And for the new analytics culture to be sustainable, self-service analytics and visualization front-end was created for reporting, dashboards, discovery and analytics, and advanced analytics, including commercialization of new tools like SAP Lumira to enable self-service.

The new organizational model and technical infrastructure allows the company to deliver global reporting more efficiently, expand self-service capabilities, better handle data for tactical and strategic analytics use, and deliver with more consistent quality.

Alfa Laval provides Systems and Components designed for High Performance

- Automation
- Boilers
- Brewery solutions
- Centrifugal separators
- Control valves
- Evaporation systems
- Filling solutions
- Fittings
- In-line valves
- Instrumentation
- Membranes
- Mixing equipment
- Olive oil solutions
- Plate heat exchangers
- Protein solutions
- Pumps
- Scraped surface heat exchangers
- Seat valves
- Tank cleaning equipment
- Tank equipment
- Thermal solutions
- Tubes
- Tubular heat exchangers
- Vegetable oil solutions

Alfa Laval started out making dairy separators and has expanded over its long history to provide a wide range of equipment and systems for the food industry. It supplies components such as pumps and valves, process equipment such as centrifuges and heat exchangers and sub process systems such as for evaporation. As seen in the process section, the company also provides full systems. It has the potential to move further into remote monitoring and operation. The performance agreement with the Brazilian sugar factory is a stepping stone to full remote O&M

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Alfa Laval Performance Agreement for Brazilian Sugar Company

By signing a Performance Agreement with Alfa Laval, a Brazilian sugar and ethanol plant eliminated unplanned downtime and saved around 100,000 Euros in nine months.

- Without the necessary expertise, early warnings and minor problems were left to reach a crisis point before being addressed which translated into huge costs and inefficiencies. For a fixed fee, a four-year Performance Agreement was tailored-made by Alfa Laval, providing Preventive Maintenance, emergency engineers and a solid partnership for the future, including:
  - A team of dedicated service engineers, who know the company, the factory footprint and the equipment inside-out
  - Preventive Maintenance to ensure machinery is running at optimum performance levels
  - Condition Audit to help determine when equipment needs service or replacement
  - Best practice for maintenance established and full training for the staff
  - 40 emergency hours available every calendar year
- In previous McIlvaine webinars on water/wastewater and filtration the remote monitoring capabilities and performance software for centrifuges were covered. Slides on Alfa Laval processes at the beginning of this slide deck show the complete processes provided by the company. This places Alfa Laval in a very strong position to capitalize on IIoT and Remote O&M.

Alfa Laval is providing Separation Solutions to recover Product from Wastewater

- **Value Streams from FOG (Fats, Oil and Greases) in Industrial Wastewater Reduce** Water Waste Food and Beverage processing plants face unique challenges when it comes to the treatment of Industrial Wastewater. The municipalities may charge high rates – or may not even accept complex wastewaters. Wastewater Treatment may become a bottleneck for expanding production or a source of valuable product loss. The Reduction of Water and Waste; Recovery of Water and Product; and Reuse of Water, Waste and Product is the foundation for the processing plant manager's plans for optimizing Total Cost of Operation. Listen to the Alfa Laval recording to discover how Food & Protein processing plants – including the processor for fresh and cooked (breaded) product – may implement solutions towards achieving process optimization. In this webinar.
- Alfa Laval illustrates solutions for extracting and recovering fats and inorganic matter to reduce waste-load - both within the process and after it "hits the drain". Learn how plants have turned what was once "the high cost of waste" into a value stream from both within the process and after it "hits the drain". Key Points
- • Industrial Wastewater Challenges of a protein processing plant: o Slaughter Plant, Processing and Packaging plant and Cooked (Breaded) Processing plant
- • Optimizing Total Cost of Ownership: Full Circle o Product Recovery, Re-Purposing to Value Stream Water
- • Optimizing Unit Operations: o Within Process before Product, Water and Waste "hit the drain" o Within Industrial Wastewater Treatment
- View this webinar at https://attendee.gotowebinar.com/register/4956454764878597123

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Bete Nozzles for Food Spray Dryers

- Industry: Dairy
- Application: Spray dry process for milk producer
- Product: Twist and DryTM - TDL
- Problem: A plant spray-dried milk in a box drier with 24 nozzles that typically operated between 2,500 to 3,500 psi. The nozzles, however, started to become clogged after about 8 hours of operation. This produced variances in quality, increased costs related to cleaning, and caused periodic production shut downs.
- Solution: To address the problem, BETE recommended six 1/4TDL2-36 nozzles for testing. During tests of eight hours and 28 hours, BETE nozzles sprayed flawlessly without clogging and showed no visible signs of wear. Cost savings from the switch to BETE nozzles enabled the plant to purchase two complete sets of nozzles. The BETE TDL nozzle eliminates the need to shut down the drier for cleaning, providing additional savings. Other Applications: • spraying preservative • moistening before baking • cooling drums • color coating • dough splitting • pan lubrication • evaporative cooling • moisture control

Cisco Connected Factory at Campofrio Food Group

- Spanish food manufacturer Campofrio Food Group rebuilt its La Bureba factory from the ground up to be a state-of-the-art, digital food processing facility. Campofrio Food Group implemented Industrie 4.0 and smart manufacturing pillars of full connectivity and visibility across processes, sensors, production lines, and people.
- The plant implemented tracking and traceability of all SKU's along the different steps of production (slicing, drying, etc.). The factory went a step further in terms of data management of various recipes as well as real-time visibility of materials, operational equipment effectiveness (OEE), and labor utilization. Another key concern was worker safety. With 5 different buildings in the La Bureba campus and with the inherent risks of food manufacturing, people tracking was key for safety and security.
- How did they accomplish this? They applied Cisco proven validated architectures for Connected Factory, Security, and Wireless, which resulted in a robust infrastructure comprised of hundreds of WiFi access points and nearly 2000 connection endpoints. They also used the latest Industrial Ethernet switches to better track production lines, improve redundancy, and also leveraged Cisco Prime for monitoring and maintenance.
- "We've created one of the most advanced food manufacturing plants in Europe. Designing our 'New Bureba' facility with connectivity at its core, we are confident to have a Factory 4.0 blueprint that will help us in continuing to demonstrate excellence through innovation, competitive pricing, and rapid time to market."-Javier Alvarez, CIO, Campofrio Food Group

Cisco - Sugar Creek Packing

- Automation vendors' poster child for IIoT investment in the food industry is Sugar Creek Packing Co., a pork processor that christened a new facility in Cambridge City, IN, in 2015. Sugar Creek invested $6 million in networking hardware and software. The technology was a necessary foundation for a high-performance work team system that executive management introduced at the new facility. Eliminating workflow bottlenecks provided the return on investment
- The facility has advanced process control systems, data acquisition and collection, historians and several high-tech devices (including wireless everywhere and 250 hi-def video cameras inside and outside the plant), with an Industrial Internet of Things (IIoT) network provided by Cisco Systems. ONEsource Facility Solutions designed, built and oversaw the construction of the site.
- Sensors throughout the plant monitor everything—from the temperature of pork bellies in the smoke house so airflow is optimized to the positioning of precooked bacon in slicers to improve yield. Temperature tags on trucks ensure proper refrigeration for products during transport, and worker helmets will leverage RFID sensors to enable better communication and to boost safety within SugarCreek's plants

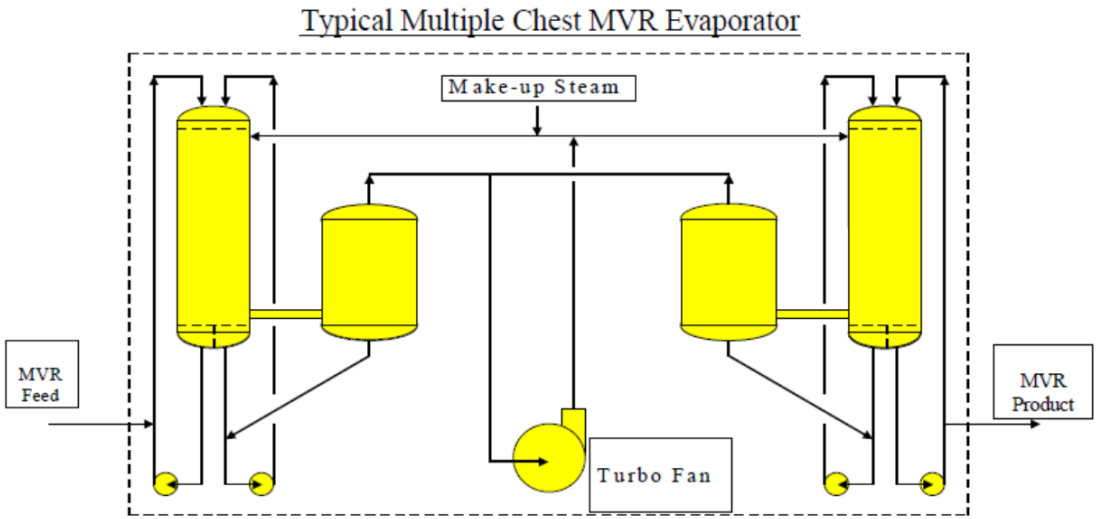
Sugar Creek Wastewater Treatment

- SugarCreek thoroughly evaluated several pretreatment technologies before selecting a system. SugarCreek and the design engineers met several times with state and local officials to present their chosen technology and explain how the system would achieve compliance with their limits, something the operation prior to SugarCreek could not do. The resultant pretreatment system is located in a separate 16,000-sq.-ft. facility and includes a 18,000-gallon pit, two roto-strainers, three DAFs, a moving bed bioreactor system and a 250,000-gallon EQ (equalization) tank. Currently, the system can easily handle the approximately 300,000 gallons per day the plant produces when it's operating at full capacity. The wastewater facility has been producing an effluent well below the POTW requirements for BOD, TSS, Oil and Grease, etc.

Colfax-Howden - Food Industry MVR

MVR: Mechanical vapor recompression is common in sugar, edible oil and other food processes.

Powdered food products such as milk and coffee can also be prepared using evaporation. Steam is needed for many food process operations. The use of MVR provides steam at a lower cost than once through systems. Howden furnishes the ExVel Turbo fans for this application. The process is complex and lends itself to automation and remote monitoring. The benefits are substantial energy savings. Since steam is a major cost for food companies MVR is being given close attention.



Lurgi MVR for sugar

Colfax Howden ExVel Applications

Dairy Industry	milk powder, cheese, protein concentrates, lactose
Sugar and Sweetener Industry	glucose, dextrose, fructose, sorbitol, sugar, malt dextrin
Food and Drink Processing Industry	lysine, fish, vitamins, juice, protein concentrates, bottled water
P&P Industry	xylitol, black liquor, effluent treatment
Chemical Industry	enzymes, calcium carbonate
SAGD	produced water for re-use as part of the steam assisted gravity drainage (SAGD) process to extract oil sand Zero liquid discharge (ZLD), water recovery, effluent treatment, distillation, desalination, concentration, crystallization etc. as part of many different industrial processes

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Colfax has expanded into Fans, Compressors, and Software

Colfax Fluid Handling provides support to the Food and Beverage market with pumps and systems capable of handling liquids over a range of viscosities, pressures, flows and composition. Featured applications include:

- Metering (Dosing, Fill, Coating, Injection)
- Spraying and Drying Towers
- Waste Treatment

Colfax has purchased Howden which in turn purchased the blower division of GE. This positions Colfax to supply a range of pumps, blowers, and compressors to the food industry. In our earlier mine ventilation webinar we covered the Mine Ventilation System package offered by Howden after a software company acquisition. Colfax can leverage the mining experience to expand its IIoT and Remote O&M activities to food.

FLIR™ Cameras for Automated Temperature Measurements

- In the food industry, it's essential to carefully control the temperature of perishable goods throughout production, transportation, storage, and sales. Repeated warnings about illnesses due to tainted and improperly cooked foods highlight the need for tighter process control. Because this almost always involves a human factor, food processors need tools that automate crucial operations in a way that helps minimize human error while holding down costs. Infrared (IR) thermography is such a tool.
- Using FLIR™ IR cameras, you can make automated non-contact temperature measurements in many food processing applications. Analog video outputs can be viewed on video monitors, and digital temperature data, including MPEG4 video outputs, can be routed to a computer via Ethernet.

Filtration Group Filter Press Cloths reduce Product Losses and Down Time

Filter press cloths capture the product and dewater food slurries. Their operation is an important element in the cost of operation. Filtration Group has expertise is this industry based on many decades of experience. Coreflo is the lasted cloth development

Coreflo™ is currently providing savings in reduced maintenance time and increased operational efficiency for recessed and membrane filter plates in many demanding applications worldwide. The benefits of the product include:

- Unique construction that permanently joins an elastomeric barrel neck to the filter cloth using patented welding technology. This holds the filter cloth completely flat without creasing or twisting, so the cloth life and integrity are not compromised and cloths can be fitted more easily.
- Excellent resistance to high velocity and abrasive slurries.
- Eliminated product loss since there are no stitch holes through which leakage could occur. This reduces losses in yield-critical process applications.
- Using Coreflo™, the core plug is totally discharged; no cleaning is required. This eliminates operator clean up time, both with and without core blowing operations.
- The Coreflo™ design means that a consistent slurry flow is delivered to the chamber through a uniform open feed core. This reduces the potential for differential pressures and reduces the risk of plate damage.
- Coreflo™ has a unique low profile flange design to eliminate the possibility of cake scraper damage.

The performance of filtration can be remotely monitored. The Filtration Group industry experts can be second tier practice matter experts as problems occur. Components Matter

McILVAINE

GE -7 Proven Steps to Success

Food, Beverage, and CPG manufacturers face constant pressures around costs, quality, and efficiency. Making effective decisions to address all three of these concerns can be a major challenge for companies that are not properly structured. The operational excellence program that leading manufacturers rely upon is one that aims to arm their decision makers with the information they need to maximize productivity, ensure product safety and quality, and limit sustainability costs. Reid Paquin of DE Digital lists 7 steps to success

1. Automate the collection of manufacturing data.
Automated data collection is the basis for creating the real-time enterprise, and significantly differentiates successful companies from their poorer performing peers

2. Build compliance and traceability into your processes.
F&B/CPG have unique compliance and safety mandates; build these into your production processes to ensure they are adhered to every step of the way.

3. Utilize historical and real-time data to minimize asset downtime.
By using trending data and analytics, companies are able to predict adverse events and downtime before they occur.

4. Be prepared for non-conformances.
Establish role-based visibility and automated workflows in the case of a quality, non-compliance, or product recall event.

5. You can't overlook sustainability costs.
Energy, waste, and wastewater costs can really add up over time. Factor environmental impact/costs into operational decision making to improve the bottom line.

6. Digitize your manufacturing processes (Document management, WIP, HAACP, etc.) through MES.
MES builds the foundation of process control and automation that successful manufacturers rely upon. In addition, it eliminates inefficient paper-based systems and provides a timely, unified picture for decision makers.

7. Operational Excellence is an evolving journey.
Take a continuous improvement mindset to your operations, commit to it, and you will be set up for long-term success.

Food, Beverage, and CPG manufacturers face constant pressures around costs, quality, and efficiency. Making effective decisions to address all three of these concerns can be a major challenge for companies that are not properly structured. The operational excellence program that leading manufacturers rely upon is one that aims to arm their decision makers with the information they need to maximize productivity, ensure product safety and quality, and limit sustainability costs.

GEA using SAP for Predictive Maintenance and Service

- GEA will use SAP Predictive Maintenance and Service, cloud edition, to help its remote service technicians monitor the status of machines located at GEA customer sites and identify unusual trends or machine behavior in real time. Integration of the Internet of Things (IoT) services of SAP HANA Cloud Platform and the line recorder agent embedded (LRAE) adapter 1.0 from IFM Electronic GmbH, which is certified for integration with cloud solutions from SAP, will allow for machinery data to be collected. This data can then be enriched with business information from the SAP Business Suite software deployed at GEA.
- With SAP Predictive Maintenance and Service, cloud edition, GEA intends to offer new innovative services including modular service-level agreements, warranted availabilities and insurance to its customers. Planned innovations from SAP in the areas of vibration and predictive analysis will further complement the solution. The solution is expected to provide GEA the flexibility to add more machines and further product groups over time.
- With GEA PerformancePlus GEA is offering its customers service level options that extend way beyond routine preventive maintenance and complement customer Industry 4.0 strategic efforts.

GEA Ammonia Compressors in Automated System at SugarCreek

- For safety's sake, the 85,000-lb. ammonia-based refrigeration system is located downwind of the entire plant in its own dedicated 11,000-sq.-ft. structure. Twelve compressors are in the engine room, 11 of which are used for primary refrigeration; the other is used for pump-out during maintenance of refrigeration components. The 11 GEA screw ammonia compressors have a total capacity of 4,300hp and create up to 4,000 tons of refrigeration capacity. The system also uses evaporative cooling, with the water treatment chemistry for the evaporative condensers allowing increased cycles of concentration, saving millions of gallons of water each year.
- Since safety is a primary concern, SugarCreek conducted a detailed process hazard analysis (PHA) on the refrigeration system. The HAZOP (hazard and operability study) methodology used for the PHA helped SugarCreek develop a thorough, orderly, systematic approach for identifying, evaluating and controlling potential hazards involving dangerous chemicals such as ammonia.
- The GEA compressors and all integrated refrigeration components are controlled by an electronic control system sequencer. An intelligent HMI finds the optimal operating point to save energy, determine machine operating times and compute capacity utilization. The automated system also minimizes the potential for operator error and system failures.
- Ammonia leak sensors are located in the refrigeration structure, scattered throughout the entire plant and tied into the plant-wide network. Connected into the network is a multivalve system that helps provide automatic shutdown if a leak is detected anywhere at the facility.
- The automatic shutdown sequence is accompanied by local and remote, audible and visual alarms, as well as immediate operator notification via an automated dial-out system. The emergency ventilation system incorporates two additional redundant exhaust fans and provides an exhaust rate 30 percent greater than required by existing codes.

GEA is Monitoring Food and Beverage processing from Start to Finish

- GEA has purchased Inteliicomm which an automated grain sampling and tracking system, solves an industry-wide problem that is costing grain producers and shippers billions of dollars per year. The system provides a comprehensive solution for acquiring, splitting, storing and tracking grain samples, to ensure samples are representative of the grain being sampled. An additional benefit of the product is that the related grain quality and quantity data collected will allow producers to make more informed decisions regarding selling and planting. GEA is already supplying remote O&M to food processor
- The FDA's PAT (Process Analytical Technology) initiative has enabled GEA to combine its equipment design skills and process engineering know-how in order to integrate online analyzers and measurement devices into its process systems in a way which can provide real insight into the operation of the process and help customers achieve key product quality target.
- The goal of the PAT initiative is to ensure that products are manufactured using processes which are understood and monitored so that the key quality characteristics of the products can be actively controlled.
- Combining process monitoring using online analyzers, together with solid process engineering principles and advanced process modelling techniques will enable processes to be actively controlled in order to compensate for minor input variations (e.g. raw materials) so that the specifications for the final product will be closer to the ideal target.
- At New Belgium Brewing the GEA process automation solution controls the entire production process: from malt intake up to the bright beer tank cellar. The Wonderware system platform ArchestrA is used including the MES products for the SCADA level. The underlying PLC platform is based on the Rockwell ControlLogix® control system with standard and library functions and the Rockwell Equipment Phase Manager. NBB developed the automation solution together with GEA.

Honeywell Xtralis Smoke Detection System at Patties Foods

Patties Foods is very successful with their range of baked goods that includes the Four and Twenty range of meat pies. They embarked on a fire safety improvement program

From a fire safety and protection standpoint a large bakery and food processing plant is a very challenging design problem. A multitude of different environments exists under one roof. They range from the ovens and other heat-producing equipment to the extreme cold of the refrigerated areas storing raw ingredients. This cocktail of difficult conditions becomes even more problematic when flour dust, oven smoke and steam are added to the mix. It was desired that nothing be installed on the ceiling that could trap dust or flour, as this makes cleaning more difficult.

The smoke detection system also had to withstand the regular steam cleaning .

Since installation of the VESDA system, the plant managers at Patties Foods have been delighted with its performance. “Patties realized that the overall success for this fire detection system relied on its workforce being able to use the system. Simple operation and real time feedback was very important” .

“Patties Foods runs practically 24/7 with different personnel manning each shift. The VESDA system allows the various shift supervisor/fire wardens to assess a possible situation at a very early stage and make appropriate decisions quickly and effectively.” The VESDA system also saved a substantial amount of money during the construction process – both in building design and compliance and in the installation of the VESDA system itself due to its flexibility of the sampling points.

Honeywell Combustion Safety Support for ConAgra and other Food Manufacturers

Honeywell Combustion Safety support the Food & Beverage Industry with Code and equipment experts help to make the boilers, dryers, ovens, fryers, cookers and heaters at food facilities all around the world safer, more reliable and efficient.

- Clientele consists of Fortune 1000 corporations such as: ConAgra, Tyson Foods, Nestle, JM Smucker, Mondelez and KraftHeinz! These organizations are meeting and exceeding industry safety standards through HCS's Corporate Programs which include:

Customized Training

- Improve in-house personnel's troubleshooting and hazard recognition abilities for equipment. HCS has on-site, off-site or online training options!

Engineered Compliance Analysis

- HCS's Corporate Inspection Programs identify all compliance related issues with any existing combustion equipment. Final reports not only list Code deficiencies, but categorize all discovered issues based on their risk; referencing the Code or National Standard text that supports the deficiency, while providing a recommendation as to what should be done to reach compliance.

Online Reporting

- Honeywell Combustion Safety Corporate Program customers are given access to HCS's online management database, *SafeView*. This interactive website provides clients access to all of their combustion equipment audit data anywhere there is an internet connection. Data can be manipulated to show progress and track costs across multiple sites; achieving corporate compliance faster and raising the bar for safety.

Burner Tune-Ups

- Most manufacturers recommend semi-annual tune-ups of the burners at your facilities. These tune-ups typically result in fuel savings and improved emissions!

Upgrades

- If a problem with fuel-fired equipment exists, Honeywell Combustion Safety can and will resolve it to ensure safety, efficiency, reliability and emissions compliance for all of the processing equipment.

Hench Control

- There are three major categories that food manufacturers should focus on with regard to remote monitoring systems: security and safety, accessibility and functionality. The integrity of their product is paramount and the type of refrigerant to maintain the integrity of the processing and storage of that product is just as important.
- Remote monitoring should be accessible anywhere — be it at home, on the road or through a smart phone — so that one can safely and securely monitor the levels and readings of the operation. When implementing remote monitoring systems, food manufacturers should consider that technology exists to make it possible to control operations — not simply monitor them remotely. This entails turning equipment on or off, changing set points or acknowledging alarms. Remote monitoring is a great tool, but it only serves half the purpose if one cannot take action as well.
- Hench Control has implemented a technical support center which not only monitors our customer operations but also backs up all alarms, so there is redundancy and a second set of eyes watching the system. We also back up all data offsite in case that data is lost at the plant for whatever reason. Hench generates a weekly report with findings and recommendations on how to further optimize the operations while maximizing the possible energy savings.
- From a liability standpoint technicians should not make any direct changes to a customer's system unless they are authorized to ahead of time. Instead a weekly report can provide insight and transparency on how the system is running and how it can be improved, a valuable management tool to measure performance and track bottom line results. Hench Control's report shows efficiency levels, horse power usage, kWh usage, CO_2 usage, total dollars saved and quantified saving opportunities. This information provides a granular level to not only monitor the system remotely but also to control the system and know specifically how to maintain the system at its most optimum level indefinitely.

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Ichida Remote Software Solutions for Food Manufacturers

- Ichida has introduced a remote customer care software solution which enables food manufacturers and packers to operate their lines to maximum performance and efficiency, and helps avoid unnecessary downtime.
- The Ishida Sentinel software connects compatible Ishida machines, anywhere in the world, to a central system manned by Ishida engineers to provide complete monitoring of machines, however widely distributed, with Ishida experts on hand to identify and rectify any emerging faults or rectifying poor performance.
- A number of different Sentinel pack options are available. Customers can mix and match services to meet their needs. In addition to the monitoring and reporting pack, a variety of intervention options are available. For example, it is possible to select live performance monitoring, with Ishida engineers keeping a continual check on line performance and ensuring maximum uptime.
- Further, the Ishida Sentinel Web Client facility provides instant access from any Smart phone, tablet, laptop or PC worldwide so that machine operation can be monitored and assessed at any time or place.

McILVAINE

Key Sorters are Digital Information Centers

- Optical sorters could be looked at as digital information centers," observes Marco Azzaretti, who oversees Key's advanced inspection systems. Images of each item moving down the line are captured, and real-time processing of the captured data can be used to adjust the process.
- Potato processors are at the top of the sophistication hierarchy of fruit, vegetable and nut processors who use Key's sorters. Their lines run 24/7 up to three weeks between cleaning and sanitation shutdowns. When sorters are placed at multiple points on the line, they tell a story of how the processes between them impacted the product. They also provide clues about upstream machine performance and the state of the sorter itself — a malfunctioning ejector, for example, or a sensor window in need of cleaning.
- Machine performance also is an indicator of component wear, and analyzing the performance of multiple sorters in a company's manufacturing network enhances predictive maintenance. The information would be even more powerful if it consolidated data from comparable sorters at McCain Foods, Simplot and other potato processors, although security concerns pre-empt that possibility.

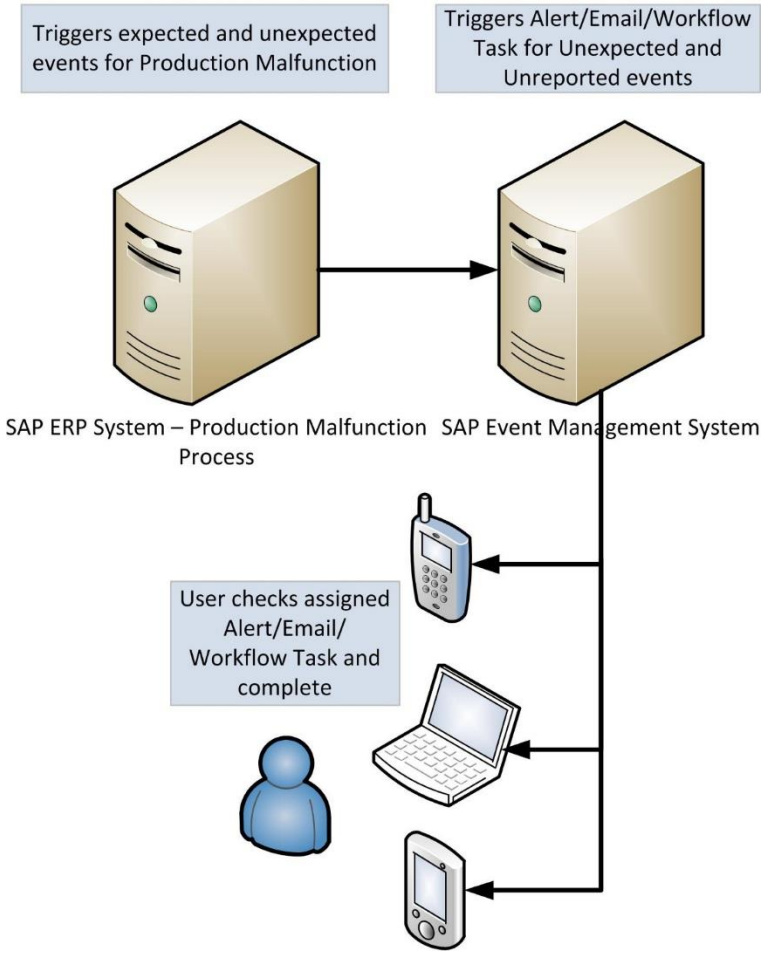
Nalco 3D TRASAR reduces Cooling Tower Maintenance and reduces Sewerage Costs at Food Processor

- A food processing plant was experiencing low make-up water hardness and high alkalinity issues, resulting in significant white rust problems that caused cost expenditures of $750,000 to replace failed cooling towers.
- This food processing plant turned to Nalco for assistance to help them address these issues. An important key to the success of the program was the alarm notification feature of the automation equipment. Through implementing 3D TRASAR® Technology for Cooling water, the plant was able to save 5 million gallons per year in reduced cooling water sewer costs. The plant was also able to save $10,000 per year in reduced cooling water sewer costs.
- 3D TRASAR technology measures the key parameters related to system stress. When upsets occur, 3D TRASAR technology takes timely, appropriate, corrective action. It then communicates with system users, informing them of what happened, when, and what actions were taken to compensate.
- http://www.nalco.com/documents/Case-Studies/CH-640.pdf

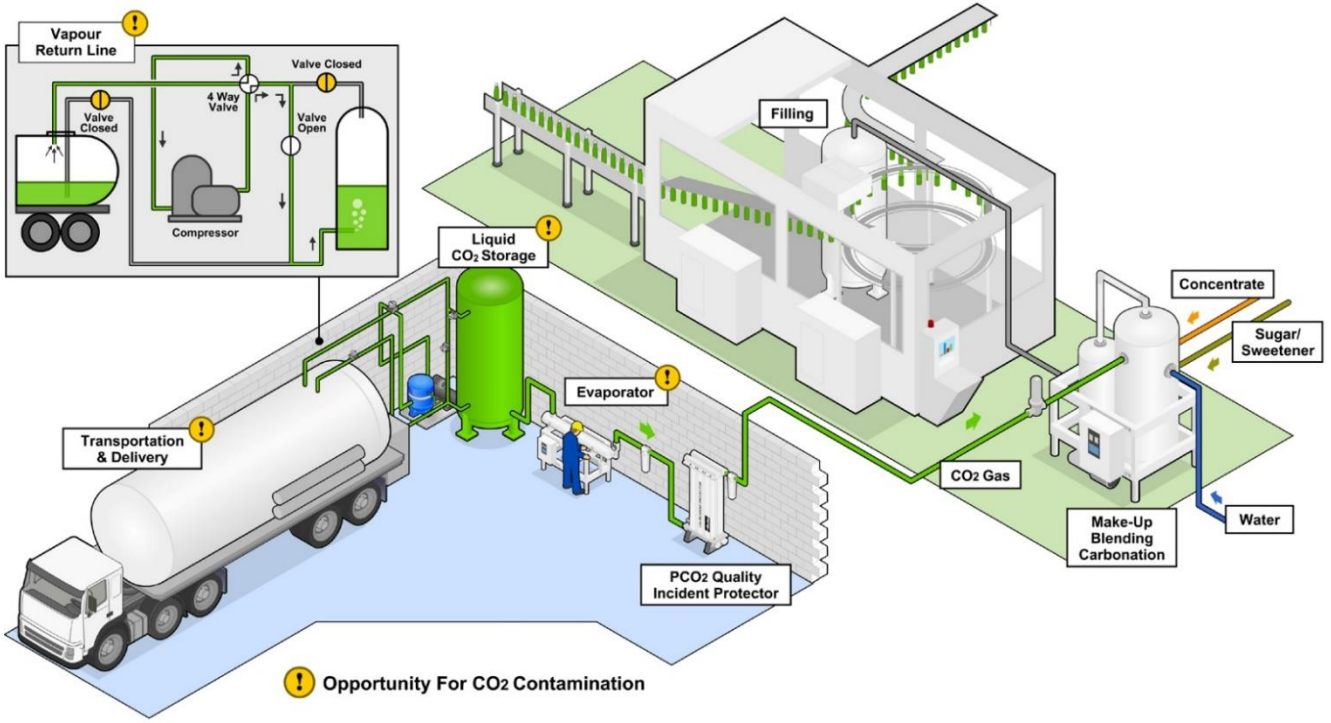
SAP Event Management for the Food Industry

Food processing and manufacturing is crucial but also highly complex in nature. Unlike a car or a computer, it is not possible to disassemble food and put back its components into their original states. Each food and beverage requires a separate set of processes, methods and techniques. Some processes feature straightforward manufacturing steps, whilst others have multiple phases to manufacture a single product. No matter how simple or complex, it is ultimately still a manufacturing process. If a single process fails, then sometimes the entire production is affected and can result in expensive losses. The real time visibility of plant operations and multiple levels included on the 'Bill of Materials' is another complex element of the food and beverage industry.

These complex business scenarios may easily be monitored through *SAP Event Management* integrated with *SAP Enterprise Resource Planning* systems. The entire end-to-end production process can be monitored through *SAP Event Management Production Malfunction Processing* providing visibility into the different or key phases, for example; receipt of goods or failures of plant machines. You can see each of the production statuses from commencement of the process until the final products are received at the warehouse – all in *SAP Event Management* – and this also has the capability to highlight any unexpected events that occurred in the production process either when they happened, or if less serious, after the fact, for further investigation.



Parker Dominick-Hunter CO2 Purification System



Traditional methods for CO2 contamination removal consisted of passing the gas through an activated carbon bed. Recent improvements with on-site analytical equipment have revealed that this method cannot maintain the required gas quality.

Working with the International Society of Beverage Technologists (ISBT), to gain a better understanding of the contaminants affecting CO2 and the maximum allowable levels Parker domnick hunter developed a multiple stage purifier that would essentially take out-of-specification, beverage-grade CO2 and bring the quality of gas back within an acceptable quality standard.

McILVAINE

At Middleton Distilleries Seepex supplied more than the Pumps - an IIoW Solution

Global demand for Irish whiskey is continuously rising, and Irish Distillers is the largest producer of premium Irish whiskey. Since 1780, the company's distillery in Midleton, County Cork has produced the famous Jameson brand via traditional methods and using water from the Dungourney River and the best Irish barley. Targeted optimization of the production process increased yield by 50% with no change in quality. SEEPEX BT pumps are a key part of this new solution.

In the production process, large amounts of draff are pumped from the mash tun into a feed production system where it is processed into high-quality animal feed. Pneumatic conveyor systems were previously used to transport the draff in a very energy-intensive process using compressed air. Growing demand for the distillery's whiskey necessitated increasing the number of mashing operations from 30 to 45 per week. But the conveyor system for the draff and the time required to empty the mash tun – an average 55 minutes – posed the largest problems, creating bottlenecks.

SEEPEX proposed replacing the pneumatic conveyor system with a progressive cavity pump with open hopper, based on applications developed for UK breweries and distilleries. This pump is able to reliably transfer low to highly viscous products with low or high moisture content, eliminating the frequent blockages which occur with pneumatic pumping systems.

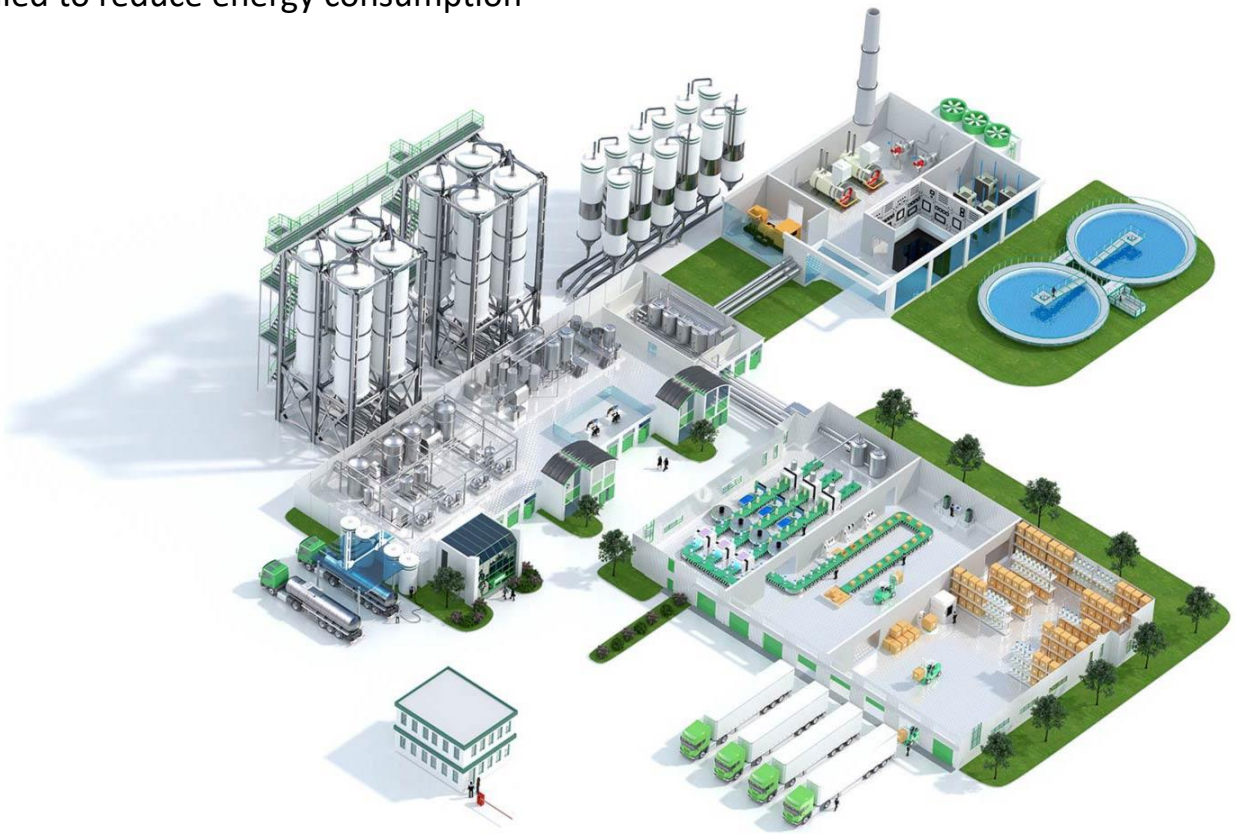
The goal was to empty the mash tun in 25 minutes. In the past twelve months emptying the tun took an average 22 minutes using the SEEPEX pump, improving even upon the target time. The original goal of 45 mash operations per week was also achieved. Rising global demand for premium, high quality Irish whiskey can now be met without any issues or problems.

"WE REALLY DID ATTAIN A 50% PRODUCTIVITY GAIN WITH SEEPEX. SO AN ALREADY GOOD PARTNER HAS TURNED INTO LONG-TERM PARTNER FOR US."

TOMMY KEANE
GENERAL MANAGER, MIDLETON DISTILLERIES

Schneider Electric

Solutions for the food and beverage industry are based on expertise, proven methodology, reuse, and a deep understanding of the markets and their challenges. Experts and partners help specify installations and advise the best solutions. International teams coordinate the implementation of complex projects. The Ecostructrure allows integration of components such as variable speed pump and fan drives which are controlled to reduce energy consumption



Schneider Electric Wonderware at New Belgium Brewery in Colorado

Goals

• To increase the company's ability to fully take advantage of manufacturing capabilities

• Achieve Overall Equipment Effectiveness (OEE) to produce a quality product; manage production efficiency; and ensure production line availability through scheduled downtimes, package changes, and scheduled maintenance activities

• To operate the brewery at full production capacity and double case production

Challenges

• The brewery lacked real-time information on unscheduled downtimes at various equipment areas which caused production slowdowns

• Production staff were continually reacting to unscheduled downtime at equipment areas

• Management needed to address gaps in methods and processes to drive improvements

• The bottling operation lacked the ability to predict capabilities to effectively commit brewery staff to specific production goals

Solutions and Products • Wonderware MES Performance Software Results • OEE increased from 45% to 65% in just over 2 years • Decreased downtime by more than 50% • Efficiency of scheduled run time increased by 25% - 30% • Achieved record production weeks producing 190,000 to 200,000 cases consistently, successfully meeting customer demands • Extended packaging area capacity to about 1.3 million barrels each year • The brewery was able to delay capital investments, enabling it to maintain lower operating costs

Ultimately, the most beneficial feature from our MES Performance, was the data (and reports to display that), as that has been the driving factor in much of our process improvement. Integrating with our other enterprise applications and systems was also very beneficial." —Lora Heckman Business Applications Manager New Belgium Brewing

Sensire Oy Food Remote Monitoring of Food Processing

- Sensire Food enables continuous and automated condition monitoring of the desired conditions in food processing, manufacturing and storage facilities that require strictly monitored conditions. Wireless sensors continuously measure temperature, relative humidity, CO2 , ammonia concentration, and other selected variables, and all data is automatically transferred to Sensire's secure web service.
- The round-the-clock monitoring and real-time alerts about abnormal conditions enable prompt reaction to anomalous situations. Moreover, continuous, automatic recording and a diverse range of reporting functions eliminate the need for manual documentation, thereby reducing recordkeeping mistakes and freeing up staff time for core tasks. The wireless sensors can be placed virtually anywhere, including next to workstations, which allows for the most accurate condition measurements possible. This makes it easier to identify potentially harmful conditions and correct them rapidly.
- Entire food processing or storage facilities, as well as individual workstations, can be remotely monitored with the same automated system. The transferable sensors can also be used to map or validate the conditions in various types of areas and facilities.
- Sensire Food includes a web service as well as gateways, handheld devices and wireless sensors, the number of which can be tailored according to the customer's needs. All data is transferred wirelessly and stored on the secure web service, which can be accessed at any time via computer, tablet, or smart phone. The user-friendly web service provides versatile reporting functions for optimizing internal processes, for estimating the need for device repairs or purchases, and for addressing regulatory requirements.

Spraying Systems Co. suggests continuous monitoring of your spray nozzle systems

There are numerous spray applications in food, dairy and beverage processing including coating, cleaning, spray drying and drying/blow-off applications.
To achieve efficient, optimal and sustainable performance and to keep operating costs as low as possible, consider your spray system in its entirety and develop a plan for evaluating, monitoring and maintaining it.

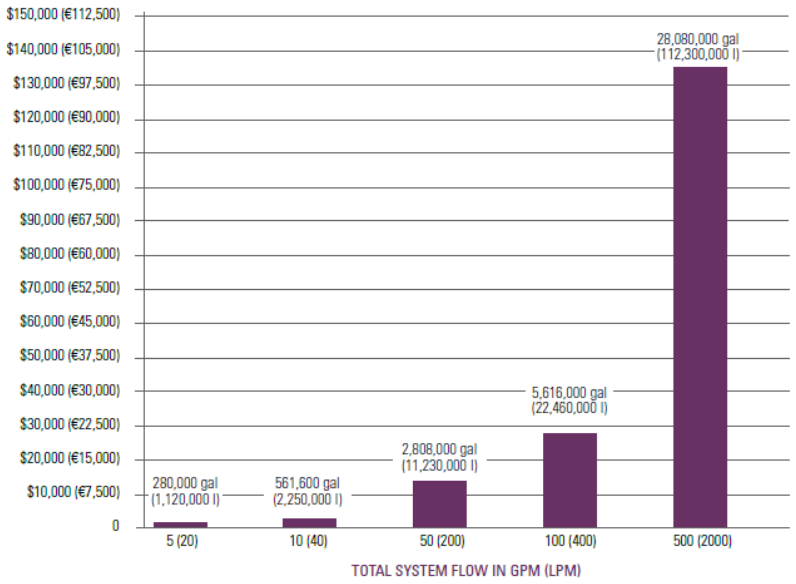
Evaluate your current system and check for: (1) Flow rate, (2) Pressure, (3) Spray Pattern, (4) Drop Size and (5) Nozzle Alignment to ensure your nozzle spray system is optimized and running smoothly.

1. FLOW RATE – EACH NOZZLE

❑ **Centrifugal Pumps**
Monitor flow meter readings to detect increases. Or, collect and measure the spray from the nozzle for a given period of time at a specific pressure. Then compare these readings to the flow rates listed in the manufacturer's catalog or compare them to flow rate readings from new, unused nozzles.

❑ **Positive Displacement Pumps**
Monitor the liquid line pressure for decreases; the flow rate will remain constant.

TABLE 3 – ANNUAL COST OF WASTED WATER USING NOZZLES SPRAYING 15% OVER CAPACITY



Based on a five-day work week, 24 hours per day. The cost of wastewater disposal should also be considered. In addition, excessive wastewater may aggravate water shortage problems. All figures calculated with a conversion factor of 1USD = €0.75.

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Spraying Systems Co. suggests continuous monitoring of your spray nozzle systems

2. SPRAY PRESSURE – IN NOZZLE MANIFOLD

- ❑ **Centrifugal Pumps**
  Monitor for increases in liquid volume sprayed. (Spraying pressure likely to remain the same.)
- ❑ **Positive Displacement Pumps**
  Monitor pressure gauge for decreases in pressure and reduction in impact on sprayed surfaces. (Liquid volume sprayed likely to remain the same.) Also, monitor for increases in pressure due to clogged nozzles. Visually inspect for changes in spray coverage.

3. DROP SIZE

- ❑ **Examine application results for changes.** Drop size increases cannot be visually detected in most applications. An increase in flow rate or a decrease in spraying pressure will impact drop size.

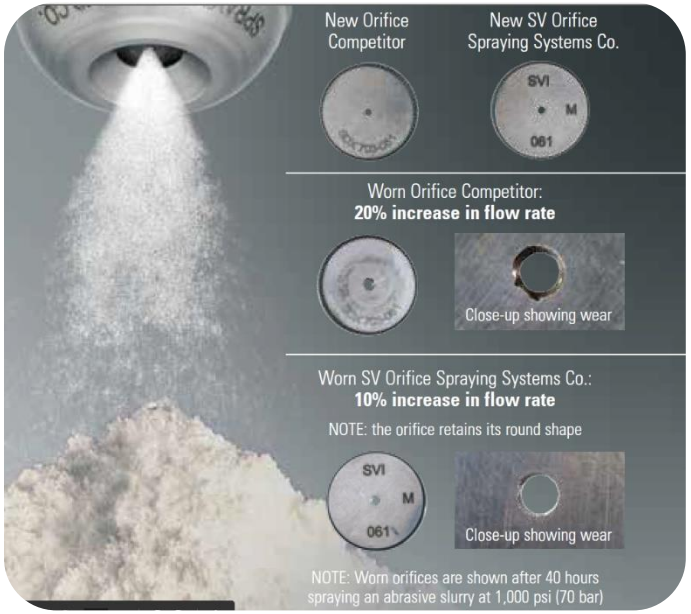
4. NOZZLE ALIGNMENT

❑ **Flat Spray Nozzles on Manifold**
Check uniformity of spray coverage. Patterns should be parallel to each other. Spray tips should be rotated 5° to 10° from the manifold centerline. Quick-connect nozzles providing automatic spray pattern alignment are available.

5. SPRAY PATTERN

- ❑ **Each Nozzle**
  Visually inspect for changes in the uniformity of the pattern. Check spray angle with protractor. Measure width of spray pattern on sprayed surface.

If the nozzle orifice is wearing gradually, changes may not be detected until there is a significant increase in flow rate. If uniform spray coverage is critical, request special testing from the nozzle manufacturer.



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Yara Remote Water Status Monitoring for Crops

Yara has developed a continuous, non-destructive and remote measurement of plant water status in real time via the Internet. This allows farmers to apply water on demand to optimize the resources, while maintaining production quality and quantity.

The **Yara Water-Sensor** measures the relative changes in the leaf's turgor pressure – or "water" / "blood" pressure of the plant - together with other microclimate parameters.

As the turgor pressure is the driving force for plant growth and fruit production, proper water management is important. If a plant is not able to access enough water, it cannot maintain turgor pressure and it will begin to wilt.

Turgor pressure is the pressure caused by fluid pushing against the cell wall of plant cells. It is needed to keep the plant's rigidness to stand straight and continue normal cellular functions.