Benchmark Design, LLC

**BENCHMARK DESIGN, LLC**
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## PROFILE OF SERVICES

BENCHMARK DESIGN, LLC (Benchmark) specializes in process design, engineering, project management and equipment manufacture for food processing, by-product recovery processing, oil and essence recovery and folding, waste treatment and recycling industries. Benchmark designs and services its designs with its own employees. We also offer a range of specialized research and development services. Benchmark's current technology is the direct result of a continuous process of invention, practical application and improvement begun over 65 years ago (1942) by Charles S. Walker, founder and former president of Gulf Machinery Co. and Gulf Machinery of Brazil (GUMACO).

Benchmark offers proprietary designs for primary processing systems and components. These products include its highly efficient water removal systems for fluid concentration and solids drying, such as the T.A.S.T.E.™ evaporator (Thermally Accelerated Short Time Evaporator), the indirect heat fire dryer, and waste heat evaporator systems.

Benchmark, also offers proprietary support products. These products include molecular sieves, folding stills, oil separation columns, various food grade essence, aroma and oil recovery systems, vertical single-screw presses, hammer mills, tangential separators, meal & pellet coolers, bins, hoppers, conveyors, elevators and transfer screws, truck unloading systems, product washing systems, tanks and storage facilities.

Benchmark provides complete design-build services to support its equipment. These services range from project concept to engineering, manufacturing and installation. They include economic analysis, projections and business plans, feasibility designs and budgets, process design, preliminary engineering, final engineering, manufacturing, project management, construction, and commissioning.

Benchmark's roots are in the highly competitive and cost conscious citrus industry where its evaporation, fire drying and waste heat recovery technology is used in over 90% of the world's citrus processing capacity.

Benchmark equipment is durable. Equipment installed over 40 years ago by Charles S. Walker is still operating and competitive.

Benchmark engineers have successfully applied their citrus experience to other process industries. Benchmark has developed, and put into operation, systems for various non-citrus juice concentrates, fish rendering, food-grade alfalfa protein, corn, sugar, citrus molasses and cellulosic ethanol processes. Benchmark has also developed systems for the conversion of brewery and distillery waste to salable by-products, wood fiber drying, pectin extraction and alcohol stripping.

In addition to the U.S. and Brazil, Benchmark's T.A.S.T.E™ evaporators have been installed worldwide, from apple concentrate plants in Poland to citrus concentrate in Japan and evaporated milk in Venezuela. Benchmark engineers have extensive operating experience in addition to the citrus industry. Some examples include the O'Doul's process and by-products recovery for Anheuser Busch, tea concentrates for Lipton, pineapple concentrate for Dole, high protein fish "stickwater" for Daybrook Fisheries, leaf protein extract, grape concentrate, tomato paste, ethanol production and various tropical fruit concentrates, as well as evaporator systems for solvent recovery in nylon manufacturing and pectin extraction.

Benchmark engineers also have demonstrated expertise in treating a number of sensitive and exotic products in the field of essences and aromas. In addition to essence and d-limonene

recovery units widely used in the citrus industry, Benchmark has developed molecular sieve systems currently making food grade folded oils, aromas and fragrances for the some of the largest flavor houses in the industry. These systems remove more than 6 million pounds per hour of water from product worldwide in the T.A.S.T.E.™ evaporator.

By-product recovery has always been a major focus of Benchmark technology. Again, beginning in the citrus industry where the presence of various peel oils compounds a negative environmental impact, its indirect fire drying and waste heat recovery systems have been turning a peel disposal problem into an important source of revenue. These systems remove over 6 million pounds per hour of water from product worldwide in the dryer system and over 9 million pounds per hour of water from product worldwide in the Waste Heat system.

The spent grains from breweries and distilleries, which require careful handling to preserve valuable proteins, have been the subject of recent Benchmark projects that turn an environmental liabilities into useful products.

Production of specialty grade fishmeal is also a process that requires careful temperature and time of exposure control to preserve delicate proteins. A recent installation at Daybrook Fisheries has produced specialty grade product continuously from the start-up.

Both fish meal and distiller's grain drying require minimum fines discharge and product burning to ensure product quality, minimize environmental impact, and guarantee maximum yields. The Benchmark system fulfills these requirements efficiently. In addition, combining our drying and waste heat evaporation technologies offers significant benefits to water conservation within the plant as well as minimal air, water, and solid waste discharge.

Benchmark evaporation technology is based upon a unique mechanism for heat transfer to product in the form of a thermally accelerated, high velocity, turbulent mist. This feature results in uniform, rapid product heating, thus minimum exposure to high temperatures. These conditions achieve high heat transfer rates for thermal efficiency and low retention times for product quality. Operationally, high turbulence reduces fouling or burn-on, allowing long production cycles between clean up.

Benchmark evaporators are made in multiple effects to conserve energy. Standard models are available in configurations of up to seven effects which gives in excess of a 7:1 evaporation to steam ratio on temperature sensitive products and 14:1 steam ratio on flash evaporator designs.

Benchmark drying technology relies on product contact heat exchange with densely configured baffles and indirect heat, not flame or hot air. This feature produces a high quality product with fewer fines and better product color. The large heated mass provides efficient compensation for variations in product feed, which in turn simplifies heat source control and reduces BTU's required for water removal. A system of heat re-circulation is used to gain increased efficiencies, reduce stack discharge and limit the volume of outside air used for product transport. The reduced stack discharge results in substantially less capital cost for scrubbing systems.

Overall efficiency is significantly better than competitive systems. The Magnum Dryer uses approximately 1,400 BTU/LB of water removed, overall, with product feed at 70 degrees Fahrenheit. Without the initial pre-heat load, only 1,200 BTU's are required. In comparison with competing dryers, the system will produce a higher yield of better quality product at lower operating cost. When coupled with a highly efficient Benchmark evaporator having an evaporation to vapor ratio in excess of 2.0:1, utilizing Benchmark's T.A.S.T.E.™ evaporator technology, total energy used can be as low as 355 BTU's per pound of water evaporated.

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Benchmark has a joint venture with Dedini of Brazil where they manufacture our designs for installation in Brazil or wherever supply from Brazil is advantageous to the customer. For large projects, particularly where completion and/or process bonding are necessary, Benchmark has a teaming agreement with two major engineering companies. On an individual project basis, Benchmark provides the process design while the other team member provides engineering contracting, project management, and bonding services as required.

Benchmark is an innovative company with a background of significant technical achievement and a reputation for cost-effective engineering. We look forward to applying these capabilities to your project.

Benchmark Design, LLC is proud to be a part of the worldwide expansion of the citrus industry. As our customers have grown, they have allowed Benchmark Design, LLC to grow. As our customer list shows, we are proud to serve some of the best processors in the world.

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## ORIGINS AND TECHNOLOGY MILESTONES

Benchmark Design, LLC (Benchmark) has a rich and productive history. Benchmark's predecessor, Gulf Machinery Company, was started in the late 1940's by Mr. Charles S. Walker. Mr. Walker designed and built the first commercial citrus juice extractor in 1934 (Rotary Juice Press). Mr. Walker founded Gulf Machinery Company in 1942 to provide citrus processing equipment to support the extractor business. In 1950, Mr. Walker sold the citrus extractor business to FMC International.

**Significant achievements of Gulf Machinery and Benchmark include:**

**1958** – Charles S. Walker, owner of Gulf Machinery Company, designed and built the first Thermally Accelerated Short Term Evaporator. This was built for Imperial Citrus Products for operation in the 1959 citrus season.

**1960**- The company designed and built the second Thermally Accelerated Short Term Evaporator for Evans Packing Company with a processing capacity of 3,000 pounds of evaporation per hour. This was built for production in the 1961-1962 fruit season in Florida.

**1962**- Gulf Machinery Company started the abbreviation of the name to T.A.S.T.E.™ evaporator for the Thermally Accelerated Short Term Evaporator. This completely new concept in evaporation design addressed the flavor problems faced in the citrus concentrate business and is now used in approximately 90% of the world's citrus concentrate business.

**1963** - With the increased quality of orange concentrate a major benefit of the new T.A.S.T.E™ evaporator, the Company designed and fabricated an essence recovery system that could capture more of the natural flavors available in the citrus and make them available to the market.

**1964** – Charles S. Walker and Dr. James B. Redd started Redd Laboratories, Inc. and Intercit to manufacture, blend, and fold natural flavors obtained from citrus and other products. Redd Laboratories became the world's first and largest supplier of natural flavors and was eventually sold to Fermenich. The Company designed and manufactured the equipment used by Redd Laboratories and Intercit that is still in use by Fermenich.

**1965** - As the Brazilian citrus industry grew, the Company supplied equipment to the developing industry and designed and built the largest citrus juice evaporator in the world. With a processing capacity of 200,000 pounds of evaporation per hour this evaporator processed a semi-truck load of citrus every minute.

**1970** - Air and water pollution standards were tightened by the EPA and the MAGNUM dryer was the only drying system in the country that could pass the guidelines set by the newly formed agency. The Company designed and built a new single-pass dryer system that incorporated both a recycled vapor system and the Waste Heat Evaporator which recovered the energy and cleaned the volatiles in the remaining dryer exhaust vapor.

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**1972** – Charles S. Walker started GULMAC (Gulf Machinery Company of Brazil) in Brazil to help service the fast growing citrus industry. The new company later purchased a 30 acre site in Araraquara, Brazil and built a new fabrication facility as citrus growth in Brazil increased. The name was later changed to GUMACO.

**1978**- As a result of skyrocketing energy costs, the T.A.S.T.E™ evaporator efficiency was increased with the design and development of the first seven-effect, eight-stage T.A.S.T.E™ evaporator. When this design was developed, the evaporator was the most efficient evaporator available on the market.

**Between 1975 and 1990 the company expanded into new industries:**

- Processing fish rendering to produce high quality fish meal with superior protein content.
- Designed a sugar beet pectin extraction plant for the government of the USSR.
- 1978 - Designed a sweet sorghum ethanol plant for a private investment group and the University of Florida Agricultural Department.
- Designed and built a “no alcohol” beer system with flavor addition for a major brewing company.
- Designed and built protein extraction prototype plant for extraction of food grade protein from alfalfa.

**1990** - David R. Walker purchased the Company from the Walker family along with his partner, Richard G. Walz.

**1991 to 1994** - David R. Walker, invented seven (7) equipment and process designs that were patented and are currently licensed to the Company.

**1991** – The Company designed and built a cellulose extraction prototype plant for the University of Florida Cellulose to Ethanol Process.

**2004** – With Dr. Raphael Katzen, the designer of the first dry corn ethanol plant, the Company designed and built equipment for two (2) 54MM GPY corn ethanol plants.

**2008** – The Company formed a joint venture with DEDINI S.A. Indústrias de Base (Dedini) to build equipment designed by Benchmark for the Brazilian sugar, citrus and ethanol industries.

**2010** – David R. Walker developed a new process for a nutrient recovery system used to clean the water in waste water streams (patent pending).

**2010** - Benchmark and Dedini are building the largest T.A.S.T.E™ evaporator ever built. This evaporator has a capacity of 563,000 pounds of evaporation per hour on direct steam and will be used for the concentration of vinasse in the Cosan sugar cane to ethanol plant. The unique design on this evaporator is that it uses Pre- Flash evaporation for motive energy for the stripper column and the final evaporator’s energy source is off of the ethanol rectifier column (patent pending 2011).

Note- This evaporator is now operating for the 2011 sugar cane crop. Cosan is now called Raizen.

**2011**- David R. Walker and David Brett Walker developed the engineering of the above T.A.S.T.E™ evaporator as an integral part of the distillation process (patent pending.)

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# CORPORATE STRUCTURE

Benchmark Design, LLC has it's origins in The Gulf Machinery Company started by Mr. Charles S. Walker in 1942. David R. Walker purchased the company in 1990. Benchmark Design, LLC is a Florida Corporation formed in 1990 by the Walker Family Limited Partnership.

## Benchmark Design - Board of Directors

| | |
|---|---|
| David R. Walker | Chairman/President |
| Richard G. Walz | Vice President /Director |
| Harold Davis | Mechanical Engineer/Director |

## Benchmark Design - Key Staff

| | |
|---|---|
| David R. Walker (General Partner) | President/Process Engineer |
| Richard G. Walz | Vice President /Design Engineer |
| Karl Bishop | Operations Manager |
| David B. Walker | Process Engineer |
| Harold Davis | Mechanical Engineer |

## Consultants

| | |
|---|---|
| Sachin Gadekar Ph.D. | Chemical Engineer |
| Peter Marks | Technical Consultant/International |

## Founder

| | | |
|---|---|---|
| Charles S. Walker<br>(1914 – 1998) | Chairman of the Board<br>Citrus Engineer Award<br>Designed & built first Citrus Juice Extractor<br>Designed & built first T.A.S.T.E™ evaporator<br>Founded Gulf Machinery of Florida (purchased by Benchmark Design in 1990)<br>Founded Gulf Machinery of Brazil | 1990 – 1998<br>1997 |
| James Redd, PhD<br>(1923 – 1999) | Technical Consultant/Chemical Engineer<br>Director (1990 – 1999)-<br>Essence and Aromas Expertise | |
| Raphael Katzen, P.E.<br>(1915 – 2009) | Ethanol Consultant (2001 to 2009)-<br>Dry Mill and Corn Ethanol Expertise | |

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## PROPRIETARY PRODUCTS

Benchmark Design, LLC has exclusive license of ten (10) current patents and two (2) patents pending from DX Resources (David R. Walker inventor and patent holder).

| Patent Description | Patent Number |
|---|---|
| • Waste Treatment System and Method | 5,052,313 |
| • High Temperature Turbulent Gasification Unit and Method | 5,054,405 |
| • Method and Apparatus for Drying Waste Material | 5,080,581 |
| • In-line Electromagnetic Energy Wave Applicator | 5,114,684 |
| • Vapor Clarification System and Method | 5,137,545 |
| • Closed Sterilization System for Treating a Product such as Toxic or Infectious Waste | 5,326,538 |
| • Method and Apparatus for Extracting Soluble and Dispersible Materials from Products Using a Slotted Scroll Extractor | 5,409,541 |
| • Method and Application for Extracting Soluble and Dispersible Materials from Products Using a Slotted Scroll Extractor | 5,476,550 |
| • Method and Apparatus for De-Inking Newsprint Using Counterflow Extractor | 5,520,780 |
| • Method and Apparatus for Separating Oil from Fibrous Byproducts of a Fermentation Process | 6,106,673 |
| • T.A.S.T.E.™ evaporator Integration to Plant Stripper and Rectifier Distillation System in Ethanol Production | Provisional Patent |
| • System and Process for Recovering Struvite from Wastewater | Patent Pending |
| • Method and Apparatus for Closed-Loop Processing of Animal and Bird Manure for Removal of Volatile Organics, for Pasteurization to Destroy Pathogens, Digestion of Organics and Drying of Solids. | Patent Pending |

Benchmark Design, LLC also owns all Designs, Design Drawings, Copyrights, Trademarks, Trade Names, and all rights to the following:

- T.A.S.T.E.™ evaporators (Thermally Accelerated Short Time Evaporator)
- Waste Heat evaporators
- Redd Benchmark essence units
- Zenith Press
- CSI Freeze Concentrate
- Peninsula Organics System
- Gulf Flow Extraction equipment
- All other designs owned by Gulf Machinery Company

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## PARTIAL CUSTOMER LIST

Benchmark Design, LLC has over fifty years of service history and is proud of its client list which includes some of the most respected companies in the world.

### DOMESTIC CLIENTS

| Company | Location | Industry |
|---|---|---|
| Agri-Ethanol | Aurora, NC | Ethanol |
| Anheuser Busch | Baldwinsville, NY | Brewing |
| Anheuser Busch | St. Louis, MO | Brewing |
| Anheuser Busch | Houston, TX | Brewing |
| Beatrice Foods | Orlando, FL | Tank Farm |
| Cargill | Frostproof, FL | Citrus |
| Caulkins | Indiantown, FL | Citrus |
| Coca Cola | Atlanta, GA | Concentrate Blending |
| Dole Pineapple | Kahului, HI | Pineapple |
| Daybrook Fisheries | Empire, LA | Fish Protein |
| E.N.I. | Lafayette, IN | Sludge Waste |
| E & J Gallo | Fresno, CA | Winery |
| Florida Distillers | Lake Alfred, FL | Distillery |
| Florida Global Citrus | Auburndale, FL | Citrus |
| Florida Juice | Lakeland, FL | Citrus |
| Franzia Brothers | Ripon, CA | Winery |
| Golden Gem Growers | Umatilla, FL | Citrus |
| Great Western Ethanol | Greeley, CO | Corn Ethanol |
| Greater Ohio Ethanol | Lima, OH | Corn Ethanol |
| Jacquins Distilling | Auburndale, FL | Distillery |
| Leaf Protein | El Centro, CA | Alfalfa Protein |
| Lykes Pasco Packing | Dade City, FL | Citrus |
| Louis Dreyfus Citrus | Winter Garden, FL | Citrus |
| Metropolitan Waste | Dallas, TX | MSW/Compost |
| Metropolitan Waste | Gainesville, FL | MSW/Compost |
| Metropolitan Waste | Houston, TX | MSW/Compost |
| Midwest Bio-Energy Ethanol | Fulton, IL | Corn Ethanol |
| Minute Maid | Forest City, FL | Citrus |
| Miller Brewing | Milwaukee, WI | Brewing |
| O.C.I. | Portland, OR | Sludge |
| Ocean Gold | Westport, WA | Fish Protein |
| Oceanspray Cranberries | Plymouth, MA | Cranberry |
| Oceanspray Cranberries | Vero Beach, FL | Grapefruit |
| Omega Protein | Abbeville, LA | Fish Protein |
| Omega Protein | Cameron, LA | Fish Protein |
| Peace River Citrus | Peace River, FL | Citrus |
| Peninsula Organics | Clearwater, FL | MSW/Compost |
| Quadrex Corp. (Cellulosic Ethanol) | Gainesville, FL | Cellulosic Ethanol |
| Rush Renewable Energy | Rushville, IN | Corn Ethanol |
| Seagrams | Louisville, KY | Distillers' Grains |

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| | | |
|---|---|---|
| Seven Up | Orlando, FL | Concentrate Blending |
| South Louisiana Ethanol | Plaquemines, LA | Corn Ethanol |
| Sunkist Growers | Ontario, CA | Citrus |
| Sunkist Growers | Tipton, CA | Citrus |
| Tetley, Inc. | Morris Plains, NJ | Tea |
| Tropicana Products | Bradenton, FL | Citrus |
| Tropicana Products | Ft. Pierce, FL | Citrus |

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## INTERNATIONAL CLIENTS

| Country & Company | Location | Product |
|---|---|---|
| **Argentina** | | |
| Litoral, S.A. | Concordia, E. Rios | Citrus |
| Pindapoy, S.A. | Saladas, Corriente | Citrus |
| **Brazil** | | |
| Bascitrus, S.A. | Mirassol, Sao Paulo | Citrus |
| Cargill, S.A. | Bebedouro, Sao Paulo | Citrus |
| Citrovale, S.A. | Olimpa, Sao Paulo | Citrus |
| CICA, S.A. | Juaciero, Bahia | Citrus |
| Citrosuco Paulista, S.A. | Matao, Sao Paulo | Citrus |
| Cutrale, S.A. | Acarguaral, Sao Paulo | Citrus |
| Frutos Tropicales, S.A. | Estancia, Sergipe | Citrus |
| Frutropic, S.A. | Matao, Sao Paulo | Citrus |
| Raizen | Piracicaba | Vinasse Concentrate |
| **Columbia** | | |
| Grajales Hermanos Ltd. | Bogota | Passion Fruit |
| **Guatemala** | | |
| Alimentos Naturales, S.A. | Guatemala City | Citrus |
| **Haiti** | | |
| Citrus Products, S.A. | Port au Prince | Coconut/Fragrances |
| **Israel** | | |
| Gat Foods | Givat Hayim | Citrus |
| Milos, Ltd. | Haifa Bay | Citrus |
| Pardess, Ltd. | Rehovot | Citrus |
| **Japan** | | |
| C. Itoh & Co. (Ehime) | Matzuyama | Citrus |
| Nagaski Co-op | Nagasaki | Citrus |
| Wakayama Growers | Wakayama | Citrus |
| **Mexico** | | |
| Banco de Credito Rural | Merida, Yucatan | Citrus |
| Citricos de Colima | Colima | Citrus |
| Citro Mexico | Montemorelos | Citrus |
| Citrofrut | San Raphael | Citrus |
| Fidefrut, S.A. | Colima | Citrus |
| Jugos Concentrado, S.A. de C.V. | Montemorelos | Citrus |
| Juguera de Allende | Allende | Citrus |

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| | | |
|---|---|---|
| Juguera VeraCruzana | Vera Cruz | Citrus |
| **Morocco** | | |
| Frumat | Fez | Citrus |
| **Panama** | | |
| Citricos de Chirqui, S.A. | Chiriqui | Citrus |
| **Poland** | | |
| Polimex, CEKOP | Milejow | Apples |
| Torimex, CEKOP | Zagloba | Apples |
| DAL, CEKOP | Tarczyn | Apples |
| **Puerto Rico** | | |
| FF Concentrates | Bayamon | Citrus/Tomato |
| **Spain** | | |
| Frutos y Zumos, S.A. | Valencia | Citrus |
| **Switzerland** | | |
| Ferminich, S.A. | Zurich | Fragrances |
| **Venezuela** | | |
| Ilapeca, S.A. | Caracas | Citrus |
| Fresca, S.A. | Valencia | Citrus |
| Jugos y Concervas Nacionales, S.A. | Barquisimeto | Citrus |

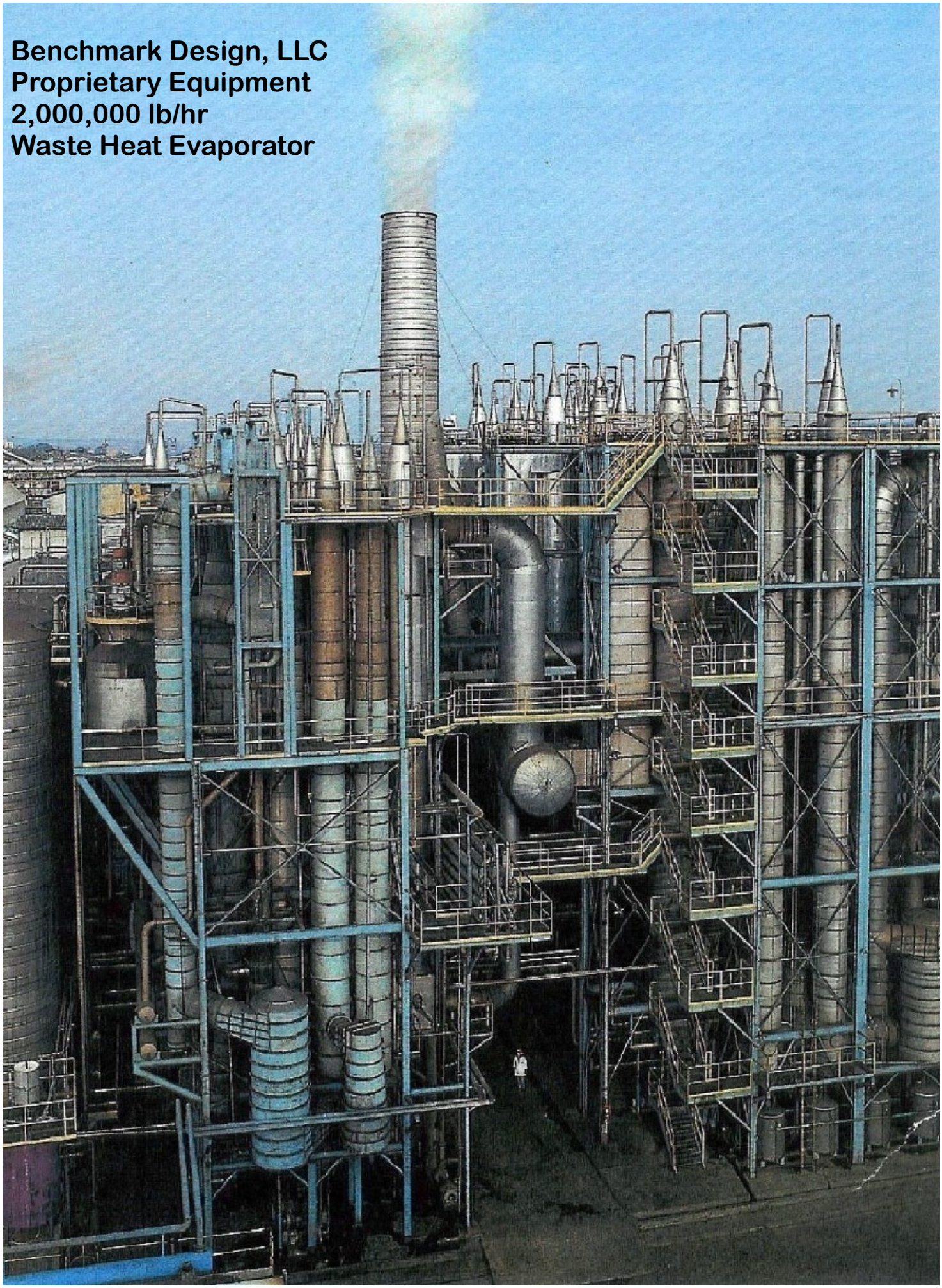
**Benchmark Design, LLC**
**Proprietary Equipment**
**500,000 lb/hr TASTE Evaporator**

**Benchmark Design, LLC  Proprietary Equipment (Patented)**

**Top Photo:  60,000 lb/hr MAGNUM Dryer**

**Bottom Photo:  20,000 lb/hr MAGNUM Dryer (Left)**
**40,000 lb/hr MAGNUM Dryer (Right)**

**Benchmark Design, LLC**
**Proprietary Equipment**
**2,000,000 lb/hr**
**Waste Heat Evaporator**



**World's Largest T.A.S.T.E.™ Evaporator**
**500,000 lbs/HR Evaporation Rate**
**Designed by Benchmark Design, LLC and built with Dedini Industries of Brazil**
**Started Operation in June 2011**