

# glassmachinery world plants & accessories

BI-MONTHLY INTERNATIONAL MAGAZINE FOR GLASS MANUFACTURING

YEAR 23

ISSUE NO. 6/2010

NOVEMBER/DECEMBER

## range of products

### Moulds in:

- cast iron
- bronze
- steel

### Winding:

- copper
- TIG
- VCOF

### Back steps in:

- cast iron
- cast iron, fully treated
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- Bronze - aluminium with metalised edges
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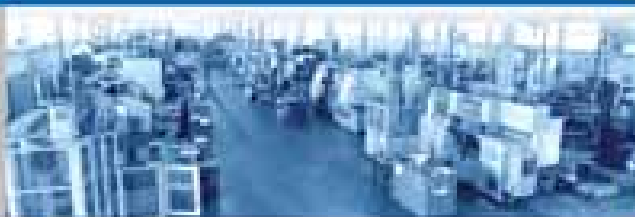
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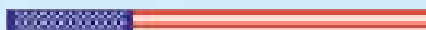
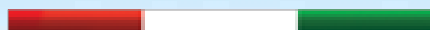
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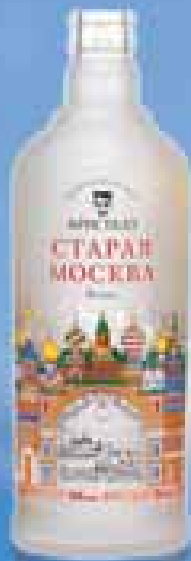
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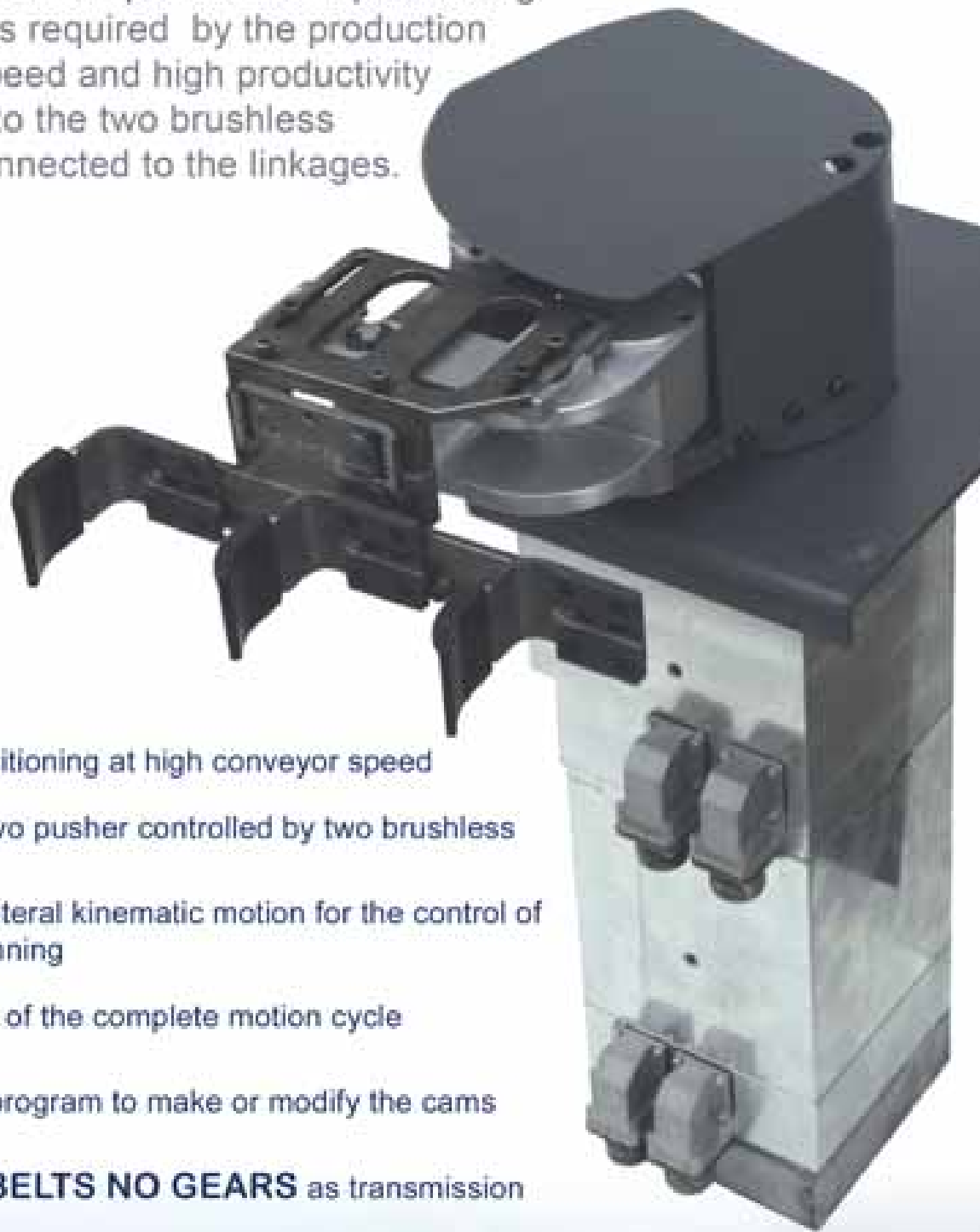
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**regular features**

- 12** OUR FAIRS CALENDAR 2011
- 13** ADVERTISERS INDEX & ALL COMPANIES MENTIONED
- 14** NEWS AND PRODUCTS
- 61** AGENTS WORLD GUIDE 2011
- 75** SUPPLIERS GUIDE - Yellow Page
- 78** SUBSCRIPTION SERVICE

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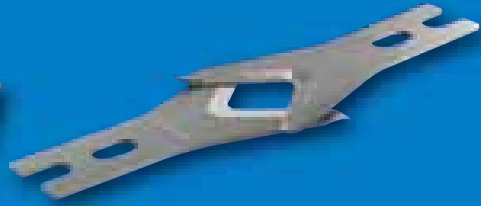
**Contents**

24

article

24 **COLD-END EQUIPMENT**

Zecchetti: Realizing the 'impossible' with a unique machine model



35

30 **SPECIALIZED PRODUCTION**

Turmond: Changing mentality for long-term savings

35 **COMPANY ANNIVERSARY**

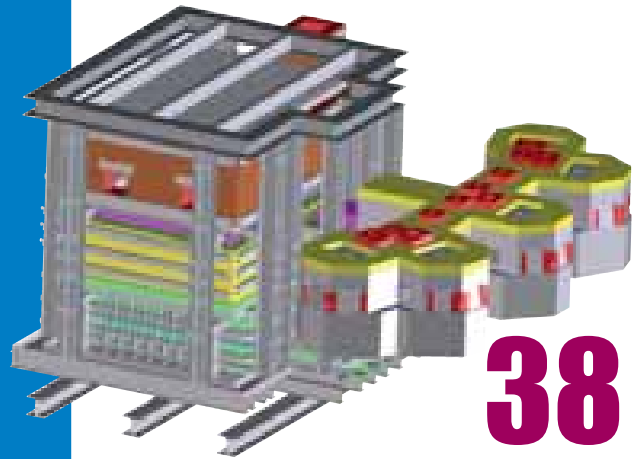
RHI: 50 years of refractory research in Leoben/Austria

38 **FURNACE TECHNOLOGY**

Glass Service: Quality lead glass production  
Anton Kotljarov – GLASS SERVICE SRL

41 **GLASSTEC REPORT**

futronic: Looking back on a successful exhibition



38



41



45

45 **FURNACE ENVIRONMENTS**

S.I.G.MA.: Regenerator chamber refractories

Ettore Mineo – S.I.G.MA. SRL

50 **INTERVIEW**

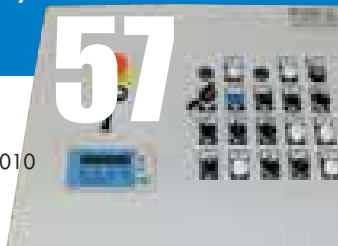
HEYE: From the glassmakers' point of view

57 **COMPANY PRESENTATION**

TecnoIMI: revamping automated lines in the glass industry

50

57



This issue also contains:



**AGENTS  
GUIDE  
2011**

THE ONLY GUIDE TO  
AGENTS WORLDWIDE

61

30

Contents

# Special cast irons and alloys for glass moulds





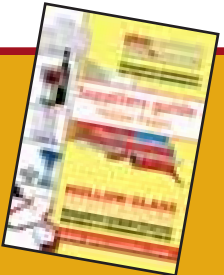






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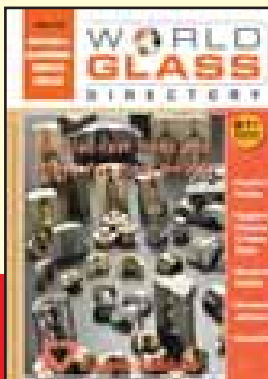
# companies mentioned & advertisers index

...in this issue of **GMP&A**. Advertisers are indicated in **bold**

COMPANY NAME	PAGE NO.	COMPANY NAME	PAGE NO.	COMPANY NAME	PAGE NO.
Ancor Glass.....	14	<b>GT Glass Technologies</b> .....	<b>3, 75-77</b>	S.I.G.MA.....	45-49
<b>Amig</b> .....	<b>8, 75-77</b>	<b>Gulf Glass</b> .....	<b>22, 60</b>	Saint-Gobain .....	18
<b>Antonini</b> .....	<b>17, 75-77</b>	Heye .....	50-55	Schott.....	22
Ardagh.....	19	Hindustan National Glass .....	15, 17	<b>Sipac</b> .....	<b>6, 75-77</b>
Baccarat .....	38	<b>Horn</b> .....	<b>15, 75-77, Back cover</b>	Solvay.....	18
<b>BDF Industries</b> .....	<b>3, 75-77</b>	<b>Istanbul Glass Window</b> .....	<b>80</b>	Sorg.....	15
<b>Busellato Glass Moulds</b> .....	<b>.....Front cover, 75-77</b>	<b>MCR System (BDF Group)</b> .....	<b>3, 75-77</b>	SRI .....	16
Companhia Industrial de Vidros.....	23	<b>Moderne Mecanique</b> .....	<b>8, 75-77</b>	Steuben Glass .....	38
<b>Emmeti</b> .....	<b>5, 75-77</b>	<b>MT Forni Industriali</b> .....	<b>8, 75-77</b>	Stölze-Union.....	21
<b>Fluorital</b> .....	<b>Front inside cover, 75-77</b>	Naigai .....	22	Swarovski .....	38
<b>Fond Metalli Conveyors</b> .....	<b>4, 75-77</b>	Northwestern Glass.....	18	<b>Tecno 5</b> .....	<b>2, 75-77</b>
<b>Fonderie Valdelsane</b> .....	<b>11, 75-77</b>	Nuova Ompi - Stevanato Group.....	14	TecnolMI.....	57-59
futronic.....	41-44	O-I.....	23, 58	<b>Teco</b> .....	<b>23, 75-77</b>
Gerresheimer .....	20	<b>OCSI OTG</b> .....	<b>8, 75-77</b>	<b>Teichmann, Henry F.</b> .....	<b>19, 75-77</b>
<b>Glass Service</b> .....	<b>7, 38-40, 75-77</b>	<b>Olivotto-Antas-Lynch-Lindner</b> .....	<b>.....First page, 75-77</b>	Turmond.....	30-33
Glass Technology Services .....	16	Owens Brockway India .....	17	Verallia .....	18
<b>Glass-Tech Poland</b> .....	<b>34</b>	Pneumofore .....	14	Vidromecanica .....	20
<b>Glasspex India</b> .....	<b>Back inside cover</b>	RHI.....	35-37	<b>Walcast</b> .....	<b>21, 75-77</b>
Glasstec 2010.....	14, 15, 20, 22, .....24, 25, 41-44, 50, 51, 56			Waterford Crystal.....	38
				WRAP .....	16
				Zecchetti.....	24-29



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## NUOVA OMPI EUROPE PRODUCT DIFFERENTIATION EXCELLENCE AWARD FOR PREFILLABLE SYRINGES

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According to Frost & Sullivan's Report, "With the exception of Nuova Ompi, none of the other PFS suppliers possess the capacity to design and manufacture syringe assembly machinery. The group's Optrel unit manufactures inspection machines for containers. This capacity enables Nuova Ompi to meet the specific dimensional requirements of its customers."

"In a highly competitive and dynamic environment, such as the prefilled syringe market, our group opted to invest in customer service innovation," said Nuova Ompi-Stevanato Group president Sergio Stevanato. "Our strategy is to manufacture and supply customized PFS syringes that are competitively priced and of high quality. In addition, we recognize that meeting the specific demands for the vaccine and the needs of our biotech customers would be a major growth driver for Ompi. This is made possible thanks to our unique specifications, whereby the manufacturing lines at Ompi are flexible and cater even to small volume requests from customers."


"This Award offers further proof of our superior production capabilities and demonstrates that we are on the right path towards the commercial production of high quality pharmaceutical systems," Stevanato said. "We are grateful for the acknowledgement and the impact it will have on our future growth, especially in meeting specific

requests from vaccine and biotech customers. Nowadays the Stevanato Group is offering a complete range of pharmaceutical containers made from glass tubing, and the recent extension of our EZ-fill™ sterile production from syringes to other pharmaceutical containers such as vials and cartridges is just one step towards the development of innovative packaging systems."

The company received the award for its unique ability to differentiate itself from the other players in the market, especially the large syringe suppliers. Close collaboration between the engineering division (Spami, Optrel) and the glass division (Nuova Ompi) on the development of new machines and new devices is the main strength of the group.

Nuova Ompi president Sergio Stevanato received the Award at a special Frost & Sullivan banquet on 7 October in Bruxelles.

## AMCOR GLASS SUPPLY DEAL FOR BOTTLES


 Australia's Gawler-based glassmaker **Amcor Glass** has signed an agreement with South Australian family brewer Coopers for the supply of beer bottles, enabling it to commission a third furnace at Gawler. Amcor Glass business development manager Mark Ogden estimated that annual plant capacity would be 380 million beer bottles, with more than 120 million for Coopers.

Coopers managing director Tim Cooper said the Amcor contract was more competitive than previously and allowed for bottles to be supplied on a "just-in-time" basis.

Ogden estimated that US Owens-Illinois, which bought ACI Glass in 1998, had an annual production of 2.5 billion beer bottles in Australia.

Once running at full capacity, the Gawler beer manufacturing plant would give Amcor 15% of the beer bottle market.

## PNEUMOFORE - POST-GLASSTEC REPORT


 The last edition of the *Glasstec* fair in Germany confirmed itself as the world-leading event for equipment and services for the hollow glass industry. During the four days of the fair, **Pneumofore** had the opportunity to meet several key contacts, also from distant nations. A chance to exchange experience

with vacuum for IS machines, to evaluate results on productivity, to report improvements in the forming process and, why not, to discuss problems.

The general feeling was positive, with clear signs of investments towards quality-oriented industrial goods. When it comes to reliability of

continuously operating equipment, or to the need for higher moulding speed, or to a minor rejection rate as per the growing quality standards of the final product, then Pneumofore responds with vacuum system solutions based on solid experience, meeting the latest criteria of efficiency and environmental protection.

## HORN OPTIMISM AT GLASSTEC 2010

 After difficult economic times a spirit of optimism is now once again prevailing in the glass sector. This was made clear by the 1,274 exhibitors at **Glasstec**, the world's most important glass trade fair. A total of about 45,000 trade visitors attended the event.


During the event, **HORN** had several good discussions with high-ranking visitors, also including many international contacts, with a significant increase of 20% in contacts with customers.

During the fair, **HORN** concluded two contracts for projects in India and Russia. In India, **HORN** will build what will probably be the world largest regenerative end fired furnace with 685 tonnes of glass per day for *Hindustan National Glass* (HNG).

HNG, one of the leading figures in the Indian container glass industry, signed a contract with **HORN** for a 175 sq.m. and a 150 sq.m. regenerative end fired furnace. The same contract also includes an agreement to deliver a further 10 furnaces.

The signed contract involves complete planning for refractory material and steel, to be carried out by **HORN**, as well as the delivery of the complete heating equipment, the reversing system, the electrical boosting and the measurement and control equipment of the tank. The construction of the furnace will be monitored by **HORN** supervisors.

## SORG ENTERING THE FLOAT GLASS MARKET

 With clients in more than 70 countries, and more than 250 furnaces operating worldwide, there is one major area of the glass industry that **SORG** has not been intimately involved in until now - the float glass sector.


However, thanks to the signing of a collaborative agreement between **SORG** and the companies involved in the design, construction and operation of one of Europe's most modern float installations, which was commissioned in summer 2009, **SORG** is now able to

## RECYCLING



### US

## CRT GLASS RECYCLING TECHNOLOGY RECEIVES APPROVAL

 US recycler of electronic waste, Electronic Recyclers International (ERI), has reportedly received approval from the State of California to utilize a technology system for the recycling of TV glass, computer monitors and cathode ray tubes (CRTs).

ERI's new technology, which uses a proprietary cleaning system, enables to clean and process glass on site in a safe and environmentally responsible way.

ERI is the first North American organization to use this technology, which was developed in Europe, is already in place at ERI's Fresno, California location and is being installed at all other ERI locations around the country.

ERI has gained the rights to utilize the technology in the US after researching and evaluating its success in European countries such as Italy, Germany, Scotland and England. The technology is now being used in 18 nations there.

The Indiana Department of Environmental Management has recently awarded ERI a grant of USD 100,000 to assist the company in expanding its presence in Indiana, the total cost of which is expected to be around USD 4.5 million.

offer this float glass furnace technology to the market.

The agreement brings together two partners with differing but compatible experience. **SORG's** partner has detailed know-how and practical knowledge of float plant design and operation, backed up by the experience that only the day-to-day operation of such a plant can provide. **SORG** has extensive experience of all forms of continuous melters - cross-fired, end-fired, regenerative, recuperative, conventional fossil fuel, oxy-fuel and all-electric - coupled with familiarity with a wide range of glasses.


The furnace technology on offer is unique in having been used to produce both architectural and solar glass during the course of a single campaign with a glass change on the run. Energy consumption and emission levels are both remarkably low in comparison with other float furnace designs.

As a result of the agreement this technology is now available through the **SORG** organization. Practical support is available in all phases of a project, both from **SORG** and, especially in the vitally important initial operation phase, from its partner.

It is anticipated that the agreement will be of interest to both new entries into the float market as well as existing producers seeking a general repair or extension of their existing facilities.

## SRI

### BUSY LAUNCH OF BOTTLE PRINTING PLANT

 Serigraphie Richford Incorporated Ohio, or **SRI**, has been in production less than two weeks, but demand for screen-printed bottles has kept company officials busy. The Lancaster, Ohio plant is the first US location for the Canadian-based company.

"It's a real treat to start with an empty building and now we're in production," said SRI Ohio vice president of operations Bob Muckensturm.

The company prints and heats labels onto empty glass bottles, many of which will be filled with spirits; one of the firm's biggest contracts is with Svedka, a Swedish vodka. The bottles are printed in Lancaster, then shipped to a distillery in Kentucky to be filled.

One of the keys to starting production was the expansion of the building at 1061 Mill Park Drive. In a few months, the existing facility was expanded from 60,000 to 80,000 sq.ft. The added space was completed in early September 2010.

The manufacturer currently operates one shift, but will eventually move to three-shift operations. Muckensturm said the company will employ 30 people by the end of the year and about 100 during the next 2 1/2 years - all full-time.

Fairfield County Economic Development Director Shane Farnsworth said he was pleased to see the manufacturer begin production: "We had a lot of challenges with the economy. It's great to see the investment they have made to the community. Great to see them up and running," Farnsworth said.

He credited Lancaster Economic Development Director Mike Pettit, for being instrumen-


tal in getting the company to Lancaster. The Ohio Development Financing Advisory Council awarded a USD 2.27 million loan from the Ohio Enterprise Bond Fund to SRI Ohio Inc. to buy machinery and equipment.

The company is part of the Lancaster's Community Reinvestment Area and receives a 100% property tax abatement for 15 years on the expanded section of the building. The company must pay property taxes for the original section of the building.

## RECYCLING

### WRAP

### NEW RESEARCH FOR RECYCLED GLASS

 A study carried out by *Glass Technology Services* on behalf of the UK's Waste and Resources Action Programme (**WRAP**), Leeds University Psychology Department and Sainsbury's, found that consumers are just as likely to buy products in jars and bottles made from mixed colour recycled glass as they are to buy items in clear glass packaging.

According to a WRAP spokesperson: "The research... should boost demand for containers with high recycled content. It could stimulate a market within the container glass industry for green cullet (broken glass for recycling)... which means more of the mixed glass cullet already collected is diverted away from landfill and low value end uses such as aggregates which do not deliver the CO2 savings. But, one ton of cullet used for remanufacture, instead of virgin raw materials, provides a CO2 saving of 315kg."

At present, clear (flint) glass accounts for 64% of the demand for recycled cullet from UK container glass manufacturers, with amber 20% and green only 16%.

"The result of this scenario is that the UK has become a net importer of green glass much of which is currently going into secondary markets such as aggregates," said the spokesperson.

WRAP's director of market develop-

ment, Marcus Gover, said: "This study should give retail-

ers the confidence to use more recycled glass in their products - in the knowledge that it will not adversely affect sales. This is good news for the recycling industry as it could help to stimulate a high value market for mixed colour recycled glass in the UK. This in turn may provide the impetus to divert more of this glass away from landfill and secondary markets and into closed loop recycling."

Paula Chin, Sainsbury's grocery packaging technologist, supported Gover's view: "Ultimately it's all about getting the customer offer right and if our customers are interested, we are interested," she said. "The positive results from this small-scale study would give Sainsbury's the confidence to explore further the opportunity to use recycled glass containers."

WRAP is taking part in a tender for a large-scale trial to manufacture containers with mixed colour recycled glass content of over 90%, which would deliver at least 18,000t of carbon dioxide reduction. The target is to consume at least 30,000t of mixed colour recycled glass which would otherwise be destined for landfill or secondary markets.

During the marketing promotion Choose Glass Week, a series of events were staged across Europe - in Austria, Belgium, France, Germany, Italy, Portugal, Spain and UK - to promote the environmental benefits of glass, held by the *European Container Glass Federation* (FEVE).



## HINDUSTHAN GLASS SALE OF STAKE, ACQUISITION OF OVERSEAS FIRMS



**Hindusthan National Glass and Industries Ltd.** is reportedly in talks with a European multinational to sell a minority stake, with plans to form a strategic partnership for global expansion. India's largest glass bottle manufacturer is said to be divesting part of its 16.76% treasury stock, which was created in 2002 when it merged with *Owens Brockway India Ltd.* and which is made up of shares that are held by the issuing corporation and are available for resale.

Senior vice-president and chief financial officer Laxmi Narayan Mandhana declined to name the potential stake buyer or share other details of the deal under negotiation. "This strategic stock divestment to the multinational company would help both the companies to tap the complementary strengths, and become an undisputed leader in the world glass packaging market," he said.

US private equity firm Sequoia Capital acquired a stake of at least 7% in Hindusthan National Glass in June this year.

The firm has begun a capacity expansion drive by setting up two new manufacturing plants, which will create additional capacity of 1,300 tonnes per day (tpd), in Andhra Pradesh and western India.

"Our strategic stake sale is not exactly to raise money, but to expand the business with a strong global footprint by exploring the capabilities of the multinational partner, and our own strength," Mandhana said.

Hindusthan National Glass, leader in its segment with a domestic market share of 55%, is also exploring acquisition opportunities overseas, in markets such as Europe and Africa.

The company earns almost 95% of its revenue from its local business. "We are in exclusive discussions for acquiring two companies, one in Southeast Asia and the other in Europe. The two acquisitions together could cost around INR 550 crore," said joint managing director Mukul Somani.



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## SODA ASH

### SOLVAY

#### WEAK CONSTRUCTION MARKETS

 **Solvay**, the world's leading maker of soda ash, booked a EUR 197 million (USD 272 million) impairment charge after tax on industrial assets due to weak construction markets, causing its third-quarter profit to miss estimates.

The Belgian chemicals and plastics maker said the impairments

were almost entirely related to its soda ash operations in Europe where demand remains weak, particularly with regards to flat glass used in the construction industry.

"Industrial measures have been taken: capital expenditures have been drastically reduced and will remain at a low level as long as end markets remain sluggish," Solvay said at the end of October. "Our commercial policy will be revisited and if insufficient, new

industrial measure will be considered."



Third-quarter net profit for the group was EUR 18 million, well below the average estimate of EUR 69.3 million, as the impairment offset a capital gain of EUR 130 million from the sale of a stake in Inergy Automotive Systems.

Solvay's third-quarter recurring earnings before interest and tax (REBIT) of EUR 149 million also missed the average forecast of EUR 158 million.

The company, however, still raised its full-year outlook.

In the year-earlier period Solvay had comparable REBIT of EUR 95 million, excluding its now divested drugs unit.

"Solvay expects a higher REBIT in chemicals compared to last year," Solvay said in a statement, which had previously expected operating profit at its chemicals unit to be in line with 2009.

"Taking into account the significantly stronger demand for specialty polymers experienced in the first nine months, Solvay will realize a sharply improved REBIT in plastics compared to the low level of last year," it said.

## RECYCLING

### VERALLIA

#### MODERNIZATION, INCREASED USE OF RECYCLED GLASS

At the **Verallia** plant's 'hot end', glassmaking remains an industrial process, with towering steel furnaces, brick and oppressive heat, where raw materials are mixed, melted and dripped in glowing globs into metal moulds.

The 'cold end', however, has received a new system of conveyor belts on blue frames to carry cooled and coated wine bottles through state-of-the-art packaging equipment.

Verallia, owned by French *Saint-Gobain*, has invested USD 20 million in the last 18 months to modernize its plant in South Seattle, which has been involved in the manufacture of glass containers since before the end of Prohibition in the early 20th century.

Daily plant production is about 1 million bottles - 90% of which are wine bottles for winemakers in Washington, Oregon and British Columbia.

The plant was founded by *Northwestern Glass* in 1931 and, over the years, it has had many different owners and produced many different types of glass food and beverage containers. Production of wine bottles began since 1995.

The new mechanized package system was just one focus in Verallia's plant modernization. The second, which involved improving the plant's sustainability, regards the new partnership eCullet, which moved onto the site in early 2009, doubling the use of cullet, or crushed recycled glass. The cullet is hauled to Verallia's plant and mixed with the raw materials of sand, soda ash and limestone, which results in 48% of the bottles produced at the plant being made from cullet; with year-end goal of 50%.

Washington State's number of wineries has doubled to 700 since 2005 despite the recession, with Washington in second place after California for wine production.

"Production [of wine] in the region is increasing; a lot of bright companies in the area are producing great wines," said Saint-Gobain CEO Jerome Fessard. "We are keen on serving those people."



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# news

## & PRODUCTS

## ARDAGH

### GOVERNMENT GRANT

 **Ardagh Glass** has received a GBP 1.95 million Regional Selective Assistance Award (RSA) from the Scottish Government. The amount will be used to improve operating efficiencies and to reduce the plant's environmental impact.

The third biggest glass manufacturer in Europe, Ardagh operates mainly in the spirits industry, producing more than 13 billion glass containers a year and employing 6,500 people in 20 European plants.

According to a statement issued by the Scottish government, the award "...will safeguard the jobs of 248 workers at the plant and ensure facilities are upgraded to secure the long term manufacture of glass in the town."

Scotland's first minister Alex Salmond said: "This investment shows Scotland has a high quality manufacturing base and is testament to the talent, skills and experience of the Ayrshire workforce. I am delighted that companies such as Ardagh Glass and Lombard Medical are showing support for staff by continuing and expanding their presence in Ayrshire."

RSA grants have already helped encourage 22 companies to invest in the area, thus safeguarding or creating 1,343 jobs related to projects with capital investment of GBP 120 million.

The Scottish government's award to Ardagh Glass is part of a GBP 16.3 million RSA investment programme.

### DOUBLE IN SIZE FOLLOWING TAKEOVER

Ardagh is to double in size with the acquisition of the world's second biggest can maker - Impress Cooperative - with annual revenues of EUR 1.8 billion operating 57 factories in 22 countries. Ardagh has bought Impress for EUR 1.7 billion from a private equity firm. The enlarged business will trade as *Ardagh Packaging Group* and will have an annual turnover of EUR 3 billion.

Ardagh has a EUR 1.2 turnover from its 24 factories in seven countries.

The new company will employ 14,000 people and will take Ardagh into the North American and Australasian markets. Impress, founded in 1997 through a merger of French and German interests, is based in the Netherlands. The company expanded in 2000 when it bought the can making business of food giant Heinz. Its customers include household names such as John West, Del Monte and Crown Paints.

Niall Wall, Ardagh's chief executive officer, said: "The newly enlarged group will operate 81 facilities with leading market positions across 24 countries."

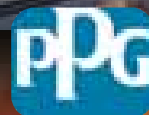
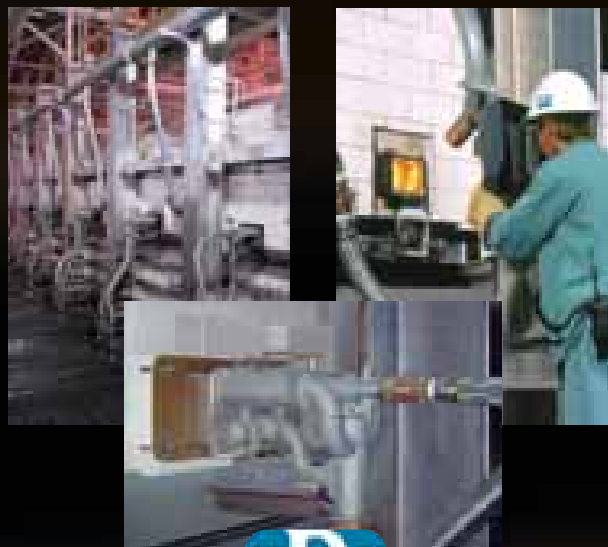
He added: "The new business will have considerable scale with sales in excess of EUR 3 billion and employing 14,000 people."

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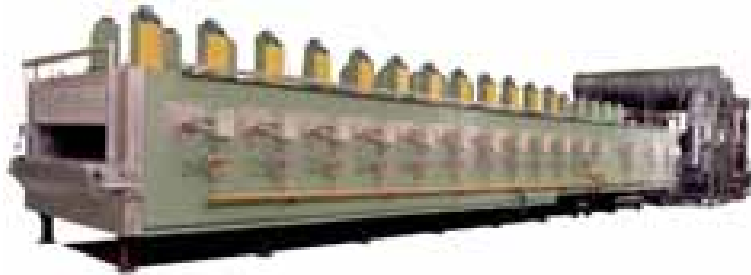
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## VIDROMECA ANNEALING, DECORATING AND TEMPERING EQUIPMENT

**Vidromecanica**, an ISO9001:2008 certified company based in Portugal, manufactures annealing, decorating and tempering equipment; equipment for hot- and cold-end coating, and internal cullet recycling plants able to run 24/7 on long-term production.

Development, design and manufacture of machinery,



control systems, control panel construction and software for production lines are handed in-house.

Company know-how is the result of more than 30 years of dedication, research and development regarding a wide range of technical solutions.


At *Glasstec 2010*, Vidromecanica presented its new realizations and improvements of the following equipment:

- annealing and decorating lehrs;
- belt and spindles tempering lines for tableware;
- moulds pre-heating kilns;
- hot-end coating hoods;
- cold-end coating spraying equipment;
- cullet processing plants.

[www.vidromecanica.com](http://www.vidromecanica.com)

## GERRESHEIMER

### STRONG EARNINGS AND SALES GROWTH

 **Gerresheimer AG**, one of the leading world-wide suppliers to the pharma and healthcare industry, is continuing its growth course in the financial year 2010.

In the period from June to August 2010 the company increased its revenues (excluding the Technical Plastic Systems business which has been sold) by 9.5% to EUR 259.4 million (prior year EUR 236.9 million). At constant exchange rates, revenues grew by 5.8% in the third quarter. In the first three quarters, Gerresheimer achieved revenue growth of 4.4% at constant exchange rates to EUR 753.0 million (prior year excluding Technical Plastic Systems: EUR 714.9 million). The main growth generators in the pharma business were insulin pens, asthma inhalers and prefillable syringes. Additionally, a resurgence of demand for cosmetics packaging and economic recovery in the laboratory glassware segment had a positive impact on the business trend.

Gerresheimer also achieved a further rise in earnings. For the third quarter of the financial year the company reports operating earnings (Adjusted EBITDA) of EUR 53.3 million, 28.1% up on the prior-year period (third quarter 2009 excluding Technical Plastic Systems: EUR 41.6 million). In the third quarter of 2010 the operating margin (Adjusted EBITDA margin) improved by 3.2 percentage points in comparison with the prior year to 20.5%

(first three quarters 2010: 19.6%). Adjusted earnings per share improved substantially from EUR 0.20 to EUR 0.52. As a result of the positive business trend, Gerresheimer was able to reduce net financial debt by EUR 74.1 million to EUR 356.6 million (prior year: EUR 430.7 million).

For the current financial year 2010, Gerresheimer continues to expect revenue growth of 3% to 4% at constant exchange rates, excluding Technical Plastic Systems. This is equivalent to nominal sales growth of 5% to 6%. The company also stands by its forecast EBITDA margin of 19.5% to 20%. In 2010 the company expects to invest a total of EUR 75-80 million.

### REPRESENTATIVE OFFICE IN INDIA

Gerresheimer is continuing to expand its global operations with the establishment of a representative office in Mumbai/India.

Gerresheimer intends to advance its very promising pharmaceutical primary packaging and drug delivery systems business in the growth market of India. In addition to sales operations, the company is also stepping up its local customer services and technical services.

Alongside China, where Gerresheimer already has seven production facilities, the fast-growing Indian pharma market is continually gaining in significance. There is incessant growth of demand for medicines in India.

One reason for this is the improvement of the Indian healthcare system, which gives people greater access to medications.



## STÖLZLE-UNION HERMANOVA HUT OFFICIAL INAUGURATION



The official inauguration of **Stölzle-Union** took place on 14 October in the presence of almost 150 customers, suppliers and partners. Stölzle's new flagship production unit for pharmaceutical packaging glass has five lines (with a sixth line to be added shortly), for the production of pharmaceutical glass and mini spirits using the furnace's daily output of 140 tons of amber glass. Thanks to Laminar Flow technology and the installation of packaging robots, the company can guarantee the highest efficiency and clean conditions in accordance with GMP guidelines.

Johannes Schick, CEO of the glass group, and group CFO/CEO of Stölzle-Union, Bernhard Karrer, presented the new factory to international clients from more than 20 worldwide countries. Guests were shown around the glassworks following the natural process of glass production, also including the main new areas: batch house, compressor building, regenerative furnace, feeder, furnace control room, hot end, air lock, cold end and packaging robots.

The impressive facts and figures involved in the rebuilt plant include: more than 5,000 m<sup>3</sup> of concrete and 650 tons of steel used to build the new production and sorting halls; 2,000 tons of refractory material and 300 tons of steel to build the furnace, working end and feeders; a 44-metre chimney assembled using a 100-ton crane and two supporting cranes. The entire company area was increased by 13,000 sq.m. of adjacent land, occupied for the sorting, re-sorting and warehouse area.

After the disastrous fire on Christmas Eve 2009, Stölzle-Union has risen 'from the ashes' in just seven months thanks to the cooperation between Czech and Austrian Stölzle staff and external companies.

"The inauguration was a great event and a good opportunity for our guests to visit not only the new plant but also the marvellous region around Pilsen. The dinner which took place in castle Kozel and the guided tour through the Pilsner Urquell brewery were just two of the highlights of the inauguration days," says Cornelius Grupp, owner of the glass group.

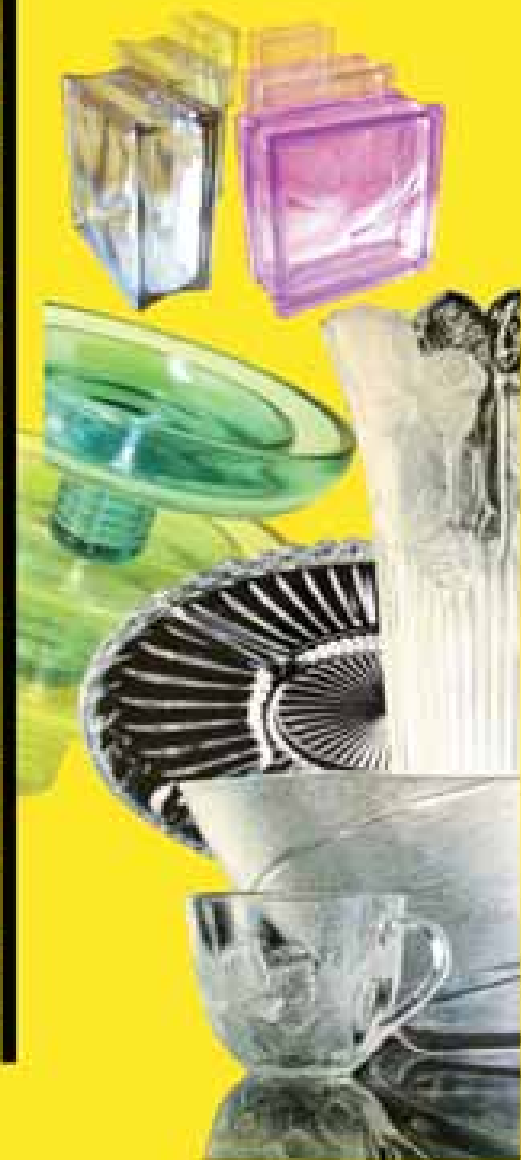
Böhringer, Bionorica, Egis, Zentiva and Fareva were only some of the important pharmaceutical companies at the inauguration event. One of the most renowned customers in the field of mini spirits was also Underberg AG, represented by its owner Emil Underberg who has filled his famous bitters for years in mini spirits bottles made by Stölzle-Union.

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## GULF GLASS CONTAINERS AND REFRACTORIES SEE BOOST



The fourth **Gulf Glass** exhibition in 2011 (and the first in Abu Dhabi), during this post-*Glasstec* period has seen a large-scale upswing in terms of exhibitors from sectors not traditionally seen in great numbers at the event.

“Usually the flat and processed flat glass sector has been the most important,” says Derek Burston, sales and marketing manager, “but on this occasion, we are seeing container glass, tableware and refractories coming up in terms of numbers of exhibitors.”

*Saint-Gobain Sefpro* is just one of the most recent high-profile refractory companies to sign up for the 2011 show, whilst on the container side the likes of *Zippe*, *CMS Makine* and *Ungricht* have all signed up in the last few weeks.

“We now have offers out for double the remaining space,” added Burston “and are in negotiations with Abu Dhabi to release another hall should we require it.”

“When you consider that we have secured sizeable involvements from China and – the first time – Egypt for 2011, as well as support from the industry’s leading machinery organization, *GIMAV*, we are delighted to report that the exhibition is likely to be sold out entirely.”

## SCHOTT and NAIGAI PHARMA JOINT VENTURE



German technology group **Schott** and Japanese company **Naigai Glass Industry Co., Ltd.** have founded a joint venture for pharmaceutical packaging activities. The new company - *Schott Naigai K.K.* - will manufacture high-quality vials for the Japanese pharmaceutical industry mainly from Schott’s pharmaceutical tubing glass *Fiolax*.

“The founding of this joint venture in Japan represents yet another important milestone in our global growth strategy

## RECYCLING



### UK

## INNOVATIVE GLASS REPROCESSING PLANT



A new innovative glass reprocessing plant has been set up near Doncaster, in Blaxton, South Yorkshire, using machinery supplied by Finlay Hire - part of the Finlay Group of companies.

Waste glass is ground to -50mm in a Tesab RK623 impact crusher before entering a Terex Finlay 390 feeder to a Terex Finlay MP300 16 x 6 foot, triple-deck, horizontal washing screen.

Any lightweight material, such as paper or plastic, is floated off through a Mogensen Trash Screen, while the -6mm glass fines enter a Terex Finlay TC15 Sandmaster.

Twin cyclones on the Sandmaster separate the washing water from the clean glass fines, which are stockpiled before being sold for use in concrete block and pipe construction.

The -6mm sand fraction is fed into the Sandmaster to produce washed recycled sand for utility fill.

The +6mm is further processed through a Finlay 206 Logwasher for further removal of clay and rinsing, before grading in a Finlay 683 Supertrak into 40x20 mm, 20x10 mm and -10mm clean secondary aggregate.

The versatility of the plant at Bank End Quarry means that it is not limited to processing glass, and that construction and demolition waste can also be put through the system, which is fitted with a magnetic belt to remove ferrous metal prior to feeding into the MP300.


for our core business of pharmaceutical packaging. With Naigai, we have found a strong partner who shares the same high commitment to quality that Schott has. This will allow us to significantly strengthen our market position inside the world’s second largest pharmaceutical market,” explained Prof. Udo Ungeheuer, Chairman of the Board of Management of Schott AG.

“The customers of our new joint venture will benefit from Schott’s global set-up with multiple production sites and an integrated tubing production, in addition to the technological advancements resulting from its broad research and development base,” notes Keisuke Muratsu, president of Naigai.

Schott holds 80% of the shares in the joint venture and Naigai owns 20%. Naigai will be shifting its existing vial manufacturing activities over to this company and Schott will be contributing its highly advanced automatic inspection system. Over the next few years, Schott Naigai plans to expand its capacities by adding new production lines and leveraging technological know-how from Schott.

“As a result of this collaboration, customers will benefit from the high quality and technology standards, as well as supply safety along the entire supply chain,” says Dr. Juergen Sackhoff, executive vice president at Schott Pharmaceutical Systems.

## O-I ACQUISITION OF COMPANHIA INDUSTRIAL DE VIDROS

 Owens-Illinois, Inc. (O-I) has announced the acquisition of Brazilian glassmaker **Companhia Industrial de Vidros** (CIV), significantly expanding its reach in the Brazilian container market.

The acquisition includes two plants in the state of Pernambuco and one in the state of Ceara, thus boosting O-I's capacity in Brazil by about 50%. The plants employ approximately 1,300 people and produce glass containers for the beverage, food and pharmaceutical industries, as well as tableware.

As per the agreement, O-I is purchasing CIV's glass container business for USD 603 million, including future tax benefits with an estimated present value of USD 140 million. These tax benefits include federal and state incentives for development in Brazil's north-eastern region. The all-cash transaction closed on 1 September.

O-I expects the acquisition will boost regional net sales by approximately USD 200 million during the first full year of operation, with return on investment expected to exceed O-I's cost of capital.

"The acquisition of this well-managed company in South America - our fastest-growing and most profitable region - directly supports our strategy of expanding our presence in emerging markets with robust earnings growth potential," said Al Stroucken, O-I chairman and CEO. "Our recent expansions in Argentina, China, Malaysia and Vietnam, as well as the opening of new furnaces in Peru and New Zealand, clearly demonstrate our commitment to these rapidly growing regions and the opportunities they offer."

According to O-I South America President Andres Lopez, the expanded Brazilian footprint also aligns with unfolding consumer trends and customer growth plans. "Economic development and increased consumer purchasing power is driving significant growth in the Brazilian container market. Our customers are expanding their operations, and this acquisition enables us to serve them, as well as new customers, more effectively. After we've implemented our advanced technology and lean manufacturing principles, we fully expect to boost productivity in the new plants," said Lopez.

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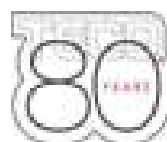
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Zecchetti:

# REALIZING THE 'IMPOSSIBLE' WITH A UNIQUE MACHINE MODEL

Speaking to two key people – General Manager, Mauro Giovanelli and Miriam Garimberti, Sales and Marketing – at Zecchetti, one of Italy's main and well-known manufacturers of machinery for the cold end of glass packaging, gave *Glass*

*Machinery Plants & Accessories* some interesting information and updates on this company. One really important piece of news was that May and June were the two busiest and most important months for Zecchetti in 2010 and, in fact, May 2010 was the best month for the

company in all its history as far as orders and business are concerned - and we are speaking about 50 years of activity!

## INNOVATIONS AT GLASSTEC

*What are the innovations that you have just presented at Glasstec?*

During a recent visit to Zecchetti, *Glass Machinery Plants & Accessories* spoke to Mauro Giovanelli, General Manager of the company, and Miriam Garimberti, Sales and Marketing, to find out about the developments being carried out – with regards to markets and, of course, to products.



Glasstec for Zecchetti is the ideal way to demonstrate to the entire hollow glass sector what we have done, and better still, what we will be doing in 2011.

With regards to the recently-held edition of Glasstec, Zecchetti's aim was that of bringing innovations to the hollow glass market with products, above all, for 'difficult con-

tainers', because now our clients are diversifying, especially with regards to non-round and square-, rectangular- or even strange shapes.

Thanks to our experience in the Italian market with one of its hollow glass manufacturers, we real-

ized it was now time to demonstrate the solutions that we have for all glassmakers with particular products for conveyors, systems of division, orientation and recognition of the diverse sizes and shapes of the glass items, as well as, of course, with regards to palletizing.

And with regards to palletizing, we realized that our clients found it difficult to choose the right

machine to suit their needs – both present and future.

The two basic machines that most companies of this sector have are pick & place and sweep-off machines, and container manufacturers often had to choose between these two different machines.

Zecchetti's response to this dilemma is the new patented solution that transforms our traditional machine - the pick & place - into a universal machine - the *R-Pal* with the new *Multi-Purpose Palletizing Head M.P.H.*

It can start as a pick & place machine, and additional/different equipment can be added at a later date. Another benefit is that a container manufacturer can, for exam-

ple, have three machines equipped differently and those different systems are absolutely interchangeable.

This means that it is no longer necessary to have three 'complete' machines each with a complete series of dedicated equipment. Glassmakers can buy three 'modular' machines and equip them as the need arises, now and in the future, also interchanging and adding equipment on the different machines.

A perfect example of this is a typical glassmaker who has a transport line going to three different terminal units that palletize. With Zecchetti's new modular machine, each machine can be the same base, but can be equipped and inter-

changed to carry out the operations necessary for each product being transported and for each process that must be carried out.

Normally, particular shaped bottles and containers must be handled by means of special inflating tubes because they cannot be 'pushed' as normal shaped ones. In other situations, we are obliged to move the containers by pushing, as for example, with small bottles. These are the two extremes as far as palletization is concerned, but there is a myriad of different situations in between depending on the shape of the container and the type of glass it is made of.

Obviously, the more we use the 'sweep-off' mode, the fewer prob-

### Facilitating glassworks' production and production choices

## R-PALLETIZER, ROTARY COLUMN MACHINE, WITH NEW M.P.H. MULTI-PURPOSE PALLETIZING HEAD

The advantages of the M.P.H. concept are:

- only one palletizer for all palletizing needs;
- no need to choose in advance between sweep-off and pick-and-place modes; and
- the same main features that have contributed to the PAL 300's worldwide success.

The peculiarities of the new patent pending Multi-Purpose Head M.P.H. enable safe layer transfer for almost all types of containers, even in the absence of space among the container necks:

- pick-up/deposit: slat plane, very thin and highly smooth;
- during the layer pick-up phase the plane replaces the table mat with zero jumps for the containers;
- the layer transfer is possible both with the table running and with the stationary table without constraints whatsoever for the stacker;
- during the layer deposit phase the slat plane flexible tip lays the bottles onto the layer separator with zero jumps for the containers;
- possibility of transferring strapped layers;
- possibility of transferring layers of cartons or bags;
- tool-free format changeover;
- quick format changeover (automatic format changeover on request).

M.P.H. Multi Purpose Palletizing Head





Energy Saving  
(low absorption)  
motors

lems we will have with the machine and with changeover of format. This, of course, is the dream of all glassmakers – having a single machine that does everything! Diversification can also be seen in the palletizing format – with trays or with different layer separators as per the different packaging needs of each client.

And this can demonstrate how the sweep off mode is not really as universal as it is said to be, because in some situations we are obliged to use the pick and place mode.

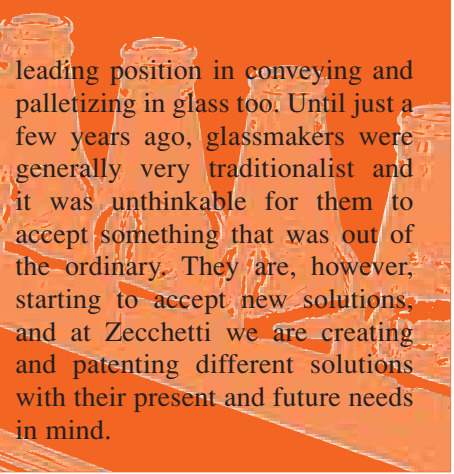
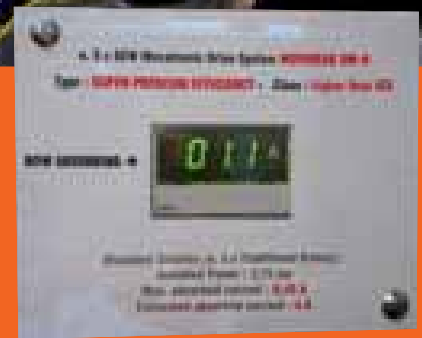
Obviously, our ‘old’ universal palletizer could be integrated with a pick-up head and we still consider it a very valid machine. However, all these so-called universal machines are quite problematic as they often need to be modified because of lack of space.

Zecchetti’s pick and place machine – the *Column Palletizer* – was created about 30 years ago, and has, since then, continued to undergo development. Being basically single-column machines: a rotating column for the pick-up head; a stationary single column for the centering unit; and an interleaver column with the parts in movement always working in a rotating way means that many different types of layout can be created – even extreme types – providing the best access to the machines.

**FUTURE OUTLOOK**

*What do you expect from the near future, and 2011 in particular?*

As leader in the PET sector, Zecchetti entered the glass sector about 20 years ago with an ambitious goal: that of maintaining its



leading position in conveying and palletizing in glass too. Until just a few years ago, glassmakers were generally very traditionalist and it was unthinkable for them to accept something that was out of the ordinary. They are, however, starting to accept new solutions, and at Zecchetti we are creating and patenting different solutions with their present and future needs in mind.

*And which will be the target companies and geographical areas for this new type of machinery – large groups, which seem to be open-minded to new solutions, or medium- to large glassworks that are still family-owned?*

Zecchetti is active in almost every country, in both larger glassworks as well as smaller companies. The latter are those active in the production of special items and this is a sector that can find good response with our new machine. Being able to transport up to six types of bottles all produced at the same time, right from the exit of the annealing lehr is the ideal solution for glassmakers with continuously changing production types.

The name Zecchetti is well-known throughout the world at all the major glassmaking groups – about ten at the most – and they usually have more than one supplier of machinery – Zecchetti included of course! A situation that also creates healthy competition among machinery manufacturers, maintaining the market active. This, however, also creates fierce competition as far as prices are concerned, which is not always a good situation.

We are not used to discussing or negotiating prices but technology yes – and this is what we want to continue to do. Making different machines and proposing different solutions to be able to satisfy a wider range of glassmakers and their needs.

And Glasstec for Zecchetti was the perfect way to inform people about this aim of standing out from the crowd with our style and quality, which will, as always, continue as part of our market strategy in 2011 too.

### WORLDWIDE PRESENCE

*What about your worldwide market presence? What can you tell us about the countries that are the most active for Zecchetti?*

We can say that our analysis of the worldwide market is quite

clear. We are perfectly aware that in some countries our 'traditional' approach does not really work. In some of the large and interesting markets – China and Brazil for example – it is very difficult to carry out direct sales. In Brazil, because of the very high customs taxes applied, in India because there is quite a good internal market there already, and in China, where they have started manufacturing machinery – quite simple up to now.

Zecchetti has more or less a global presence, but we have realized that in the above-mentioned countries for example, we need to have a different type of marketing strategy, which is based more on collaboration with local companies. What we are trying to do in certain countries is to identify the most suitable way of entering the market.

Zecchetti has a very strong presence in the United States with our palletizers for PET, with about 200 lines installed, and there is our branch there – Zecchetti USA, where we started about 13-14 years ago, when we were able to win against local competition with our completely new way of palletizing PET. These fully-automatic machines were bought by almost every PET manufacturer, making our name known in the market, enabling us to set up our branch, which provides high-level technical assistance, spare parts as well as commercial activities. And, therefore, seeing the good results of the PET market we are now working to achieve the same goals with the glass market too!

In fact, the extremely traditionalist US market is now looking for more automatism and is already starting to use a different approach to palletizing, similar to the European one and, therefore, opening the market more.

*This means that the market you are expecting to get the most satisfaction from in the short- to*

*medium-term is therefore the United States?*

No, not really! Other than India, Brazil, Central- and North America, where we are working hard, Zecchetti also has some important projects with other countries, such as the Middle East, for example.

With regards to Europe, we know that Eastern Europe is undergoing a positive trend, with Poland, for example, now in the position to invest, as well as Slovenia.

Speaking about other countries of Europe, work is more concentrated on the substitution and updating of machinery, due to the high costs of raw materials and fuel. There are, however, many glassworks, especially in France, Germany and Italy.

Italy is a good and important market for Zecchetti but Germany was the first and best country for our sector and was the country where we sold our first rotating column machine. It is, in fact almost a monopoly of Zecchetti with 60 per cent of machinery sold by us.

These countries are followed by Spain, France and the United Kingdom, even if not on a regular basis.

*What about joint ventures? Are you thinking about this kind of collaboration with international companies? If so, in which countries?*

We are discussing this type of situation at present but nothing definitive has been decided yet. Zecchetti, however, will not be opening a production unit in any of these countries. For us, the joint venture, in the case we decide to make this kind of move, would obviously be in the form of collaboration with a company there, and will involve exchange of technology, with production carried out by the local company.

In many countries, until now, palletizing has been carried out by hand, also thanks to the abundance of human labour. The situation is, however, starting to change, espe-





cially with regards to India, creating market thanks to the presence of the large glassmaking groups exporting glass containers.

This in turn means the need for adequate pallets and palletizing systems suitable for the overseas markets.

It is therefore now the perfect time to enter the market.

### CONCLUSIONS

Sometimes a crisis has the ability of shaking the market. Companies that want to stay in the market and grow need to be alert and not just think that they are strong because of what they have done in the past or because their name is well known.

The crisis in the United States, which started off the entire global crisis, has given us the push to do more. Our company has always had the ability and strength to react, be appreciated by clients, and to be able to turn the tables in our favour.

In fact, we are already seeing

the first results from the actions that we have taken, with new clients coming to us, which is a really positive situation.

Our next developments are those of automation, increasing speed, and the need to have high-speed production changeover with – as we already have in our PET palletizers – the *One Push Button Changeover*. And, of course, the developments we had on show at Glasstec were just the beginning of these developments. ■

 **Zecchetti**  
HANDLING TECHNOLOGIES

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## COLD END *advanced solutions*

*Automatic System to adjust conveyor sideguides by taking into consideration the different needs of each conveyor section along the line, as well as other specific necessities of glassworks.*

*High precision cameras to orientate containers with identification signs or shaped ones. Continuous flow, high speed and efficiency splitter.*

*Auto-adjustable spacer to handle simultaneously a mix of containers.*

*Multi-container sorter to divide the incoming different containers.*

*Energy-saving drives.*

## SPECIALIZED PRODUCTION

Founded in 1969, Turmond is specialized in the production of tungsten carbide parts with the highest possible

quality so as to guarantee constant quality over time. This particular material has a unique combination of strength, hardness and heat conductivity to respond perfectly to the most demanding applications – especially glassmaking.

**T**urmond is a family-run company and, in fact, when we at *Glass Machinery Plants & Accessories* visited the firm, we were greeted by one of the owners - Alessandro Colombatto, Sales and Marketing Manager - who is also extremely available and ready to help in the workshop too.

The company uses its tungsten carbide for many different production sectors, such as paper and packaging, metal, plastic and fiber, seal rings and special applications and, of course, the glass sector. Used in the manufacture of shear blades for the hollow glass industry – a relatively new sector for this company – it can reach impressive performance with regards to working lifetime and cut quality, in turn, guaranteeing important advantages in terms of economic payback. Turmond's tungsten carbide shear blades have been patented in Europe and in the main worldwide markets.

Company facilities are so complete and functional that the entire process – from the mixing of the powder for the

metal – Sandvik – to the sintering, grinding, material analysis and packaging of the finished items, is all carried out entirely in-house.

### THE INTERVIEW

Speaking to Alessandro Colombatto

“Of course, the long working life of the shear blades, as with every moving part of a machine or production process, depends on how they are used, and what kind of process they are used for.

There are, for example, some kinds of production – standard, such as beer bottles for example, or normal containers – where extremely high quality is not really necessary and where normal blades can have a working life of five to six months on average.

We have also used them for other applications, such as in the case of crystal and borosilicate glass production, where, on average, stainless steel blades need to be changed every eight hours.

This, however, does not mean that the blade is no longer good to cut, but that the quality of the cut is not up to the level required by the crystal or borosilicate glass maker.

With our blades, on the other

Turmond:

# CHANGING MENTALITY FOR LONG-TERM SAVINGS



hand, they told us that they have even reached 200 hours without changing them – an incredible difference.

## Standardized production

What we tried to do when we entered the glass market was to standardize our production so as to satisfy the widest range of requests from clients – in fact, our production range consists of four different types. This also simplifies our work too as we can programme our production and keep items on stock in the warehouse ready to be shipped. It also means that we are never without these products and that our clients do not have to wait until we manufacture them.”

*How and why did you enter the glass market?*

“With a considerable company history and experience in the pro-

duction of tungsten carbide metal parts for diverse industries such as metal, paper and plastic, and after studying the demands and specific requests coming from the glass sector, Turmond began commercialization of its shear blades only in June 2009, but immediately with very positive results.

The idea to start in this market came because of the wide range of applications and types of glass and products used, as well as, of course, the fact that it is a highly valid market in terms of technology and, of course, economically.

Entering the market required, first and foremost, standardized production. This was carried out and, of course patented, with regards to the special tip of the shears, especially designed to facilitate the joining of the two shears during cutting of the glass gob, and thus ensuring

less wear and tear on the shears too.

Turmond’s patented shears are available in four standard formats, and can be used on any kind and make of IS machines. Being made of tungsten carbide means, of course, that they have quite a high price – up to ten times the price of stainless steel. However, ensures the company, they give an immediate payback as their use can be continuous from the beginning to the end of their working life.

Moreover, considering that the downtimes needed to change blades are reduced greatly, this is a considerable saving in terms of production costs. When we speak about working life, the difference is easy to see: with normal steel blades, these must often be changed every two or three weeks; with tungsten carbide the figure not only increases

## SPECIALIZED PRODUCTION

from two to five or six, but months not weeks!

This means, however, that the commercialization of these blades is connected to markets for the production of more complex items and not for mass production. In fact, in market sectors where high cutting quality is requested, companies manufacturing crystal items, for example.”

### Cutting quality

“The real strongpoint of our blades is their high and constant cutting quality. At present, however, sales are now ongoing in many different sectors – even those that do not really require the same type of quality standards – which means that the long working life of the blades is also a highly appreciated feature.

A further improvement regards the heat conduction of the metal used for the blades: compared to steel, which has high conductivity, tungsten carbide has even double this conductivity and thus heats up faster and cools down faster too. On the contrary to steel, which may start having problems at temperatures of 200-250°C, tungsten carbide and other so-called hard metals resist to temperatures up to 500-600°C without difficulty.

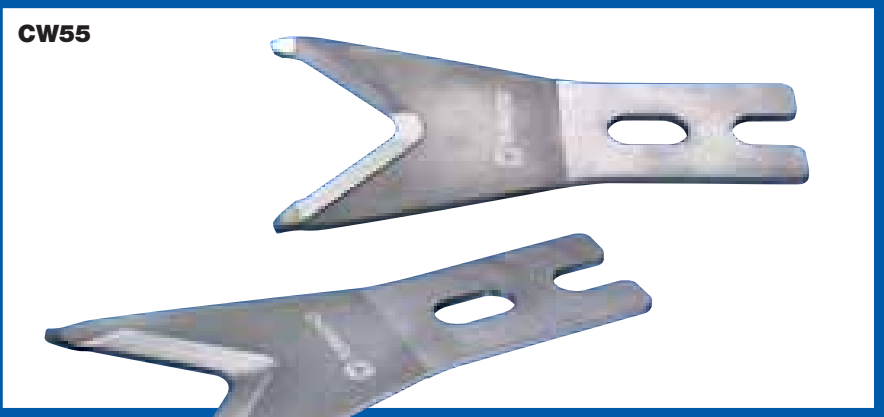
Moreover, this extremely resistant metal and the special design of Turmond’s blades, ensure better closure, and thus higher precision of cut. Moreover, thanks to a special spacer supplied with the shears, their installation is greatly facilitated.”

### Market areas and companies

“Countries where we are active at the moment are, in alphabetical order: Africa, Eastern European countries, France, Germany, Italy, Japan, Mexico, Spain, South Thailand, Taiwan, Turkey, United Kingdom, United States.

On average, when we launch a new product on the market, it takes about three to four years to see the

**CW55**



**CW75**



**CW90 - R8**



**CW90 - R18**



## Plungers? YES, PLUNGERS.

"We carried out some trials this June with an international glassmaker, who gave us the idea that using the same hard metal could be an interesting idea also for plungers. We are now carrying out further tests with other glassmakers to find out if this product is feasible. One of these glassmaking groups was the same one that collaborated in the geometry of our blades.

The company is now testing a second series of plungers and we should be able to have the results of these tests by the end of this year.

However, the plungers were on show at our stand at Glasstec, as we were also interested in discussing this new type of product with glassmakers who were willing to collaborate and test them for us too, as well as to see what the market thought of them. Just think about the different in the transmission of heat and resistance between the present marketed coated plungers and the ones that we are testing made entirely of tungsten carbide. Ours will provide a real economic advantage as they will be able to work for one to one and a half months compared to the three or four days with steel plungers. However, this is something we are still working on."



results and to have a real idea of this product and the real effect it has on company turnover.

We must also consider that we have entered a market with a product that has been used without competition for the past 40 years, and that we have completely revolutionized the market – with regards to costs, geometry, and so on. Of course, there is another

important fact to be considered, as the blades are much more fragile and delicate to install and need careful handling so as not to chip or scratch them. But once they have been installed, they can be forgotten about for at least three or four months.

Clients of Turmond also include some of the most important worldwide glassmaking and crystal manufacturing groups."

*What can you tell us about your shear blades?*

"We have four different types of blades, with a code name as per the size and geometry of the blade. The smallest, used for triple gob, is the 130 x 70, cutting width 55; the second – 150 x 90, cutting width 75 – is for double gob, followed by the 150 x 105, cutting width 90 and radius 8, and last but not least, 150 x 105, cutting width 90 and radius 18, both for single gob.

All these blades can be installed on any type of IS machine of any worldwide manufacturer.

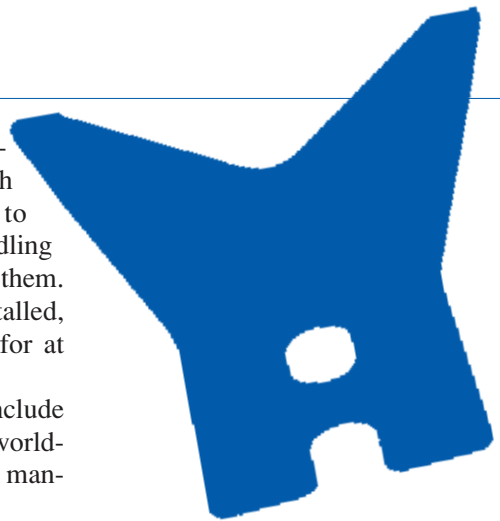
All types of blades are supplied with a special spacer that facilitates and speeds up installation, also reducing the danger of breakage during installation.

A further feature of all our blades is their particular geometry, and this is what the patent is concentrated on: cutting angles, drains, planarity, curved edges, and other features."

### Benefits: long working life and quality

"Some examples of the use and resistance of our blades can be seen, for example, in the manufacture of beer bottles: two weeks with steel blades and seven months with Turmond tungsten carbide blades! And this gives the idea that even if the price of our blades is a lot higher, the economic benefit is considerable and immediate.

A further advantage thanks to this long working life can be seen during long production runs where the cost-



ly downtimes needed for blade changeover are almost eliminated.

This difference in duration can also be seen in particular production such as for crystal where instead of changing over the blades every two or three hours, they can last 10 or 15 times more – meaning days or sometimes even weeks. And in this second type of situation, the blades have a consistent payback in terms of quality and precision, which remains the same for the entire duration of the life of the blades."

"When we started producing and commercializing our shear blades, nobody knew who we were – but, thanks to word of mouth our company name and our products are starting to be recognized all over the world – especially with regards to the high quality of the product and the glass they process." ■



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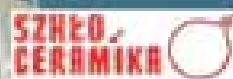
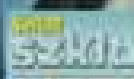
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# RHI: 50 YEARS OF REFRACTORY RESEARCH IN LEOBEN/ AUSTRIA

Experience is always a principal request of any firm, and more so when we are speaking about a company of the glass

sector. In this article, RHI gives us some basic information on the 50-year anniversary of its R&D Center in Austria, highlighting the milestones that have enabled it to develop innovative refractory products and processes over the years.

## ABOUT RHI

**A**RHI is the world market and technology leader in high-grade ceramic refractory products and services and is based in Vienna, Austria. The Group employs about 7,300 people worldwide at 31 production sites and approximately 70 sales offices. In the first half of 2010, RHI reported revenues of EUR 741 million (financial year 2009: EUR 1.2 billion). The RHI share is listed as a member of the ATX on the Prime Market of the Vienna Stock Exchange.



RHI's R&D team in 1960

COMPANY ANNIVERSARY



**RHI Technology Center Leoben in 1960 - right; and in 2010 - left**

**HUNDREDS OF REFRACTORY INNOVATIONS AND PATENTS**

Refractories innovations for the basic industries have been developed at the Technology Center of RHI AG in Leoben for 50 years. In 1960 the centre was officially presented to the public as a research institute of what was then Veitscher Magnesitwerke. The initial team consisted of 42 people. Leoben was chosen because of its central location and close proximity to the plants in Trieben, Veitsch and Breitenau, but also because it is situated close to the University of Leoben and the steel industry.

Previously the three plants had operated their own laboratories.

**RESEARCHERS FROM MORE THAN 10 COUNTRIES**

Today RHI is the global technology leader with 31 production sites on four continents and has concentrated its worldwide research and development activities in Leoben. More than 150 employees continuously work on the research and further development of existing refractory products and raw materials in state-of-the-art industrial laboratories and test facilities. RHI invests roughly EUR 20 million per year in research and development, an above-average amount in the industry. The federal and provincial governments provide financial support for the numerous research projects.

**INTERNATIONAL COOPERATION – MULTIPLE AWARDS**

The successful research activities in cooperation with customers, international research institutions and universities, above all the University of Leoben, have laid the foundation for RHI AG's excellent reputation in refractory technology. More than 500 patents and 1,500 industrial property rights reflect these intensive research activities. The Technology Center Leoben has received multiple awards for the scientific papers of its research staff.

The Technology Center also comprises other important departments, among them worldwide purchasing and logistics, quality management, the technical department and production control.

**Below - Wet chemical analysis laboratory 1960; right - X-ray diffraction examination 2010**





## Production capacities in China extended EUR 13 MILLION INVESTED

Plant extension in Dalian: third tunnel kiln with state-of-the-art heat management; Increased capacity for the cement, glass, nonferrous metals and steel markets; Improved delivery times and more flexible production.

RHI AG, the world market leader for refractory products, increases its production capacity in China by more than 20 per cent to 270,000 tonnes. In late September, a third tunnel kiln was successfully commissioned at the Dalian plant. RHI invested about EUR 13 million, thus continuing its growth strategy in the BRIC countries.

“With this capacity extension we are strengthening our position in the cement, glass, nonferrous metals and steel segments. We are cutting delivery times and increasing flexibility in production,” Manfred Hödl, COO of the Industrial Division, explains.

At its plants in Dalian and Bayuquan, RHI produces fired basic bricks, basic mixes, isostatically pressed products as well as magnesia carbon bricks and prefab components. Both plants are supplied with raw materials from RHI’s Aoding site to a considerable extent.

Apart from the 156-meter-long tunnel kiln, the new plant in Dalian comprises crushers, mixers, two presses, packaging plants and warehouses. The tunnel kiln was completed two months ahead of schedule and is equipped with specially developed heat management. The entire plant was internally planned and built by an RHI team of some 100 people.



Above - Electric arc furnace 1960; left - Henning E. Jensen, CFO of RHI

### CEREMONY WITH MORE THAN 250 GUESTS

RHI celebrated this anniversary with current and former employees, partners, customers, and guests from politics and business at a ceremonial act on 15 October 2010. In their speeches they particularly emphasised the importance of operations research and development for jobs and the industry location Austria. Following the ceremony, the guests participated in a guided tour of the Technology Center.

On the same day, more than 200 students visited the Technology

Center and gained insight in the work areas during a tour of the Technology Center where they learned more about RHI’s refractories world. The explanation that hardly any product used in daily life – from water glasses to mobile telephones – can be produced without refractory products caused an “aha-experience” among the students.

All in all, more than 1,350 visitors celebrated with RHI on the two days of the open house.

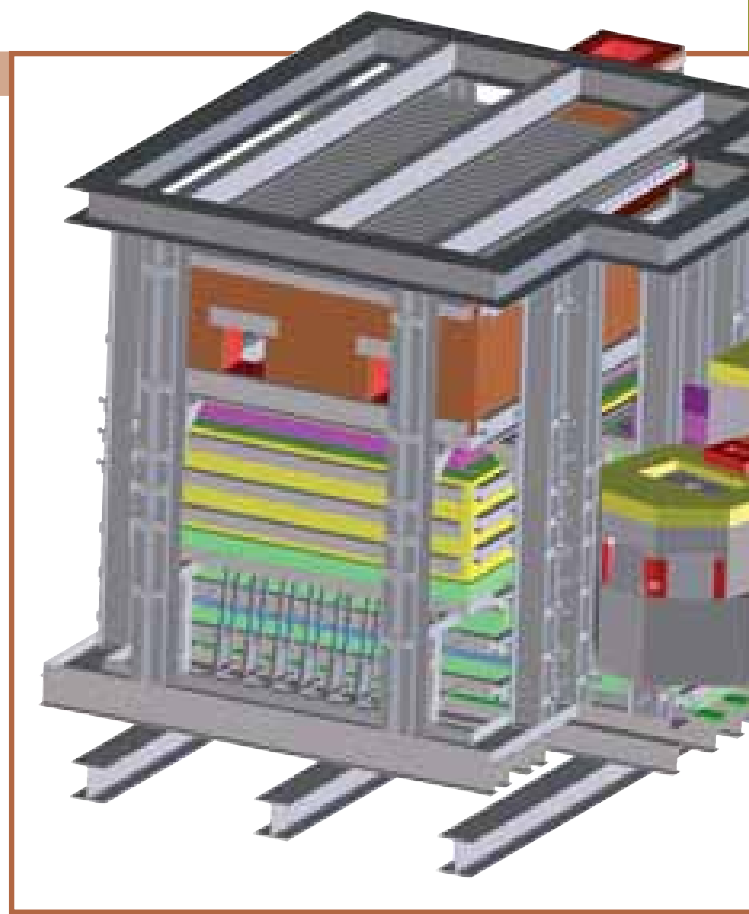
Guided tours of the Technology Center also took place during an Open House Day on 16 October. ■

# Glass Service: QUALITY LEAD GLASS PRODUCTION

**Anton Kotljarov** – Technical Assistance

GLASS SERVICE SRL

Glass Service (Italy) presents its experience in the development and construction of electric furnaces for lead crystal glass (24% PbO) production. The all-electric melting tank of the furnace is combined with the Working End, which is heated using both gas and electricity. The furnace is perfectly suitable for automatic production and enables the manufacture of a wide range of



different items thanks to its distribution layout and gathering bays design.

## **G** LASS SERVICE (ITALY) ELECTRIC FURNACE

The manufacturing of hand-cut lead crystal plays an important role in the production of high quality tableware. For several hundred years, lead crystal glass has been a well-known attribute of luxury and wellbeing. The production of

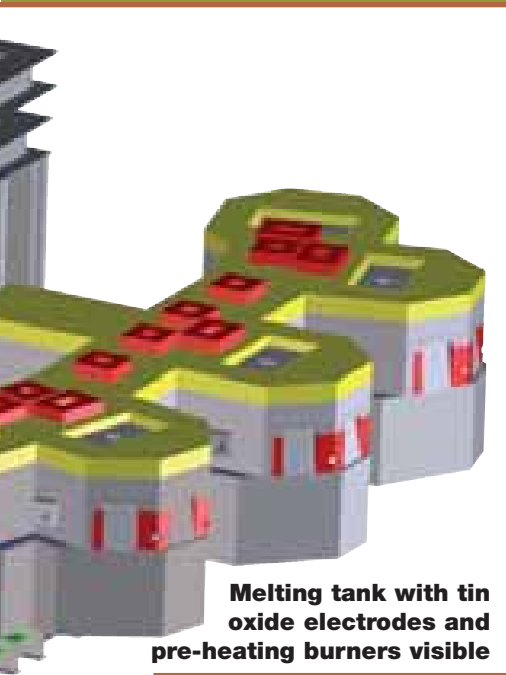
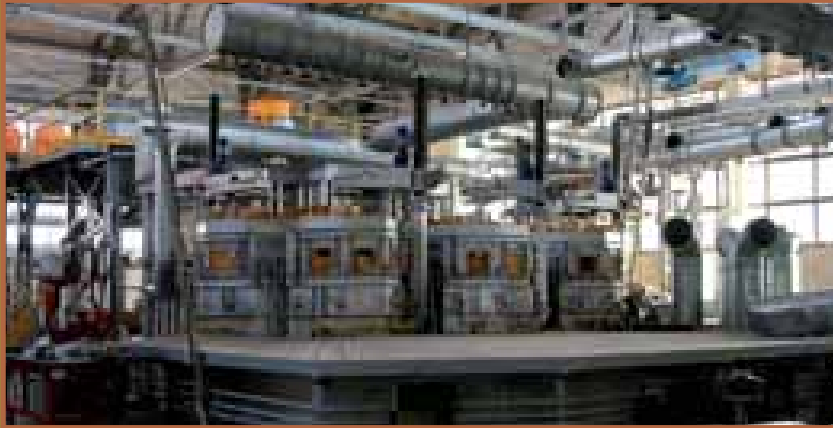
large lead crystal makers, such as *Swarovski* (Austria), *Waterford Crystal* (Ireland), *Steuben Glass* (United States), *Baccarat* (France) and others, is world famous.

At the same time, there are many small lead glass manufacturers, who have more difficulties to maintain their position on the market, while know-how costs are quite

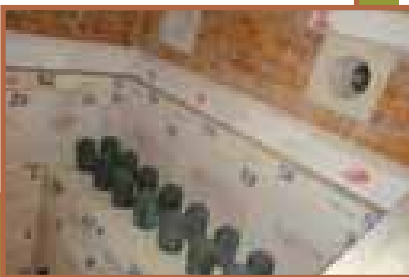
high, homemade development of high-quality solutions is frequently difficult, and quality standards of the market are growing.

Apart from the most common 24 per cent PbO lead crystal, there are also glass types with up to 65 per cent of lead oxide and which are used as, for example, radiation shielding or lense material.

## Furnace under construction



**Melting tank with tin oxide electrodes and pre-heating burners visible**



under thorough supervision of Glass Service specialists.

### LEAD CRYSTAL GLASS

First of all, lead crystal glass is known for its glance caused by its optical density. The refraction index of lead crystal is up to 1.7, while in the case of soda-lime glass it is about 1.5. The cutting of lead crystal uses this effect to create a diamond-like play of light on the edges. At the same time, high transparency and absence of own colour emphasizes the effect. All these optical properties are important both in tableware production creating a particular charm of crystal glassware, and in production of optical glass such as achromatic lenses. Among the properties, which are considered important in tableware production, there are also the high density ( $\geq 2.9$ ) caused by lead and, last but not least, specific sonority.

Properties that have direct impact on the production process are the low electric conductivity and low viscosity of lead crystal glass, both orders of magnitude

lower than those of ordinary glass, caused by the large ionic radius of lead  $Pb^{2+}$  (106 pm).

These above-mentioned properties depend on several factors: first of all, the chemical composition, chemical and physical homogeneity, and absence of defects.

### Production of lead crystal glass

Lead crystal glass production leads us to a series of important factors. Thus, the production of high quality lead crystal glass is a critical issue due to the high lead content. Among the basic difficulties that arise are:

- high corrosion rate of fused cast;
- high volatility of lead oxide  $PbO$ ; and
- low viscosity resulting in high penetration.

To solve these problems, an adapted furnace is required. Melting is a very important process in lead crystal glass production, since it is where glass homogeneity starts. Efficient melting provides glass free of gaseous inclusions such as bubbles and cords, but also solid impurities such as stones.

In this situation, Glass Service (Italy) has designed and built a furnace commissioned in autumn 2010; which represents the latest development of electric furnaces. The 24 per cent  $PbO$  glass is gathered both manually and mechanically using the Glass Service (Italy) gathering robot. The furnace has been built by clients' craftsmen



## FURNACE TECHNOLOGY

Taking into account the importance of chemical composition and purity, as well as process control, the situation could be summarized as follows: "A good cook, good ingredients and a good pot are needed to prepare good soup".

The concept of a "good pot" considers, first of all, high quality material, but also a proper system of heating and control. The "pot" created by Glass Service (Italy) is an electric furnace designed in a way to deal with the peculiarities of lead glass properties using minor construction improvements, which create synergetic effects, resulting in high quality glass.

### THE FURNACE

#### Melting

The melting part of the furnace is all-electric, with two sets of tin oxide electrodes used to introduce the current into the melting material. The positioning of electrodes and electric linking offer uniform electric energy distribution in the layer of the incoming batch. The construction of the melting tank uses perfectly ground high quality fused cast material. The geometry of the melting tank is a result of thorough development aimed at avoiding possible undesired effects, such as metallic lead formation, glass flow velocity in different zones, etc. Temperature control is performed using immersed thermocouples, which allow for adequate

monitoring of the melting and fining processes.

A critical passage in the movement of liquid glass is the throat, where mass ratio of the contained glass and the surface of heat transfer to the environment is rather small. Moreover, there are few possibilities to heat up the glass in this part, and, therefore, the booster has been installed here.

#### The Working End

The Working End design has been developed with great attention to deliver thermally homogeneous glass to gathering bays. The geometry of the distributor and the channels was defined according to the planned gathering layout, desired by the client. Combined gas + electricity heating, along with overflow system, stirrers and auxiliary burners, offer constant glass quality resistant to the influence of environmental conditions.

Thanks to the control system, all process parameters within the furnace can be easily adjusted according to client requirements.

Specific solutions used:

- construction materials;
- melting tank geometry;
- melting tank heating system;
- level measuring system combined with the batch charger;
- number of electric boosters and relevant power;
- Working End design;
- combustion system;



- glass overflow;
- auxiliary burners;
- stirrers;
- control system.

The furnace is highly efficient in terms of energy consumption, while heat loss is very low. Heat is emitted in the environment only from the working end, due to the flue gas flow, while almost all electric energy is transferred to the glass. The control system offers a user-friendly and intuitive interface for process management. The furnace is perfectly suited for automatic production, and process control is reliable for manual production too. However, in this case, correct work organization is required.

All-in-all, the solutions of Glass Service (Italy) used in this furnace design resulted a significant increase of transparency of lead crystal glass using the same raw materials as before.

Based on this experience, Glass Service (Italy) can offer an integral solution for lead glass production. Moreover, the furnace design can also be adapted to produce opal fluoride or borosilicate glass. This design concept is also suitable for some types of special glass production.

In combination with automatic production lines, these furnaces can fit the needs of any manufacturer. ■

TABLE 1

### INDICATIVE TECHNICAL CHARACTERISTICS OF THE FURNACE

Type of melting part	All electric melter
Melting part power supply	Single phase
Melting electrodes	High purity tin oxide SnO <sub>2</sub>
Melting tank geometry	Rectangular
Melting capacity (glass yield)	14 t/day
Batch charger	Band type
Working end heating	Combined gas + electric boosting
Number of gathering bays	5
Specific energy consumption of the melter	1.04 kW/kg

**glass**  
SERVICE

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**GLASS SERVICE SRL**



This year, all eyes of the international glass industry were once again focused on Düsseldorf. From 29 September to 1 October, the world's leading manufacturers, engineering companies and their suppliers convened at Glasstec 2010 to



showcase their latest developments. The industry's premier exhibition has also been a must-attend event in futronic's agenda for many years. The Tett nang control system specialist returned home extremely pleased with the outcome.

## futronic: LOOKING BACK ON A SUCCESSFUL EXHIBITION

### **S**PEAKING ABOUT THE FAIR

"Glasstec is not simply the biggest but also the most important fair in the world for us," explains Michael Preuß,

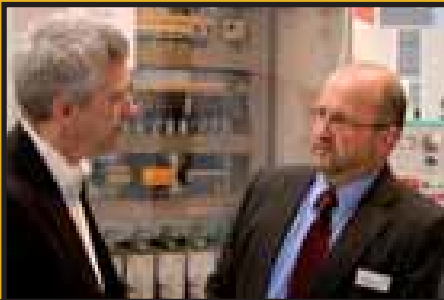
Managing Director of futronic GmbH in Tett nang. The biannual Düsseldorf event provides an ideal setting in which to meet, and exchange experiences with other players in the industry. "It's a good

## GLASSTEC REPORT

place to strengthen relationships with customers, establish useful contacts and initiate new projects," he continues. "Glasstec is a must we can't afford to miss."

This year's exhibition was staged as the world's economy witnessed gradual recovery from the financial and economic crisis. The economic upswing was also accompanied by an increased willingness among hollow glass manu-

**Below, Michael Preuß, Managing Director of futronic (right); and meetings during Glasstec**



facturers to invest in the refurbishment, modernization and extension of their facilities. "The trend was clearly noticeable," Preuß reports. Visitor interest in information that could influence impending investment decisions was consequently high. "This year, customers approached us with very specific ideas, project requirements and even preformulated project plans," he adds. "In other words, the discussions we engaged in were much

more focused than in the past." He is also highly satisfied with the new contracts that were signed and sealed, mainly for extensions to facilities in which futronic technology is already installed. "Our customers continue to place their trust in futronic products," Preuß observes, "and our quality and service are integral elements." Several new challenges also await the company: futronic is currently drawing up quotations for projects that are

### ASDR 2 hot-end distributor box

The ASDR 2 hot-end distributor box forms the heart of an autonomous hot-end reject system, which automatically detects and rejects fallen over containers or those that have stuck together. The control system for this purpose is preinstalled and can be operated without having to open the box. An optional machine control allows containers to be rejected either by pressing a key on the section or automatically, e.g. after lubrication. In addition, the reject signal of an IS machine control can be corrected and the precision of the container reject process optimized. The structure and design of the box reflect the harsh conditions prevailing in the IS machine's environment.



# OPANSKI 2002

## alarm system for oil separators

- Patented and specific system for refuse water purification and filtering for the glassmaking industry
- System complying with EU standards
- Guaranteed conformity regarding the disposal of wastewater
- Minimum and simplified maintenance with consequent very long working life of the system
- Low consumption of harmless reagent chemicals
- Modular systems expandable on request

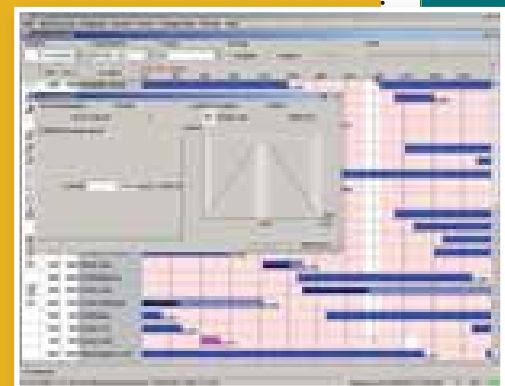
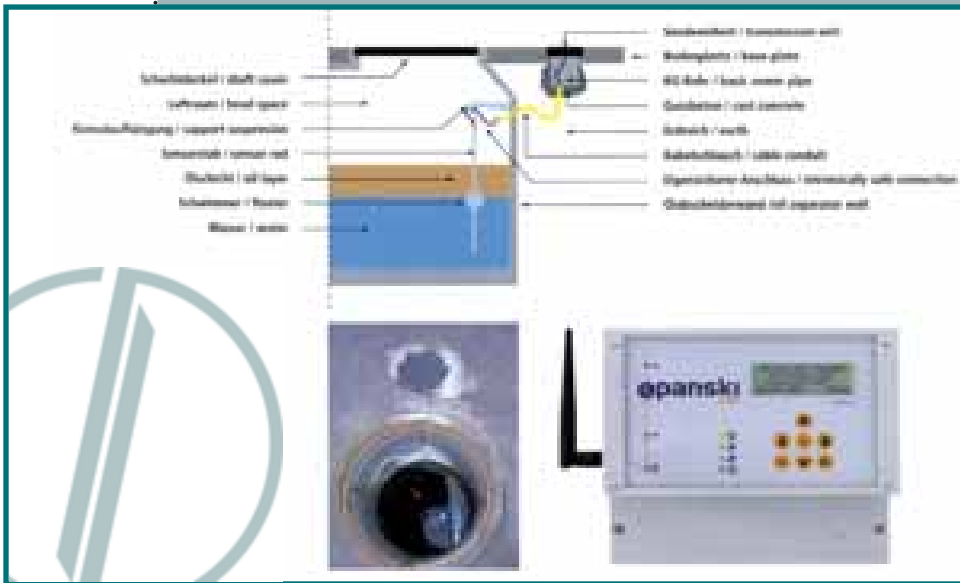


## FMT24S IS machine control

The FMT24S is a state-of-the-art distributed machine control system. It consists of interconnected modules that mainly communicate over industrial buses. It can be expanded with FMT24S-specific modules as well as any standard, bus-capable digital I/O modules, analogue I/O modules, interface converters, etc. Other important features include:

- Full servo integration
- CANopen® safety bus
- Valve current monitoring
- Analogue actuating elements
- Integrated electric overrides
- Networked PLCs
- Mushroom-head pushbutton without additional wiring
- Internet technology

The module technology employed for this system and the way in which it is integrated mean customers are assured maximum flexibility.



## FDU24S DRIVE

Servo technology has long become an integral part of industrial production lines. Servo drives with high precision and dynamics as well as compact motors with high power density are crucial for flexible, efficient production processes. Manufacturers in the container glass sector also became aware of the potential of servo technology some time ago. Today, their interest is mainly focused on the mechanisms of moulding processes. Yet how can this technology be harnessed in a way that lets production oriented users manufacture more efficiently?

### The solution

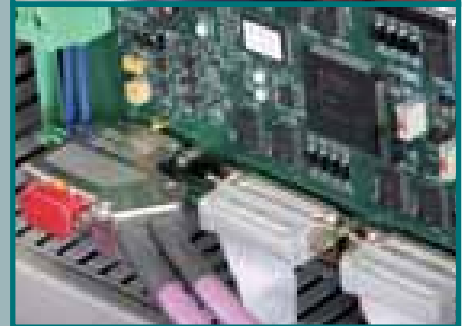
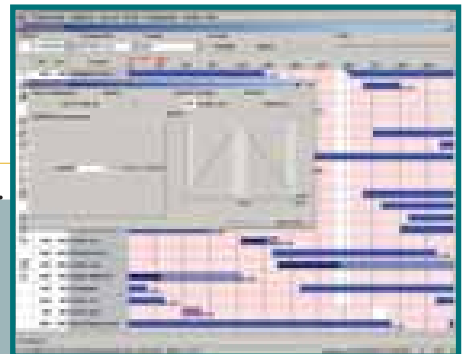
futronic has now come up with a powerful answer - the newly designed FDU24S (Flexible Drive Unit). All the IS machine's synchronized servo drive axes plus any group of servo mechanisms for moulding containers are now combined under a single operator interface. The servo feeder, servo shear, servo gob distributor, machine conveyor belt, belt height adjuster, ware transfer, cross conveyor and servo stacker as well as the servo pusher, servo takeout and servo invert - to name but a few - are parameterised, monitored and optimised with just one control. The FDU24S can work as a standalone system, or it can interact with the futronic IS machine control family or with equipment from third-party suppliers.

### Meaningful integration helps simplify production

The best results are achieved when the FDU24S teams up with the FMT24S. The drive and the IS machine control - the hardware and the software - are so closely inter-

woven that the operator perceives the machine as a closed system. All data is consolidated, managed and visualized on the control desk. Binary, analogue and servo valves can be freely combined and represented in standardised bar charts. Several new features that were previously no more than a vision have now become a reality. If a container moulding event is assigned to a servo mechanism, not only the theoretical switch points are displayed but also the actual behaviour of the mechanism in real time. For example, the mechanism can thus be correlated exactly with

optimized start and stop points during the production process without ever leaving the workplace. Ramp offset, acceleration, deceleration and jerk limitation are further parameters that can be modified directly in the bar chart. Gob-moulding drive axes that require the close attention of the user (e.g. the servo plunger and the servo shear).



not due for completion until 2011 or 2012.

"We're very pleased with the way the fair went this year," Preuß concludes, mentioning the numerous interesting conversations and robust visitor numbers.

The fact that the exhibition was slimmed down to four days also had a positive effect. "It was a good idea to do away with the Saturday. The new concept was definitely a success," Preuß claims, hoping this change will turn out to be a permanent one.

### PRODUCTS ON SHOW

Once again, futronic presented its innovative technology at a joint stand in Hall 13, where the Tettnang control system specialist proudly demonstrated its flagship product - the FMT24S - a distributed control system for

IS machines with up to 24 sections.

The FDU24S, a new servo drive system that is set to make a big mark owing to its maximum precision when it comes to synchronizing individual movement sequences in gob generation and material handling processes in container glass machines, made its debut before a trade audience. Using a servo takeout mechanism, futronic showed how the drive works in combination with an FMT24S control system.

The exhibits at the futronic stand also included the ASDR2, a reject system in a standalone version, the SPV24S, a standalone control system for servo proportional valves that is also suitable for retrofitting to older futronic controls or to third-party products, and the new opanski 2002 separator manager, a warning system for light liquid separators.

### "FUTRONIC - AUTOMATION IS OUR LIFE"

Concluding the interview, Michael Preuss told us that: "We have been developing and manufacturing electronic control systems for more than three decades. Based on our experience in a variety of industries, we are in a position to offer a broad spectrum of proven solutions. As an ISO 9001-2000 certified company and technology partner for many key sectors of the economy, we enjoy a reputation among our international clients for quality, competence and dependability." ■



**futronic**

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# S.I.G.MA.: REGENERATOR CHAMBER REFRACTORIES

**Ettore Mineo**  
Technical Consultant  
S.I.G.MA. SRL

The choice of material for furnaces is a fundamental aspect of glass melting and must take into consideration a series of functions and the same furnace environment. In this article, S.I.G.MA. leads us through the different zones of regenerator chambers, taking into consideration the main operative factors, providing the suitable material to be used at each and every stage.



## INTRODUCTION

Refractory selection for glass furnace regenerator chambers must recognize both the functions of the refractories and the operating environment within the chambers.

In particular, checkers and internal separation walls function as heat exchangers, while crowns and external walls limit thermal losses.

The main operating factors to be considered are temperature, repeated temperature cycling, airborne particulates, volatiles and load.

Fuel and glass composition must also be considered when deriving the refractory specifications.

We will analyze regenerator chambers in a soda-lime glass furnace natural gas fired in the following zones:

- Checkers;
- Rider arches;
- Crowns;
- External walls;
- Target walls;
- Chamber separation walls.

## CHECKERS

As heat exchangers, checkers must have high thermal capacity and conductivity and from this point of view basic materials and fused cast refractories are the best solution.



However, refractory selection also depends on the operating conditions, which will be markedly different at the checker top when compared to the bearer arch level.

Average temperature, particulate build up and condensation of volatiles will all be dependent on position within the chamber.

Let us consider in detail checker behaviour in four zones:

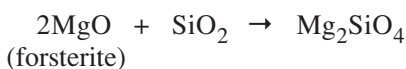
- Top zone: from the first row to 1,350°C;
- Mid zone: from 1,350°C to 1,000°C;
- Condensation zone: from 1,000°C to 700°C;
- Lower zone: from 700°C to rider arches.

## TOP ZONE

### Basic refractories

High temperature combined with batch carry over results in chemical attack and gradual degradation of the basic checkers.

If refractories are MgO based, the chemical attack is governed by the CaO/SiO<sub>2</sub> ratio in the waste gases; if it is low (high silica) the following chemical reaction occurs:



and the formation of forsterite, which has a higher volume compared to MgO, results in fissures opening within the bricks.

Subsequently, silica penetrates these fissures resulting in the familiar cubic breakdown of the upper checkers as illustrated above.

If the CaO/SiO<sub>2</sub> ratio in the waste gases is  $\geq 1$ , a liquid phase enters into the refractory causing deformation as you can see in the picture above.

The best technical solution is high magnesia content refractories, with well developed periclase (MgO) crystals and, importantly, a “direct bonded” structure: this means refractories fired at very high temperature, thus obtaining a high percentage of periclase-periclase bonding and a reduced silicate phase.

Additionally, the refractories in this area, in which redox variation occurs, must have “low iron” to avoid FeO oxidation to Fe<sub>2</sub>O<sub>3</sub> and vice versa (Fe<sub>2</sub>O<sub>3</sub> reduction to FeO) with volume variations and resultant brick failure.

With a view to maintaining optimum conditions within the regenerator top, an oxidized furnace atmosphere should be maintained. A reduced atmosphere will result in late combustion within the regenerator top and will adversely affect the checker performance.

### Fused cast refractories

Fused cast refractories have no surface porosity thus they are resistant to the corrosive effects of waste

gases and carryover and can be used in all the checker zones.

Compared to sintered refractories they are more resistant to abrasion due to their dense and homogeneous structure thus they are suitable for the top zone where there is a strong carry-over.

The recommended quality is high alumina for its very limited glassy phase.

No glassy phase means no exudation therefore no excessive bonding with carry-over thus minimizing the risk of blockages.

## MID ZONE

This zone is protected by the top checker area and temperature level is lower, thus 96 per cent MgO low iron is the recommended quality.

In the case of a fused cast installation, the recommended quality is 32 per cent ZrO<sub>2</sub> AZS (Alumina-Zirconia-Silica).

## CONDENSATION ZONE

As with the top zone, this is another critical area but for different reasons.

The waste gases contain alkaline sulphate and SO<sub>3</sub> which will condense out in the 1,000-700°C range



(higher quantity of sulphuric anhydride when using oil as a fuel).

In presence of sodium sulphate, the predominance of  $\text{Na}_2\text{O}$  or  $\text{SO}_3$  in the waste gases causes the type of chemical attack.

Table 1 illustrates the different chemical reactions with periclase ( $\text{MgO}$ ), dicalcium silicate ( $2\text{CaO}\cdot\text{SiO}_2$ ) (a silicate phase of basic refractories), forsterite ( $2\text{MgO}\cdot\text{SiO}_2$ ) and fireclays.

Periclase base refractories are not chemically attacked by sodium sulphate or sodium oxide but they strongly react with  $\text{SO}_3$  forming  $\text{MgSO}_4$  causing densification of the structure.

The chemical attack, enhanced by the presence of vanadium pentoxide when using fuel oil, breaks up the refractory and the structure densification lowers thermal shock resistance.

Viable substitutes for chrome bearing refractories, which have a high resistance to condensates but cannot be used for environmental reasons, are both the spinel ( $\text{MgO}\cdot\text{Al}_2\text{O}_3$ ) and refrac-

tories made by periclase ( $\text{MgO}$ ) and zirconia ( $\text{ZrO}_2$ ) having good resistance against  $\text{Na}_2\text{O}$  and  $\text{SO}_3$ .

When firing with natural gas, the  $\text{SO}_3$  quantity is low and basic refractories can be used.

When fused cast material is used, the recommended quality is AZS refractory.

### LOW ZONE

Extending from the end of the condensation zone to the rider arches.

Super duty fireclay can be used in non severe working conditions, otherwise, 90-92 per cent  $\text{MgO}$  is recommended when firing by natural gas.

Thirty-two per cent  $\text{ZrO}_2$  AZS fused cast refractories are also used in this zone.

### Rider arches

Rider arches must withstand strong thermal shock due to reversals and severe load but at low temperature ( $600\text{-}700^\circ\text{C}$ ).

Fused cast and basic refractories cannot be installed due to very low thermal shock resistance, while sillimanite and mullite are the recommended qualities.

## CROWNS AND WALLS

### Introduction

From a cost effectiveness stand point, we will consider sintered products as opposed to fused cast, although it is accepted that fused cast materials are sometimes used in the "target area". This will be discussed later.

### Crowns

In making the choice between Basic, Silica and Alumino Silicates, including Mullite, we have to consider their respective resistance to creep and chemical attack.

### Creep

The temperature level is very important for the refractory choice.

Basic refractories, due to their cubic lattice, have limits in creep even if they do not have a glassy phase but a high melted silicate phase. If the temperature is close to  $1,500^\circ\text{C}$  and the material is under a strong compression, life limiting creep will ensue.

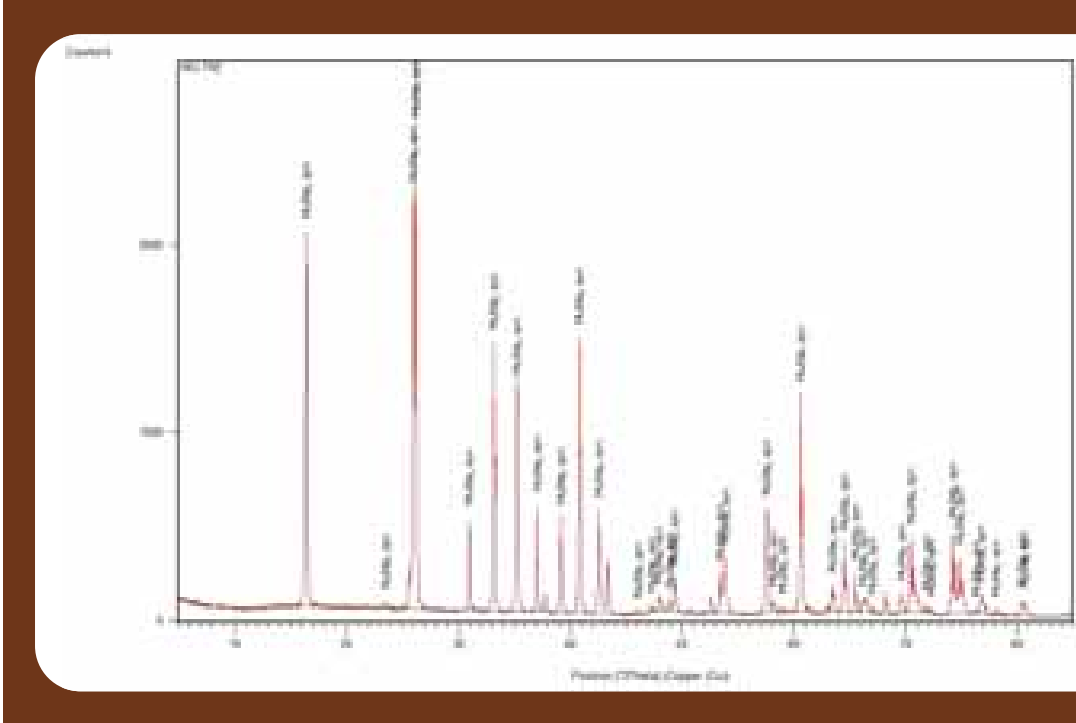
As a consequence, basic refractories can be used only if the operating temperature is lower than  $1,500^\circ\text{C}$  ( $1,460\text{-}1,480^\circ\text{C}$ ).

TABLE 1

### CONDENSATION ZONE - DIFFERENT CHEMICAL REACTIONS

	$\text{Na}_2\text{O}/\text{SO}_3 < 1$	$\text{Na}_2\text{O}/\text{SO}_3 = 1$	$\text{Na}_2\text{O}/\text{SO}_3 > 1$
	$\text{Na}_2\text{SO}_4 + \text{SO}_3$	$\text{Na}_2\text{SO}_4$	$\text{Na}_2\text{SO}_4 + \text{Na}_2\text{O}$
	$\text{SO}_3$ if $T \leq 760^\circ\text{C}$	$\text{Na}_2\text{SO}_4$ dissociates	$\text{Na}_2\text{O}$
	$\text{SO}_2 + \frac{1}{2} \text{O}_2 \rightarrow \text{SO}_3$ if $T \geq 760^\circ\text{C}$	$\text{Na}_2\text{O} + \text{SO}_2 + \frac{1}{2} \text{O}_2$	
	$\text{SO}_3 \rightarrow \text{SO}_2 + \frac{1}{2} \text{O}_2$		
MgO	$\text{MgSO}_4$ if $T < 1050^\circ\text{C}$	$\text{Na}_6\text{Mg}(\text{SO}_4)_4$	no reaction
$\text{C}_2\text{S}$	$\text{CaSO}_4$ if $T < 1400^\circ\text{C}$ medium reaction	$\text{CaSO}_4$ if $T < 1400^\circ\text{C}$ weak reaction	
$\text{M}_2\text{S}$	no reaction	a $T > 1000^\circ\text{C}$ weak reaction	$\text{Na}_x\text{Mg}_y(\text{SiO}_7)_z$ strong reaction
Fireclays	no reaction	a $T > 800^\circ\text{C}$ strong reaction	$\text{NaAl}(\text{SiO}_4)_2$ nepheline the strongest reaction

Note: C =  $\text{CaO}/\text{M} = \text{MgO}/\text{S} = \text{SiO}_2$



Considering only creep resistance, silica is the best refractory because of its lack of glassy phase and its different crystalline lattice, which avoids plane slipping. Furthermore, creep starts only at temperatures close to 1700°C.

Mullite is another quality suitable for the crowns for its excellent creep resistance.

### Chemical reactions

Basic refractories have a very good chemical resistance against the alkaline waste gases coming from the glass furnace, but they are susceptible, but not limiting, to carry-over enriched with silica and subsequent forsterite formation at the hot face.

This chemical reaction increases volume and leads structure to a collapse.

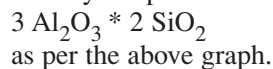
Basic refractories can be used in the crowns temperatures lower than 1,500°C (1,460-1,480°C).

Silica is not suggested for crowns because condensation of alkali in the colder zones of the masonry would lead to corrosion, loss of mass and also holes.

Mullite refractories react with alkali and carryover to form a series

of layers which prevent alkali penetrating into the bulk of the refractory and wear proceeds at a minimal rate (millimetres per year) while the thermo-mechanical properties are preserved.

Mullite is a good solution for crowns but bricks must have a high mullite content (95-97 per cent); the crystallographic analysis must show only the phase:



### External walls

Let us consider the walls in four zones as with checkers:

Top zone: from the crown skew-backs to one meter under first row of checkers;

- Mid zone: from the end of the top zone to 1,000°C;
- Condensation zone: from 1,000°C to 700°C;
- Lower zone: from 700°C to the bottom.

### TOP ZONE

The operating conditions are the same as for the crown but with minor load.

Low iron basic refractories with a high periclase content and high-

grade mullite (95-97 per cent mullite) are suitable for this area.

As far as basic refractories are concerned the operating temperature must be under 1,500°C (1,460-1,480°C) to avoid creep.

### Target wall

Provided the target wall is exposed to the same conditions as the other top zone walls, then the refractory material will be as for the rest of the top zone.

However, in the event the target wall is subject to excessive waste gas impingement then AZS fused cast material is recommended.

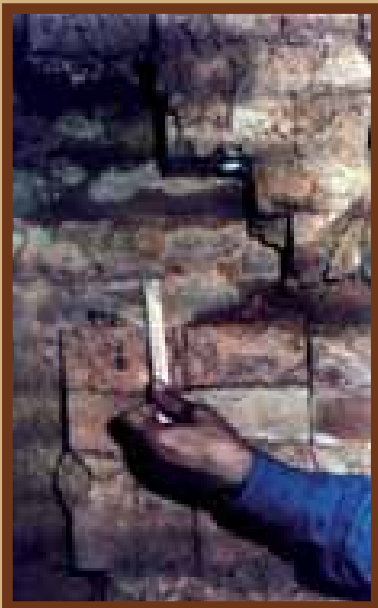
### MID ZONE

Checkers protect the mid zone wall. Temperature and load are lower compared to the top area, thus basic refractories with 95 per cent MgO or a good mullite are suitable for this area.

### CONDENSATION ZONE

Chemical corrosion is not so strong as in the checkers because bricks are protected by the masonry and only one side is exposed to the chemical attack.

Load is higher than on the



overhung zones, but temperature is lower.

Periclase based refractories, mullite and sillimanite are suitable for this application.

#### LOW ZONE

Characteristics of this area are: high load, low temperature and a reduced chemical attack.

Basic materials with 90-92 per cent MgO, mullite, sillimanite and 44 per cent  $Al_2O_3$

“superduty” are suitable for this application.

#### Internal separation walls

The dividing walls are fully immersed in the high temperature environment and therefore the operating conditions are severe.

They must resist loading at high temperature, and thus they must have high values of refractoriness under load and therefore high creep resistance.

Basic materials are suitable within the temperature limits indicated in the top zone (1,460-1,480°C), while different grades of mullite according to the different zones of the separation wall can be used.

In these figures, we show a case of a deformation and consequent collapse of the internal separation wall of an end-port furnace due to operation temperature higher than 1,500°C.

#### CONCLUSIONS

This article seeks to provide guidance on the choice of refracto-

ries for regenerator chambers serving natural gas fired furnaces producing soda lime glass.

Our recommendations recognize the various functions required of the materials and the operating environment in the regenerator zones.

In particular we can cite fused cast, direct bonded basic materials, alumina-periclase spinel, periclase-zirconia refractories and high grade of mullite (95-97 per cent of pure mullite).

The table here below presents the trademarks of the products S.I.G.M.A. can supply. ■



**SIGMA SRL**

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Fax: +39 - 0331 - 823198  
E-mail: [sigmaref@tin.it](mailto:sigmaref@tin.it)  
[www.sigmaref.it](http://www.sigmaref.it)

TABLE 2

#### SIGMA REFRACTORIES FOR REGENERATOR CHAMBERS

Trademark	Qualità	Main oxide	Applications
MU 75 E	Mullite	76-78 $Al_2O_3$	Crown, top area of external and separation walls, rider arches.
MU 72 S	Mullite	72-73 $Al_2O_3$	External and separation walls in the mid and condensation area.
MUL 70 M	Mullite	72-74 $Al_2O_3$	External and separation walls in the low area.
SL 60/63-A	Sillimanite	60-62 $Al_2O_3$	External and separation walls in the low area, rider arches.
SG 44	Fireclay	45-47 $Al_2O_3$	Low area walls.
MAG S 90	Basic	90-91 MgO	Checkers and walls in the low area.
MAG S 96	Basic	96-97 MgO	Checkers and walls in the mid and condensation area.
MAG S 98	Basic	97-99 MgO	Crown and top area of checkers, external and separation walls.
MG ZR 13	Magnesia-zirconia	74-76 MgO 11-13 $ZrO_2$	Checkers and walls in the condensation area.
AZS 33	AZS Fused cast	33-34 $ZrO_2$	Checkers and walls in the mid-, condensation- and low area, target walls.

# Heye International: FROM THE GLASSMAKERS' POINT OF VIEW

## INTRODUCTION

With three “highs” in mind: HiTRUST, HiPERFORM and HiSHIELD, Heye International aims at covering the full range of possibilities and aspects of the glass-making process. HiTRUST for expertise in projects, HiPERFORM for Hot End Forming products, and HiSHIELD being the company’s Inspection portfolio.

And speaking to two of Heye International’s team present at *Glasstec* – Dirk Pörtner, Managing

Director and CEO, and Mark Ziegler, Marketing Manager – gave *Glass Machinery Plants & Accessories* an idea of just how the company is focussing strongly on higher performance.


## SPEAKING TO HEYE AT GLASSTEC

### Dirk Pörtner

Heye International has a long heritage and history and has certainly made some important changes and developments over the

years. And history always has two different sides to it, as we all know. History could be explained as long experience or as great experience and expertise, which we definitively have here at Heye International. But, in turn, it could also be something conservative conservative, and this is something we try to avoid. The world is moving forward, technologies, skills of people, management procedures are developing fast. We want to be always

Dual Motor  
Shears



The importance of having a long history and experience also involves developing expertise and learning from this history. During Glasstec, we spoke to Heye International to find out how this company deals with the everyday situation and – of course – problems that glassmakers may have – and how it solves them thanks to its abilities. Three new product ranges are now available, giving the company's clients – glassmakers – the best on offer in terms of reliability, performance and inspection.

**INTERVIEW**

ahead and we have to challenge ourselves day by day to make it happen. Holding outdated or antiquated positions would be exactly the wrong move.

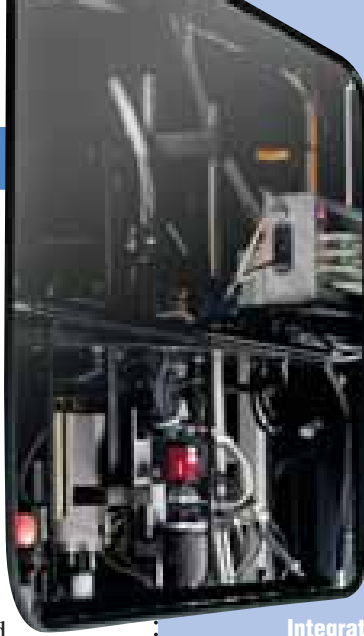
What we at Heye International are quite proud of and what is important for us is that we have learned from our history and we have used our considerable in-depth knowledge of glassmaking in developing and expanding our product range. Many of our competitors consider their work only from the point of view of machinery. We, on the other hand, work exclusively as glassmakers with glassmakers and with their work in mind. So this is made possible thanks to our history and it is something we want to maintain.

Heye International is well-known and respected in the glass-making world for its High Performance Equipment and to the mechanical strength and the long working life of its machinery, even in the very hostile environment of container glass making.

*What is Heye International doing to improve and facilitate the glassmaker's job?*

**Mark Ziegler**

Our company invests considerably in Research and Development. This means that we are working hard on product development and



**HiSHIELD  
SMARTLINE**

**Expertise in Quality Control**

Quality continues to become more and more important. Producers of consumer goods care about the quality and consistency of their brand on a global level. Product safety and purity are major issues. The HiSHIELD SmartLine has been developed as an inspection and sorting machine for the hollow glass production industry. The ongoing integration of the latest technology combined with robust electrics and an electronic control system are characteristic of the SmartLine. Additional features include a graphic interface with touchscreen, servo drive technology and machine speed of up to 400 items per minute.

**Integration into the Heye International Information System**

The SmartLine can be integrated into the HIS, which gives the user real-time data about the production process. Article defects can be attributed to mould numbers or IS-section numbers, giving the user detailed information on weak points and potential improvements. Of course, the HIS offers the option of remote maintenance.

Additionally, it is possible to integrate control systems from other manufacturers. There is also the option to connect line information systems, jam sensors and additional outfeeds.

**Flexible inspection options**

The cold-end inspection line can be configured in different ways. Depending on the customers requirements, various qualities of the product can be controlled:

- Planarity (flatness) and tightness
- Height / inside and outside gauging
- Checks of the finish
- Checks of the bottom
- Checks in the body (with LED white light or laser)
- Wall thickness inspection (with contact and optical-non contact)
- External wall thickness inspection (optical-non contact)
- Defects of the finish (LOF - line over finish)
- Ovality in the body (with contact and optical-non contact)
- Mould number reading (dot code)
- Mould number reading (digital code)
- External mould number reading (dot code)

**Speed and Flexibility**

The application of servo technology results in a high degree of flexibility. Fast and easy changes of the item number and optimal use of the servo torsional moment for up to four rotation stations are possible. Optimized motion sequences allow faster reactions to changing process parameters.

**Fast article change**

The infeed screw parameters are saved in a master data file and are therefore always reproducible. The changeover time is shortened as the calibrations are carried out by the software; very few additional mechanical adjustments are necessary.

The maximum article height is 400 mm; angular, oval and round containers can be processed. The relationship between machine speed (up to 400 bottles per minute) and article diameter is shown in the following table:

- Innovations have to stand the test of time. This is achieved by use of robust industrial electronics and a climate-controlled electrics and electronics compartment, together with high quality components. Operational usability is enhanced by a 17" touchscreen monitor, easy access to all electronic components and an extricable mounting plate for frequency inverters and servo controllers. The operator is protected by a micro-processor-controlled safety module.

Pockets in starwheel (item number)	Article diameter (mm)	Machine speed (bottles per minute)
06*	202	max. 170
12	121	max. 250
18*	84	max. 300
24	62	max. 315
30*	49	max. 325
36	41	max. 350
42*	35	max. 375
48	30	max. 400

\*on request  
In offering these numerous combinations SmartLine is setting the market standard.





IS machine with servo modules



HiSHIELD  
SmartLine Servo

on obtaining good results that we can provide to our clients.

A special part of our investments is dedicated to our new brand strategy and its three different sub-brands.

This is the Hi brand: HiTRUST, HiPERFORM and HiSHIELD.

HiTRUST regards the "Soft" items in our product portfolio: The ability to design, combine, to engineer, install, to start up and hand over a complete plant built and designed to latest standards, managed by a professional project management team. The ability to provide ongoing management, production or operational assistance to those who started up a new plant or a new process and also to those who want to develop their companies to most modern international standards. Operational assistance, training and impartial consultancy in all

different sectors of the manufacturing process are the main columns of Technical Assistance.

With regards to inspection systems, we have HiSHIELD, which "protects" glassmakers from the problems that could arise making the glass items – with quality control, speed and flexibility. This is particularly important as glass is mostly used as packaging material for highly sensitive food products and those products need highest protection through bottles or jars manufactured and inspected with highest care.

The third Hi brand is HiPERFORM, applied to IS machines and corresponding equipment, ensuring higher speed in forming repeatability, as well as higher productivity figures too.

And, of course, we must not forget about new strategy and new market approach – other important aspects of development that are ongoing at Heye International.

## INTERVIEW

*And how is Heye International doing this?*

**Dirk Pörtner**

We are focussing on high-performing machinery, we are focussing on clients, who are producing with this high performance and high technological level, and we are also focussing on clients who are moving towards reaching that stage. And so we are not just dedicated to those who are already using this type of technology, but we are also working with those who want to reach these high levels.

We are seeing more and more clients in so-called "emerging countries" who are challenging themselves to reach the highest level of productivity and quality requested from the worldwide market right now. In fact, these countries are requested higher and higher levels of quality and productivity of course, and companies there are working very hard to be able to satisfy these requests.

Brazil for example has already reached the international level, India is moving, is moving very fast to reach the international levels as far as quality is concerned.

China, for example, is the largest producer of beer in the world! And so it is a must for the glassmaking sector to have the standards required internationally also with regards to glass consumption per person.

Another positive aspect for the glass sector at the moment is the important interest of the general public in health and in the environment, which is also bringing positive results as far as the use of glass is concerned. Glass is playing an important role in the general public's view of what is healthy and what is natural.

We carried out a customer survey and the results were that quality is the top priority for almost everyone.

*So where do your machines fit in with their energy consumption?*

Energy consumption, pollution and a clean environment are being

## Flexible Assortment Production HiPERFORM

### Flexibility in Production

In the past, if glassmakers needed to produce smaller quantities of a different article, the entire IS Machine had to be stopped and switched to other articles. The downtime was very costly with negative effects on the production efficiency. Also more moulds than really necessary had to be procured per article. Heye International now provides the solution: together with the Heye International Servo Drive Control Unit, the servo plunger and dual motor shear, gobbs of different weights can be produced on the same IS Machine - all at the same time.

### Unique Advantages

What differentiates the Heye International solution from others is that plunger and shear are "working together". Every gob is used, no energy is wasted. The handling and operation are very simple, clear and need little time to achieve the desired result.

Like this, the normal "main" part of the production is not affected.

### Benefits:

With the Heye International Servo Drive Control Unit you can benefit in many ways:

- Save time and money on main production
- Less downtime
- Several different articles per machine
- Fewer job changes for the complete IS-Machine
- Fewer moulds for each article required
- Production speed of up to 250 cuts per minute
- Easy operation and maintenance
- Reproducible motions
- Parameter settings via dialogue
- Nearly maintenance-free operation
- Advantages of the dual motor shears

### A Winning Team

Advantages of the Heye International Servo Drive Control are, for example, reproducible motion profiles and an easy integration of additional servo axes.

### Advantages of the servo plunger

- Usable on all feeder sizes and types
- Production speed of up to 250 cuts per minute
- Easy operation and maintenance
- Reproducible motions
- Parameter settings via dialogue
- Nearly maintenance-free operation

### Advantages of the dual motor shears

Blade motion at right angles to the centre line at the time of the cut. Constant gob weight through reproducible, preselectable motion profiles. Production speed of up to 250 cuts per minute. Long lifetime of shear blades and shear mechanism. Virtually maintenance-free operation.

studied and worked on continuously by Heye International. Aspects such as oil spillage and consumption are dealt with by means of a new device that we are presenting right here at Glasstec – which reduces the oil consumption of a machine by about 80 per cent – our Intelligent Central Lubrication, as well as Modular Valve Blocks which, thanks to their sophisticated fluid mechanics, need less pressure – and so less energy.

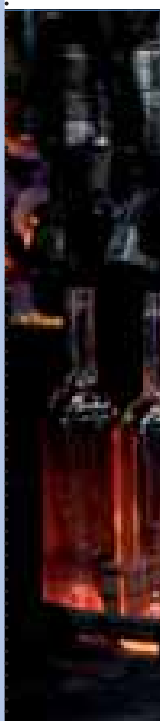
*Quality, reliability, trust, protection and the environment – quite a lot of important aspects!*

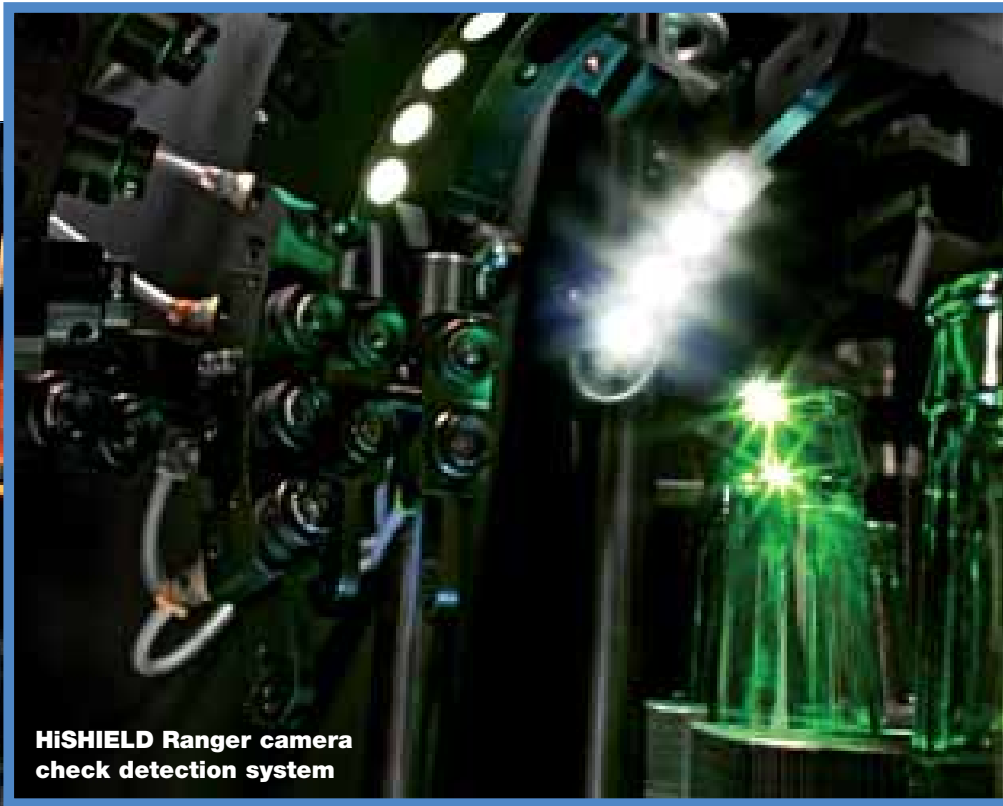
And there are many more aspects to work on and study – all grouped together under customer orientation.

### Energy savings

#### Mark Ziegler

And what also came from a recent customer service survey is that energy is a big issue for most people. In any case, Heye





**HiSHIELD Ranger camera check detection system**



**Assortment production**

International has already been working on some of these situations for a couple of years – starting with lubrication, for example.

This can also take place with servo technology that moves away from the use of compressed air to electrical movement of the devices. But we are not only speaking about the energy to run the machines, but also that to melt the glass as well as to cool it. This gives an indication of how important energy is in this industry.

Another way of saving energy is that of not wasting glass and optimized productivities are for sure giving the highest value back through energy saving.

#### Vision systems

*What about new products? What do you have on show here at the fair?*

The new products that we have on show here regard the lubrication systems, valve blocks, and inspection features – which is the highlight of Heye International's show – and the *Ranger* – which, as its name says, covers a wide range of diversified production and is a breakthrough in the industry with regards to inspection of bottles for example. The *Ranger* facilitates greatly the

work of those who pre-viously had to continuously change and readjust the check parameters for each different type and size of bottle. In fact, *Ranger* makes about 2,100 photographic images using just one camera during a single rotation of the bottle, which is quite a move from the previous check detection systems, with about 15 sensors and lights that needed to be continuously changed and modified as per the size and shape of the item to be manufactured.

#### Flexibility in production

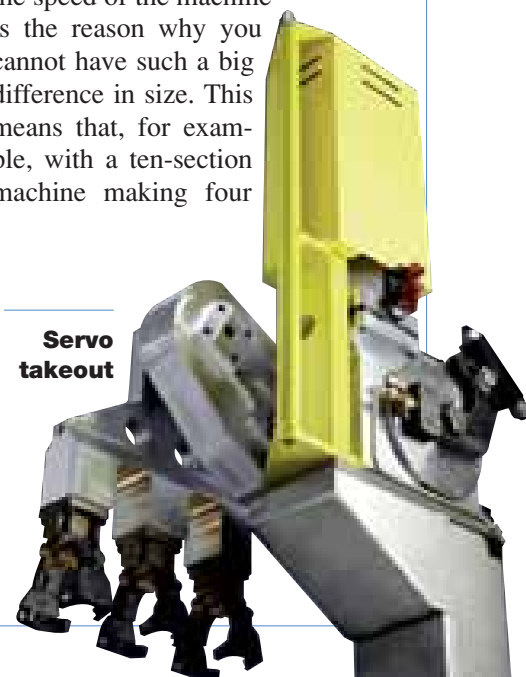
Other solutions also include our assortment production which enables a machine to produce different types of containers on the same machine by means of different weight using mechanical and electronic solutions in range that goes from 380 grams for example, up to 425 grams and more. This means that according to the information it receives from the control unit, it can calculate how much glass it has to cut and therefore create a larger or smaller container as required – at the same time as the forming of other types and sizes of containers – extremely important for speciality products and test runs, but also for

manufacturers who do not want to invest in too many moulds and have short job runs.

This means that thanks to this Servo Drive Control Unit, the IS machine can produce different items at the same time without any downtimes requested.

*What about the speed of the machine? Does this diversification have any effect of how fast the bottles are produced?*

Of course, you must optimize the speed of the machine adapting it to the range of bottle sizes. In fact, the speed of the machine is the reason why you cannot have such a big difference in size. This means that, for example, with a ten-section machine making four



**Servo takeout**

## INTERVIEW

different bottle sizes, you adjust the machine speed to be able to produce them.

*What about future developments? What will Heye International be working on after Glasstec?*

Thanks to our long-term development programme, we already have quite a good idea of what we want to have ready for the next shows and we know exactly where we want to go! This is the same for all those working in the industry.

Of course a product can only be put on show when it has been thoroughly tried and tested under 'hot' working conditions. Live testing is therefore carried out at one of the plants part of our large Ardagh Glass Group.

At the same time, this company actually provides us with feedback with regards to developments and improvements that can be requested by glassmakers.

All this takes about two or three years at least before we can present the product to the public.

And now, coming out of the crisis period, which Heye International went through quite well, the company is starting to look for new people to grow even more and expand its activities! ■



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# Consultancy, Project Management and Service in Container Glass Production FOR GLASS PEOPLE

Heye International has experience of many and varied projects of every type all over the world. This knowledge is gathered together in HiTRUST, a complete solution for the container glass industry managing every aspect of turnkey or semi-turnkey projects.

There are almost unlimited possibilities for the scope and definition of projects. We recognize that the demands and needs of every customer are different and individual. With HiTRUST, Heye International can be a partner for any kind of successful project.

- Turnkey greenfield projects
- Modernization of existing production lines
- High performance equipment

### Our resources for your success

Heye International is synonymous with global in-house competence and long-standing know-how covering all project stages and possesses a large pool of experts in each field of knowledge.

This is brought together in the HiTRUST process chain as seen below. The basis of every action is the customer's specific requirements. The different project stages are backed up by the individual competencies of our experts, resulting in successful attainment of our customers' goals.

Heye International has experts specializing in every area of a container glass plant who are involved from the very first initial project definition, through the plant concept, right up to successful production from the plant.

### Project management

Each project has its own professional, highly experienced project manager, who partners the customer and leads the project through every step from plant concept to performance test. He gives continuous progress reports and is responsible for making sure the project is finalized up to quality standards, on budget and on time. He is also able to support the customer's project team with:

- Energy concept
- Discussions with local suppliers
- HR concept
- Service team
- Civil work and buildings
- Environmental aspects

Throughout the entire process, the project manager is supported by our large team of glass specialists. The Heye International service team will support the project team in areas such as:

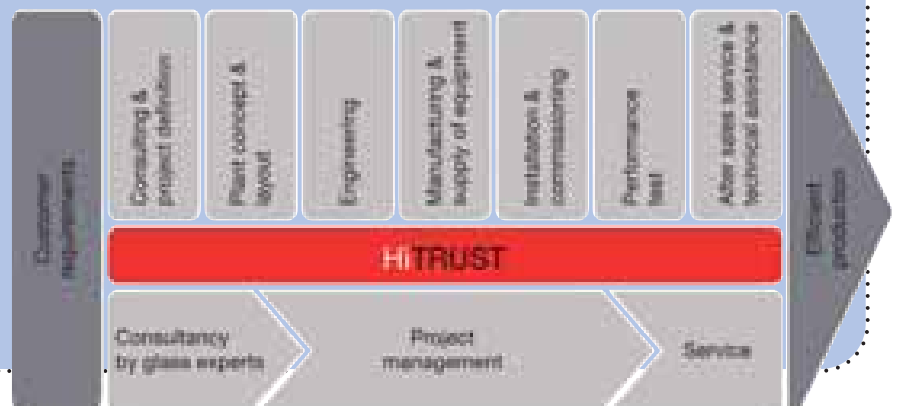
- Plant audits
- Installation & commissioning
- Performance testing
- Production follow-up support
- Training

Heye International has unique advantages as project partner:

- Large team of senior experts with production and management experience
- Access to production facilities for test runs
- HR concept adaptable to local situation
- Training facilities for nearly all production stages
- Ability to arrange on-the-job training in glass plants

Structured plant model with best-practice solutions for every process step

These days, adapting engineering concepts in a flexible way to fit skill profiles and local needs is standard for a true global player. Where Heye International makes the difference in the container glass industry is with more than 200 years of expertise in production combined with the latest technologies and methods.



TecnoIMI:

# REVAMPING AUTOMATED LINES IN THE GLASS INDUSTRY

company presentation

With 40 years of activity, TecnoIMI uses the experience and technical abilities it has gained in diverse industrial sectors to provide its clients with products that not only cover basic electronic systems, but also include complete service – from pre- to post-sales. In this article, the company presents itself and its competences in the glass industry to our readers.

## INTRODUCTION

TecnoIMI Spa was set up thanks to the acquisition of the company Elettro IMI Spa, founded in 1973, maintaining its technical abilities and competences and production structure to realize electrical and thermo-mechanical plants for the industrial and tertiary sectors.

# COMPANY PRESENTATION

## EFFICIENCY, MODERNIZATION AND PRODUCTIVITY

The company presently has 80 employees, and is organized in three divisions to be able to provide service aimed at the specific needs of each client. There is, therefore, a Plant Division, an Electric Control Panel Division, and an Automation Division. Each division has its own skilled technicians for the design of projects, as well as for the testing of the same plants.

Having its own employees, TecnoIMI can guarantee fully the quality and reliability of its products as well as of plant installation. Further service from the company regards post-installation with scheduled maintenance and/or emergency service available 24/7.

In the past few years, the renewable energy sector has undergone considerable expansion, pushing the company to develop specific abilities with regards to both specific construction competence, as well as for the technical and administrative management needed to provide these services. This important capability has enabled the company to collaborate with important renewable energy plant manufacturers (mainly photovoltaics and biomass) as well as

## References gained in the sector IN 40 YEARS OF ACTIVITIES

- Plant for the backlog of pallets of glass bottles, for O-I, Aprilia
- New cold-end bottle production line for O-I, Corsico
- Automation of the transport, thermo-shrinking and backlog, Vetri Speciali
- Automation of transport, thermo-shrinking and backlog, Adige Vetro
- Automation of thermo-shrinking line, management of backlogs and warehouse transport, O-I, Bari
- Management of handling trucks, O-I, S.Polo
- Management of thermo-shrinking line, O-I plants at Naples, Bari, Treviso, Milan, Aprilia, Czech Republic
- Revamping Mezger tray packers, O-I, Aprilia
- Substitution of PLC from S5 to S7, O-I, Asti. Reconstruction of furnace panel of Fidenza and plant of Trezzano, Bormioli



with operators and investors of the sector.

## GLASS – A STRONG SECTOR FOR THE COMPANY

The activities carried out by TecnoIMI range from the reconstruction of electric systems to the introduction of new equipment to guarantee the safety of handling and transport equipment, right up to the complete substitution of the console, equipped with avant-garde

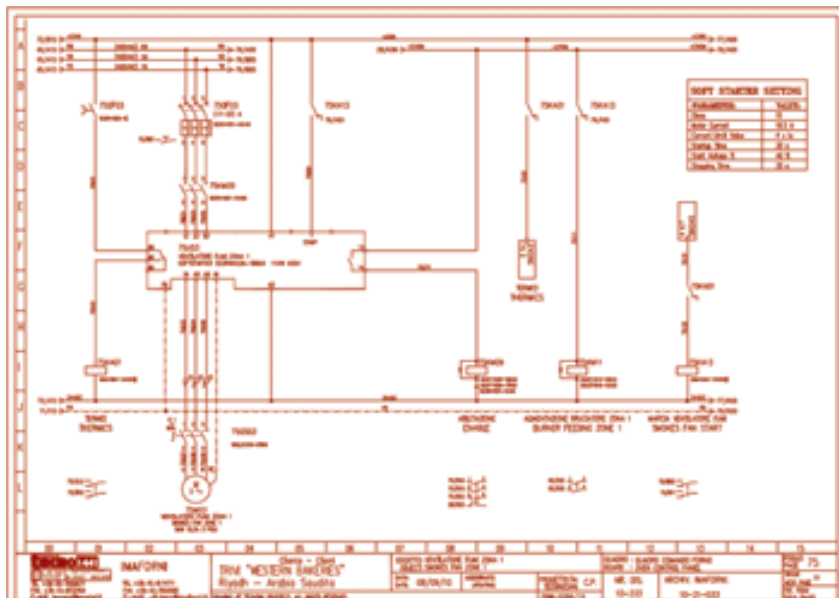
PLC controllers. Another strong point of the company is the in-house development of man-machine interface systems and supervision of plants to be connected to company networks.

With specific regards to the glass industry, TecnoIMI provides both mechanical and electrical reconstruction of tray packers and centrifuges.

The lines developed in-house by TecnoIMI pick up pallets from stackers by means of one or two shuttles, managed as per priority, and delivered using rollers to the hooders and to the thermo-shrinking furnaces. Further specifications include management of interfacing with other types and brands of machinery.

Information regarding the pallet, such as the height of the same and the optional processes it has to carry out, accompany the same material from the entry to the exit of the glasswork.

At the end of the packaging lines, the pallets reach the ware-





house, where they are automatically stored using special transporters.

#### Industrial automation

Applications of TecnoIMI's technology include:

- monitoring systems for technological plants, management of energy utilities, access control;
- plants for internal transport management: furnace loading and unloading, packing lines, palletizing and boxing lines, buffering and storage;
- control systems for industrial furnaces;
- integrated management of automatic warehouses with interfacing with plant management systems;
- weighing systems and those for automatic breaking;
- automatic liquid and powder dosing systems;
- production labelling and packing systems;
- control panels for special machines (stone, wood, sheet metal, food graphics, paper sectors).

#### OTHER ACTIVITIES

TecnoIMI also carries out the realization of technical specifications, metric calculations, measurements and readings of existing plants, test runs and sizing tests, design and adjustment of new plants, testing of ground-based systems grounding and atmospheric discharge; as well as feasibility and prototyping studies; and redevelopment plans and adjustment to the norms of existing plants.

With regards to maintenance, the company carried out the planning of regular preventive maintenance operations, as well as an emergency service for non-programmed

maintenance and the drafting of service manuals.

TecnoIMI's products can be used for the retrofit of last-generation components. Further highlights include the guarantee of respect to schedules and production programmes; technical assistance during retrofit programming; and complete compatibility of hardware and software with existing platforms. ■



**tecnoIMI**

**TECNOIMI**

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THE ONLY GUIDE TO AGENTS WORLDWIDE

# AGENTS

## GUIDE 2011

16<sup>th</sup> ANNUAL EDITION

**Find out who represents who  
in the world glass industry**

### ALPHABETICAL LIST

**COUNTRY  
BY COUNTRY**

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### COMPLETE PROFILES

- ADDRESS
- COMPANY OFFICERS
- ANNUAL TURNOVER
- TURNOVER FROM GLASS
- NUMBER OF EMPLOYEES
- NOMINAL CAPITAL
- COMPANY FOUNDED
- LOCAL OFFICES/BRANCHES
- PRODUCTS REPRESENTED
- COMPANIES REPRESENTED
- COUNTRIES

## Alphabetical list

- A. JACOVIDES TRADING LTD.
- AAR S.H. DE C. Y R. LANDLER
- A.F.C. PEREIRA - INOVAGLASS
- AGID - ASIA GLASS INDUSTRY DEVELOPMENT
- AIRVAC PRIVATE LIMITED
- ALBORZ DJAAM TECHNICAL CO. (EX SHAZFAM)
- ALTA-WELD INC. (ALTA FAR EAST WEEDING MATERIALS INC.)
- ARGENT ENTERPRISES, INC.
- ARIES SUMINISTROS S.L.
- ARYA TEC ENGINEERING & COMMERCE COMPANY
- ATHENS GLASS E. MARKOPOULOS & CO. E.E.
- A.T.M.I.
- BERNARDI
- BESANA LOVATI FRANCE SARL
- BESANA LOVATI USA
- BESANA LOVATI - WEST COAST
- BLANCK & PARTNERS
- BREMNER GLASS EQUIPMENT P/L
- CERACON ENGINEERS PVT. LTD.
- CERAM TRADE CO. LTD.
- CIAOYI GLASS C&T CO. LTD.
- CONTINENTAL TRADING COMPANY
- CORNEGA APS
- CORPOTRADE LTD.
- CORRENS CORPORATION
- CRA. GLASS
- CY HANK INDUSTRIAL CO. LTD.
- DAE JONG CORPORATION
- DAMGLASS SL
- DE GORTER INC.
- DECRISTAL S.A.
- DELTA MARKETING & INVESTMENT LTD.
- DEMAXO
- DENVER LTD.
- DIKEOS ELIAS
- EBCOTECH ENGINEERING
- ECTRAG EURO-CHINA TRADING CO., LTD.
- EFAGLAS CO. LTD. - GLASINDUSTRY TRADING
- ELEGANT I.G. SUPPLYLINE
- ERTEKA UAB
- E.S.W. - ENGINEERING FOR SPECIAL WORKS
- EUNOTECH HONG KONG LTD.
- EUROPEAN MACHINERY SALES LTD.
- EXA SRL
- FEBAC EUROPE BV PROCESSING TECHNOLOGY
- FEROX GLAS OY
- FIRST MULTITEC CO., LTD.
- FIVE STARS TRADING COMPANY
- FLAT GLASS INTERNATIONAL LTD.
- FÜLDNER MACHINES BV
- GECIT CONSULTANCY & REPRESENTACY LTD.
- GEOBELS TECHNOLOGIES INC.
- GIL BARBARA SRL
- GLASS EXPORT S.A.
- GLASS & FURNACES
- GLASS & GLAZING TECHNOLOGIES PVT. LTD.
- GLASS INDUSTRY SERVICES SA
- GLASS LINES LLC
- GLASS PLANET CO. LTD.
- GLASS PRO LLC
- GLASS SPECIFICS
- GLASSTOOLS TECHNOLOGY
- GLASTECH - PROJECTA GROUP
- GLASTECHNIK HOLGER KRAMP GMBH
- GLASTECHNIK S. THORBALL APS
- GRAHA REKA ADIYASA P.T.
- GUSMAO REPRESENTAÇÕES
- GUTAL TRADING EST. (UAE)
- HEINER REKER - EQUIPMENT FOR GLASS
- HERRAMAQ ARGENTINA SRL
- HOGLA BV
- IAIN GLASS
- IDRA D.O.O.
- IGE SOLUTIONS INC.
- INDUSTRIAL ENGINEERING & TRADING CO.
- ING.- BURO ECKHARD STOSCHEK
- INTERCHANGE EQUIPMENT INC.
- INTERNATIONAL TRADING CENTRE - ITC
- INTERPRODUCT PTY. LTD.
- ITALPOL
- JCM - SUMINISTROS INDUSTRIALES SL
- JOSEP SERRAL - MAQUINARIA VIDRIO
- JSC RITSTEKLO LTD.
- KHADJI GLASS MACHINERY - KGM
- KIRIAKIDIS VAS SA
- KRISTALLSPEGEL & GLAS AB
- KUTAS DIS TIC.PAZ. A.S.
- LANA INTERNATIONAL EST.
- LECHNER SRL
- LUSPOL RYSZARD KOWALCZYK
- MAB EXPORT D.O.O.
- MACHINES AND WHEELS, INC.
- MAQUINAS ARGENTINAS DEL VIDRIO S.A. "MAVSA"
- MARBOLZ VETROSTILE
- MARC PREVOST MACHINERY - MPM INC.
- MAVHISA S.A.DE C.V.
- MAZUR - FIRMA HANDLOWA
- MC DIAM SP.Z O.O.
- MECHANIK A.G.L. LTD. / GILRAPHAL LTD.
- MEDGENCO INTERNATIONAL TRADE CO. LTD.
- MERAN
- MESLIER MANUEL DE CASTRO LDA
- MIDDLE EAST FACTORIES' EQUIPMENT L.L.C. (ME EQUIP)
- MILLCHEM
- MINUSCO BENELUX B.V.
- MONTAJES INDUSTRIALES S.A.
- M.P.T MACHINERY CO. LTD.
- MULTI-TECH (THAILAND CO. LTD.)
- NINESUN CONSULTING CO. LTD.
- OTTO GLASTECHNIK GMBH
- OVERSEAS GLASS AGENCIES
- P.A.L. GLASS MACHINERY LTD.
- PAVLOS KOULOURIS
- PETER HAWKINS LTD.
- PETREA AGENTURA TEHNICA SRL
- PG GLASS - BIURO INZYNIERSKIE
- PGM-TECHNIC CO. LTD.
- PIETERMAN GLASTECHNIEK - BELGIUM
- PIETERMAN GLASTECHNIEK - THE NETHERLANDS
- PROFIL MACC SRL
- PROMAC GROUP - GLASS DIVISION
- PT IMACO PRATAMA MAJU
- R. MEYER S.L.
- RAW MATERIAL COM. REFRATARIOS LTDA.
- RECENT ADDITIONS
- REPLIK
- ROVER CO. LTD.
- SACAV SRL / T3 GLASS ENGINEERING
- SALEM DISTRIBUTING
- SALEPSI S.A.
- SC ABITARE CG SRL
- SDC FOREIGN & DOMESTIC TRADE CO. LTD.
- SELIM CORPORATION
- SHANGHAI BOYU GLASS TECHNOLOGY CO., LTD.
- SHINSUNG ENGINEERING CO. LTD. - SECO
- SIGMA TRADE CO.
- SIMCO INDUSTRIAL MACHINERY TRADING CO.
- SI.STE SRL
- STEKLO IMPEX
- STEKLOCENTR COMPANY
- SUVISUR SL
- TAIHEI BOEKI CO., LTD.
- TEC INDE LDA
- TECNOMAVI
- TECNOVATI SRL
- THERMO KEMI APS
- TOHMA GMS INC.
- TRADECOM CORPORATION
- TRIREX INTERNATIONAL CO., LTD.
- UAB "IDELIS"
- UCS CORPORATION
- UNIGIDA, UAB
- USE ELECTRONICS CO. LTD. (HEADQUARTERS)
- VITRAL LTD.
- VITRUM S.A.
- WITTSBURG ENTREPRISES LTD.
- ZENIRAYS COMPANY LTD.

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## Country-by-country

**Argentina**

- AAR S.H. DE C. Y R. LANDLER
- GIL BARBARA SRL
- GLASS EXPORT S.A.
- HERRAMAQ ARGENTINA SRL
- MAQUINAS ARGENTINAS DEL VIDRIO S.A. "MAVSA"
- MONTAJES INDUSTRIALES S.A.

**Australia**

- BREMNER GLASS EQUIPMENT P/L
- CRA. GLASS
- ELEGANT I.G. SUPPLYLINE
- INTERPRODUCT PTY. LTD.
- OVERSEAS GLASS AGENCIES

**Belgium**

- PIETERMAN GLASTECHNIEK

**Brazil**

- BLANCK & PARTNERS
- GUSMAO REPRESENTAÇÕES
- RAW MATERIAL COM. REFRATARIOS LTDA.

**Canada**

- MARC PREVOST MACHINERY - MPM INC.
- REPLIK

**Chile**

- DECRISTAL S.A.

**China**

- CIAOYI GLASS C&T CO. LTD.
- DELTA MARKETING & INVESTMENT LTD.
- ECTRAG EURO-CHINA TRAD. CO., LTD.
- NINESUN CONSULTING CO. LTD.
- SHANGHAI BOYU GLASS TECH. CO., LTD.

**Croatia**

- IDRA D.O.O.

**Cyprus**

- A. JACOVIDES TRADING LTD.

**Czech Republic**

- ROVER CO. LTD.

**Denmark**

- CORNEGA APS
- GLASTEKNIK S. THORBALL APS
- THERMO KEMI APS

**Ecuador**

- SALEPSI S.A.

**Egypt**

- E.S.W. - ENGINEERING FOR SPECIAL WORKS
- FIVE STARS TRADING COMPANY
- INDUSTRIAL ENGINEERING & TRADING CO.
- INTERNATIONAL TRADING CENTRE - ITC
- MEDGENCO INTERNATIONAL TRADE CO.

**Finland**

- BERNARDI
- FEROX GLAS OY
- GLASTECH - PROJECTA GROUP

**France**

- BESANA LOVATI FRANCE SARL

**Germany**

- GLASTECHNIK HOLGER KRAMP GMBH
- HEINER REKER - EQUIPMENT FOR GLASS
- ING.- BURO ECKHARD STOSCHEK
- OTTO GLASTECHNIK GMBH

**Greece**

- ATHENS GLASS E. MARKOPOULOS & CO. E.E.
- DIKEOS ELIAS
- KIRIAKIDIS VAS SA
- PAVLOS KOULOURIS

**Hong Kong - China**

- EUNOTECH HONG KONG LTD.
- WITTSBURG ENTREPRISES LTD.

**Hungary**

- EFAGLAS CO. LTD. - GLASINDUSTRY TRADING

**India**

- CERACON ENGINEERS PVT. LTD.
- GLASS & GLAZING TECH. PVT. LTD.

**Indonesia**

- GRAHA REKA ADIYASA P.T.
- PT IMACO PRATAMA MAJU

**Iran**

- AGID - ASIA GLASS INDUSTRY DEV.
- ALBORZ DJAAM TECHNICAL CO. (EX SHAZFAM)
- ARYA TEC ENGINEERING & COMMERCE COMPANY
- KHADJI GLASS MACHINERY - KGM
- SIGMA TRADE CO.

**Israel**

- MECHANIK A.G.L. LTD. / GILRAPHAL LTD.

**Italy**

- EXA SRL
- ITALPOL
- LECHNER SRL
- PROFIL MACC SRL
- SACAV SRL / T3 GLASS ENGINEERING
- SI.STE SRL
- TECNOVATI SRL

**Japan**

- CERAM TRADE CO. LTD.
- CORRENS CORPORATION
- TAIHEI BOEKI CO., LTD.
- TOHMA GMS INC.

**Jordan**

- LANA INTERNATIONAL EST.

**Lebanon**

- CORPOTRADE LTD.

**Lithuania**

- ERTEKA UAB
- UAB "IDELIS"
- UNIGIDA, UAB

**Malaysia**

- EBCOTECH ENGINEERING

**Mexico**

- GLASS & FURNACES
- MARBOLZ VETROSTILE
- MAVHISA S.A.DE C.V.

**Morocco**

- CONTINENTAL TRADING COMPANY

**Pakistan**

- TRADECOM CORPORATION

**Philippines**

- ALTA-WELD INC. (ALTA FAR EAST WEEDING MATERIALS INC.)
- GEOBELS TECHNOLOGIES INC.

**Poland**

- LUSPOL RYSZARD KOWALCZYK
- MAZUR - FIRMA HANDLOWA
- MC DIAM SP.Z O.O.
- PG GLASS - BIURO INZYNIERSKIE

**Portugal**

- A.F.C. PEREIRA - INOVAGLASS
- MESLIER MANUEL DE CASTRO LDA
- TEC INDE LDA

**Rep. of South Africa**

- GLASS SPECIFICS
- MILLCHEM

**Romania**

- PETREA AGENTURA TEHNICA SRL
- SC ABITARE CG SRL

**Russia**

- DEMAXO
- DENVER LTD.
- GLASS PRO LLC
- GLASSTOOLS TECHNOLOGY
- JSC RITSTEKLO LTD.
- MERAN

## Country-by-country

- STEKLO IMPEX
- STEKLOCENTR COMPANY

### Singapore

- AIRVAC PRIVATE LIMITED

### Slovenia

- MAB EXPORT D.O.O.

### South Korea

- DAE JONG CORPORATION
- SELIM CORPORATION
- SHINSUNG ENGINEERING CO. LTD. - SECO
- UCS CORPORATION

### Spain

- ARIES SUMINISTROS S.L.
- DAMGLASS SL
- JCM - SUMINISTROS INDUSTRIALES SL
- JOSEP SERRAL - MAQUINARIA VIDRIO
- R. MEYER S.L.
- SUVISUR SL
- TECNOMAVI
- VITRUM S.A.

### Sweden

- KRISTALLSPEGL & GLAS AB

### Switzerland

- GLASS INDUSTRY SERVICES SA

### Taiwan

- CY HANK INDUSTRIAL CO. LTD.
- USE ELECTRONICS CO. LTD. (HEADQUARTERS)
- ZENIRAYS COMPANY LTD.

### Thailand

- FIRST MULTITEC CO., LTD.
- GLASS PLANET CO. LTD.
- M.P.T MACHINERY CO. LTD.
- MULTI-TECH (THAILAND CO. LTD.)
- PGM-TECHNIC CO. LTD.
- TRIREX INTERNATIONAL CO., LTD.

### The Netherlands

- FEBAC EUROPE BV PROCESSING TECHNOLOGY
- FÜLDNER MACHINES BV
- HOGLA BV
- MINUSCO BENELUX B.V.
- PIETERMAN GLASTECHNIEK - THE NETHERLANDS

### Tunisia

- A.T.M.I.

### Turkey

- FLAT GLASS INTERNATIONAL LTD.
- GECIT CONSULTANCY & REPRESENTACY LTD.
- KUTAS DIS TIC.PAZ. A.S.
- SDC FOREIGN & DOMESTIC TRADE CO. LTD.

### UAE - United Arab Emirates

- GLASS LINES LLC
- GUTAL TRADING EST. (UAE)
- MIDDLE EAST FACTORIES' EQUIPMENT L.L.C. (ME EQUIP)
- SIMCO INDUSTRIAL MACHINERY TRADING CO.

### Ukraine

- VITRAL LTD.

### United Kingdom

- EUROPEAN MACHINERY SALES LTD.
- IAIN GLASS
- P.A.L. GLASS MACHINERY LTD.
- PETER HAWKINS LTD.
- PROMAC GROUP - GLASS DIVISION

### USA

- ARGENT ENTERPRISES, INC.
- BESANA LOVATI USA
- BESANA LOVATI - WEST COAST
- DE GORTER INC.
- IGE SOLUTIONS INC.
- INTERCHANGE EQUIPMENT INC.
- MACHINES AND WHEELS, INC.
- RECENT ADDITIONS
- SALEM DISTRIBUTING

### A. JACOVIDES TRADING LTD.

**Headquarters**  
9 Invrou Street  
Latsia Industrial Area  
2234 Nicosia - Cyprus  
Tel: +357-22-454840  
Fax: +357-22-454843  
E-mail: jaco.ing@cytanet.com.cy

**Company Officers**  
Andreas Jacovides: General Manager  
Mikaela Jacovidou: Marketing Manager  
Maria Marinou: Administrator Manager

**Company Data**  
Annual turnover: USD 5,000,000  
Number of employees: 16  
Turnover from glass: 35%  
Company founded: 1983  
Nominal capital: USD 100,000

**Local offices/branches:**  
ADDRESS IMVROU STR., 9  
2234 LATSID INDUSTRIAL AREA

#### Companies represented:

**3M (USA)**  
**ALTUGLAS (FRANCE)**  
**BAYER SHEET EUROPE (GERMANY)**  
**KÖMMERLING (GERMANY)**  
**MOMENTIVE (USA)**  
**PROFILGLASS (ITALY)**  
**PROFINE (GERMANY)**  
**UOP (ITALY)**

### AAR S.H. DE C. Y R. LANDLER

Bahia Blanca 3203  
C1417 Asw Buenos Aires - Argentina  
Tel: +54-11-45027418  
Fax: +54-11-45047045  
E-mail: aar@sion.com  
www.landler.com.ar

### A.F.C. PEREIRA - INOVAGLASS

Zona Ind. da Agrela Pav. C  
4825-026 Agrela Sto. Tirso - Portugal  
Tel: +351-229-689900  
Fax: +351-229-689901  
E-mail: afc@afcpereira.com  
www.afcpereira.com

### AGID - ASIA GLASS INDUSTRY DEVELOPMENT

Flat no. 4, No.374, Hoseinieh Alley,  
Dolat St. - Pasdaran Ave.  
Tehran 19516 376 45 - Iran  
Tel: +98-21-2257760  
Fax: +98-21-22547228  
E-mail: info@agid-inc.com  
www.agid-inc.com

### AIRVAC PRIVATE LIMITED

B1k 3023, Ubi Road 3  
#05-10, Ubiplex 1  
Singapore 408663 - Singapore  
Tel: +65-65424321  
Fax: +65-65421819  
E-mail: sales@airvac.com.sg  
www.airvac.com.sg

### ALBORZ DJAAM TECHNICAL CO. (EX-SHAZFAM)

**Headquarters**  
14367 Tehran, Iran  
Tel: +98-21-88031897  
Fax: +98-21-88058551  
E-mail: albarz.djam@gmail.com  
www.albarz\_djaam.com

**Company Officers**  
S.A. Moravej: Managing Director  
M.H. Moravej: Director of Board of D.

**Company Data**  
Annual turnover: USD 1,000,000  
Number of employees: 5  
Turnover from glass: 100%  
Company founded: 1992  
Nominal capital: USD 1,100,000

### Agent/Representative of:

- MACHINERY/EQUIPMENT SUPPLIERS
- Every kind of glass processing machinery and equipment
- GLASS MANUFACTURERS
- Architectural and automotive glass
- Countries where we act:**  
China, Italy, Taiwan

### ALTA-WELD INC. (ALTA FAR EAST WELDING MATERIALS INC.)

**Headquarters**  
Sun Valley Drive, Km 15, West Service Rd.,  
1700 Paranaque, Metro Manila - Philippines  
Tel: +63-2-8234032/8242966  
Fax: +63-2-8211782  
E-mail: altaweld@compass.com.ph

**Company Officers**  
Alfredo K.S. Tan: President & CEO  
Alfred C. Tan: EVP & General Manager  
May Mendoza: ADM/Operations MGR

**Company Data**  
Annual turnover: USD 1,720,000  
Number of employees: 28  
Turnover from glass: 26%  
Company founded: 1985  
Nominal capital: USD 238,000

**Local offices/branches:**  
ADDRESS LA PURISSIMA - BACOLOD CITY  
ADDRESS ESTEBAN SAARNES ST., 6TH DIVISION,  
PATAG, CAGAYAN DE ORO CITY  
ADDRESS RM. 2B BTDI BLDG. - A.C. CORTES AVE.  
MANDAUE, CEBU CITY  
ADDRESS 150 ROSE ST., LANDMARK III SUBD.  
SASA, DAVAO CITY

### Agent/Representative of:

- MACHINERY/EQUIPMENT SUPPLIERS
- Hollow glass machines, flat glass machines wheels for glass processing
- GLASS MANUFACTURERS
- San Miguel Corporation, Asia Brewery  
Alliance Global, Arcya Glass
- Companies represented:**  
**BELFORTGLASS (ITALY)**  
**BOTTERO SPA (ITALY)**  
**ENGELHARD (USA)**  
**METALOR (HONG KONG)**  
**TRIULZI (ITALY)**  
**UTP SCHWEISSMATERIAL (GERMANY)**  
**ZANETTI MACCHINE (ITALY)**
- Countries where we act:**  
Philippines

### ARGENT ENTERPRISES INC.

**Headquarters**  
P.O. Box 163, Graysville PA, USA  
Tel: +1-724-499-5800  
Fax: +1-724-499-5715  
E-mail: aeinc@windstream.net  
www.aeincglass.com

**Company Officers**  
Ron D. Argent: President & CEO

**Company Data**  
Number of employees: 2  
Company founded: 2000  
Turnover from glass: 100%

**Local offices/branches:**  
ADDRESS P.O. Box 163 GRAYSVILLE, PA  
15337-0163 USA

### Agent/Representative of:

- MACHINERY/EQUIPMENT SUPPLIERS
- All equipment knowledge and know-how related to glassmaking and production
- GLASS MANUFACTURERS
- All
- Companies represented:**  
**ANTONINI (ITALY)**  
**ANTONINI NORTH AMERICA (USA)**  
**BATISTI MECCANICA (ITALY)**  
**FALORNI GIANFRANCO (ITALY)**  
**JSJ JODET (GERMANY)**  
**LDM GLASS CONSULTING (USA)**  
**LUBISOL ENGINEERING Co. (BULGARY)**  
**MOTIM FUSED CAST REFRACTORIES (HUNGARY)**















## OVERSEAS GLASS AGENCIES

138-140 Malcom Road  
Braeside VIC 3195 - Australia  
Tel: +61-3-95872488  
Fax: +61-3-95872688  
E-mail: enquires@oga.com.au  
www.oga.com.au

## P.A.L. GLASS MACHINERY LTD.

**Headquarters**  
33 Hornsby Square  
Southfields Business Park  
Basildon Essex SS15 6SD  
United Kingdom  
Tel: +44-1268-493382  
Fax: +44-1268-493385  
E-mail: sales@palmachinery.co.uk  
www.palmachinery.co.uk

**Company Officers**  
Paul Lithauer: Managing Director

**Company Data**  
Company founded: 2000

**Agent/Representative of:**  
• MACHINERY/EQUIPMENT SUPPLIERS

Glass processing machinery  
**Companies represented:**  
**ADELIO LATTUADA (ITALY)**  
**EMAR (ITALY)**  
**MAPPi INT. (ITALY)**  
**RBB DI BRAZZI (ITALY)**

**Countries where we act:**  
Ireland, United Kingdom

## PAVLOS KOULOURIS

**Headquarters**  
Tinou 17-19, 14452 Metamorfofi  
Athens - Greece  
Tel: +30-210-2846840  
Fax: +30-210-2843790  
E-mail: elenkoglass@gmail.com

**Company Officers**  
Pavlos Koulouris  
Sandra Koulouris

**Agent/Representative of:**  
• MACHINERY/EQUIPMENT SUPPLIERS  
Sealants for I.G., glass doors hardware

• GLASS MANUFACTURERS  
Float glass, mirrors, low-E glass

**Companies represented:**  
**KAVEH GLASS INDUSTRY GROUP (IRAN)**  
**KÖMMERLING (GERMANY)**  
**USAF (TAIWAN)**  
**XINYI GLASS Co. (CHINA)**

**Countries where we act:**  
Albania, Bulgaria, Greece

## PETER HAWKINS LTD.

Caste Lane  
Melbourne Derbyshire DE73 8JB - United Kingdom  
Tel: +44-1332-864747  
Fax: +44-1332-864748  
E-mail: info@phawkins.co.uk  
www.phawkins.co.uk

## PETREA AGENTURA TEHNICA SRL

Str. Carpati nr. 2B  
505100 Codlea, Brasov - Romania  
Tel: +40-268-253067  
Fax: +40-268-254290  
E-mail: ioanpetrea@clicknet.ro  
www.petrea.ro

## PG GLASS - BIURO INZYNIERSKIE

**Headquarters**  
Ul. Francesco Nullo 12  
31-543 Krakow - Poland  
Tel: +48-12-4113132  
Fax: +48-12-4113132  
E-mail: andrewu@tlen.pl  
**Company Officers**  
Andrzej Weglowski

## Company Data

Number of employees: 1

**Agent/Representative of:**  
• MACHINERY/EQUIPMENT SUPPLIERS

Forming machines, furnace accessories

**Companies represented:**  
**GLASS SERVICE (ITALY)**  
**TECNO5 (ITALY)**

**Countries where we act:**  
Poland

## PGM-TECHNIC CO. LTD.

Green Place 16/106  
Chaloem Phrakiat R.9, Soi 28  
Dokmai District, Pravate Bangkok 10250 - Thailand  
Tel: +66-2-7516729  
Fax: +66-2-7516729  
E-mail: info@pvm-technic.com  
www.pvm-technic.com

## PIETERMAN GLASTECHNIEK - BELGIUM

Schemkensstraat 1  
3583 Paal-Beringen - Belgium  
Tel: +32-11-421775  
Fax: +32-11-420792  
E-mail: sales@pgv-be.com  
www.pieterman-glastechniek.be

## PIETERMAN GLASTECHNIEK

**Headquarters**  
Industrieweg 28  
3133 AH Vlaardingen - The Netherlands  
Tel: +31-10-4358022  
Fax: +31-10-4353481  
E-mail: info@pgv-nl.com  
www.pieterman-glastechniek.be

**Company Officers**  
R.C. Pieterman  
E. Indesleege  
B. de Jong

**Company Data**  
Annual turnover: USD 13,000,000  
Number of employees: 46  
Company founded: 1953  
**Local offices/branches:**  
ADDRESS SCHEMKENSSTRAAT 1  
3583 PAAL-BERINGEN - BELGIUM

**Agent/Representative of:**  
• MACHINERY/EQUIPMENT SUPPLIERS  
Glassworking machinery

**Companies represented:**  
**ADLER (FRANCE)**  
**BOVONE SRL (ITALY)**  
**EUROMEC (ITALY)**  
**FORVET SRL (ITALY)**

**HAKON (CZECH REPUBLIC)**  
**HELIMA (GERMANY)**  
**INTERMAC SRL (ITALY)**  
**RBB DI BRAZZI (ITALY)**  
**SCHIATTI (ITALY)**  
**SULAK (CZECH REPUBLIC)**  
**WIN (GERMANY)**

**Countries where we act:**  
Belgium, Luxembourg, The Netherlands

## PROFIL MACC SRL

**Headquarters**  
C.da Alezza Z.I.  
74012 Crispiano, Taranto (Italy)  
Tel: +39-99-613637  
Fax: +39-99-612461  
E-mail: info@profilmacc.it  
www.profilmacc.it

**Company Officers**  
Gianni Digregorio: Owner

**Company Data**  
Number of employees: 20  
Company founded: 1984

**Agent/Representative of:**  
• MACHINERY/EQUIPMENT SUPPLIERS  
Bovone, Di Gregorio srl

**Companies represented:**  
**BOVONE (ITALY)**  
**DI GREGORIO SRL (ITALY)**

## PROMAC GROUP - GLASS DIVISION

Unit 3b & 3c Hadrians Way  
Glebe Farm Industrial Estate  
Rugby Warwickshire CV21 1ST - United Kingdom  
Tel: +44-1788-577577  
Fax: +44-1788-567938  
E-mail: sales@promac.co.uk  
www.promac.co.uk

## PT IMACO PRATAMA MAJU

**Headquarters**  
Jl. Ciputat Raya 2 E  
12310 Jakarta - Indonesia  
Tel: +62-21-7502280  
Fax: +62-21-7502367  
E-mail: imaco@idola.net.id

**Company Officers**  
J. Trisnadi: Sales Manager

**Company Data**  
Annual turnover: USD 4,000,000  
Number of employees: 10  
Company founded: 1985  
Turnover from glass: 80%

**Agent/Representative of:**  
• MACHINERY/EQUIPMENT SUPPLIERS  
Glass presses

• GLASS MANUFACTURERS  
Tableware

**Companies represented:**

**ANTONINI (ITALY)**  
**BDF (ITALY)**  
**DR. SCHMITT (GERMANY)**  
**FERMAC (ITALY)**  
**KLÖPPER (GERMANY)**  
**OLIVOTTO-GLASS (ITALY)**  
**VALSPAR (GERMANY)**

## R. MEYER S.L.

C/Llull 70-72, 3º 3a  
08005 Barcelona - Spain  
Tel: +34-93-3010525  
Fax: +34-93-4120576  
E-mail: info@rmeyersl.com  
www.rmeyersl.com

## RAW MATERIAL COM. REFRACTORIOS LTDA.

**Headquarters**  
Rua Rosa Kasinski 1109 - Cj. 11/12  
09380-128 Mauá - São Paulo - Brazil  
Tel: +55-11-45139844  
Fax: +55-11-45138726  
E-mail: raw@rawmaterial.com.br  
www.rawmaterial.com.br

**Company Officers**  
Nilson Sako: Director  
César Rodrigues: Director  
Marina Tsuda: Manager

**Company Data**  
Number of employees: 22  
Company founded: 1992  
Turnover from glass: 20%

**Agent/Representative of:**  
• MACHINERY/EQUIPMENT SUPPLIERS

Batch plants, batch chargers, glass level controller, crusher, bubbling, electric boosting, burner, drainage system, hot- and cold-end coating, melting glass furnaces, IS machines, inspection machines, rollers, deadplates and shearblades, zircon mullite, insulating and silica bricks, ceramic fiber and heating elements

**Companies represented:**

**BOTTERO HOLLOW GLASS (ITALY)**  
**DR. C. OTTO/DYKO/P-D REFRACTORIES (GERMANY)**  
**HORN (GERMANY)**  
**I SQUARED R (USA)**  
**MORGANITE THERMAL (BRAZIL)**  
**MSC & SGCC (FRANCE)**

**RUREX-STAHl (GERMANY)**  
**ZIPPE (GERMANY)**

**Countries where we act:**  
South America

## RECENT ADDITIONS

**Headquarters**  
2355 E. Stadium Blvd Suite 2  
48104 Ann Arbor, Michigan - USA  
Tel: +1-734-769-2534  
Fax: +1-734-769-2803  
E-mail: ccocagne@hotmail.com

**Company Officers**  
Charles J. Cocagne: President  
Edward Cocagne: Treasurer

**Company Data**  
Number of employees: 2  
Company founded: 1990

**Agent/Representative of:**  
• MACHINERY/EQUIPMENT SUPPLIERS

Glass bending, tempering, batch chargers, hanger/valves, electric boost, transformers and other electrical, equipment, air pollution control

**Companies represented:**  
**F.I.C. UK LIMITED (UK)**

**GLASSROBOTS (FINLAND)**

**ROMAN MANUFACTURING (USA)**

**TRI-MER (USA)**

**ZIMMERMAN JANSEN (GERMANY)**

**Countries where we act:**  
Canada, Mexico, USA

## REPLIK

**Headquarters**  
3737, Blvd. Du Tricentenaire  
Montréal H1B 5W3 - Canada  
Tel: +1-514-6446410  
Fax: +1-514-6441717  
E-mail: info@replik-art.ca  
www.replik-art.ca

**Company Officers**  
André Mantpetit: General Manager

**Company Data**  
Number of employees: 2  
Company founded: 2009

• GLASS MANUFACTURERS

Coloured glass, engraved glass  
**Companies represented:**  
**CAVEDA**

## ROVER CO. LTD.

Klostermannova 663/13  
460 01 Liberec - Czech Republic  
Tel: +420-482-416070  
Fax: +420-482-416079  
E-mail: rover@rover-lbc.cz  
www.rover-lbc.cz

## SACAV SRL / T3 GLASS ENGINEERING

**Headquarters**  
Via Volpicella 240  
80147 Napoli (NA) - Italy  
Tel: +39-081-5720167  
Fax: +39-081-5720258  
E-mail: stefanofornario@t3glass.com  
www.sacav.com

## SALEM DISTRIBUTING

5901 Gun Club Road  
Winston Salem NC 27103 - USA  
Tel: +1-336-7661104  
Fax: +1-336-7661119  
E-mail: sales@salemDIST.com  
www.salemDIST.com

## SALEPSI S.A.

**Headquarters**  
09-0616198 Guayaquil - Ecuador  
Tel: +593-4-2275775 - Fax: +593-4-2275775  
E-mail: rcasalw@gmail.com



**Companies represented:**

**BATOYLE (UK)**  
**FERLAM (FRANCE)**  
**GEDEVELOP (SWEDEN)**  
**HORN (GERMANY)**  
**IRIS (FRANCE)**  
**MAC VALVES (BELGIUM)**  
**MAGNECO/METREL (USA)**  
**MOTAN (HUNGARY)**  
**OTTO VISION (GERMANY)**  
**RUREX (GERMANY)**  
**SKLOSTROJ (CZECH REPUBLIC)**  
**ZIPPE (GERMANY)**

**Countries where we act:**

Argentina, Brazil, Chile, Mexico, Portugal, Spain

**TECNOMAVI**

C/. Senyera, 57  
 Pol. Ind. Bovalar  
 46970 Alaquas (Valencia) - Spain  
 Tel: +34-961-985634  
 Fax: +34-961-519432  
 E-mail: info@tecnomavi.com  
 www.tecnomavi.com

**TECNOVATI SRL**

Via Toscana 10/12  
 53036 Poggibonsi (SI) - Italy  
 Tel: +39-0577-980749  
 Fax: +39-0577-934832  
 E-mail: info@tecnovati.it  
 www.tecnovati.it

**THERMO KEMI APS**

Oliefabrikvej 61  
 2770 Kastrop - Denmark  
 Tel: +45-70201266  
 Fax: +45-32548266  
 E-mail: Info@Thermo-kemi.dk  
 www.thermo-kemi.dk

**TOHMA GMS INC.**

**Headquarters**  
 Whs#7, Shin-Tachikawa,  
 Koukuukj Co. 1-100, Takamatsu-Cho  
 Tachikawa-Shi, Tokyo, Japan  
 Tel: +81-42-521-3990  
 Fax: +81-42-521-3991  
 E-mail: tohmagms@lapis.plala.or.jp

**Company Officers**  
 K. Tohma: President  
 T. Tohma: Manager

**Company Data**  
 Turnover from glass: 100%

**Companies represented:**

**ABRASIVE TECHNOLOGY (USA)**  
**ARTIFEX (GERMANY)**  
**BORIDE (USA)**  
**BURGALASSI (ITALY)**  
**DIAMOND SRL (ITALY)**  
**EDTM (USA)**  
**FRANK LOWE (USA)**  
**FUJI STAR (JAPAN)**  
**GK (USA)**  
**IION (JAPAN)**  
**IMS (ITALY)**  
**INLAND DIA (USA)**  
**ITALMOLE (ITALY)**  
**LIXON (BELGIUM)**  
**MONROE (USA)**  
**OST (UK)**  
**RBM (ITALY)**  
**SHIN-EI SEITO (JAPAN)**  
**UNIVERSAL SUPER AB. (USA)**  
**WOOD'S POWER GRIP (USA)**

**Countries where we act:**  
 East Asian Countries, Japan

**TRADECOM CORPORATION**

**Headquarters**  
 301-303, 3rd Floor, Commerce Centre  
 Hasrat Mohani Road, Karachi  
 74000, Karachi - Pakistan

Tel: +92-2132634715  
 Fax: +92-212637052  
 E-mail: tradecom@nanjee.com

**Company Officers**

Hasnain Akbarali: Director

**Agent/Representative of:**

• MACHINERY/EQUIPMENT SUPPLIERS

Furnace, IS machine, belts, batch plants,  
 level controllers, lehrs, lowerators, palletiz-  
 ers, press & blow machines, stackers and  
 feeders.

**Companies represented:**

**ANTONINI (ITALY)**  
**BOTTERO S.p.A. (ITALY)**  
**CUGHIER GLASS (ITALY)**  
**EMMETI (ITALY)**  
**HORN GLASS (GERMANY)**  
**OLIVOTTO GROUP (ITALY)**  
**PARKINSON-SPENCER REFRACTORIES (UK)**  
**PIETRO BONAITI (ITALY)**  
**ZIPPE INDUSTRIAL LAGEN (GERMANY)**

**Countries where we act:**

Malaysia, Pakistan

**TRIREX INTERNATIONAL CO., LTD.**

192 Serithai Road  
 Kannayao  
 10230 Bangkok - Thailand  
 Tel: +66-2-9060187  
 Fax: +66-2-9060197  
 E-mail: tr@trirex.co.th  
 www.trirex.com

**UAB "IDELIS"**

Pelesos Str. 3  
 02115 Vilnius - Lithuania  
 Tel: +370-5-2383391  
 Fax: +370-5-2384009  
 E-mail: info@idelis.lt  
 www.idelis.lt

**Company Officers**

D. Chitavichiene  
 N. Tenesis

**Company Data**  
 Nominal capital: USD 11.500  
 Number of employees: 3  
 Company founded: 1998

**Companies represented:**

**FALORNI (ITALY)**  
**FRAELLI PEZZA (ITALY)**  
**GLASTON (ITALY)**

**Countries where we act:**  
 Belarus, Estonia, Latvia, Lithuania

**UCS CORPORATION**

B-605 Sigma II Officetel  
 Gumi-Dong 18, Bundang-Gu  
 Seongnam-Si, Kyunggi-Do - Seoul - South  
 Korea  
 Tel: +82-31-7174611  
 Fax: +82-31-7174618  
 E-mail: ucslee@korea.com

**UNIGIDA, UAB**

**Headquarters**  
 Liepu G. 9  
 38116, Panevezio r. - Lithuania  
 Tel: +370-45-462634  
 Fax: +370-45-462634  
 E-mail: unigida@takas.lt  
 www.unigida.lt

**Company Officers**  
 Gytis Sidauga: Director  
 Daiva Sidaugiene: Comm. Director  
 Rima Sidagyte: Manager

**Company Data**  
 Annual turnover: EUR 300,000  
 Nominal capital: EUR 30,000  
 Number of employees: 5  
 Company founded: 2000  
 Turnover from glass: 80%

**Local offices/branches:**

ADDRESS MARIJONU G. 36,  
 35138 Panevezys - Lithuania

**Agent/Representative of:**

• MACHINERY/EQUIPMENT SUPPLIERS

Heat resistant material, pneumatics, wire  
 conveyor belts

• GLASS MANUFACTURERS

Insulating glass, tempered glass,  
 glass bottles

**Companies represented:**

**FOND METALLI (ITALY)**  
**GR2 (GERMANY)**  
**ROSS CONTROLS (USA)**  
**TUFF TEMP (USA)**  
**WARTA GLASS PANEVEZYS (LITHUANIA)**

**Countries where we act:**

Estonia, Latvia, Lithuania

**USE ELECTRONICS CO. LTD.  
(TAIWAN)**

**Headquarters**  
 20 Fl., No. 85, Sec. 1  
 Chung Hsiao East Road  
 Taipei - Taiwan  
 Tel: +886-2-23934825  
 Fax: +886-2-23970899  
 E-mail: sherly@use.com.tw  
 www.use.com.tw

**Company Officers**

Sherly Chan: Director  
 Bill Lin: Sales Manager

**Company Data**

Annual turnover: USD 145,900,000  
 Nominal capital: USD 2,000,000  
 Number of employees: 270  
 Company founded: 1975  
 Turnover from glass: 30%

**Local offices/branches:**

ADDRESS BEIJING - CHINA  
 SHANGHAI - CHINA  
 SHENZHEN - CHINA  
 GUANGZHOU - CHINA  
 KAOHSIUNG, TAICHUNG - TAIWAN

**Agent/Representative of:**

• MACHINERY/EQUIPMENT SUPPLIERS

Bevelling, edging machines,  
 CNC working centers, cutting  
 machines, tempering furnaces,  
 PVB, IG sealants, tools

**Companies represented:**

**BANDO (JAPAN)**

**BOVONE (ITALY)**  
**BRIDGESTONE (JAPAN)**  
**EDGETECH (USA)**  
**ELECTROGLASS (UK)**  
**GLASSROBOTS (FINLAND)**  
**GLASS SERVICE (ITALY)**  
**INTERMAC (ITALY)**  
**KÖMMERLING (GERMANY)**  
**OST (UK)**  
**PUTSCH (GERMANY)**  
**SCHIATTI ANGELO (ITALY)**  
**TRIULZI (ITALY)**

**Countries where we act:**

China, Malaysia, Singapore,  
 Taiwan, Thailand

**VITRAL LTD.**

Sebastopol 12/22  
 02160 Kiev - Ukraine  
 Tel: +380-44-5875474  
 Fax: +380-44-5663334  
 E-mail: vitral@vitral.in.ua  
 www.vitral.in.ua

**VITRUM S.A.**

Corcega 108-110  
 08029 Barcelona - Spain  
 Tel: +34-934-103600  
 Fax: +34-934-103609  
 E-mail: vitrum@vitrum.es  
 www.vitrum.es

**WITTSBURG ENTREPRISES LTD.**

489-491 Castle Peak Road  
 Block B, Flat B-11, 8/FL.  
 Hong Kong Industrial Centre - Kowloon -  
 Hong Kong - China  
 Tel: +852-27429917  
 Fax: +852-27853640  
 E-mail: wel@wittsburg.com  
 www.wittsburg.com

**ZENIRAYS COMPANY LTD.**

2nd Floor No. 69-1  
 Sec. 1 King Shan South Road  
 Taipei 100 Taiwan R.o.c. - Taiwan  
 Tel: +886-2-23972090  
 Fax: +886-2-23922812  
 E-mail: zenirays@ms59.hinet.net

**In view of the 17<sup>th</sup> edition:  
 the Agents Guide 2012**

**Are you an agent or  
 representative  
 working in the glass industry?**

**If so, you are kindly requested  
 to send back the form  
 on the next page by post or fax  
 no later than July 2011**

**Please note that your profile  
 will be published free of charge.  
 Thanking you in advance  
 for your cooperation, we look  
 forward to hearing from you!**

# AGENTS GUIDE 2012

# FREE LISTING FORM!

...fax back this form!  
+39-02-66305510

**DEADLINE JULY 2011**

PLEASE TYPE OR PRINT IN BLOCK LETTERS

Company Name .....  
 Address .....  
 Postal Code ..... City ..... Country .....  
 Tel. int.: + ..... /area code: ..... / ..... Fax .....  
 E-mail: ..... Website .....

### Company Officers

Name ..... Job Title ..... e-mail .....  
 Name ..... Job Title ..... e-mail .....  
 Name ..... Job Title ..... e-mail .....

Annual turnover: € ..... US\$ ..... Number of employees: .....  
 Nominal capital: € ..... US\$ ..... Company founded: year .....  
 Quality certifications: ..... Turnover from glass: ..... %

### Local offices/branches (total no.: .....):

1) Address .....  
 2) Address .....  
 3) Address .....  
 4) Address .....  
 5) Address .....

### Type of business:

Agent/Representative of **machinery/equipment suppliers** :  Agent/Representative of **glass manufacturers** :  
 Type of equipment: ..... Type of glass: .....  
 .....  
 .....

### Companies we represent today (total no.: .....):

1) ..... - Country: .....	7) ..... - Country: .....
2) ..... - Country: .....	8) ..... - Country: .....
3) ..... - Country: .....	9) ..... - Country: .....
4) ..... - Country: .....	10) ..... - Country: .....
5) ..... - Country: .....	11) ..... - Country: .....
6) ..... - Country: .....	12) ..... - Country: .....

### Countries where we act as an agent/representative:

.....  
 .....

Date ..... Name ..... Signature .....

**PLEASE RETURN TO: ARTEENERGY PUBLISHING SRL**  
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# SUPPLIERS GUIDE

## YELLOW PAGES

LISTING IN THIS SECTION IS RESERVED FOR ADVERTISERS OF THIS ISSUE.

FOR FURTHER INFORMATION ON BEING LISTED, PLEASE CONTACT OUR ADVERTISING DEPARTMENT.

FAX: +39 - 02 - 66306866 • TEL. +39 - 02 - 66305510

E-MAIL: [publications@glassonline.com](mailto:publications@glassonline.com)

### ACID FUME REDUCTION PLANTS

**Glass Service**

### AIR COOLING SYSTEMS

**BDF Industries  
GT Glass Technologies  
MCR System (BDF Group)**

### ALLOYS FOR MOULDS

**Fonderie Valdelsane**

### AMPOULE AFTER- FORMING MACHINES

**Moderne Mecanique**

### AMPOULE FORMING MACHINES

**Moderne Mecanique  
OCMI OTG**

### ANNEALING LEHRS

**Antonini  
Horn  
MT Forni Industriali**

### AUTOMATION

**BDF Industries  
Glass Service  
GT Glass Technologies  
Horn  
MCR System (BDF Group)  
Olivotto-Antas-Lynch-Lindner**

### BAG FILTERING PLANTS

**Glass Service**

### BALL GATHERERS

**Amig  
Glass Service  
Olivotto-Antas-Lynch-Lindner**

### BATCH CHARGERS

**Glass Service  
GT Glass Technologies  
Horn  
MT Forni Industriali**

### BATCH/CULLET PREHEATERS

**GT Glass Technologies**

### BATCH PLANTS

**Glass Service  
MT Forni Industriali  
TECO  
Teichmann, Henry F.**

### BENDING FURNACES

**MT Forni Industriali**

### BLOWING LINES

**Olivotto-Antas-Lynch-Lindner**

### BLOWING MACHINES

**Olivotto-Antas-Lynch-Lindner**

### BURN-OFF MACHINES

**Olivotto-Antas-Lynch-Lindner**

### BURNERS & ACCESSORIES

**Glass Service  
GT Glass Technologies  
Horn  
MT Forni Industriali  
TECO**

### BURNERS / LOW NO<sub>x</sub>

**GT Glass Technologies**

### BURNERS/OXY-FUEL

**Glass Service**

### CAST IRON FOR MOULDS

**Fonderie Valdelsane**

### COATING OF GLASS - SYSTEMS & MATERIALS (HOT/COLD-END)

**BDF Industries  
Fluorital  
Horn**

### COATING OF/FOR MOULDS - SYSTEMS & MATERIALS

**BDF Industries**

### COLD-END LINES

**BDF Industries  
Sipac**

### COLOURS & ENAMELS

**Fluorital**

### CONSULTING SERVICES

**BDF Industries  
Glass Service  
GT Glass Technologies  
Horn  
MCR System (BDF Group)  
Olivotto-Antas-Lynch-Lindner  
TECO  
Teichmann, Henry F.**

### CONTROL & AUTOMATION SYSTEMS

**Amig  
BDF Industries  
Glass Service  
GT Glass Technologies  
Horn  
MCR System (BDF Group)  
Olivotto-Antas-Lynch-Lindner**

### CONVEYING & STOCKING SYSTEMS

**Sipac**

### CONVEYOR BELTS

**BDF Industries  
Fond Metalli Conveyors  
Olivotto-Antas-Lynch-Lindner  
MT Forni Industriali**

### CRACK-OFF MACHINES

**OCMI OTG  
Olivotto-Antas-Lynch-Lindner**

### CROSS-CONVEYORS

**BDF Industries  
MT Forni Industriali**

### CULLET SEPARATION & TREATMENT SYSTEMS

**Fond Metalli Conveyors  
GT Glass Technologies**

### DECORATING LEHRS

**Antonini  
Horn  
MT Forni Industriali**

### DECORATING MACHINES

**Tecno 5**

### DEDUSTING & FILTERING SYSTEMS

**Glass Service**

### DRIVE SYSTEMS/ VARIABLE SPEED

**BDF Industries  
MCR System (BDF Group)  
Olivotto-Antas-Lynch-Lindner**

### ELECTRIC KILNS

**MT Forni Industriali**

### ELECTRODE HOLDERS

**GT Glass Technologies**  
Horn

### EMISSION MONITORING SYSTEMS

**GT Glass Technologies**  
**MCR System (BDF Group)**

### ENGINEERING & CONSTRUC. OF PLANTS

**Amig**  
**BDF Industries**  
**Glass Service**  
**GT Glass Technologies**  
Horn  
**MT Forni Industriali**  
**Olivotto-Antas-Lynch-Lindner**  
**TECO**  
Teichmann, Henry F.

### FEEDERS & MECHANISMS

**BDF Industries**  
**Olivotto-Antas-Lynch-Lindner**

### FIBERGLASS/ GLASSWOOL PRODUCTION LINES, EQUIPMENT AND PRODUCTS

**MCR System (BDF Group)**

### FIRE POLISHERS & EQUIPMENT

**Amig**  
**Olivotto-Antas-Lynch-Lindner**

### FOREHEARTHS & SYSTEMS

**BDF Industries**  
**GT Glass Technologies**  
Horn  
**MT Forni Industriali**

### FORMING MACHINES

**Amig**  
**BDF Industries**  
**Olivotto-Antas-Lynch-Lindner**

### FURNACES (MELTING)

**Glass Service**  
**GT Glass Technologies**  
Horn

### MT Forni Industriali TECO

Teichmann, Henry F.

### FURNACE BUBBLING SYSTEMS

**GT Glass Technologies**

### FURNACE DRAINING SYSTEMS

**GT Glass Technologies**

### FURNACE HEAT-UP

**GT Glass Technologies**

### FURNACE HOT CULLET FILLING

**GT Glass Technologies**

### FURNACE PREHEATING SYSTEMS

**Glass Service**  
**GT Glass Technologies**  
Horn  
**Olivotto-Antas-Lynch-Lindner**  
**Teichmann, Henry F.**

### FURNACE REPAIR & MAINTENANCE

**Glass Service**  
**GT Glass Technologies**  
Horn  
**MT Forni Industriali**  
**TECO**  
Teichmann, Henry F.

### FURNACE STRUCTURES IN METAL

**Glass Service**  
**GT Glass Technologies**  
**TECO**

### FURNACES (OXY-FUEL OR RECUPERATIVE)

**Glass Service**  
**GT Glass Technologies**  
**MT Forni Industriali**  
**TECO**

### GLASS BRICK PRODUCTION LINES

**Amig**  
**Olivotto-Antas-Lynch-Lindner**

### GLASS LEVEL CONTROL DEVICES

**Glass Service**  
**GT Glass Technologies**  
Horn  
**MCR System (BDF Group)**  
**MT Forni Industriali**  
**Olivotto-Antas-Lynch-Lindner**

### GOB WEIGHT CONTROL SYSTEMS

**BDF Industries**

### HANDLING EQUIPMENT

**BDF Industries**  
**Olivotto-Antas-Lynch-Lindner**

### HEAT RECUPERATORS

**Glass Service**  
**GT Glass Technologies**  
Horn  
**MT Forni Industriali**

### HEAT REGENERATION PLANTS

**BDF Industries**  
**GT Glass Technologies**  
Horn

### HEAT RESISTORS

Horn

### HEATING SYSTEMS

**Glass Service**  
**GT Glass Technologies**  
Horn

### HOT GLASS CONTACT MATERIALS

**Amig**  
**Glass Service**  
**Olivotto-Antas-Lynch-Lindner**

### INJECTION MACHINES

**Olivotto-Antas-Lynch-Lindner**

### INSPECTION MACHINES FOR VIALS & AMPOULES

**Moderne Mecanique**  
**OCMI OTG**

### I.S. MACHINES

**BDF Industries**  
**Olivotto-Antas-Lynch-Lindner**

### I.S. MACHINE LUBRICATION SYSTEMS

**BDF Industries**

### I.S. MACHINE RECONSTRUCTION

**BDF Industries**

### LASER CUTTING MACHINES

**OCMI OTG**

### MEASUREMENT & CONTROL SYSTEMS

**BDF Industries**  
**Glass Service**  
**GT Glass Technologies**  
Horn  
**MCR System (BDF Group)**  
**Moderne Mecanique**

### MECHANICAL POLISHING MACHINES

**BDF Industries**

### METALLIC STRUCTURES FOR MELTING FURNACES

**BDF Industries**  
**GT Glass Technologies**

### MIXERS

**Glass Service**  
**MT Forni Industriali**

### MOULD CLEANING/ POLISHING MACHINES

**BDF Industries**

### MOULD COMPONENTS

**Olivotto-Antas-Lynch-Lindner**  
**Walcast**

### MOULD POLISHING MACHINES

**BDF Industries**

### MOULD PREHEATING OVENS

**Antonini**  
**BDF Industries**  
**MT Forni Industriali**



**MOULDS**

**Busellato Glass Moulds**  
**Olivotto-Antas-Lynch-Lindner**  
**Walcast**

**NECK RINGS**

**Busellato Glass Moulds**

**PALLETIZING/  
PACKAGING LINES**

**Emmeti**

**PASTE MOULD MACHINES**

**Olivotto-Antas-Lynch-Lindner**

**PLANT UTILITIES**

**Glass Service**

**PLATINUM FEEDER  
SYSTEMS**

**Olivotto-Antas-Lynch-Lindner**

**PLUNGERS &  
MECHANISMS**

**BDF Industries**  
**Busellato Glass Moulds**  
**Olivotto-Antas-Lynch-Lindner**

**POLISHING/  
GRINDING MACHINES**

**Olivotto-Antas-Lynch-Lindner**

**PRESSES**

**Amig**  
**Olivotto-Antas-Lynch-Lindner**

**PRESSES (INJECTION),  
FOR CHANDELIER  
LIGHTING PENDANTS**

**Amig**  
**Olivotto-Antas-Lynch-Lindner**

**PRESS  
RECONSTRUCTION**

**Olivotto-Antas-Lynch-Lindner**

**PUSHERS**

**BDF Industries**  
**Olivotto-Antas-Lynch-Lindner**

**REFRACTORIES**

**GT Glass Technologies**

**REPLACEMENT PARTS**

**BDF Industries**

**ROBOTS - HANDLING  
APPLICATIONS**

**BDF Industries**  
**Glass Service**  
**MCR System (BDF Group)**  
**Olivotto-Antas-Lynch-Lindner**

**ROTATING TABLES**

**Olivotto-Antas-Lynch-Lindner**

**SANDBLASTING  
MACHINES**

**Olivotto-Antas-Lynch-Lindner**

**SAW MACHINES**

**Olivotto-Antas-Lynch-Lindner**

**SECOND-HAND  
EQUIPMENT**

**BDF Industries**  
**Horn**  
**Olivotto-Antas-Lynch-Lindner**

**SHEAR BLADES**

**BDF Industries**  
**Fond Metalli Conveyors**  
**Glass Service**

**SHEAR SYSTEMS**

**BDF Industries**  
**Olivotto-Antas-Lynch-Lindner**

**SILKSCREEN INKS**

**Fluorital**

**SILKSCREEN PRINTING  
EQUIPMENT FOR  
HOLLOWWARE  
& TABLEWARE**

**Fluorital**  
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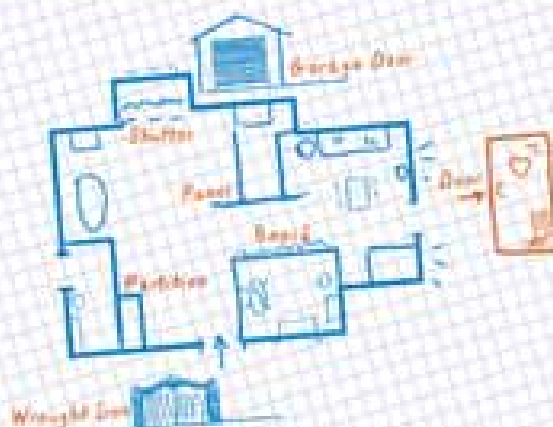
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