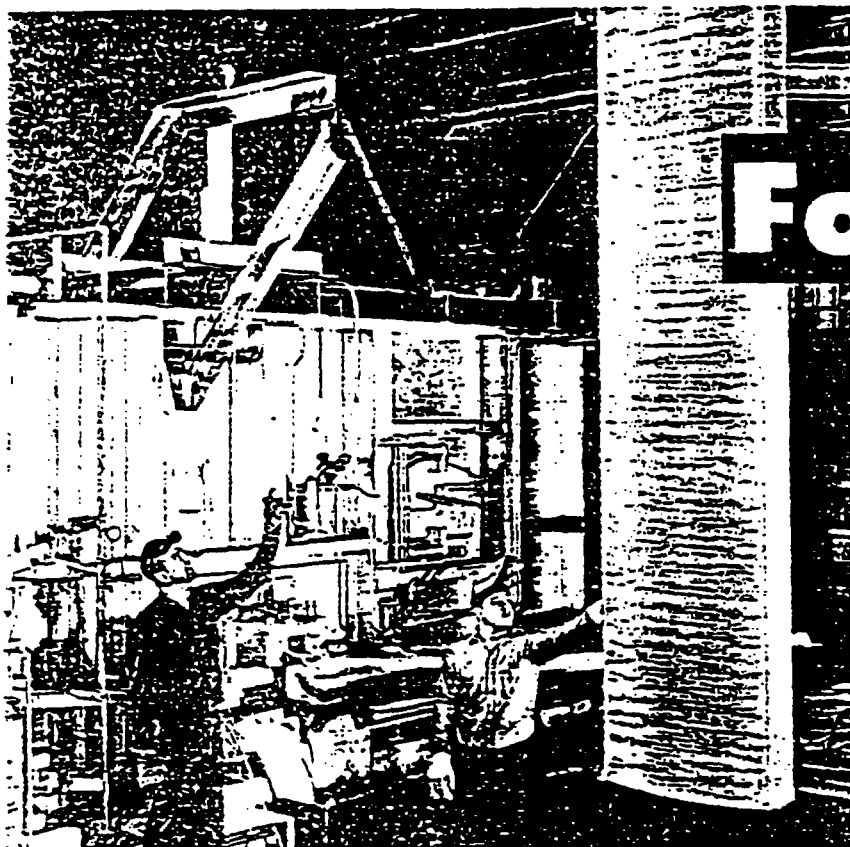




**Foseco®**



"Wherever metals are poured"

The Foseco group of 19 companies is an international organization manufacturing and marketing products under the trademark Foseco® and serves the metal melting industries in most countries of the world. It does not make castings, ingots or any other metal products, but it serves those industries which do produce them such as foundries, steel mills and wrought mills producing aluminum and copper base products.

Chemical and metallurgical products and processes for the improvement of molten metals, backed by worldwide technical service enable Foseco to provide ideas, contributions, and know-how for these industries to:

- 1) Produce better castings, ingots, and billets at lower cost.
- 2) Boost productivity.
- 3) Improve casting quality.
- 4) Simplify operations.





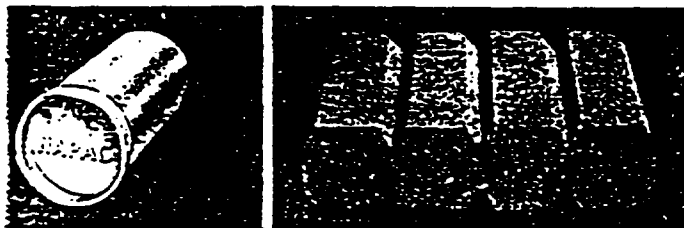
## METALLURGICAL PRODUCTS AND PROCESSES...

Every metallic object, at one or more stages of its fabrication, has been molten and all Foseco products are applicable to metals while they are in this state. The majority of them are patented chemical mixtures suitably bonded, packaged and supplied in forms for convenient application to furnace, ladle or mold.

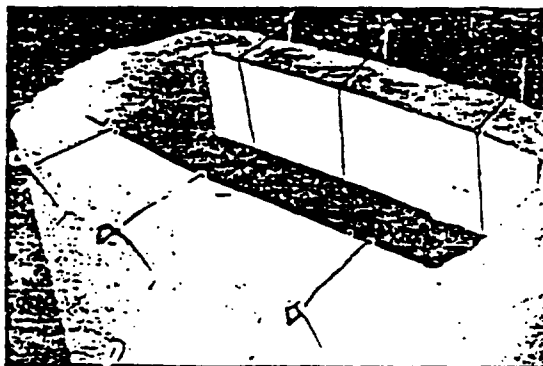
These products, which number over 200, perform a variety of functions all of which lead to improvements in efficiency in the casting of metal. Some control the manner in which the metal solidifies in the mold, some remove impurities by chemical action, some add minute traces of important elements and some protect the metal surface during the melting period.

In each of these, Foseco offers products for application to iron, steel, bronze, brass, copper, aluminum, zinc, and magnesium.

### TYPICAL FOSECO PRODUCTS



Foseco foundry products are designed for easy application and offer foundries exact chemical additions for uniformity of metal analysis.



PROFAX® — light-weight prefabricated insulating hot top slabs for producing quality steel ingots

## FOSECO IN FOUNDRIES

Cast metals often have defects due to incorrect melting or molding practice, but sometimes due to factors beyond a foundryman's control. By treating the molten metal in the furnace with certain Foseco chemical mixtures or by applying other Foseco products to the mold or core, most

## FOSECO IN STEEL MILLS

In steel mills the metal is first cast into large ingots before it is rolled into slabs or blooms subsequently to be finished into sheets, tubes, bars or other type end products. The higher quality steels known as "killed steels" are prone to center line shrinkage. This results in lower yield of acceptable product unless "hot tops" are used during pouring of the ingot.

Foseco produces numerous types of insulating (Profax®) and exothermic (Feedex®) hot top-

## FOSECO IN WROUGHT NON-FERROUS

Technical developments and Foseco products are applied to the wrought non-ferrous producer.

This industry melts large quantities of non-ferrous metals such as aluminum and copper-base for end usage in industries that manufacture electric wire, siding for homes, storm windows,

of these defects can be avoided.

Foseco makes a wide range of products including exothermics, fluxes, degassers, core and mold coatings, feeding compounds and alloying additions for castings of most metals.

ping systems to control solidification of the steel. There is little or no waste, and therefore the yield from ingot to finished product of slabs or blooms is improved by means of superior ingot quality (more sound metal per ton of metal cast), and therefore greater salable output from existing melting and rolling plant without additional capital investment by the mill. This is a substantial contribution to increased productivity and steel mill efficiency.

## DUSTRIES

automotive trim and cigarette foil.

In the production of non-ferrous sheet, strip, wire and extrusions, Foseco contributes to increased productivity by improving metal quality, as illustrated which show chill cast ingots of aluminum alloy 319.



The porosity or holes in this bronze casting was caused by incorrect melting practice.

This sound casting was made from metal treated with a Foseco product.

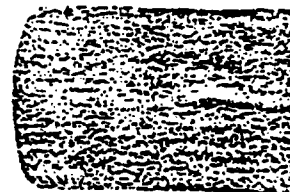


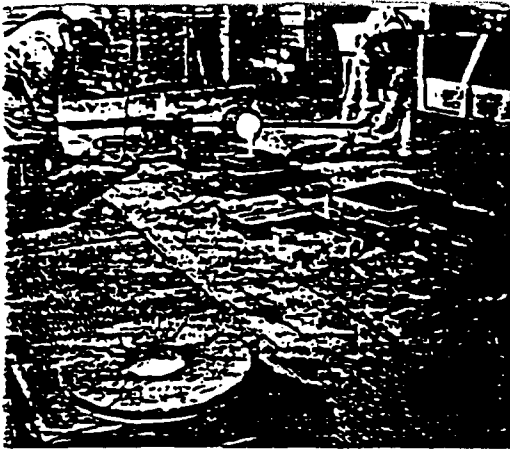
This is the top or head of a steel ingot which has been cast by a conventional method. (Ingot has been sliced in two and clearly shows the shrinkage cavity.)

This is the top of an ingot cast with the aid of the PROFAX® insulating hot top. There is no shrinkage cavity in the top of this ingot.

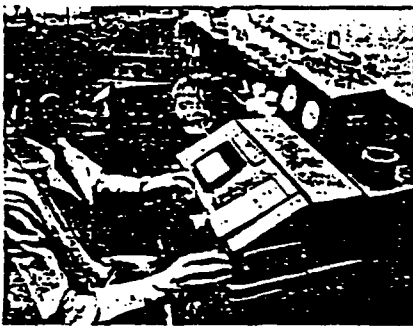


Ingot at the bottom shows the effectiveness of a grain refining treatment with a Foseco product. Ingot to the left is untreated metal. Note the large, columnar crystals at edges — a type of structure highly detrimental to rolling or forging properties.

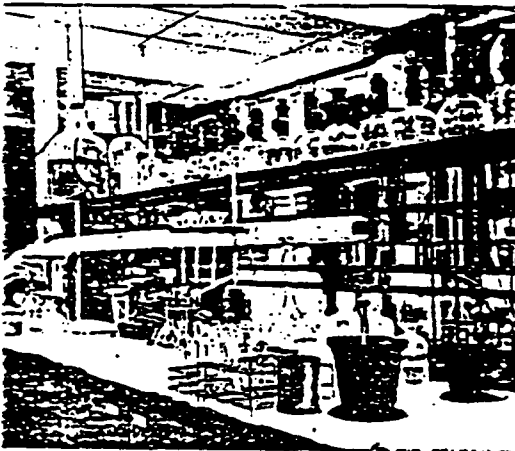




Experimental foundry technicians Joe Vrh and Jim Austin pouring copper into exothermic sleeves. The experimental foundry not only contributes to the production control of exothermic compounds but also spurs new products and techniques.



Mel Leeb, Lab. Technician at the Beckman Spectrophotometer which determines alkali metals and colorimetric traces of iron, manganese, chromium, titanium, boron and the like.



Jay Steiger, Chemist and Bob Henning, Quality Control Analyst, in central quality control lab, which is responsible for raw materials control, along with production control of paste and liquid products and fluxes.

QUALITY and economy are essential in cast metals today. Castings must be stronger, denser, free from fatigue failures, close to dimensional tolerances to avoid needless machining, and, frequently, of X-ray soundness.

Foseco, Inc., with a 30-year record of contributions to improved foundry practice through formulations of metallurgical compounds and chemicals to make cast metals do a better job offers a specialized service to permit any foundry to produce better castings at a lower unit cost. Whether that foundry melts iron, steel, zinc, aluminum, magnesium, lead, tin, or copper, it can avail itself of competent technical services based on complex international experience.

The company, now in process of expanding its facilities for foundry research and development, has close "family" ties to a group of companies in 19 countries around the world, all attuned to foundry research.

Market demands of foundries naturally govern product requirements. Through the Foseco sales force they are transmitted to a research and development (R&D) group which initiates projects for investigation. This staff begins with an existing product, or with available information and experience. In the case of an existing product, the effects of ingredients are known, and other suitable elements will be added to meet the necessary demands.

The new formulations will be tried in an experimental foundry in minimum melts. If this is not practical, a test program will be conducted in cooperation with a local foundry with an R & D engineer from Foseco as supervisor.

If the product idea warrants further investigation and seems to be formulated to meet requirements in accord with demand, it is then taken to a local foundry for additional testing. Once it proves out in field trials, it becomes an experimental product of Foseco identified by an "EP" number and can be purchased by metalcasters.

The new product is under the cognizance of the R & D group, from market suggestion to EP number, including responsibility for direction of trials in foundries and suggesting and implementing the optimum manufacturing methods during the pilot plant stage.

## Exothermics

Typical checks on raw materials made by the company's general analytical service section include control of aluminum fuel for the manufacture of exothermics. Percentages of aluminum, zinc, lead and chlorides are critical. Also, sieve analyses and related tests insure uniformity before mixes and finished products are blended.

In the manufacture of pastes and liquids for mold and core coatings, fluxes, and degassing agents, extensive tests on raw materials are indicated. As an instance: a common ingredient for degassing aluminum melts is hexachloroethane, in which moisture is a contaminant. Laboratory tests are run on every batch of this product to guarantee that less than 0.10% moisture is present.

# Foseco's Market

## Outgoing Product Control

In the manufacture of foundry exothermic compounds, a primary product of Foseco, aluminum fuel (metal) is the major ingredient. Each batch is individually formulated, because of the tight control on aluminum specifications — and also because each exothermic grade is tailor-made for the end use application. If used with copper, for example, the exothermic must ignite faster than for steel or iron, because of the variance in melting temperature of the metals.

To meet specifications, intensive quality control checks are made before, during, and after formulation, before release for shipment to customers as dry bulk material, or for internal fabrication into moldable exothermic shapes. A sample from each mix is brought into the experimental foundry for comprehensive testing. This includes dry-mix tests of powder sensitivity and burning rate, along with other investigations.

Two core sleeve samples from each batch then are molded and baked, and metal poured into them to record sensitivity, general burning characteristics and heat output.

The batch is then approved for bulk shipment to customers or for in-shop fabrication into moldable sleeve shapes. The latter are 100% inspected by the quality control laboratory group of Foseco for (1) physical cracks, (2) soft spots, (3) friability, (4) sagging, (5) wall thickness, (6) proper baking and (7) adequate vents.

## Accent on Service

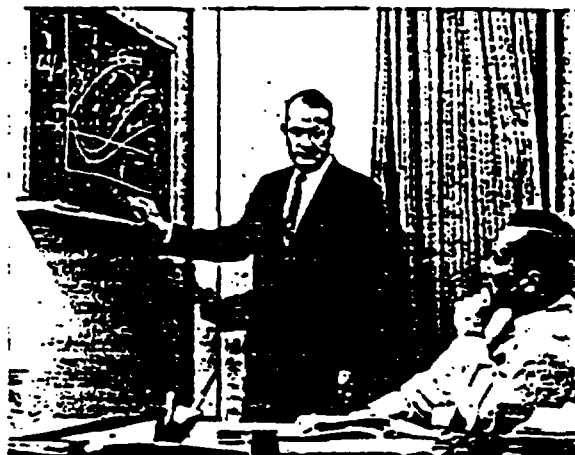
Foseco also helps serve foundries by offering what the company calls "second opinion services".

Casting defect investigations, aid in rising critical jobs, and assistance in setting up effective cupola operation for better hot metal are a few of the "second opinions" which the company strives to deliver, in conjunction with its field sales technical service staff.

These product specialists can help larger foundries because of their intimate knowledge of specific processes. At the same time, foundries benefit from these services because they free the metallurgical talent of the foundry for concentration on problems unique to its particular operation.

Small foundries realize benefits because they may not have skilled metallurgists to investigate operational problems. The help which Foseco can supply may be of primary importance for those melters who cannot economically support their own investigations.

Basic worldwide research and development, continuous new product development, exacting quality control techniques and customer oriented technical service enable Foseco to provide products and services of considerable value to the foundryman in his never ending endeavors of producing higher quality castings economically.



Ron Ruddle, Technical Manager of Research & Development at the board, and Ted Jago, Supervisor of Exothermic development discussing the exothermic properties of experimental products.



Bill Steinman, Quality Control Supervisor of exothermics at the Unitron metallograph viewing metal structure of casting section.



Jack Morgan, Technical Service Manager, and John Gotheridge, Sales Manager, Foundry Division, rising a casting at the request of a steel foundry. One of the "second opinion services" offered by Foseco.



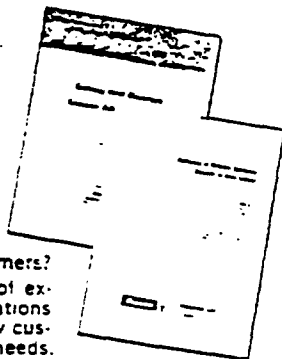
"Wherever metals are poured"



### THE FOSECO MAN

The Foseco man has worked in foundries. Many are recognized authorities and contribute to the fund of available knowledge in the foundry and mill industry. The Foseco man is knowledgeable about foundry practice, can communicate with its people, and understand its everyday work problems. He can offer ideas and solutions—and most important, learn from his customers.

How does this benefit Foseco customers? Foseco can adapt its plus 30 years of experience in chemical product formulations to fit the practical requirements of any customer in terms of what that customer needs.



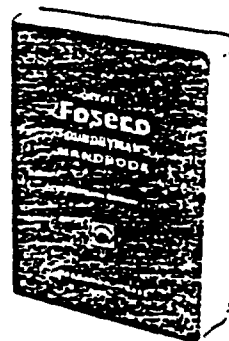
## MORE THAN QUALITY PRODU

DEGASER® 450 removes hydrogen from molten aluminum. It is vacuum blended during manufacture to ensure freedom from moisture and is shipped in water-proof heat sealed foil.



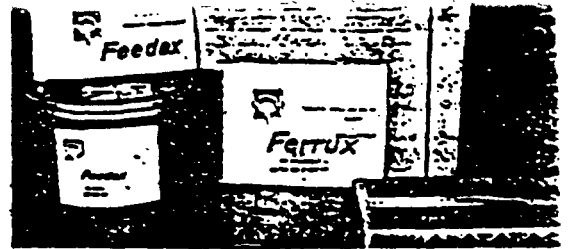
## IDEAS, TECHNIQUES, METHO

FOSECO  
FOUNDRYMAN'S HANDBOOK  
387 Pages of Foundry  
Technology



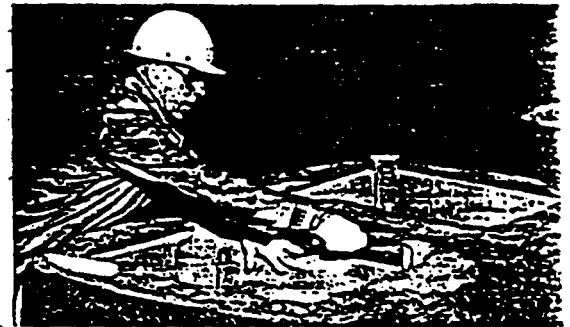
The handbook contains facts and figures, charts and graphs, for the practical foundryman, metallurgist and apprentice. It is pocket size with a flexible leatherette cover, and designed for easy, daily reference in the foundry.

Foseco products are "engineer packaged" in bags, drums, boxes, pails and pallets for sale and speedy shipment.

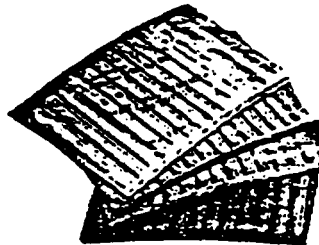


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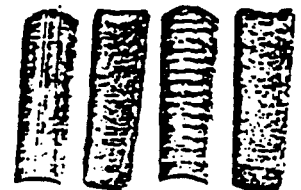
A corner wedge of a Profax® hot top is being hammered into an ingot mold to secure the side slabs.



Prefabricated FEEDEX® exothermic shapes are available in a wide variety of design and are custom made in all sizes and shapes to meet a variety of casting requirements.



The complete Profax assembly for use in an ingot mold such as illustrated above.



## KNOW-HOW FOR BETTER CASTINGS

### 30 YEARS OF "FOUNDRY PRACTICE"

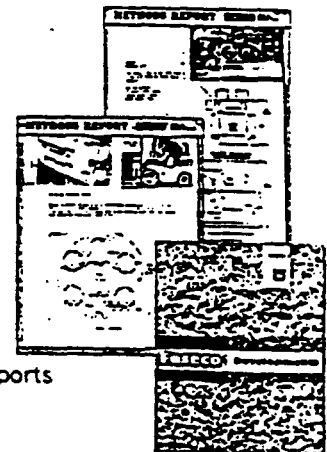
One of the Most Widely Read  
Foundry Periodicals in the World



This 8 page journal is now published in eight editions in seven languages with over 50,000 circulation. Containing articles on melting, molding, core making, feeding and other foundry problems it gives useful hints and tips for everyday use, as well as information on the latest foundry developments.

### "EXTRA VALUE" SERVICE

World-wide Research and  
Application Engineering Reports

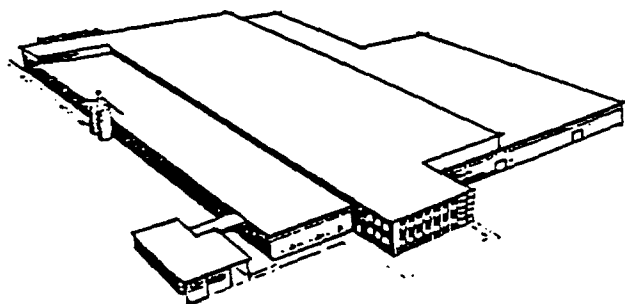


The latest developments and research projects of the Foseco group of 19 companies are published annually in FOSECO DEVELOPMENTS.

METHODS REPORT is a "case-history" application engineering report sent regularly to metal casters to generate ideas and inform of proven worthwhile methods of producing quality castings economically.



## WORLDWIDE FACILITIES ... TO SERVICE THE METALCASTING INDUSTRY

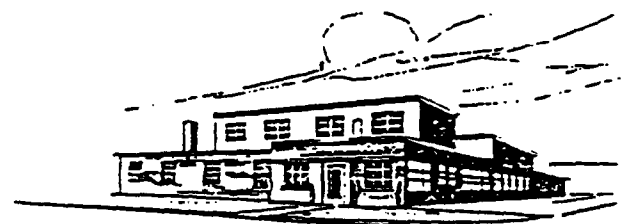


U.S.A.

200,000+ Square feet



ENGLAND



CANADA

The world-wide business known today as Foseco had its beginning in 1932 in Birmingham, England. In 1935, an American licensee was established. Modest foreign expansion continued until 1938, but the onset of World War II prevented further foreign development by Foundry Services, Ltd., as Foseco was then known.

After the war, overseas expansion resumed and manufacturing companies were established in France, Canada, Germany, Italy and South Africa between 1949 and 1952. In 1953 the American licensee was bought and the American Company reorganized. In 1959, Foundry Services, Inc., as Foseco, Inc. was then known, moved from Columbus, Ohio into new offices and manufacturing facilities in Cleveland.

The growth process has continued until there are now 19 companies strategically located across the globe from Austria to Australia, from Brazil to Japan, and from India to Spain. The largest are those in the United States, Great Britain, Japan and France. In addition, there are stocking distributors in 24 other countries of the world.

This complex international experience, research, and new product development enables Foseco to be first to learn of new foundry and steel mill discoveries and ideas, quick to develop products for the American metal pouring industry, based on their needs and wants.

**CENTRAL RESEARCH**  
Birmingham, England  
FOSECO INTERNATIONAL LIMITED

**MANUFACTURING COMPANIES**  
Argentina  
Buenos Aires  
FOSECO ARGENTINA S.R.L.

Austria  
Salzburg  
GIESSEREI-DIENST  
GESELL SCHAFT, m.b.H.

Australia  
Parramatta, New South Wales  
FOSECO PROPRIETARY LIMITED

Belgium  
Brussels  
FOSECO, S.A.

Brazil  
Sao Paulo  
FOSECO do BRASIL LTDA

Canada  
Guelph, Ontario  
FOSECO CANADA, LTD

France  
Chelles (S. & M.), France  
FOSECO, S.A.

Germany  
Borchen/Westf.  
FOSECO G.m.b.H.

Holland  
Woerden  
FOSECO NEDERLAND, N.V.

India  
Bombay  
GREAVES FOSECO LTD.

Italy  
Milan  
FOSECO S.p.A.

Japan  
Osaka  
FOSECO JAPAN LIMITED

Mexico  
Mexico City  
FOUNDRY SERVICES de MEXICO S.A. de C.V.

South Africa  
Johannesburg  
FOSECO SOUTH AFRICA (PTY.) LTD.

Spain  
Barcelona  
FOSECO ESPANOLA, S.A.

Switzerland  
Zug  
FOSECO A.G.

United Kingdom  
Tamworth  
FOSECO (F.S.) LIMITED

U.S.A.  
Cleveland  
FOSECO, INC

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