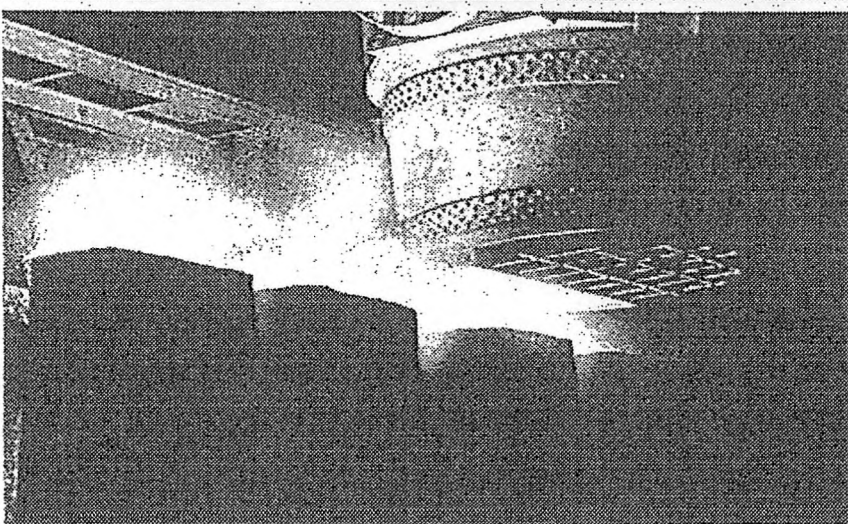
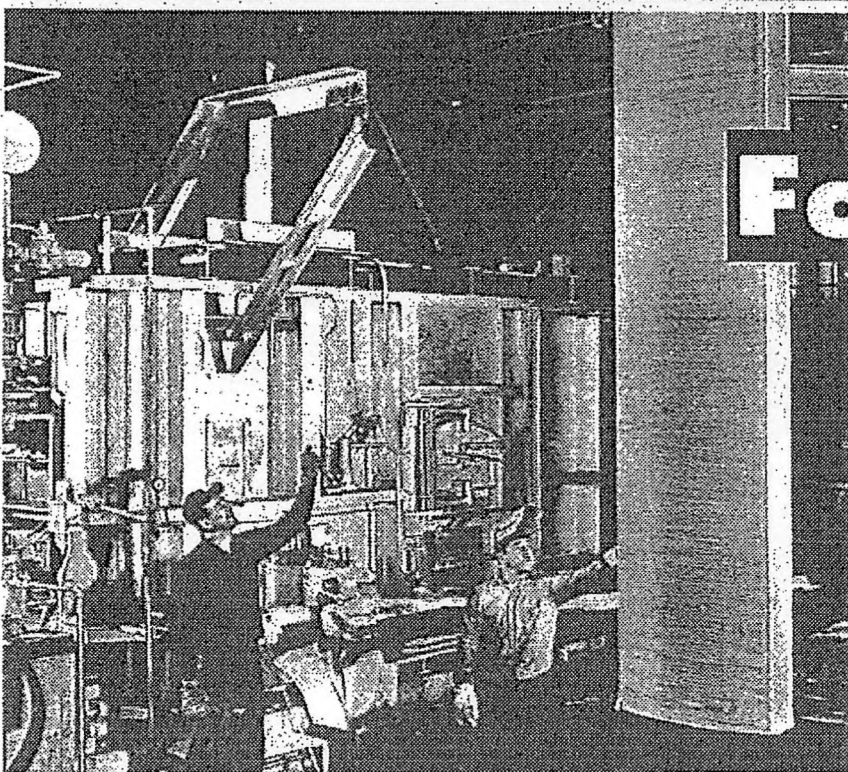
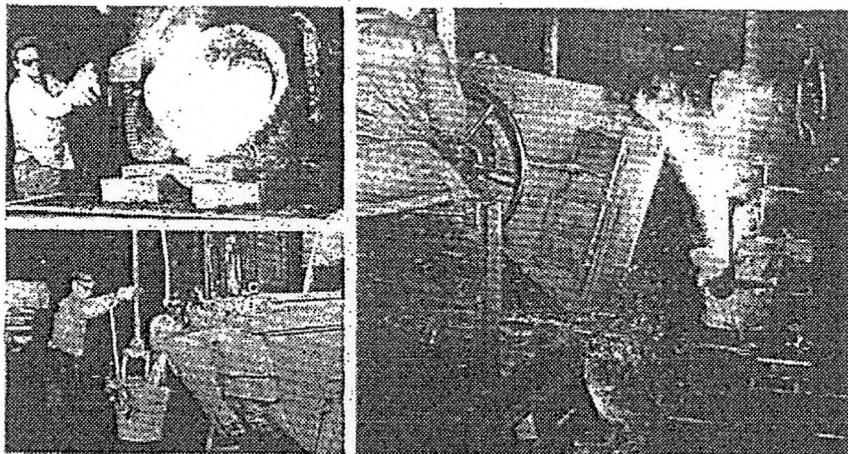


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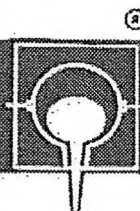
DATE: 1965-1967

DOC#: FOS009

DOCUMENT DESCRIPTION: Advertisements in Trade Publications



Foseco[®]

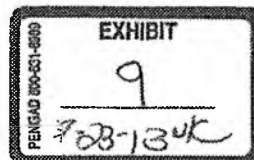


"Wherever metals are poured"

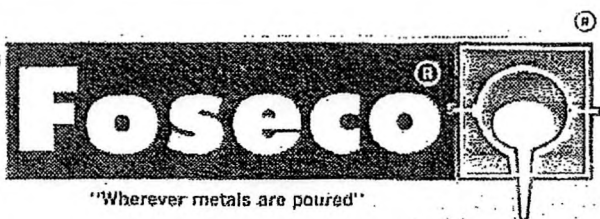
The Foseco group of 19 companies is an international organization manufacturing and marketing products under the trademark Foseco[®] and serves the metal melting industries in most countries of the world. It does not make castings, ingots or any other metal products, but it serves those industries which 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 world-wide 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.



Kradel 0011
© Foseco, Inc. -- 1965
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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.

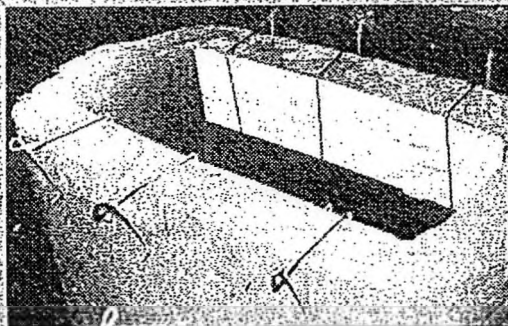
These products, which number over 200, perform a variety of functions all of which lead to improvements in efficiency in the casting of metal. Some control the manner in which the metal solidifies in the mold, some remove impurities by chemical action, some add minute traces of important elements and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

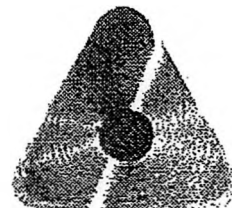
of these defects can be avoided.

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.



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.



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.



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.)

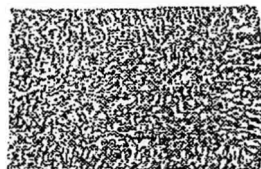
This is the top of an ingot cast with the aid of the Foseco PROFAX® insulating hot top. There is no shrinkage cavity in the top of this ingot.



INDUSTRIES

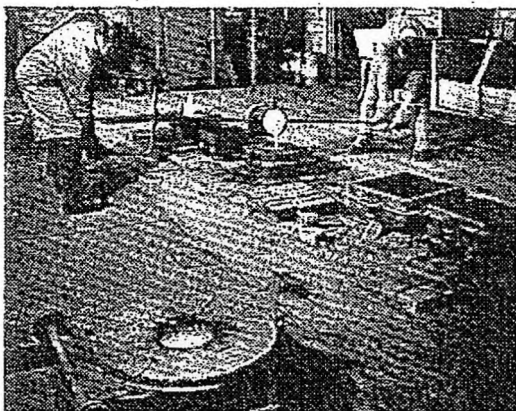
automotive trim and cigarette foil.

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.



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.

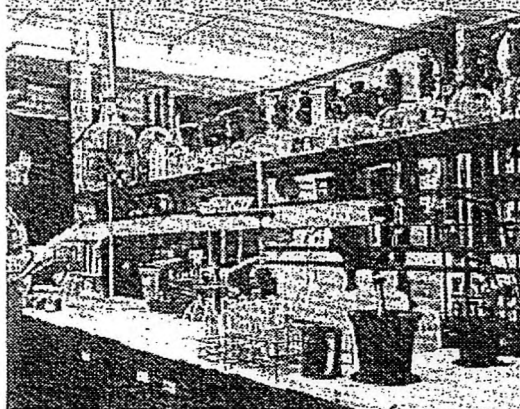




Experimental foundry technicians Joe Vrh and Jim Austin pouring copper into exothermic sleeves. This experimental foundry not only contributes to the production control of exothermic compounds but also spurs new products and techniques.



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.

Wide, Wide World

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

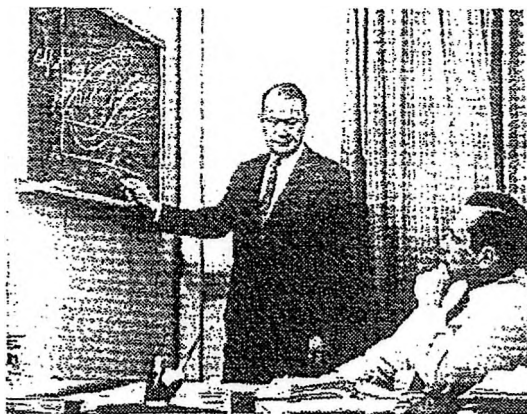
Foseco also helps serve foundries by offering what the company calls "second opinion services".

Casting defect investigations, aid in risering 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 Steinhman, Quality Control Supervisor of exothermics at the Unitron metallograph viewing metal structure of casting section.



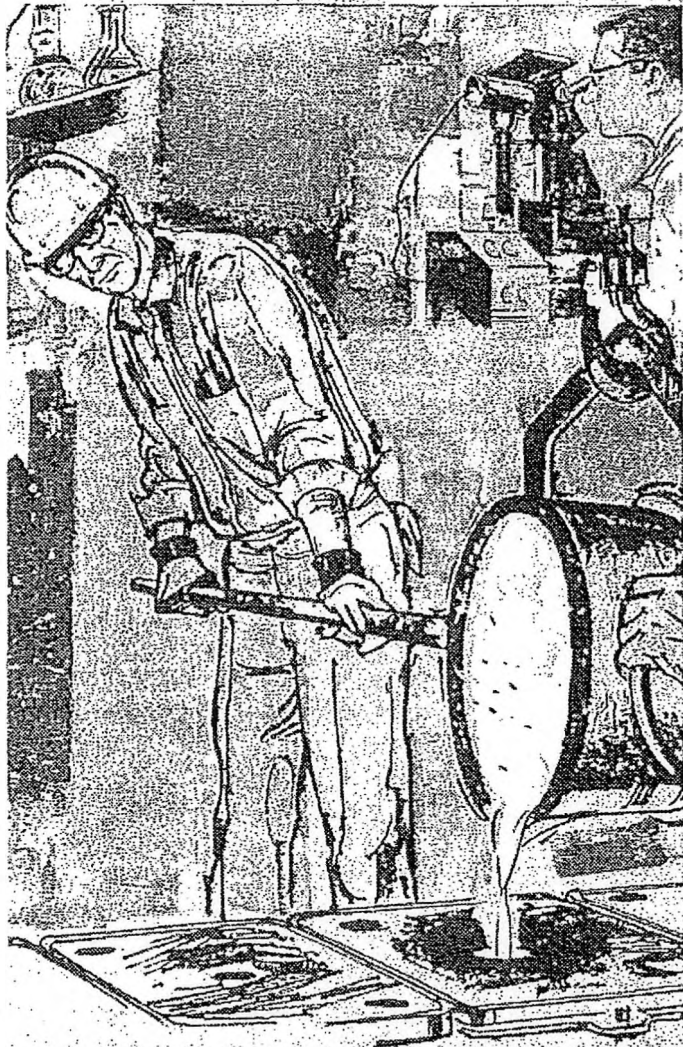
Jack Morgan, Technical Service Manager, and John Gotheridge, Sales Manager, Foundry Division, risering a casting at the request of a steel foundry. One of the "second opinion services" offered by Foseco.

KRd 0015

Foseco®



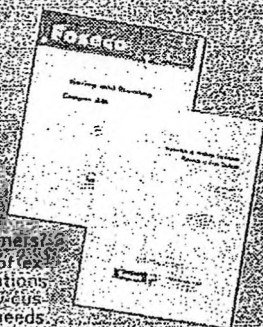
"Wherever metals are poured"



THE FOSECO MAN

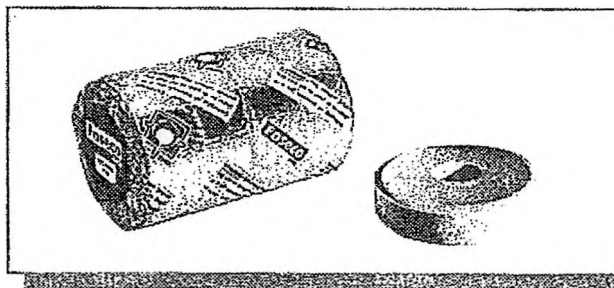
The Foseco man has worked in foundries. Many are recognized authorities and contribute to the fund of available knowledge in the foundry and mill industry. The Foseco man is knowledgeable about foundry practice, can communicate with its people, and understand its everyday work problems. He can offer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

How does this benefit Foseco customers? Foseco can adapt its plus 10 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, METHOD

FOSECO
FOUNDRYMAN'S HANDBOOK
387 Pages of Foundry
Technology

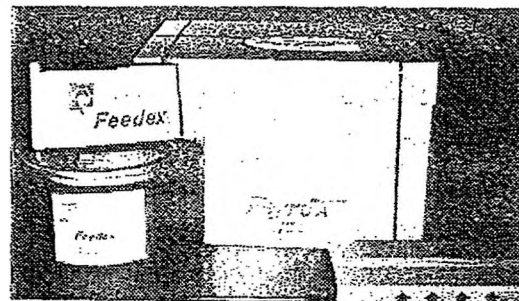


The handbook contains facts and figures, charts and graphs, for the practical foundryman, metallurgist and apprentice. It is pocket size with a flexible leatherette cover, and designed for easy, daily reference in the foundry.

Kradel 0016

CTS...

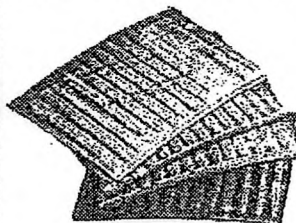
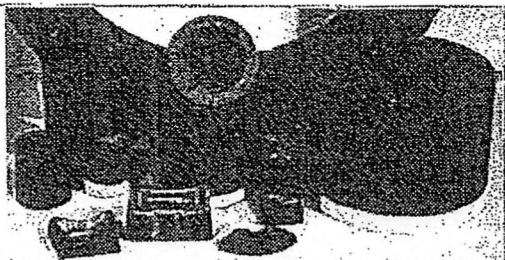
Fosco products are "engineer packaged" in bags, drums, boxes, pails and pallets for sale and speedy shipment.



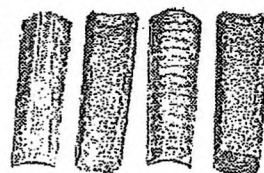
A corner wedge of a Profax® hot top is being hammered into an ingot mold to secure the side slabs.



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.



5, KNOW-HOW FOR BETTER CASTINGS

30 YEARS OF "FOUNDRY PRACTICE"

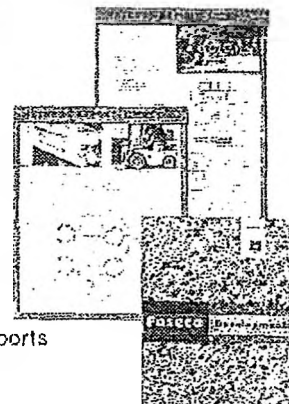
One of the Most Widely Read
Foundry Periodicals in the World



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.

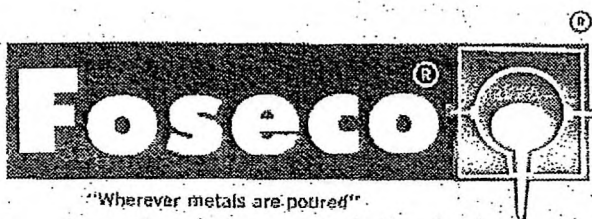
"EXTRA VALUE" SERVICE

World-wide Research and
Application Engineering Reports

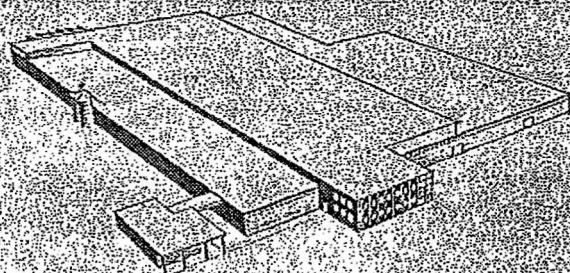


The latest developments and research projects of the Fosco group of 19 companies are published annually in FOSECO DEVELOPMENTS.

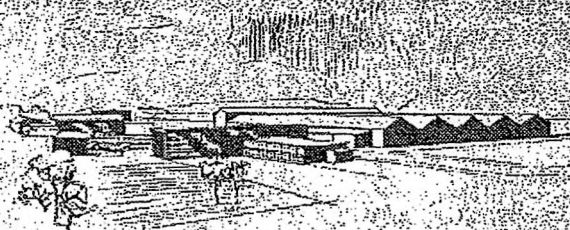
METHODS REPORT is a "case-history" application engineering report sent regularly to metal casters to generate ideas and inform of proven worthwhile methods of producing quality castings economically.



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
GESBLL SCHAFFT, m.b.H.

Australia
Parramatta, New South Wales
FOSECO PROPRIETARY LIMITED

Belgium
Brussels
FOSECO S.A.

Brazil
São Paulo
FOSECO do BRASIL LTDA

Canada
Guelph, Ontario
FOSECO CANADA, LTD.

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

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

Holland
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FOSECO NEDERLAND, N.V.

India
Bombay
GREAVES FOSECO LTD.

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

Spain
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FOSECO ESPANOLA, S.A.

Switzerland
Zug
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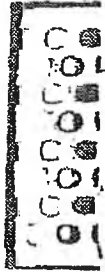
United Kingdom
Leamworth
FOSECO (U.K.) LIMITED

U.S.A.
Cleveland
FOSECO, INC.

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FOSECO, INC. • P.O. BOX 8728 • CLEVELAND, OHIO 44135
PLANT: 20200 SHELTON RD. • CLEVELAND, OHIO 44142

Foseco*



PRODUCTS FOR THE STEEL INDUSTRY



* Reg. Trade Mark



Kradel 0019

INGOT FEEDER HEAD MATERIALS

For more than thirty years Foseco has served the metallurgical industry and has led the way in improving ingot yields with highly efficient expendable linings for ingot feeder heads, and surface feeding compounds. Maximum yields of mould-killed and fully-killed steel in all steel qualities are obtained consistently and economically. Pre-fabricated units or assemblies ready for immediate use are supplied by your local Foseco company to designs made by Foseco engineers. Foseco specializes in supplying products which are clean to use and free from unpleasant and toxic fumes.

FEDEX* exothermic head lining material

This mouldable material is available in a wide variety of types of varying sensitivities and heat output. Chilling of the head metal is delayed and, after burning, the residual material insulates the head to give maximum feeding efficiency from low volume feeders. Whilst it is used on all sizes of ingots, it is of special benefit on smaller ingots (see diagram). The material can also be supplied as a powder for fabrication by the steelworks; thermo-setting, self-drying and silicate-bonded types are available.

PROFAX† insulating head lining material

On larger ingots, conservation of the heat already present in the liquid steel is more important than the supply of external heat. Profax is a superior lightweight insulator which can be supplied to almost any desired shape and gives yields which are similar to those obtained with Fedex. Heads are fitted quickly and easily with no call on crane capacity. Good surface condition of the head, and the absence of a pronounced head/body demarcation line, makes possible the use of metallurgically sound head metal as prime yield.

Where required, feeder heads can be designed for setting at different heights to give variable ingot lengths from the same mould. All Foseco proposals for hot-topping include the recommendation of the most suitable anti-piping compound for the particular ingot.

*Patented by Sandviken Jernverk AB. Manufactured under licence.

SURFACE FEEDING COMPOUNDS

FERRUX* anti-piping compounds

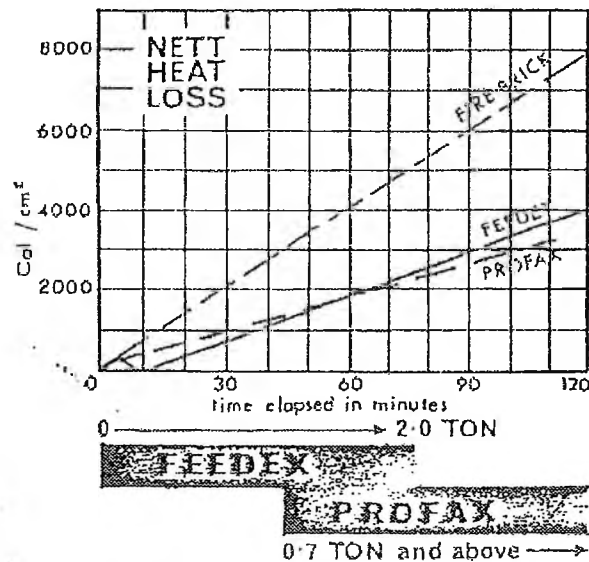
Much of the benefit of superior head lining materials can be lost by using inefficient anti-piping compounds. The Ferrux range of products has been developed to minimise heat losses by radiation. Types are available with varying sensitivities and heat output to meet the requirements of ingots of all weights.

KALMEX*

thermit anti-piping compounds

Similar in application to Ferrux, but molten iron is produced by the reaction which develops heat approaching 2000°C. (3600°F.) If for any reason there is not sufficient steel in the ladle to fill completely the last ingot in a cast, the addition of Kalmex will give a yield high enough in the shortened ingot to warrant it being rolled instead of being remelted.

The diagram shows the thermal characteristics of firebrick, Feedex and Profax under the conditions of our standard evaluation test. The heat loss through each material over a given period has been related to approximate ingot weights to indicate the weight ranges where Feedex and Profax are recommended.



SURFACE IMPROVEMENT METAL AND REFRACTORY PROTECTION

STELOTOL*

for ingot surface improvement

Bad ingot surfaces result in difficult stripping, high dressing costs and direct material loss. The Stelotol range of products reduces these and the costs of mould coating. There are types for both top and bottom pouring, including surface covering fluxes, and a conveniently handled, ignitable product which deposits an even coating on the walls of the empty mould.

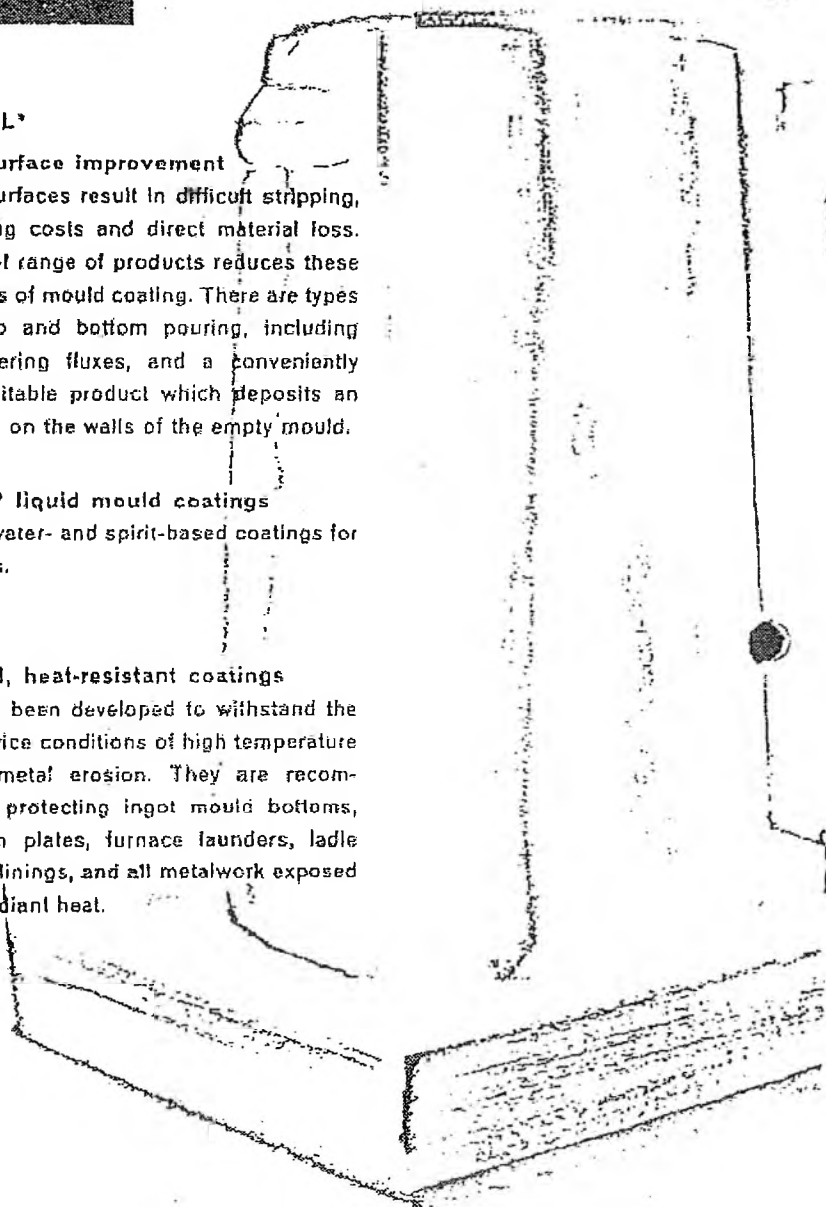
INGOTOL* liquid mould coatings

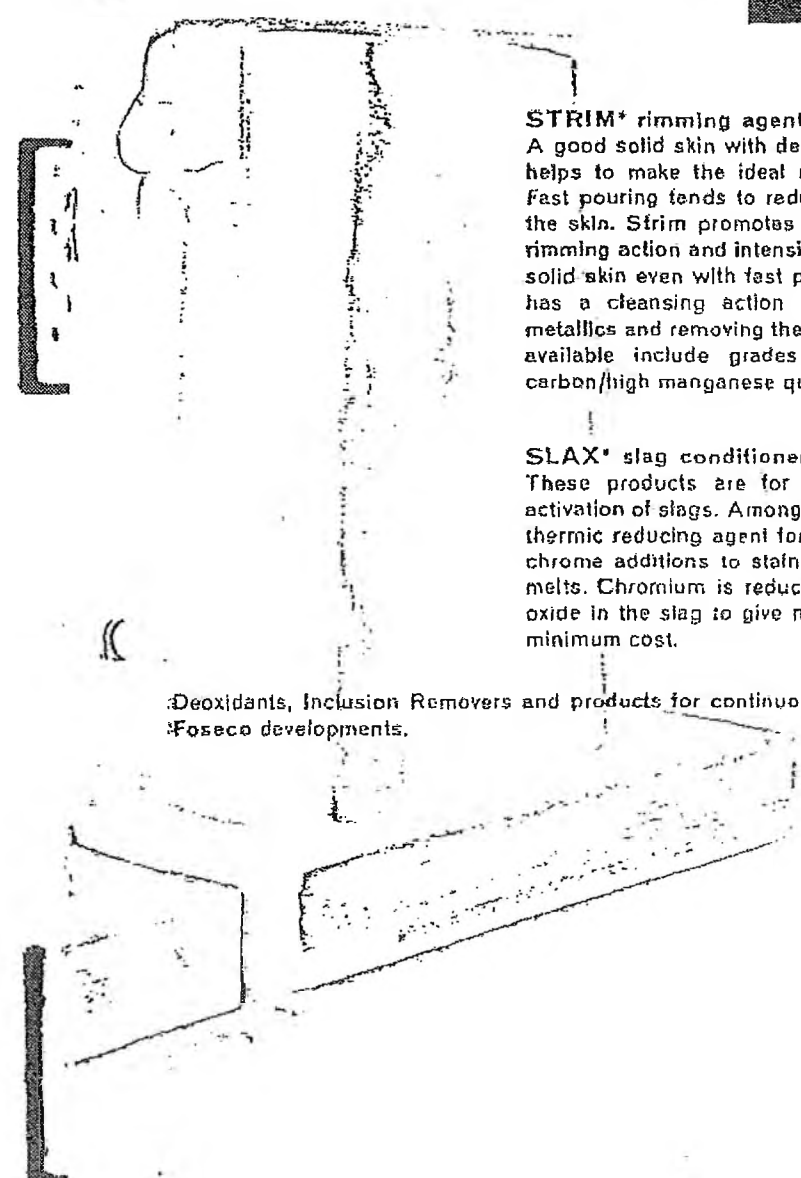
A range of water- and spirit-based coatings for ingot moulds.

KORON*

water-based, heat-resistant coatings

Grades have been developed to withstand the arduous service conditions of high temperature and liquid metal erosion. They are recommended for protecting ingot mould bottoms, ingot bottom plates, furnace launders, ladle and tundish linings, and all metalwork exposed to intense radiant heat.





LIQUID METAL TREATMENT

STRIM* rimming agents

A good solid skin with deep-seated blowholes helps to make the ideal rimming steel ingot. Fast pouring tends to reduce the thickness of the skin. Strim promotes an early start to the rimming action and intensifies it, giving a good solid skin even with fast pouring rates. It also has a cleansing action by coalescing non-metallics and removing them to the slag. Types available include grades for rimming high carbon/high manganese qualities.

SLAX* slag conditioners

These products are for the rapid chemical activation of slags. Among them is an aluminothermic reducing agent for improving yields of chrome additions to stainless and other steel melts. Chromium is reduced from the chrome oxide in the slag to give maximum recovery at minimum cost.

Deoxidants, Inclusion Removers and products for continuous casting are other Foseco developments.

SCALE AND DECARBURISATION PREVENTION

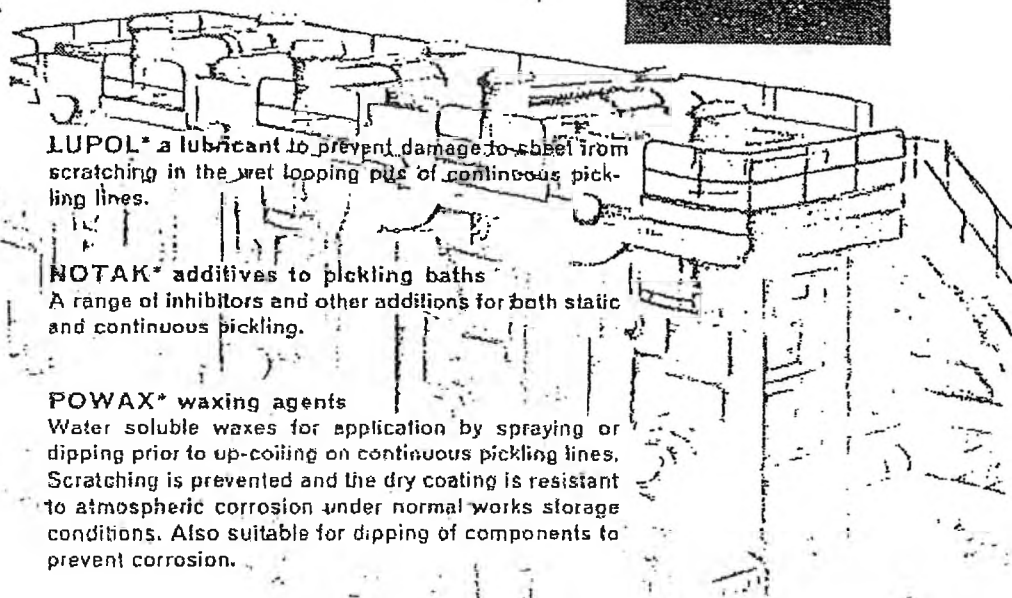
ANISCOL* protective paints

Scale formed on billets and slabs during reheating prior to further hot-working results in direct material loss. The type of scale formed on some steel qualities may cause defects in the end product, for example in tube-making.

Permissible limits of surface decarburisation on some steels are very narrow, and critical on finished components.

The Aniscol range of protective paints prevents excessive scale losses and greatly reduces decarburisation.

Water- and spirit-based paints covering a wide range of service temperatures are available for spraying, brushing or dipping.



COLD METAL TREATMENT

LUPOL* a lubricant to prevent damage to steel from scratching in the wet looping pile of continuous pickling lines.

NOTAK* additives to pickling baths

A range of inhibitors and other additions for both static and continuous pickling.

POWAX* waxing agents

Water soluble waxes for application by spraying or dipping prior to up-coiling on continuous pickling lines. Scratching is prevented and the dry coating is resistant to atmospheric corrosion under normal works storage conditions. Also suitable for dipping of components to prevent corrosion.

Other products for cold working include Wire Drawing Compounds, Degreasers and Rolling Lubricants.

FOSECO SERVICE

The experience accumulated from our world-wide activities is always at the disposal of the industry we are proud to serve. Perhaps you have a problem where our products and service may be of assistance—we would be pleased to discuss it with you.

RESEARCH AND DEVELOPMENT

Foseco research and product development is continuous.

This brochure is an outline of our current range of products serving the steelmaking and finishing industry. Further information in detail on these products and advice on how Foseco can be of service to you is available from your local Foseco company.



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Buenos Aires

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AUSTRIA
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Postfach 16.

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Ltda., Caixa Postal No. 12521, São Paulo.

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Foseco S.p.A., Milano, Via E. de Amicis 53.

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Calle Pedro IV, 345 (interior), Barcelona (S).

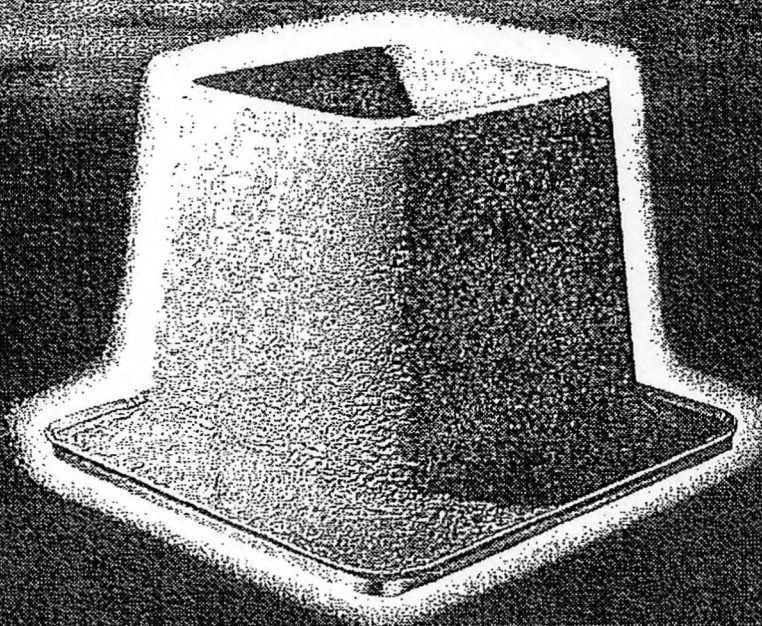
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ANOTHER NEW IDEA FROM FOSECO, INNOVATORS TO THE STEEL INDUSTRY



PROFAX[®] EXPENDABLE, ONE-PIECE, LOW VOLUME HOT TOP SYSTEM

- PRODUCES CONSISTENT, HIGH QUALITY INGOTS
- ASSURES MAXIMUM INGOT YIELD
- SAVES LABOR
- SAVES TIME
- LOWERS COSTS
- INCREASES EQUIPMENT USE
- CUSTOM ENGINEERED TO YOUR PLANT'S SPECIFIC NEEDS

* U.S. Patent Numbers Re 25,915-Re 25,905, 3,237,296 and other patents pending.

THE PROFAX® HOT TOP SYSTEM FOR B.E.U. INGOTS

The unique, one-piece, FOSECO Profax Hot Topping System is a simplified, economical, highly efficient method of achieving greater benefits from the practice of hot topping big end up ingot molds. It consists of:

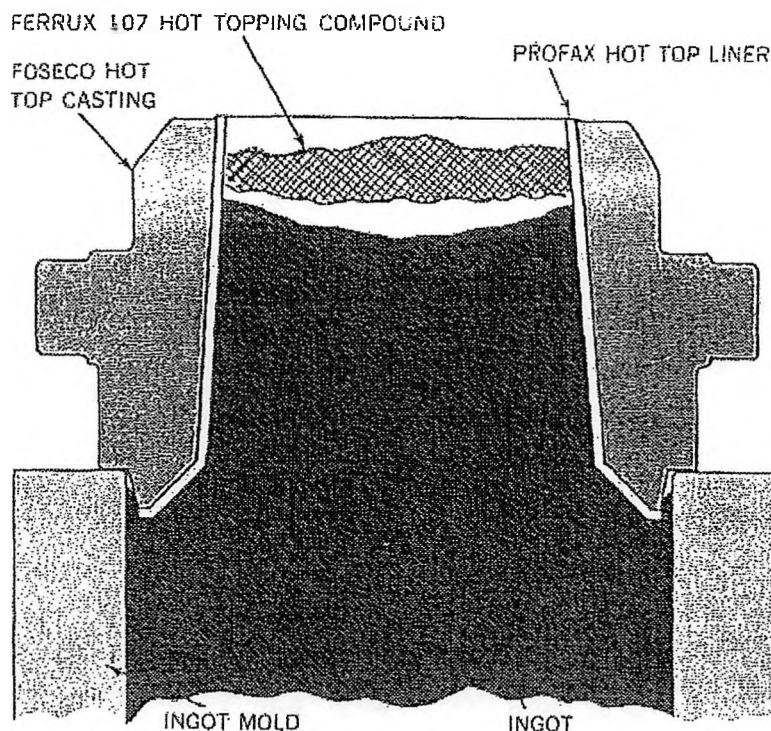
1. An expendable, light weight, one-piece, Profax insulating liner.
2. A permanent casting into which the Profax hot top is fitted and which requires no other refractory lining or treatment of any sort . . . NO BACK-UP REFRACTORY! . . . NO SLURRY! . . . NO SAND RING!
3. Ferrux® 107 exothermic-insulating hot topping compound added to the mold after teeming.

PROFAX PRODUCES CONSISTENT, HIGH QUALITY INGOTS

The prefabricated, FOSECO one-piece hot top is manufactured of the same efficient materials made famous throughout the steel making world as Profax insulating hot top boards for B.E.D. ingots.

The thin wall, one-piece B.E.U. Profax hot top liner is produced on precision machines to tolerances impossible with conventional refractories. Engineered with an integral base flange and steel wiper strip that assures a positive seal at the hot top junction, the Profax liner **ELIMINATES THE SAND RING.**

When Profax hot topped ingots are stripped, residual material falls away as a powder avoiding any



A cross sectional view of a big end up ingot mold equipped with the Profax hot top system.

carry-over of refractory into soaking pits or rolling mill.

The FOSECO one-piece hot top is designed without ledges or recesses into which molten steel could penetrate thus reducing the hazard of hanger cracks in the ingot.

FOSECO's Profax hot top system is **TOTALLY DRY** . . . eliminating all dangers resulting from the residual moisture present in other hot topping systems during pouring.

PROFAX ASSURES MAXIMUM YIELD

Because of its excellent insulating properties, the Profax liner does not require any back-up refractory

material. The thin Profax wall alone provides the high thermal efficiency needed for a low volume hot top.

The base of the Profax liner has a sloping shoulder instead of the conventional, wide, flat shoulder produced by a sand ring. This slope provides an improved rolling shape to the ingot and substantially reduces the extent of shoulder over-roll.

The Profax liner's flared base provides an approximate 80% feed area. Other B.E.U. hot tops have wide flat base shoulders with a feed area of less than 50%. The improved feeding characteristics of FOSECO's Profax liner enhances the segregation characteristics of the ingot and assures maximum product yield.

Profax is non-friable . . . has no spalling tendency . . . eliminates rejections from nonmetallic inclusions during pouring.

FOSECO's Profax material will not adhere to the ingot shoulder . . . unlike sand rings which can leave a residue to become entrapped during rolling and result in product loss. The Profax system assures a minimum top discard from the rolled ingot without endangering metallurgical quality.

PROFAX SAVES TIME

Use of the one-piece Profax hot top invariably results in sizable savings of time.

Assembly of the hot top is an easy, rapid, one-man operation. The lightweight Profax liner is simply placed in the casting and secured with wire clips. That's all there is to it!

Assembling twenty tops per hour/ per man is a common accomplishment. The Profax one-piece liner is compact, moisture resistant, has good handling strength and is not

easily damaged under steelworks conditions. No skilled labor is required and there is no need for special tools or handling equipment.

PROFAX SAVES LABOR

At all stages of hot topping procedures, the Profax system produces significant savings in labor.

With Profax, there is no tedious, costly, time-consuming re-bricking, patching, or application of slurry between pours . . . and no drying operation.

The expended Profax material does not adhere to the hot top casting or ingot mold eliminating the need for cleaning after each use.

The rugged FOSECO hot top casting is designed for longer life with proportionately lower cost per pour. It is engineered with smooth contours, both inside and out, for easy cleaning of steel splashes. Turning trunnions are located at the point of balance to insure simple one-man manipulation on the hot top assembly stand.

PROFAX INCREASES EQUIPMENT USE

The absence of semi-permanent back-up refractory allows the hot top casting to cool much more rapidly after use. It also eliminates time spent on patching and drying. These facts, coupled with the rapid assembly of the Profax hot top, result in a great improvement in turn around time. Three to four uses a day can be easily attained, which, in turn, permits a lower inventory of hot top castings.

PROFAX REDUCES COSTS

Use of the Profax one-piece hot top system invariably results in worthwhile reductions in the costs of finished product tonnage as a result of:

- Low cost per ingot ton
- Savings in time and labor
- Economies effected in equipment use
- Consistently high-quality product
- Maximum yield

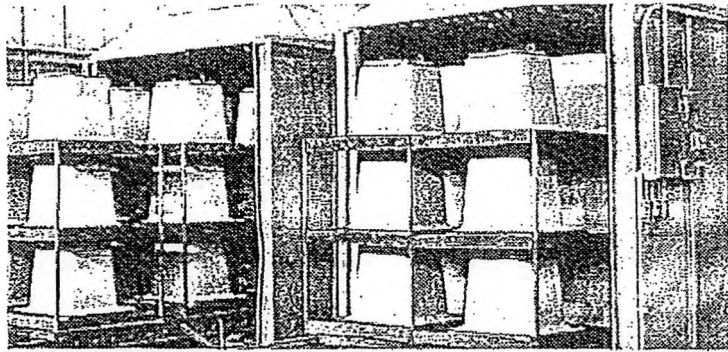


Installation of the lightweight Profax liner into the FOSECO casting is quickly and easily accomplished by one man. A 25" x 27" hot top liner weighs only 38 pounds.

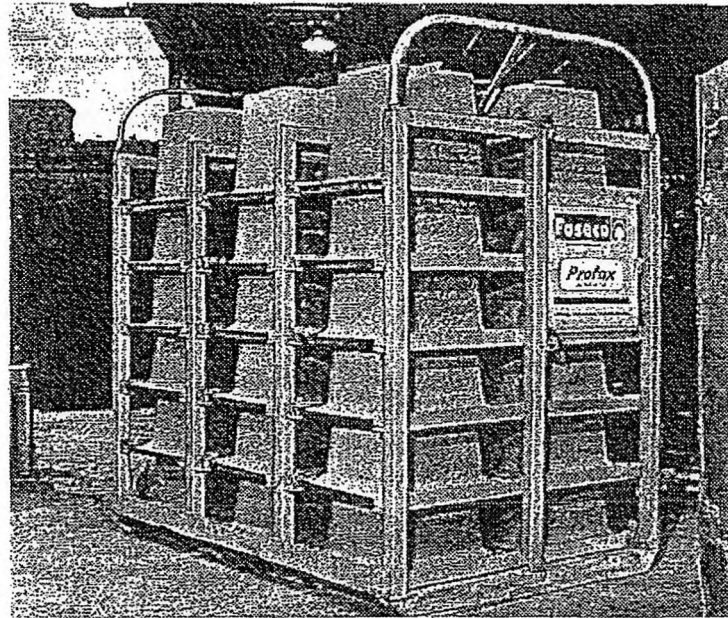


Securing the liner in the casting is accomplished with wire clips. The assembly is then inverted and is ready for placement on the B.E.U. Ingot mold.

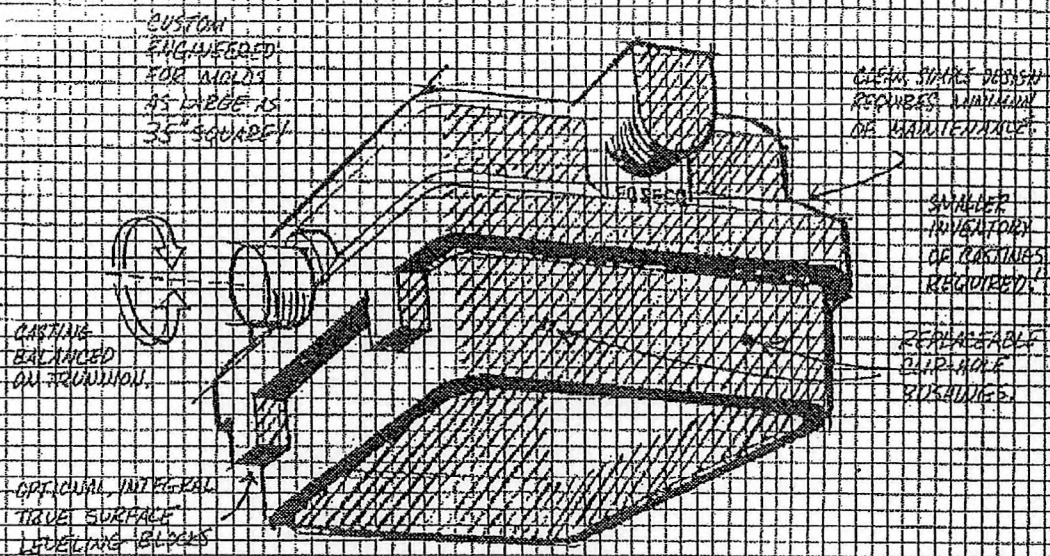
FOSECO Profax hot top liners are produced on FOSECO-developed automatic machines. The precision and performance of the finished product is assured by careful quality control measures enforced throughout each stage of manufacture.



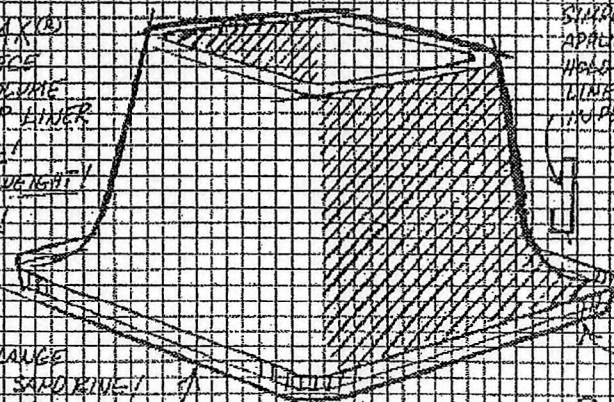
Finished Profax one-piece liners are nested on rugged steel cradles. Protected in this fashion, they will be shipped to the steel mill for which they were custom engineered and manufactured. They may also be shipped on expendable pallets.



Supplies of Profax one-piece hot top liners are trucked to steel mills at a rate matching mill production schedules. Stand-by supplies of Profax liners at the mill insure against an inadvertent shortage of hot tops when needed. Empty racks from previous deliveries will be brought to the FOSECO plant on the truck's return trip. Kradel 0030



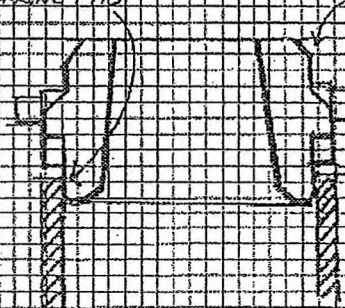
PROFAXID
ONE PIECE
ADD VOLUME
NOT TOP LINER
STICKING!
LIGHT WEIGHT!
DUE!



SIMPLE EASY
APPLIED CLIPS
HOLD PROFAXID
LINER FIRMLY
IN PLACE

UNDER RING
ASSEMBLES
SAFELY SEAL

BUILT-IN FLANGE
ELIMINATES SAND RING!
NO CARRY OVER
OF REFRIGERANTS
INTO SINKING PITS



CASTING COOLS
EASILY AFTER USE.
MAY BE USED AGAIN
AND WASH AFTER
STREPPING!

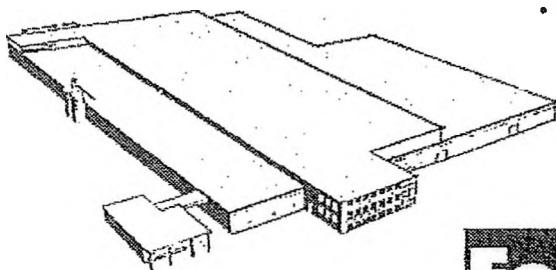


EDGE OF
ASSEMBLY!



FOSECO MANUFACTURING PLANTS ARE LOCATED IN:

- Buenos Aires, Argentina
- Salzburg, Austria
- Padstow, New South Wales, Australia
- Brussels, Belgium
- Sao Paulo, Brazil
- Guelph, Ontario, Canada
- Chelles (S. & M.), France
- Borken/Westf., Germany
- Woerden, Holland
- Bombay, India
- Milan, Italy
- Osaka, Japan
- Mexico City, Mexico
- Johannesburg, South Africa
- Barcelona, Spain
- Zug, Switzerland
- Tamworth, England
- Cleveland, Ohio, U.S.A.
- Mt. Braddock, Pa., U.S.A.
(Eureka Fire Brick Works, Inc.)



CENTRAL RESEARCH:

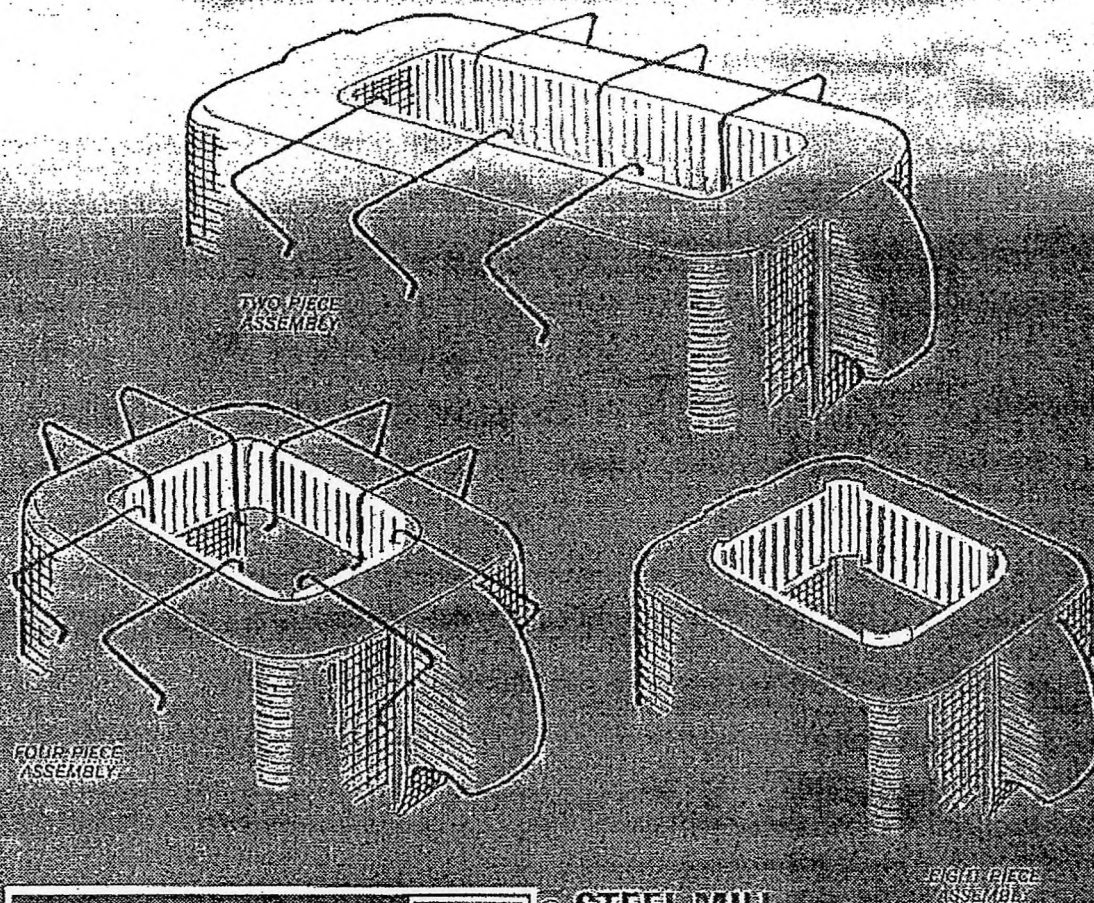
- Birmingham, England



FOSECO, INC.
P. O. Box 8728
Cleveland, Ohio 44135
234-3551

Kradel 0032

PATENTED, EFFICIENT, HOT TOP SYSTEM



PROFAX[®] EXPENDABLE HOT TOP SYSTEMS LOW VOLUME

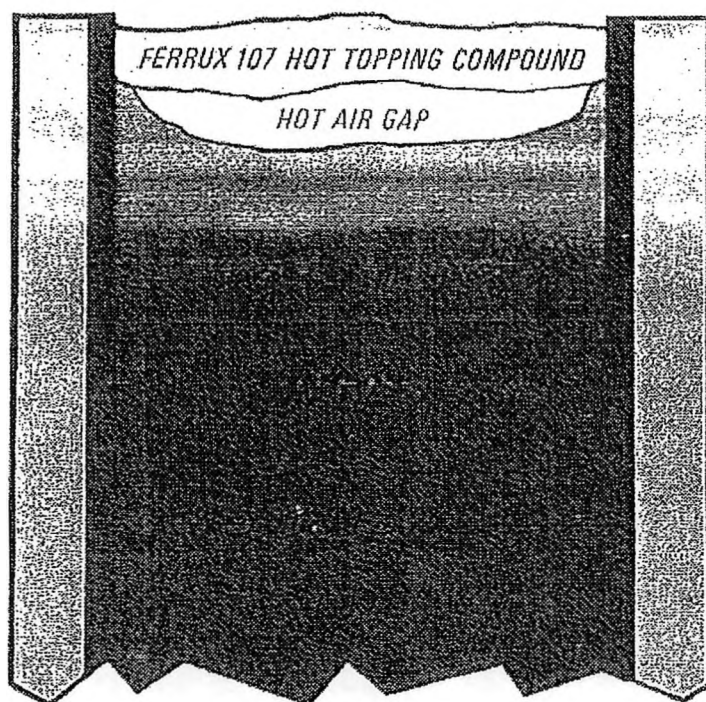
- ASSURE CONSISTENT HIGH PRODUCT YIELD
- IMPROVE INGOT QUALITY
- SAVE LABOR • SAVE TIME
- LOWER COSTS PER PRODUCT/TON
- INCREASE EQUIPMENT USE
- DECREASE STORAGE SPACE NEEDS
- CUSTOM ENGINEERED TO YOUR PLANT'S SPECIFIC NEED

* This product or its manufacture covered by one or more of the following U.S. patent numbers: Re 25,965, Re 25,915, 3,175,723, 3,297,296, 3,006,069 and 3,300,322.

Kradel 0033

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PRINTED IN U.S.A.



THE PROFAX® HOT TOP SYSTEMS FOR B.E.D. INGOTS*

Profax Hot Topping Systems provide a simplified, economical, highly efficient method of achieving maximum benefits from hot topping ingot molds. There is a Profax System available for use with any type of ingot mold.* Profax Systems are custom engineered to meet individual mills' production conditions.

1. Two or four piece slab assembly; for use in square and rectangular big-end-down molds,

or . . .

2. Eight piece slab assembly; consisting of four boards and four corner pieces for application in square and rectangular big-end-down molds

and . . .

3. FOSECO Ferrux® 107: exothermic/insulating hot topping compound added to the mold after teeming.

PROFAX ASSURES CONSISTENT, HIGHER QUALITY INGOTS

Profax hot top boards are prefabricated, insulating liners produced on precision machines to tolerances impossible with conventional refractories. The exceptionally high insulating efficiency of the Profax material permits $\frac{3}{4}$ " thin, tapered, low-volume hot top assemblies.

The wider, flat feed of the Profax Hot Topping Systems (due to the very thin hot top wall), plus the thermal efficiency

of Ferrux 107 hot topping compound, results in an ingot with consistently dependable sound metallurgical structure.

Production experience at leading mills has shown that, with Profax, certain grades of steel generally made big-end-up can be acceptably and consistently produced big-end-down.

Profax is non-friable and promotes cleaner steel. When ingots are stripped, residual material falls away as a powder avoiding any carry-over of refractory material into soaking pits or rolling mill.

FOSECO's Profax systems are **TOTALLY DRY** . . . eliminating all dangers resulting from the residual moisture present in other hot topping systems during teeming.

PROFAX ASSURES MAXIMUM YIELD

Because of its excellent insulating properties, the thin Profax wall alone provides the high thermal efficiency needed for a low volume hot top. The feather-edged bottom of the thin Profax liners results in ingots which

*FOSECO also has a one-piece Profax hot top liner for B.E.U. ingot molds. Request descriptive literature.

are, to all practical purposes, shoulderless.

This permits full use of sound portion of the ingot. During rolling, the tapered shoulder disappears. (See Figures 9 & 17.)

The effectiveness of the Profax Hot Topping Systems results in ingots with pipe and segregation confined to the uppermost portion of the hot top metal resulting in extremely high product yield.

PROFAX SAVES TIME

Use of Profax Hot Topping Systems invariably results in significant savings of time.

Assembly of Profax hot tops is an easy, rapid, one-man operation. In the case of two or four slab assemblies, Profax boards are suspended into the mold, at controlled depths, from hanger rods. They are then secured with wire clips, powder-driven nails or other suitable fastening methods. (See Figures 1-4.)

In eight piece assemblies, where ingot size may vary, the four side boards are held in proper position by a collapsible jig. The locking corner wedges are then inserted and the jig removed. Where molds are used only for maximum size ingots, Profax boards are available with integral ledges or attached hangers to facilitate assembly.

Assembling 20 Profax hot tops per man-hour is a common accomplishment! The Profax boards are lightweight, moisture resistant, have good handling strength and are not easily damaged under steelworks conditions. No skilled labor is required and there is no need for cranes or other material handling tools.

PROFAX SAVES LABOR INCREASES PRODUCTION FLEXIBILITY

The lightweight Profax material results in significant savings in labor at all stages of ingot production.

No cranes or other mechanical material handling equipment is required to install Profax hot tops. Therefore, hot topping can be accomplished at the pouring platform. A change in production scheduling, from rimmed to killed steel, can be easily met with rapid mold preparation even after the molds have been moved to the pouring site.

PROFAX REDUCES STORAGE SPACE REQUIREMENTS

The compactness of Profax materials results in great savings of storage space required for bulky, ordinary refractory materials. 120 palletized Profax hot tops for a 30" x 66" ingot mold can be stored in an area only 42" x 60".

PROFAX REDUCES COSTS

Adoption of a Profax expendable hot top system reduces net cost per product ton as a result of:

- Low cost hot tops
- Rapid, easy installation
- Reduced labor costs
- Elimination of installation cranes
- Reduced storage and freight costs
- Consistent, high-quality metallurgy
- Maximum ingot yield

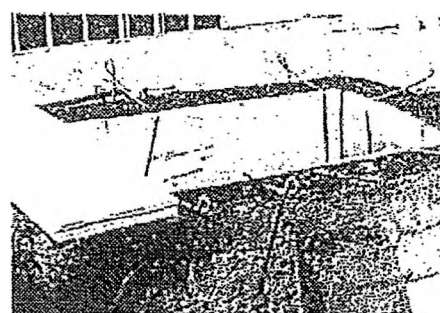


FIG. 8. Typical four-slab Profax hot top installation. Recommended for use on large slab molds where length to width ratio is less than 2:1.

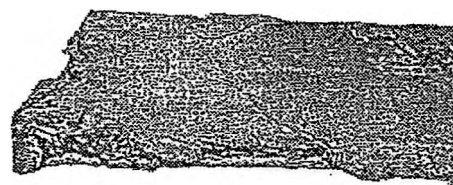


FIG. 9. Slab (top) produced from an ingot made with a conventional hot top. Note over-roll and poor slab surfaces. Top discard of this slab was more than 7 feet long. Slab (bottom) produced from same type ingot but hot topped with Profax. Note excellent surface lack of over-roll. Sound product required a top cut only 3½ feet.



FIG. 10. The above pallet (measuring only 44" x 56" at 47" high) contains 75 eight piece hot tops for a 23" x 2" ingot mold.

COMPONENTS FOR A PROFAX 8 PIECE 22" SQUARE HOT TOP:

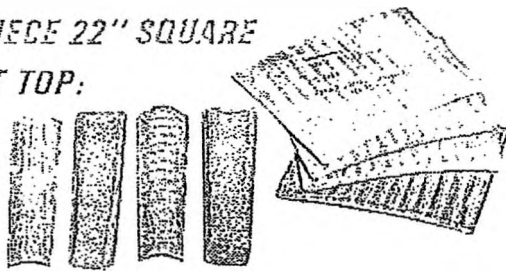


FIG. 11. Components for a Profax 8 piece 22" square hot top. Each side slab weighs 4½ pounds; each corner post 1½ pounds. Total weight: only 24 pounds.

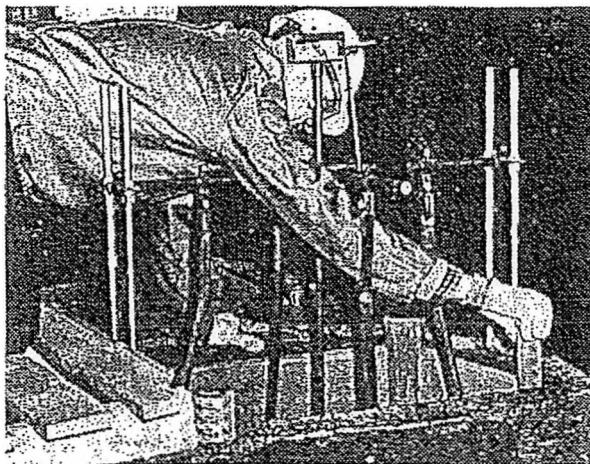


FIG. 12. The 4 side slabs are held securely in place by an automatic jig as the 4 corner wedges are driven in. Complete assembly of the 8 piece Profax hot top is accomplished in less than two minutes.

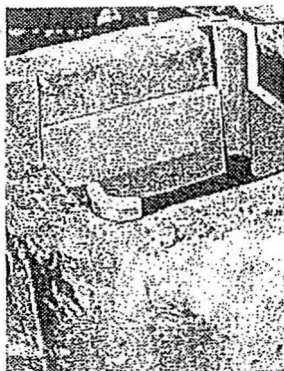


FIG. 13. Profax 8 piece hot top assembled 6" below the top of the ingot mold (left) to produce a shorter hot topped ingot.

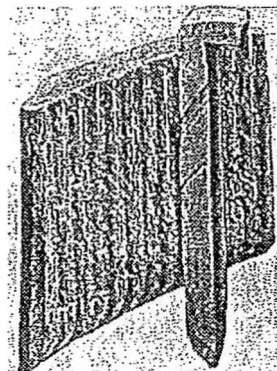


FIG. 14. Cross section view of ledged Profax boards which

automatically position the hot top's depth location in the mold. This style of Profax is recommended where required ingot size does not vary from heat to heat.

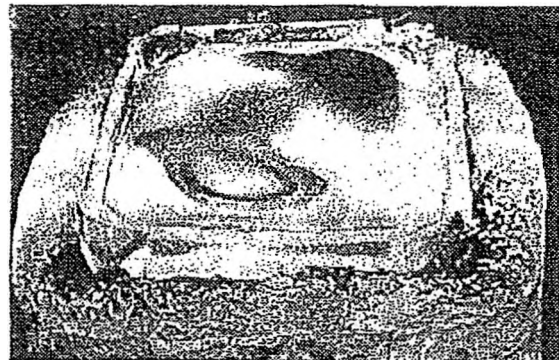


FIG. 15. Profax 8 piece hot topped ingot treated with Ferrux 107 exothermic/insulating hot topping compound. Note the unbroken crust and absence of smoke.

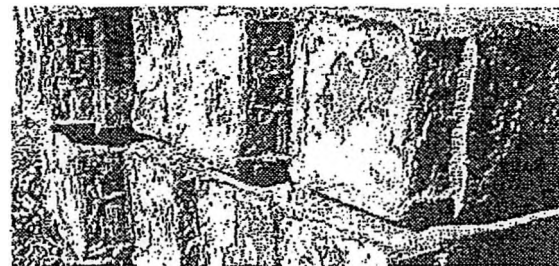


FIG. 16. The same 22" square ingots are shown above after stripping. Notice the absence of any refractory material in the hot top area, the clean tapered shoulder of the hot top and ingot body junction; the flat feed which assures good center quality.

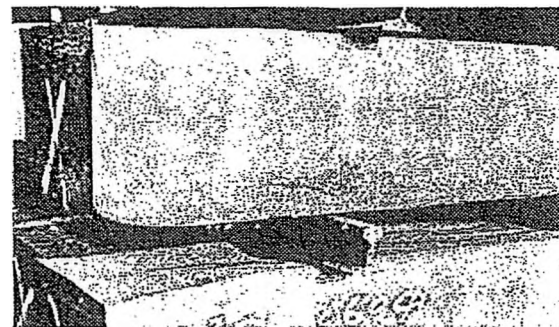


FIG. 17. Blooms made from the Profax hot topped 22" square ingot. The junction of the hot top and body is located approximately at the position of the rails. The lack of over-roll and absence of any entrapped refractory results in higher product yield.

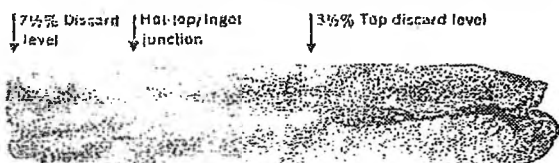


FIG. 18. This is a macro-etch made from the top bloom of a 22" square, big-end-down ingot. Note the complete absence of pipe or segregation below the 3½% top discard area. Also note the cleanliness of the hot top/ingot junction and the sound metal in the undiscarded heat area.

TYPICAL PROFAX® TWO-SLAB HOT TOP

(Recommended for B.E.D. molds with a length to width ratio greater than 2:1.)

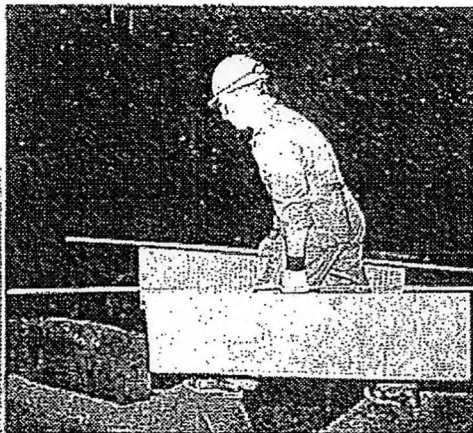


FIG. 1: Lightweight Profax hot tops are easily installed by one man at the pouring platform. The combined weight of the slabs for a 26" x 59" big and down mold is less than 55 pounds.



FIG. 2: The Profax slabs are suspended in the mold from hanger rods by which the slabs were casted. The depth location of the Profax boards can be adjusted up or down in the mold to adjust to heat being poured.



FIG. 3: After the Profax slabs have been tightly secured to the mold wall, the hanger rods are removed for use. The EOSECO engineered clips keep the Profax in place even while the molds are transported over rough trackage.

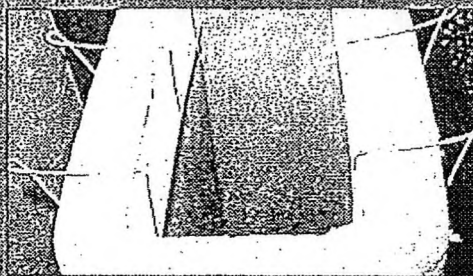


FIG. 4: Typical two slab assembly ready for teeming. Because opened Profax does not adhere to mold walls, laborious mechanical cleaning of hot top area between pours is eliminated.

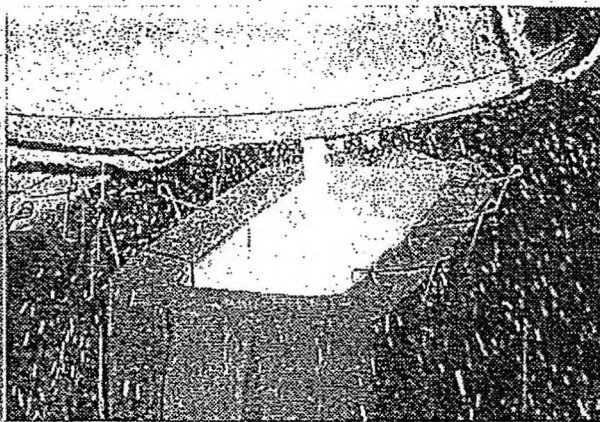


FIG. 5: The thin Profax insulating boards create no restriction at the mold top. They are poured straight up, without shutoffs, reducing the total number of shutoffs per heat. This helps to prevent leaking stoppers.

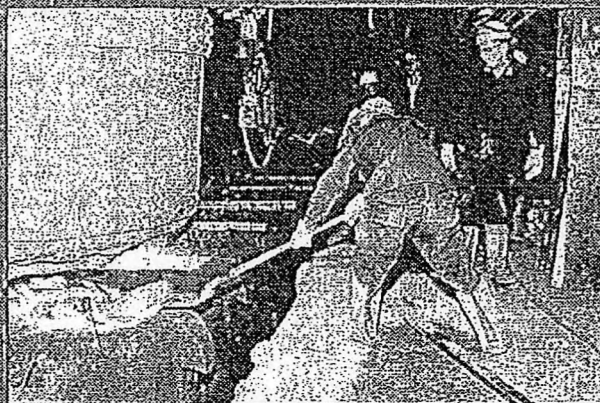
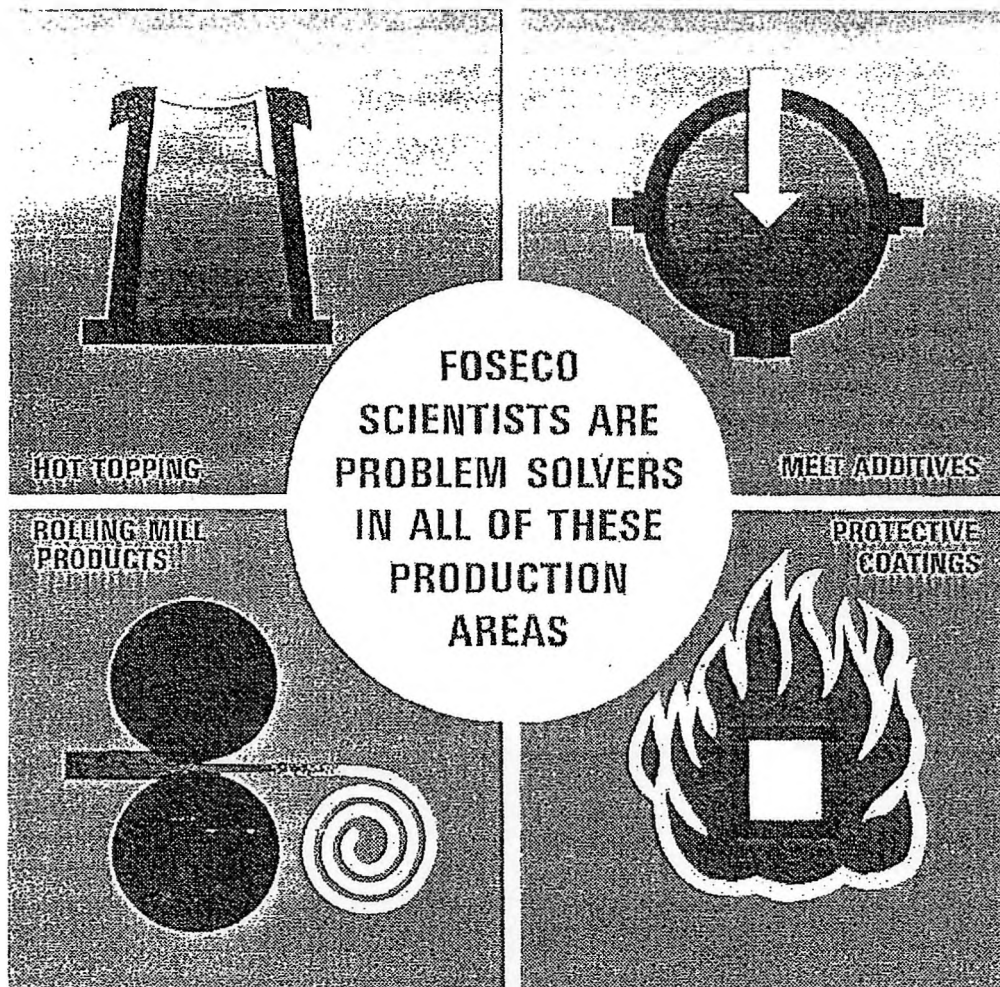


FIG. 6: Ferro-Chill is added immediately after teeming. This superior exothermic insulating hot topping compound forms a thick, solid letack (trap crust) over the hot top. (Ravesta Ferro-Chill Co. Pat. Pending) Notice absence of smoke.

FIG. 7: This is a solid pattern from a typical Profax hot topped mold. Observe that segregation and piping are confined to the uppermost section of the head. The thin tapered junction between the hot top and mold body disappears during rolling. This results in increased production yield.

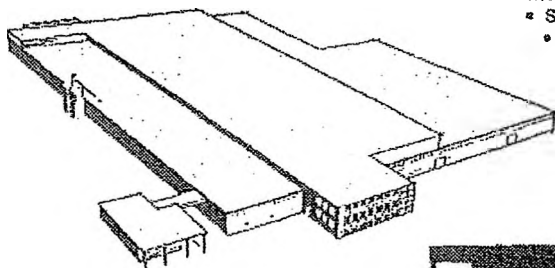


Kradel 0037



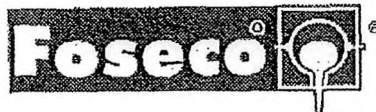
FOSECO MANUFACTURING PLANTS ARE LOCATED IN:

- Birmingham, England
- Buenos Aires, Argentina
- Salzburg, Austria
- Padstow, New South Wales, Australia
- Brussels, Belgium
- Sao Paulo, Brazil
- Guelph, Ontario, Canada
- Chelles (S. & M.), France
- Borken/Westf., Germany
- Woerden, Holland
- Bombay, India
- Milan, Italy
- Osaka, Japan
- Mexico City, Mexico
- Johannesburg, South Africa
- Barcelona, Spain
- Zug, Switzerland
- Tamworth, England
- Cleveland, Ohio, U.S.A.
- Mt. Braddock, Pa., U.S.A. (Eureka Fire Brick Works, Inc.)



CENTRAL RESEARCH:

- Birmingham, England

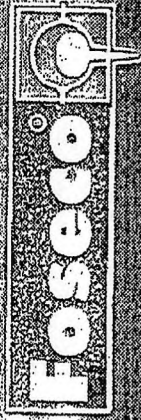


FOSECO, INC.

P. O. Box 8728
Cleveland, Ohio 44135
216/234-3551

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NEW DEVELOPMENTS IN



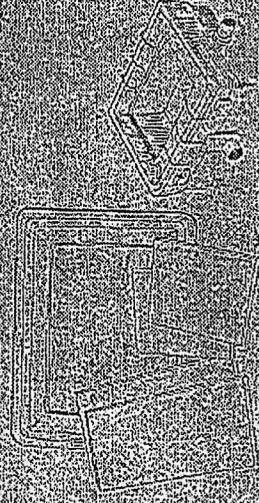
PROFAX[®]

EXPENDABLE, LOW VOLUME HOT TOP SYSTEMS

NEW PROFAX[®]

DRY SLAB
HOT TOP SYSTEM

FOR
B.E.U. INGOTS



The thick, porous, and
dry top lining, placed
between the hot top and
the ingot, is the only dry
top lining system in the
industry.

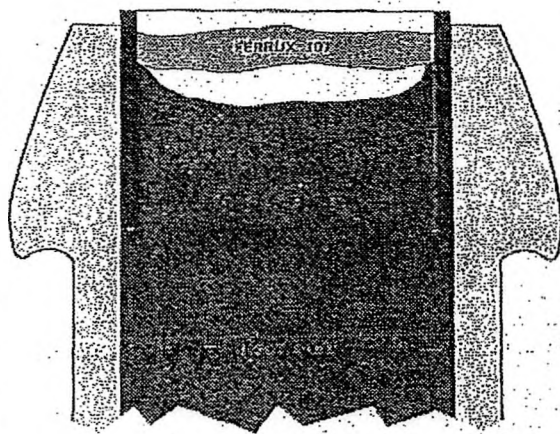
Now the many advantages of the Profax System
are available for hot tops too large for the FOSFOC
B.E.U. hot top for top (or square or large).

Profax hot tops are precise, pre-lubricated, insu-
lating, long producing, low tolerance, impossible
to wear, and they are the only hot top system in the
industry that is efficient. Profax permits a
thin, tapered dry volume hot top assembly
the result is an insignificant shoulder at the hot
top junction which appears without over-melt
the wide, flat bed and thermal efficiency for a
Profax system results in ingots with consistently
dependable, sound metallurgical structure. Pro-
fax is non-fragile, promotes cleanliness. When
ingots are stripped, residual material falls away
as a powder avoiding any carry over into soaking
pits or rolling mill.

FOSCO's Profax systems are 100% dry
eliminating all dangers resulting from the res-
idual moisture present in other hot topping
systems during teeming.

NEW PROFAX®

ONE PIECE
HOT TOP SYSTEM
FOR
B. E. D. INGOTS

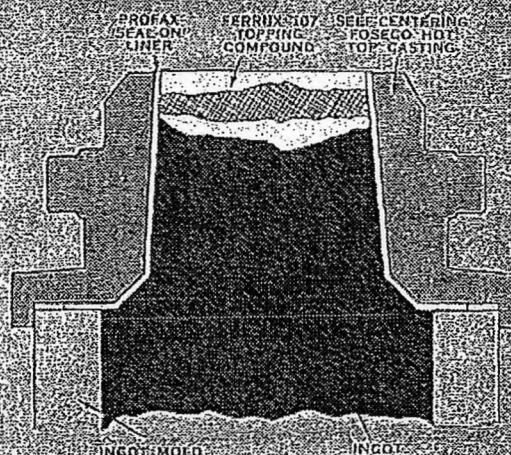


Another hot topping innovation from FOSECO research is the illustrated one-piece hot top for B.E.D. ingot molds . . . production tested and adopted by a midwestern steel mill.

Weighing only 14 lbs., this unit rests on top of its 22 inch square by 84 inch high ingot mold supported by two nails inserted in each of two diagonal corners. With this thoroughly engineered, uncomplicated Profax system, two men can hot top a drag of 40 molds in 15 minutes or less. Compare this to the 35 minutes, 3 men and a crane required for the previously employed, 132 lb. exothermic hot tops. In addition, an average yield increase of 2.79% has been realized through use of the one-piece Profax top and FOSECO Ferrux® 107 exothermic/insulating hot topping compound.

NEW PROFAX®

"SEAL-ON"
HOT TOP SYSTEM
FOR GREATER
YIELD FROM
B. E. U. INGOTS

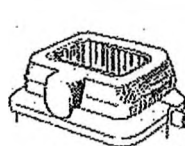


The unique, one-piece, FOSECO "Seal-On" Hot Top serves as both an efficient flow volume liner and an effective sealing gasket between the self-centering hot top casting and the ingot mold. It permits straight up pouring and greatly reduces the potential of head stickers and chancel cracks.

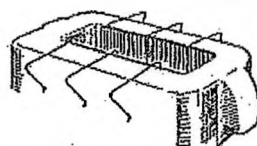
The tapered bottom of this thin Profax liner produces ingots which are, to all practical purposes, shoulderless. This permits full use of the round portion of the ingot including hot top metal. During rolling, the tapered shoulder disappears.

The effectiveness of Profax Hot Topping Systems results in ingots with pipe and segregation confined to the uppermost portion of the hot top metal. Consequently, mills utilizing a Profax system report extremely high product yield.

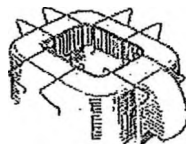
THERE IS A
PROFAX®
HOT TOP SYSTEM
TO MEET EVERY NEED



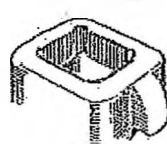
ONE PIECE HOT TOP



TWO PIECE ASSEMBLY



FOUR PIECE ASSEMBLY



EIGHT PIECE ASSEMBLY

Profax Hot Topping Systems provide a simplified, economical, highly efficient method of achieving maximum benefits from hot topping ingot molds. There is a Profax System available for use with any type of ingot mold . . . custom engineered to meet individual mills' production conditions.

1. One piece Profax for big-end-up ingots . . .
2. One piece Profax for big-end-down ingots . . .
3. Two or four piece slab assembly: for use in square and rectangular big-end-down molds, or . . .
4. Eight piece slab assembly: consisting of four boards and four corner pieces for application in square and rectangular big-end-down molds.
5. Five piece dry slab system for big-end-up molds, and . . .
6. FOSECO Ferrux® 107: exothermic/insulating hot topping compound added to the mold after teeming.

The wider, flat feed of the Profax Hot Topping Systems (due to the very thin hot top wall), plus the thermal efficiency of Ferrux 107 hot topping compound, results in an ingot with consistently dependable sound metallurgical structure.

Production experience at leading mills has shown that, with Profax, certain grades of steel generally made big-end-up can be acceptably and consistently produced big-end-down.

Write for
PROFAX®
FACTS
today!!!

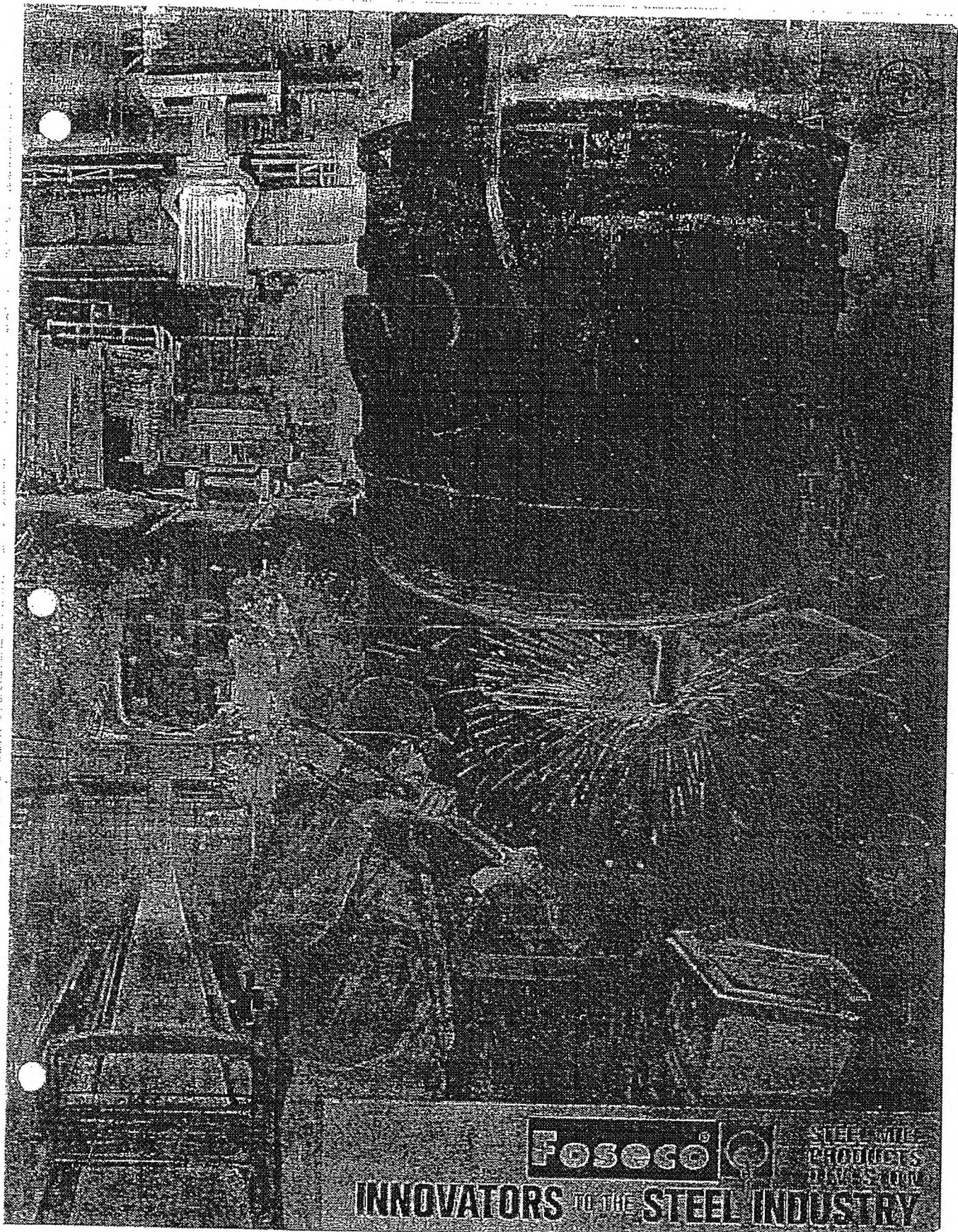


*Foseco Manufacturing Plants
are located in:*

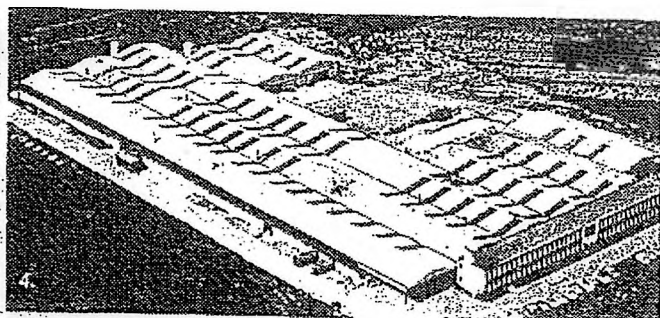
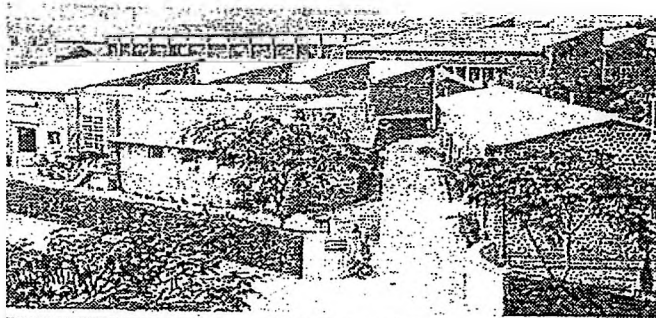
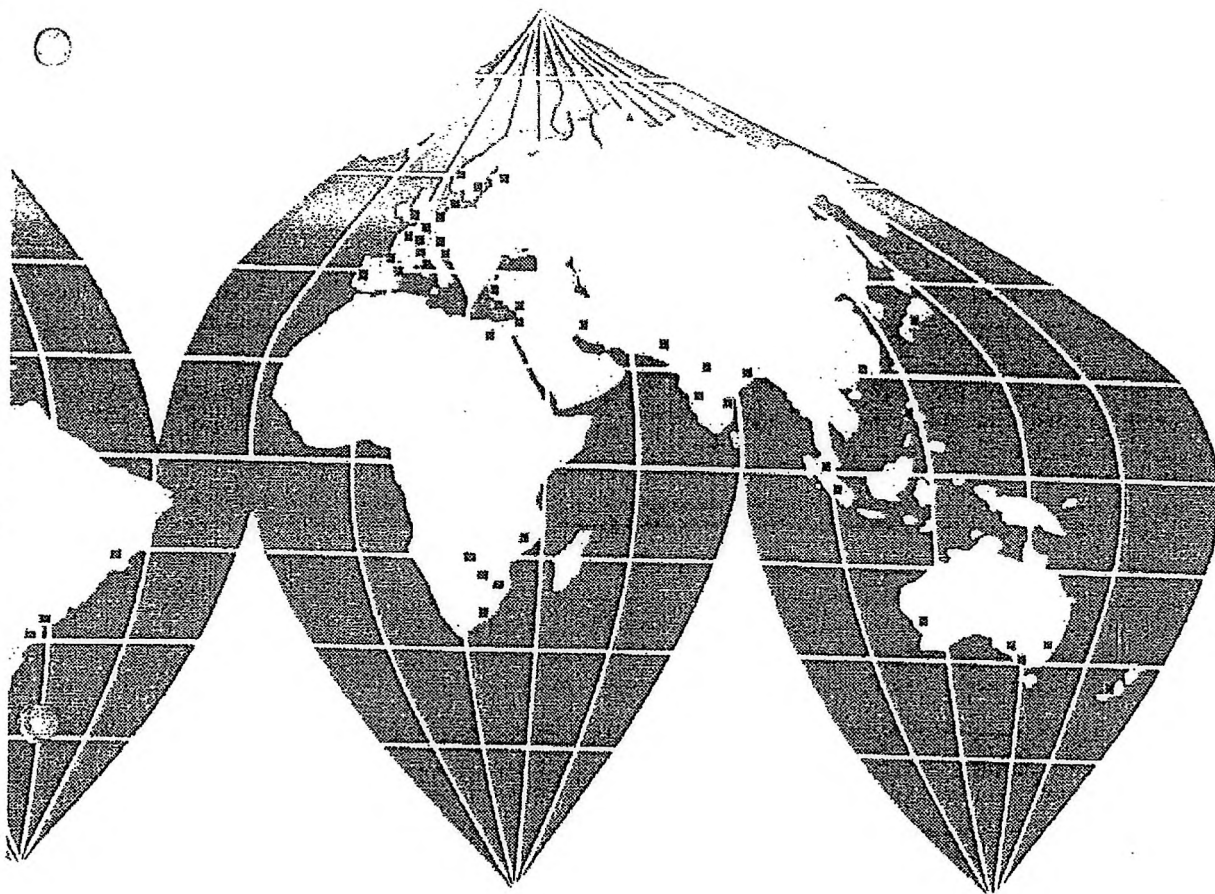
- Birmingham, England
- Buenos Aires, Argentina
- Salzburg, Austria
- Radstow, New South Wales, Australia
- Brussels, Belgium
- Sao Paulo, Brazil
- Guelph, Ontario, Canada
- Chelles (S. & M.), France
- Borken, West Germany
- Woerden, Holland
- Bonn, Aachen
- Milan, Italy
- Osaka, Japan
- Mexico City, Mexico
- Johannesburg, South Africa
- Barcelona, Spain
- Aargau, Switzerland
- Llanwern, England
- Cleveland, Ohio, U.S.A.
- Mt. Braddock, Pa., U.S.A.
- (Europe, North America, Asia)



Foseco, Inc. Steel Mill Products Division
P.O. Box 8728, Cleveland, Ohio 44135



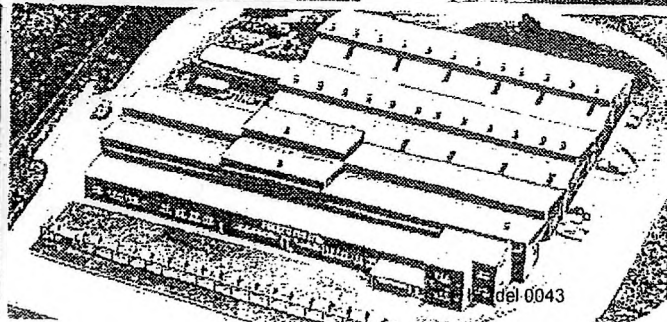
Foseco  **STEEL MILL PRODUCTS DIVISION**
INNOVATORS TO THE STEEL INDUSTRY

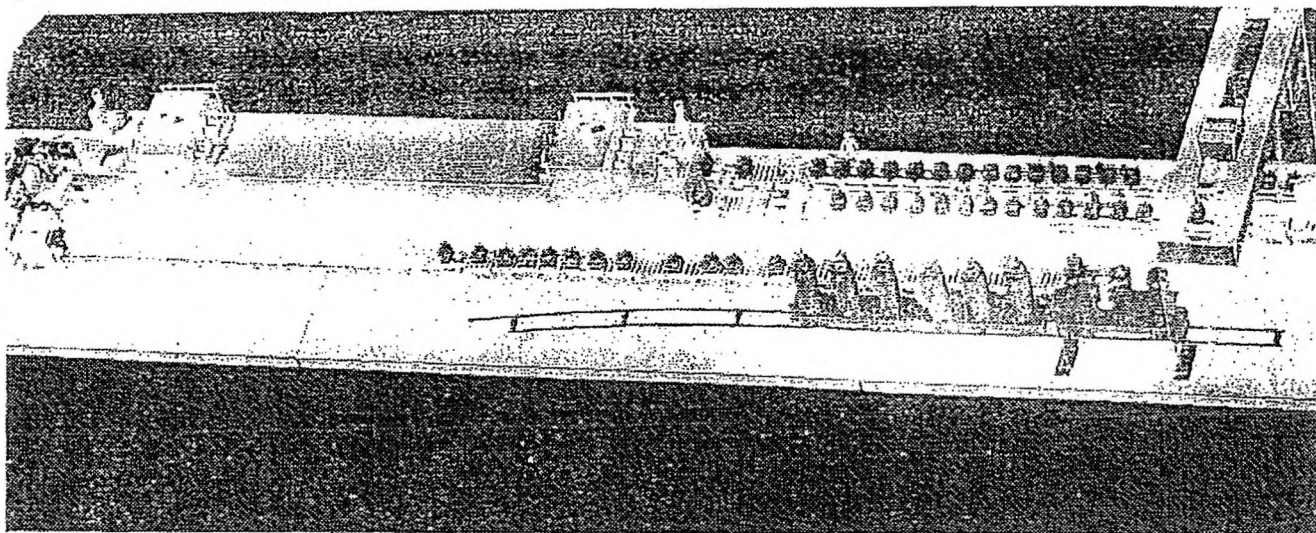


1. An international steel makers' hot topping symposium sponsored by the French Group Usinor, conducted and hosted by FOSECO. Simultaneous translation into four languages was employed.

Four typical FOSECO production plants:

2. United Kingdom
3. India (one of two factories)
4. West Germany
5. Australia





Working model of a pioneering, in situ, automated, Profax hot top production line engineered and produced by FOSECO for a major American steel mill.

Foseco® INNOVATORS TO THE STEEL INDUSTRY

A typical FOSECO® technological "break through" is the development of the PROFAX® hot topping system. Utilizing compact, light weight, expendable refractory material, this exciting FOSECO innovation brings many worthwhile benefits to users. Included among these are consistently high quality ingots and increased product yield.

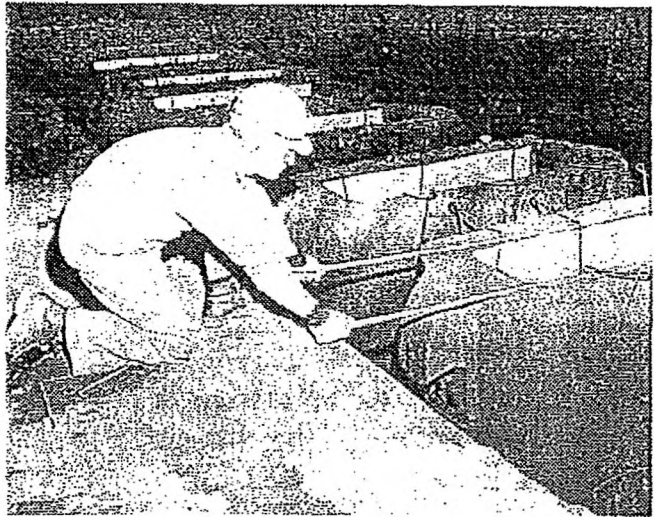
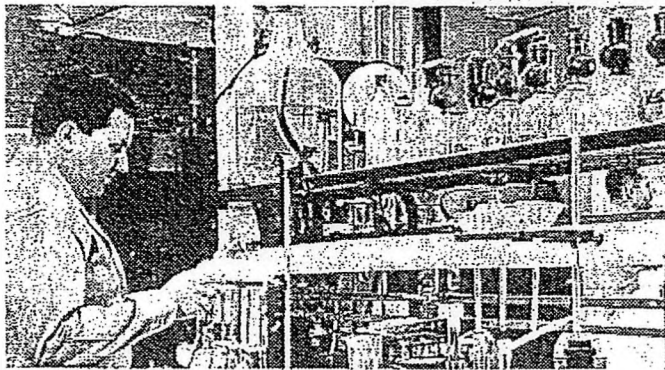
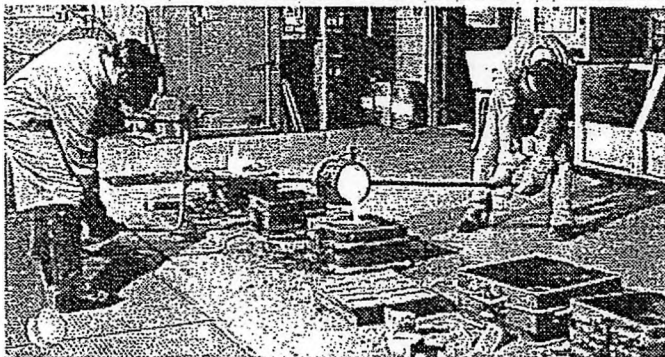
The many advantages of the PROFAX hot topping system have made it, within a very few years, the most widely used and copied hot topping method throughout the free world. However, FOSECO has continued to widen its scope of interest in solving the steel industry's problems. This brochure is designed to give the reader a broader picture of our many products and services all engineered with a single purpose in mind: to improve, simplify, speed-up and lower the cost of steel production.

Founded and growing on the performance of services to the industry, FOSECO has originated solutions to numerous production problems. These include patented chemical

compounds for removing ingot impurities. Other FOSECO compounds control the behavior of steel in its molten or solid state. Still other FOSECO materials are used to extend the useful life, and improve the performance of, steel making tools and equipment.

FOSECO's close contact with its customers throughout the world places its development teams in the advantageous position of being on the scene wherever new techniques and processes are being created. Our new-products department strives to keep ahead of these industry advancements and channels its research efforts accordingly. This long-range planning places FOSECO in the unique position of being able to supply both products and production experience of value to its steel mill customers.

FOSECO is in a position to assist on many of your mill's quality or production problems. Our research/development departments will strive to quickly develop solutions that match your needs.



1. Typical of FOSECO's highly competent staff of engineers and scientists are Vice President, Technology, Ron Ruddle and Ted Jago, Technical Manager, Steel Mill Products Division. They are shown here discussing the exothermic properties of an experimental FOSECO development.
2. FOSECO Field Engineers are well known to production personnel of many steel producers. They are available on an around-the-clock basis to serve as advisors when new FOSECO products and procedures are instituted.
3. Experimental foundries and metallurgical laboratories aid in the development and testing of new FOSECO products and techniques.
4. Quality control laboratories maintain a rigid check on all raw materials . . . assure the high level of consistency and dependability for which FOSECO products are known.
5. A small section of a FOSECO warehouse where stock products and custom engineered items are inventoried for "off the shelf" delivery.
6. Refractory specialties produced by FOSECO Subsidiary, Eureka Refractories, Inc.
7. FOSECO's Foundry Products Division has a wide range of products to aid in the casting of most metals. These include exothermics, fluxes, degassers, core and mold coatings, leading compounds, and alloying agents.



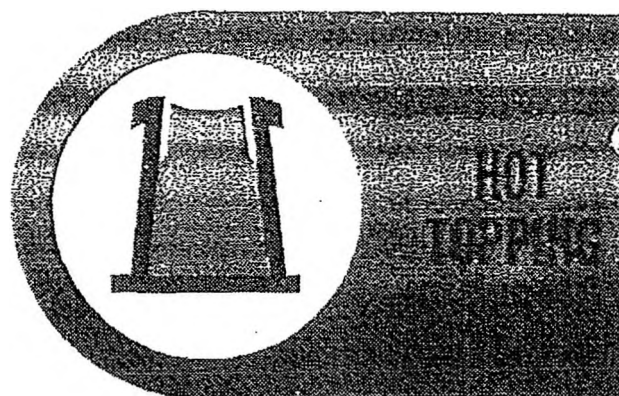
Foseco[®] PRODUCT GROUPS

FOSECO Steel Mill Products Division's extensive developments have been classified under the four general headings shown at the right.

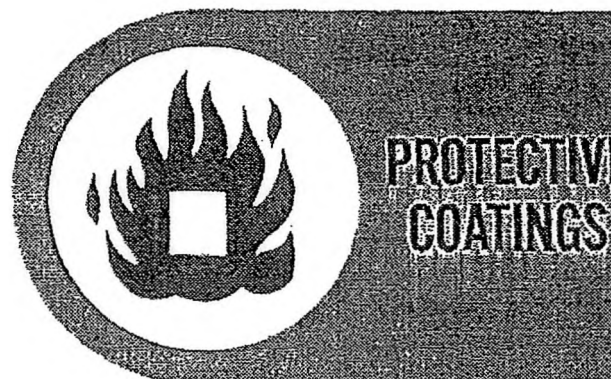
Each of the products within the group is custom engineered to suit the user's needs.

FOSECO field engineers and R/D staff are at home in a steel mill and pride themselves on their ability to find the precise FOSECO product modification required for optimum performance under individualized mill situations. These men are knowledgeable about mill practices, understand work-day problems, and can readily communicate with production personnel. They are also available to observe, or . . . when requested . . . to supervise a FOSECO product's introduction into the mill's procedures. They are on the job day and night, weekends and holidays, complying with the mill's schedules.

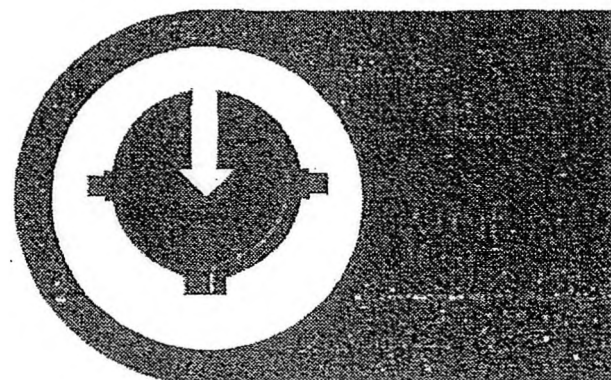
In a single year, FOSECO's many technical staffs have developed 350 product formulas. The expertise of the men who staff FOSECO's R/D departments and the great number of specialized skills they employ indicate FOSECO's dedication to retaining world-wide leadership in its industry.



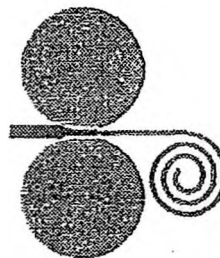
HOT
TOPPINGS



PROTECTIVE
COATINGS



ROLLING
MILL
PRODUCTS



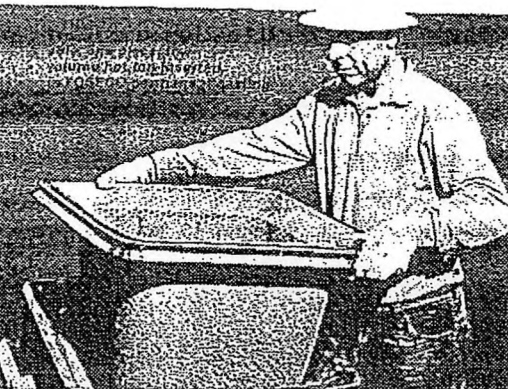
The standard FOSECO system has revolutionized the industry's approach to hot topping of ingot molds. FOSECO's hot tops are engineered to be used in all sizes of ingot molds to improve ingot quality, increase ingot yield, save heat, and increase ladle refractory life.

FOSECO and its exclusive licensee, Refractory Products, Inc., has developed a hot top system that can be used in all sizes of ingot molds.

have minimized over-pour and give increased yield.



the hot top's large volume has not increased the cost of the hot top.

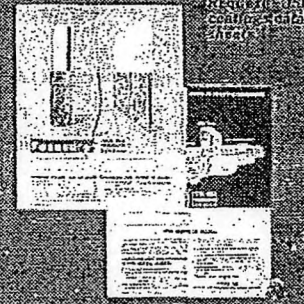


Spraying an ingot mold with KORON.

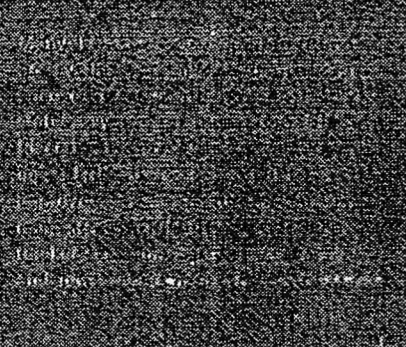


Among the FOSECO developments engineered to guard products and equipment against the deteriorating effects of heat are KORON™ and ANISCO®. The former effectively improves life performance and extends the useful life of ingot molds, tools, degassing snorkels, etc., wherever refractory or metal comes in contact with molten steel. ANISCO® reduces scale formation and minimizes decarburization on metals during heat treating.

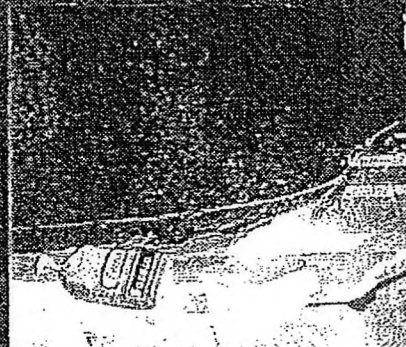
Refractory FOSECO controls ladle heat.



FOSECO's LUPOL™ 2, a wet looping pit additive, increases pit capacity and product quality.

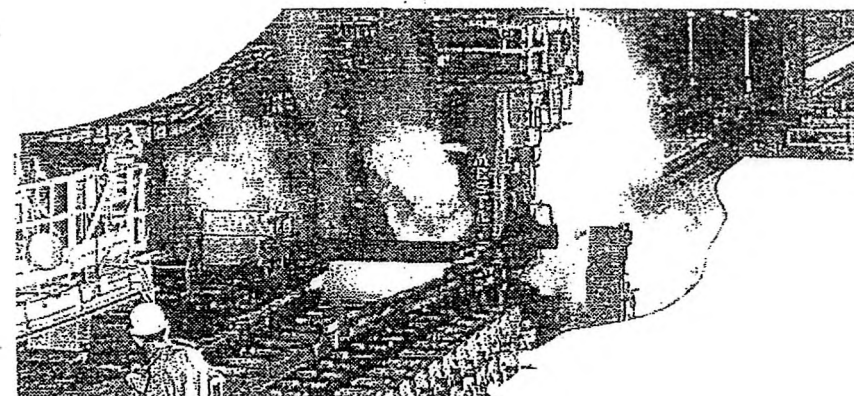


FOSECO's ZINOL™ provides a low cost method of reclaiming zinc from hot galvanizing skimmings.



FOSECO's POWAX™, a dry wax-like coating for steel sheet, offers many advantages over conventional oiling.





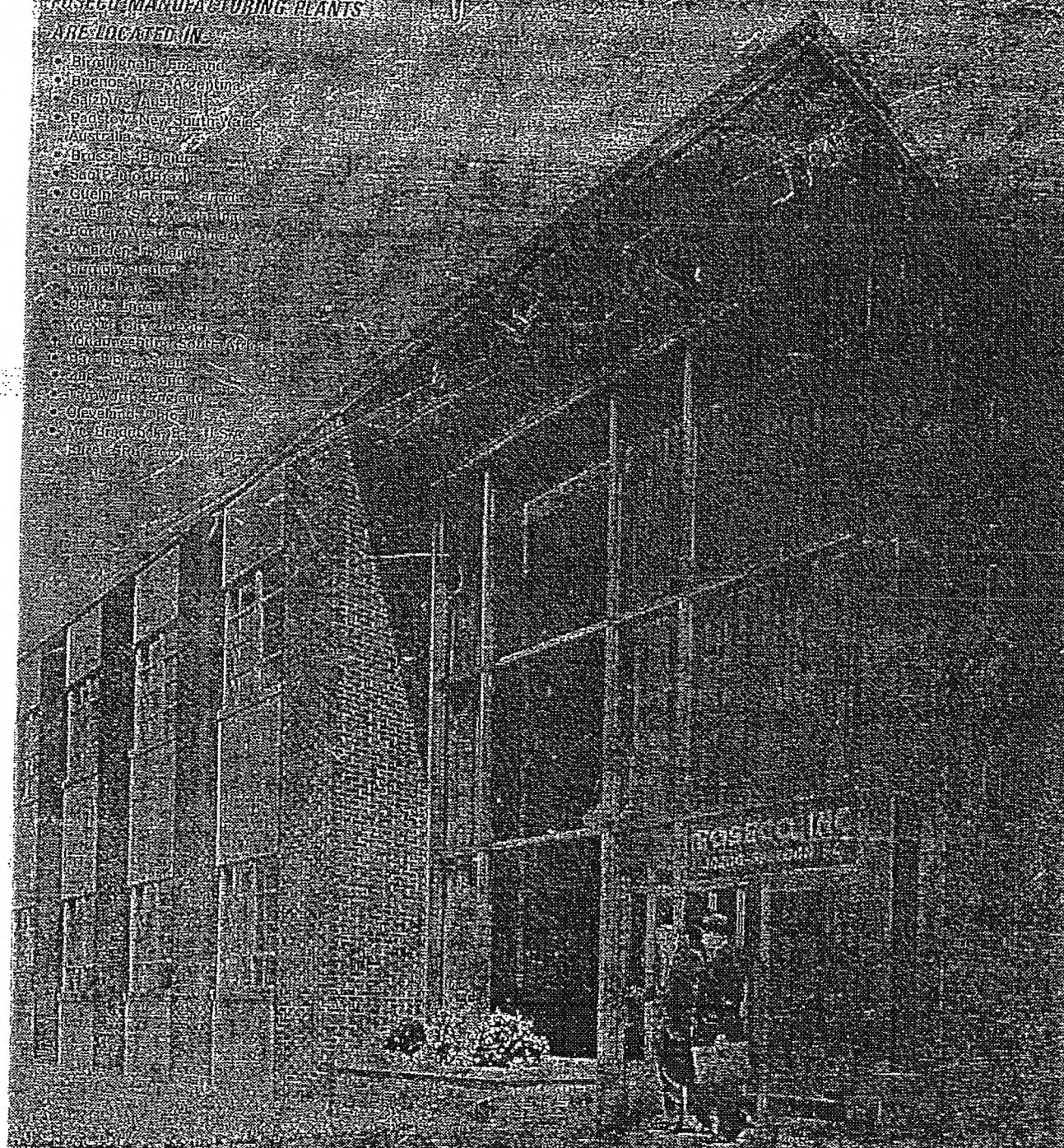
Beyond the ingot stages, FOSECO supplies steel mills with numerous compounds designed to improve the quality and reduce the price per ton of finished product. For example: POWAX™, a dry wax-like coating for steel sheet offers many advantages over conventional oiling. LUPOL™ 2, a wet looping pit additive, increases pit capacity and product quality. ZINOL™ provides a low cost method of reclaiming zinc from hot galvanizing skimmings.

Foseco®



FOSECO MANUFACTURING PLANTS ARE LOCATED IN:

- Bristol, Great Britain
- Buenos Aires, Argentina
- Salzburg, Austria
- Edgely, New South Wales, Australia
- Brussels, Belgium
- Sao Paulo, Brazil
- Cluj, Romania
- Cluj-Napoca, Romania
- Toronto, Ontario, Canada
- Rotterdam, Holland
- Bucharest, Rumania
- Madrid, Spain
- Mexico City, Mexico
- Lima, Peru
- Santiago, Chile
- Barcelona, Spain
- Zurich, Switzerland
- Geneva, Switzerland
- Cleveland, Ohio, U.S.A.
- Mc Henry, Ill., U.S.A.
- Paris, France



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