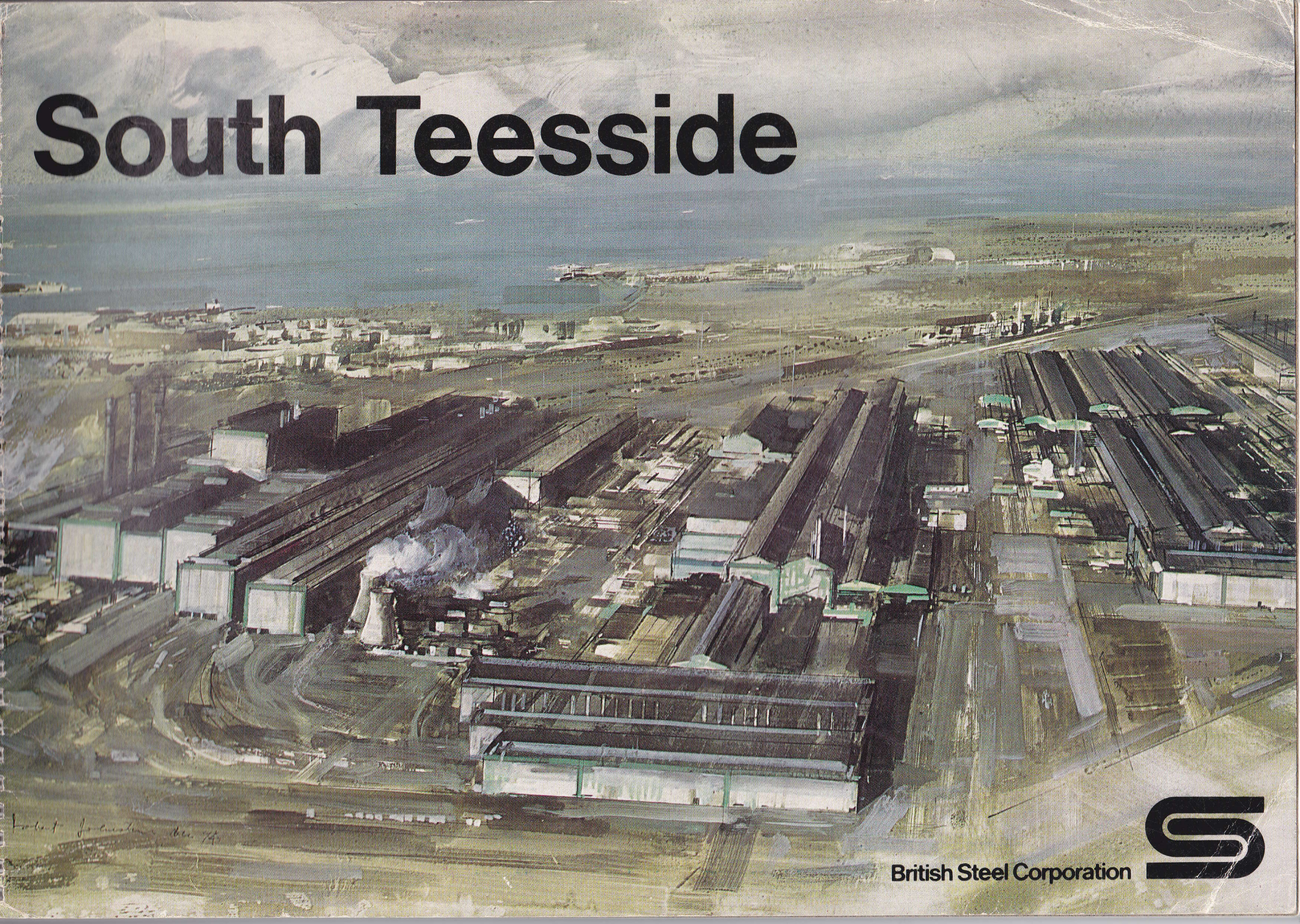
South Teesside



British Steel Corporation

COVER ILLUSTRATION:
A painting of part of South Teesside Works, showing plants in the Lackenby area and looking eastwards to the Redcar ore terminal and development project.

South Teesside

An illustrated survey of the British Steel Corporation's South Teesside Works

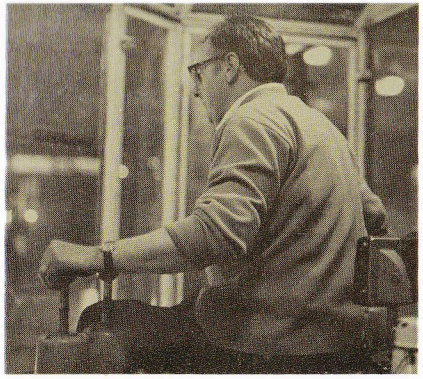
South Teesside works, bordering the River Tees in the industrial heart of Cleveland County, occupies one of the best iron and steelmaking sites in the United Kingdom. Together with the British Steel Corporation's Redcar development site, the works covers some 3,000 acres, including the contiguous areas of Cleveland, Lackenby and Redcar. Under the Corporation's development strategy it is destined to become Britain's largest steelmaking area with an estimated annual capacity of more than ten million tonnes by the 1980's.

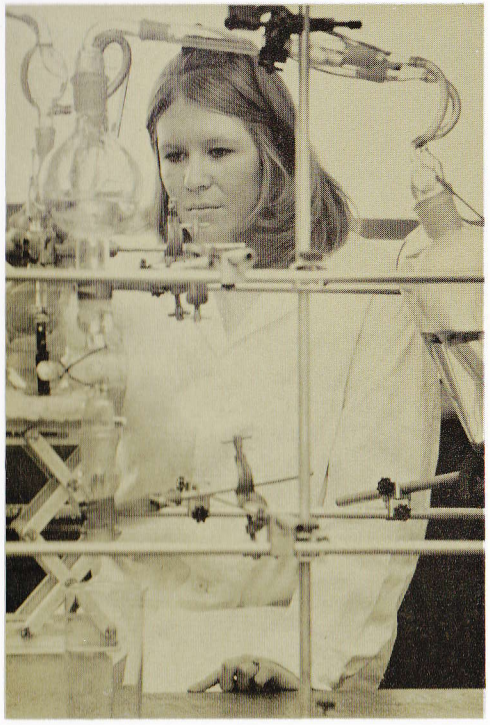
The course towards this massive development target was charted in 1973 by the Government White Paper on the BSC strategy which declared that Teesside was chosen as the location of a new steelmaking complex 'because of its commercial advantages, the cost savings offered through joint development with the existing Lackenby works and the better utilisation of plant'.

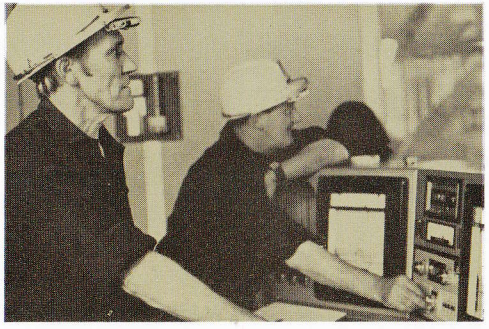
The decision recognised the strategic and economic value of Teesside as a steelmaking area enjoying ready access to a deep water ore terminal. The Redcar ore terminal, with an initial capability to unload annually 7·5 million tonnes of iron ore, was successfully commissioned in mid-1973. Soon afterwards, construction work began at Redcar on the raw materials preparation plants and in 1974 further multi-million pound projects were put in hand – notably the building of a 10 000 tonnes a day blastfurnace. The commissioning of the ore terminal and the building of new ironmaking plants at Redcar – stages I and II of the development – will provide the necessary iron to increase the overall basic oxygen/electric arc steelmaking capacity of South Teesside works from 3·5 to 5·5 million tonnes per annum within this decade.

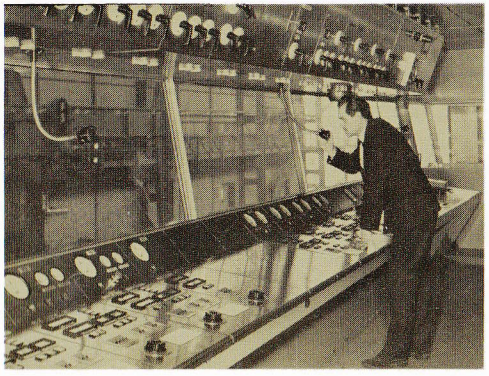
In parallel with these schemes there will be further development of continuous casting and the existing rolling mills to equip them to deal with the additional steel. Investment in the rolling mills will lead not only to increased capacity but to improved quality in the South Teesside product range of structural sections, coil plate, wire rod and reinforcing bar which are vital materials for customers at home and abroad.

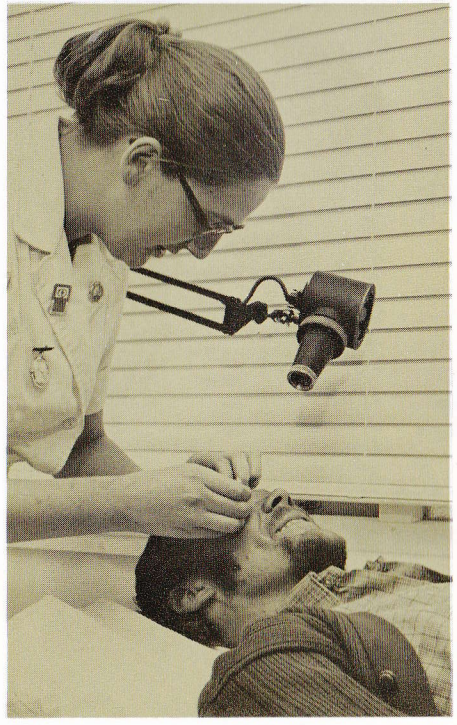
Steel People: The Iron and Steel Industry embraces a wide variety of occupations, a few of which are shown on the opposite page. Over 16,000 people are employed at South Teesside Works.

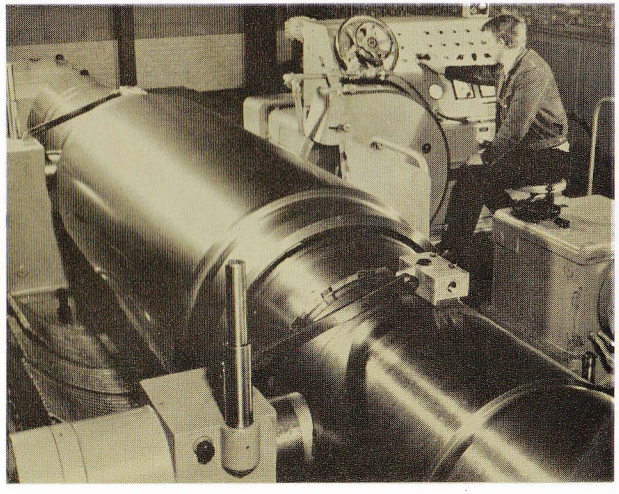




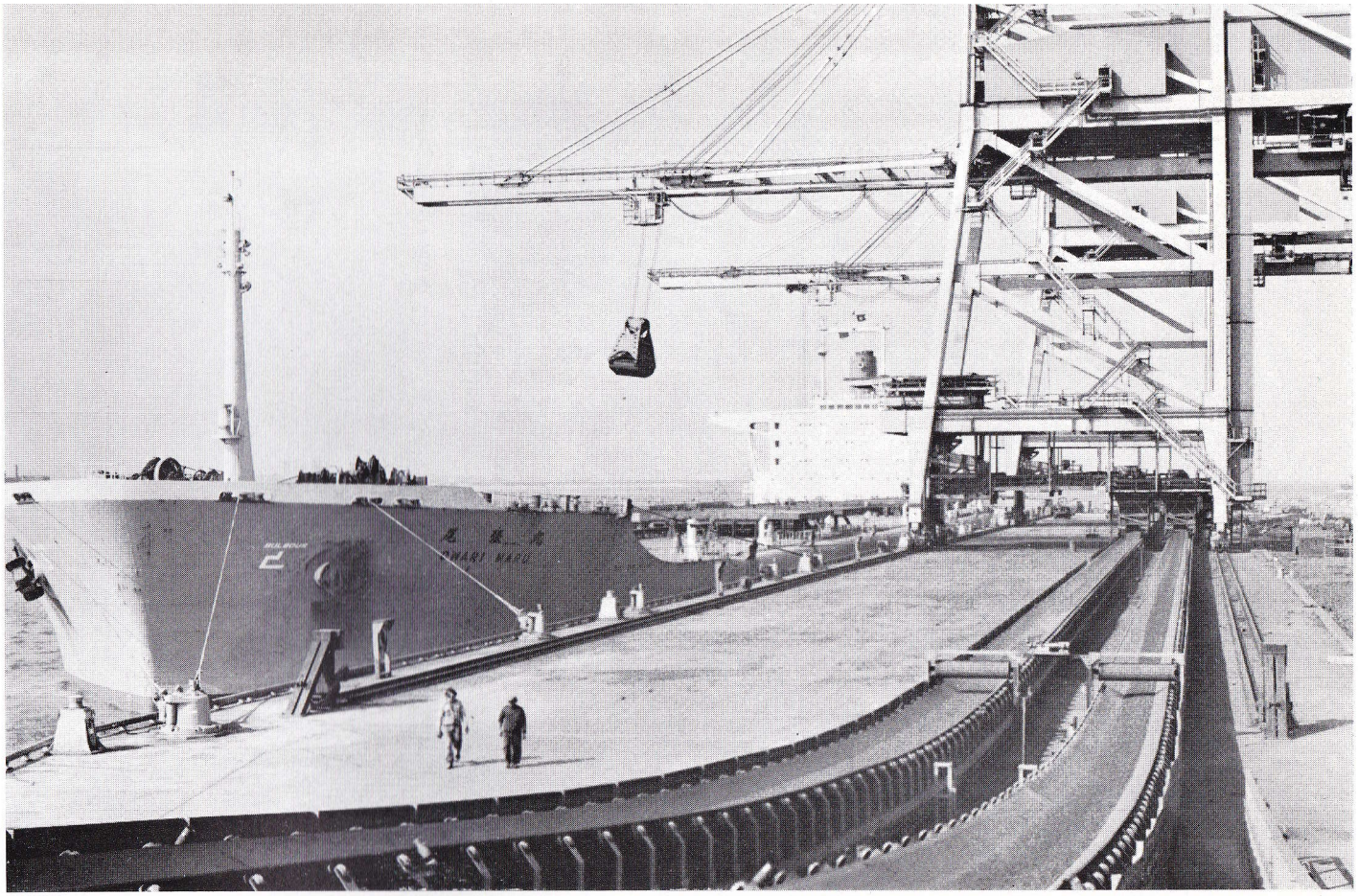








Raw Materials
Iron Making



The 'Owari Maru', a Japanese bulk carrier discharging 100 000 tonnes of Peruvian iron ore pellets at the new Redcar ore terminal. This terminal will ultimately be capable of handling ships of up to 200 000 tonnes

Molten iron for the Lackenby BOS plant is supplied by the Cleveland basic blast furnaces, situated at the western end of South Teesside Works. Adjacent to the three basic iron furnaces are two smaller blast furnaces which are the sole producers of ferro-manganese for the B.S.C.

Raw Materials

The three main raw materials for ironmaking are coal, iron ore and limestone. Coal is brought primarily by rail from the Northumberland and Durham coalfield and stocked at the coal handling plants.

At present, ores are imported mainly from Sweden, Canada, Africa, South America and Russia and are now discharged at the new Redcar ore terminal which was commissioned in July 1973. It is possible to berth vessels of up to 150 000 tonnes capacity, and eventually even bigger vessels will be accommodated. Because of the cost economies of these ships, high-grade ore can then be shipped much greater distances from previously unused sources.

Limestone is supplied from a Corporation owned quarry located in the Yorkshire dales.

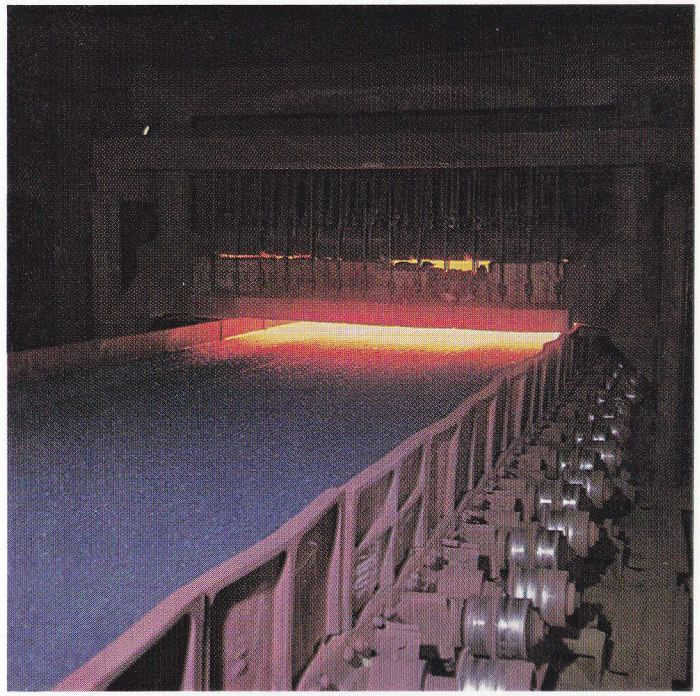
Coke Making

Coke is produced at two coke oven plants. The Cleveland coke ovens, originally established in 1936, consist of two batteries of 66 ovens.

The South Bank coke oven plant was built in 1956, when it consisted of two batteries of 75 ovens with an oven height of 4·56 m. These were replaced in 1971/72 by two new batteries of Wilputte design which, with a height of 5·3 m, were the first of a new era of high capacity ovens commissioned in the United Kingdom. The 88 ovens, lined with dense silica brick and underjet-fired with coke oven gas, were designed to produce the same tonnage as the original 150 ovens. Improvements, especially in the design of the charging and quenching equipment, have considerably minimised the levels of air pollution normally associated with coke-making.

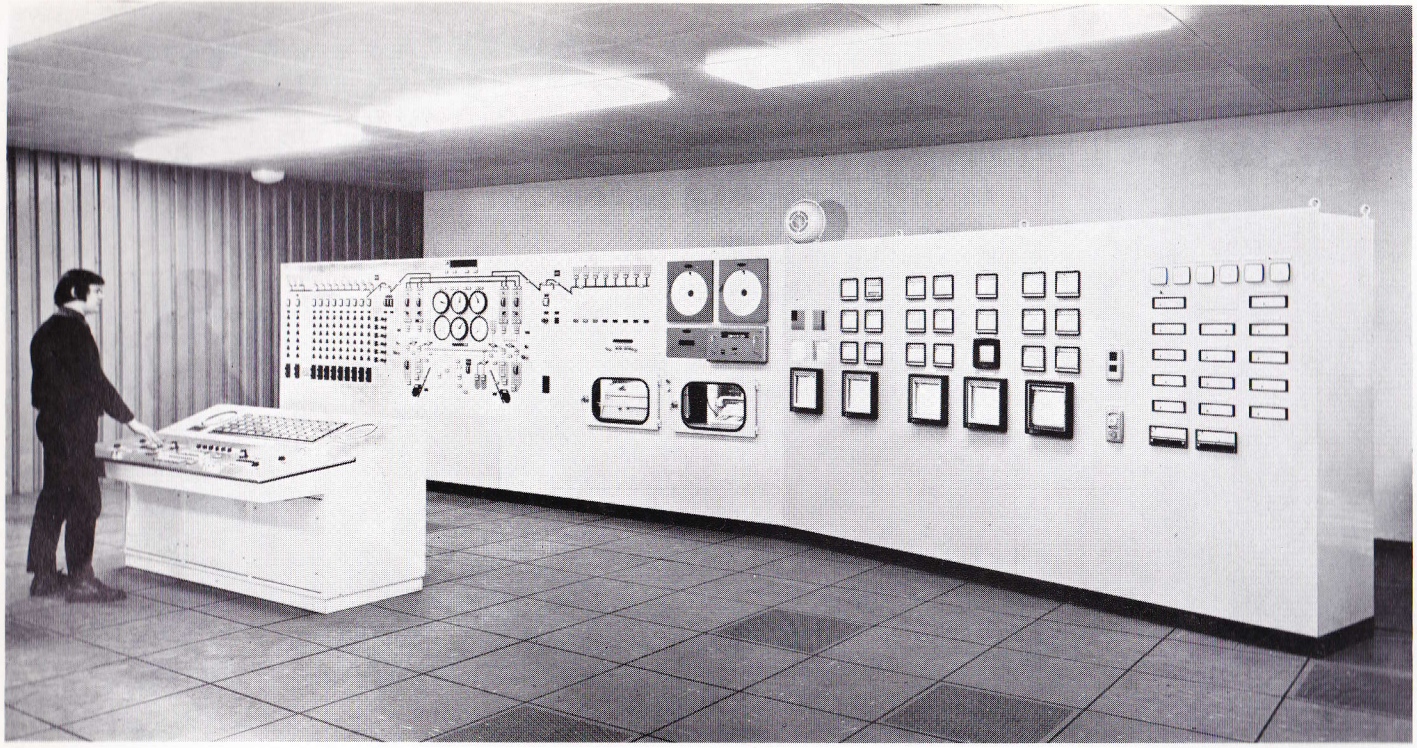
Burden Handling and Sintering

In preparation for ironmaking, ore is crushed and screened



The sintering process

Pushing coke at the South Bank coke ovens



Control room of one of the blast furnaces

A typical blast furnace casting scene at Cleveland

The three basic blast furnaces at Cleveland, South Teesside Works

to ensure reduction to a size metallurgically suitable for modern blast furnaces. All ore fines produced by crushing are mixed with specially purchased ore fines and then sintered with coke breeze. The sinter produced constitutes the greatest proportion of ferrous material charged into the blast furnace.

The burden handling, ore preparation and sinter plants, consisting of four strands, date from 1949. Two strands are rated at 50 tonnes/hour and two at 75 tonnes/hour. Limestone fines are added to the sinter blend to produce a self-fluxing sinter, thus avoiding the use of raw limestone at the blast furnaces. All sinter produced is cold-screened before despatch to the blast furnaces, any sinter less than 5 mm being recirculated through the process.

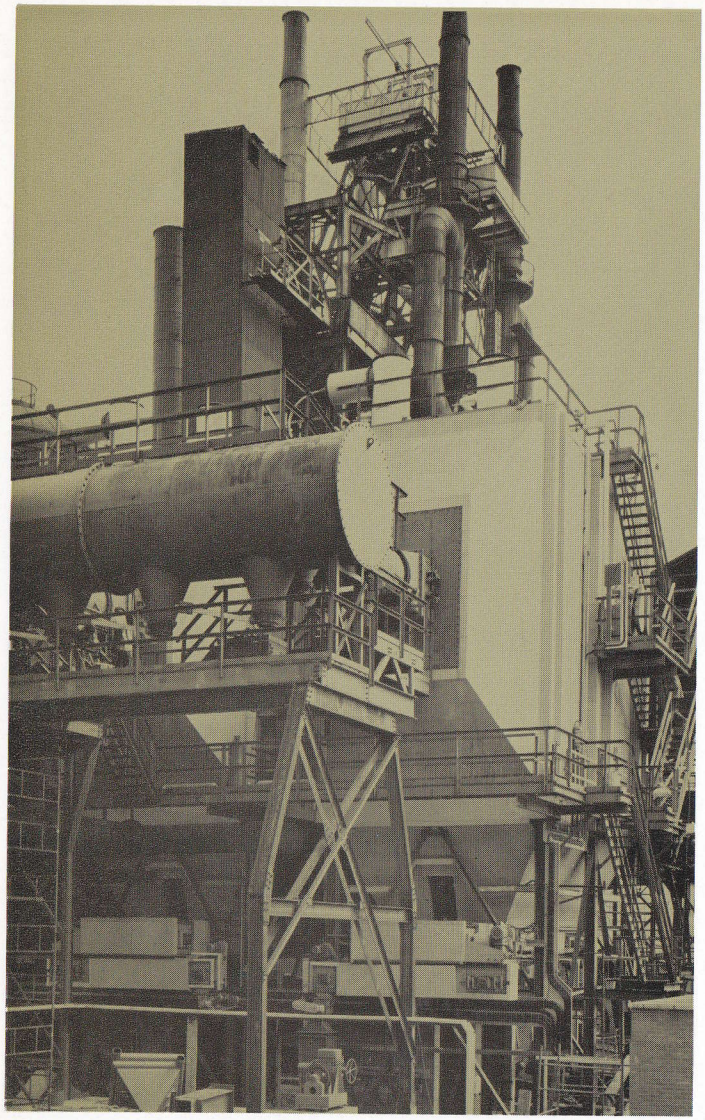
Blast Furnaces

The three blast furnaces, Nos. 1, 2 and 3, producing low-phosphorus basic iron, were commissioned between 1956 and 1961 with an original hearth diameter of 8·38 m. The normal iron-bearing charge generally consists of 50% super-flux sinter and 50% pellets and screened ore.

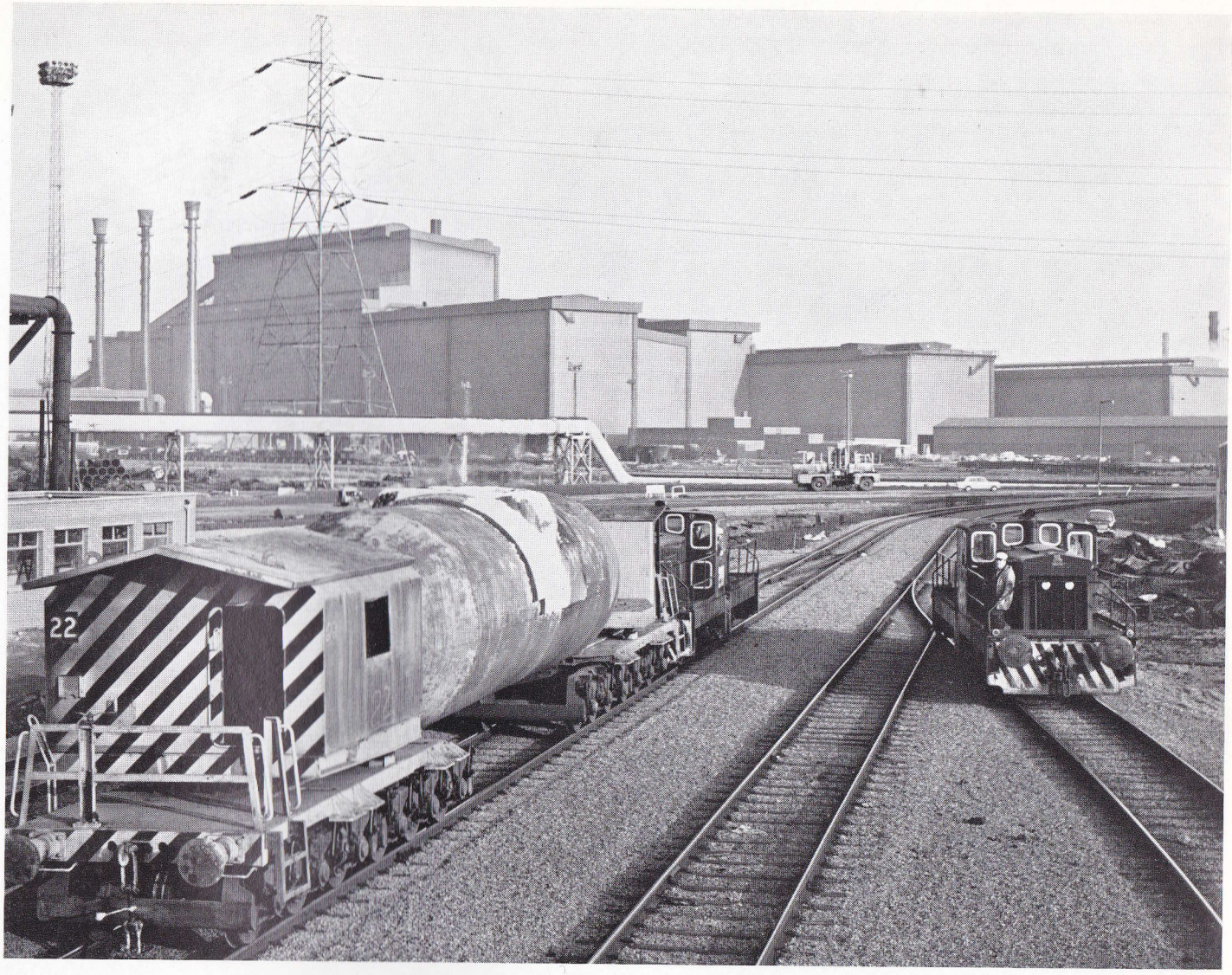
The potential output from the three furnaces has been significantly increased from 30 000 tonnes a week to 40 000 tonnes to meet the demand from the new BOS plant. This was achieved by completely rebuilding Nos. 1 and 3 furnaces so that the hearth diameter was increased to 8·84 m, and automatic charging was installed to permit pre-skip screening of all raw materials, essential for high outputs. Additionally, a fourth hot-blast stove was added to Nos. 1 and 3 furnaces, and a second taphole at No. 1. Both furnaces are equipped for high-top pressure operation and oil and oxygen injection. The cast-houses have been modified to accommodate the 250-tonne torpedo ladles which are used to transport hot metal to the BOS plant just over a mile away.

These major modifications will enable peak outputs of 2500 tonnes/furnace/day.

The two smaller blast furnaces, Nos. 4 and 5 with hearth diameters of 5·26 m and 5·49 m, have been extensively modernised for the role of sole producers of ferro-manganese alloy. A new pig-casting machine has been added to ensure a high yield of correctly sized product. Potential output from the two furnaces exceeds 5000 tonnes a week.



The blast furnaces which produce ferro-manganese



A hot metal 'torpedo' en route from the Cleveland basic blast furnaces to the Lackenby BOS plant

Steel Making

Within the Teesside and Workington Group, South Teesside Works fulfills the role of a steel 'supermarket', its formidable capacity being based on the Lackenby basic oxygen steel making plant and the Cleveland electric arc plant.

Associated with the BOS plant is a major continuous casting complex comprising a bloom casting machine commissioned in September 1972 and a slab casting machine which came into production in the early part of 1973. These machines are scheduled to produce some 38 000 tonnes of continuously cast product, not only for the rolling mills in South Teesside Works, but also for mills throughout the Group.

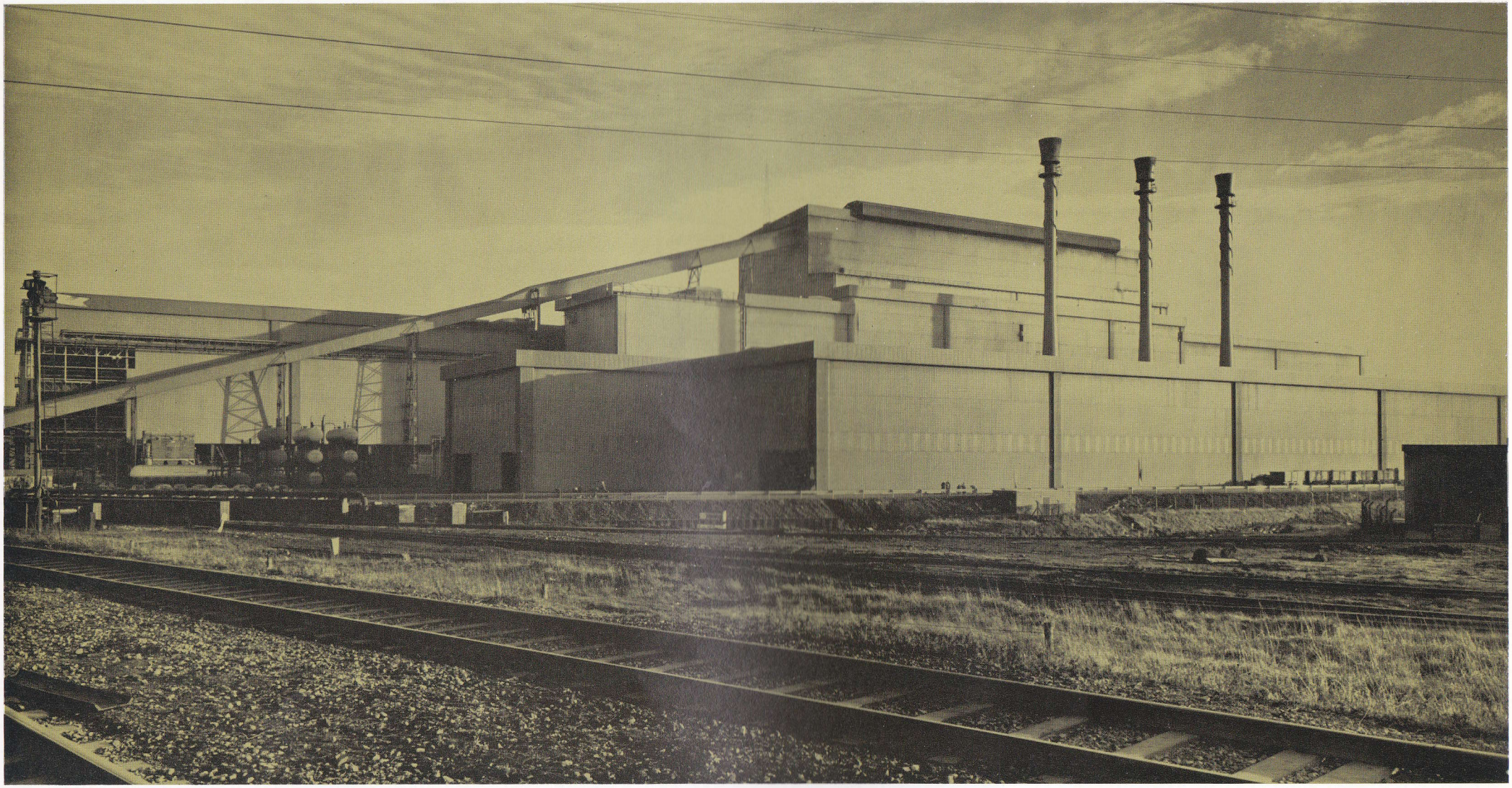
BOS Plant

The BOS plant located at the west end of Lackenby, began operations in March 1971 as a two-converter shop, each converter tapping 225/245 tonnes. A third vessel of the same size was added during the first half of 1972 to give the plant a potential weekly output of 90 000 tonnes. (The attainment of optimum production levels is, however, dependent on the commissioning of additional ironmaking capacity and further improvements in vessel services).

The plant consists of three main buildings — the scrap plant, the converter shop (the largest) and the mould preparation bay.

The converters operate on a 78/22 per cent hot metal to scrap ratio. Scrap is charged from large boxes by a specially designed charging machine, the boxes being pre-loaded by magnet cranes in an external bay.

Hot metal charging at the Lackenby BOS plant



General view of the Lackenby BOS concast complex, South Teesside Works

Hot metal is delivered by rail from the blast furnaces in torpedo ladles and transferred into 200-tonne ladles for charging into the converter by one of the two 330-tonne charging cranes.

Oxygen is blown onto the charge via water-cooled lances at a rate of up to 900 cubic metres per min. Following a process cycle of approximately 40 mins. steel is tapped into 250-tonne capacity teeming ladles and either teemed from the crane into ingot moulds ranging from 6 – 26 tonnes, or directly transferred to the continuous casting tundish. Ladle stream control is by the sliding gate system.

The waste gas cleaning system is of the limited combustion type (IRSID – CAFL) and cleaning is via a wet system incorporating a flooded disc scrubber. After cleaning the waste gas is burnt at the flare stack.

Electric Arc Plant

The Cleveland electric arc plant consists of three 100-tonne furnaces (A, B and C vessels), commissioned respectively in 1965, 1967 and 1969. Each of the 6·1 m shell diameter furnaces has a production capacity of over 4000 tonnes per week and is equipped with a 25 MVA transformer and three 508 mm electrodes.

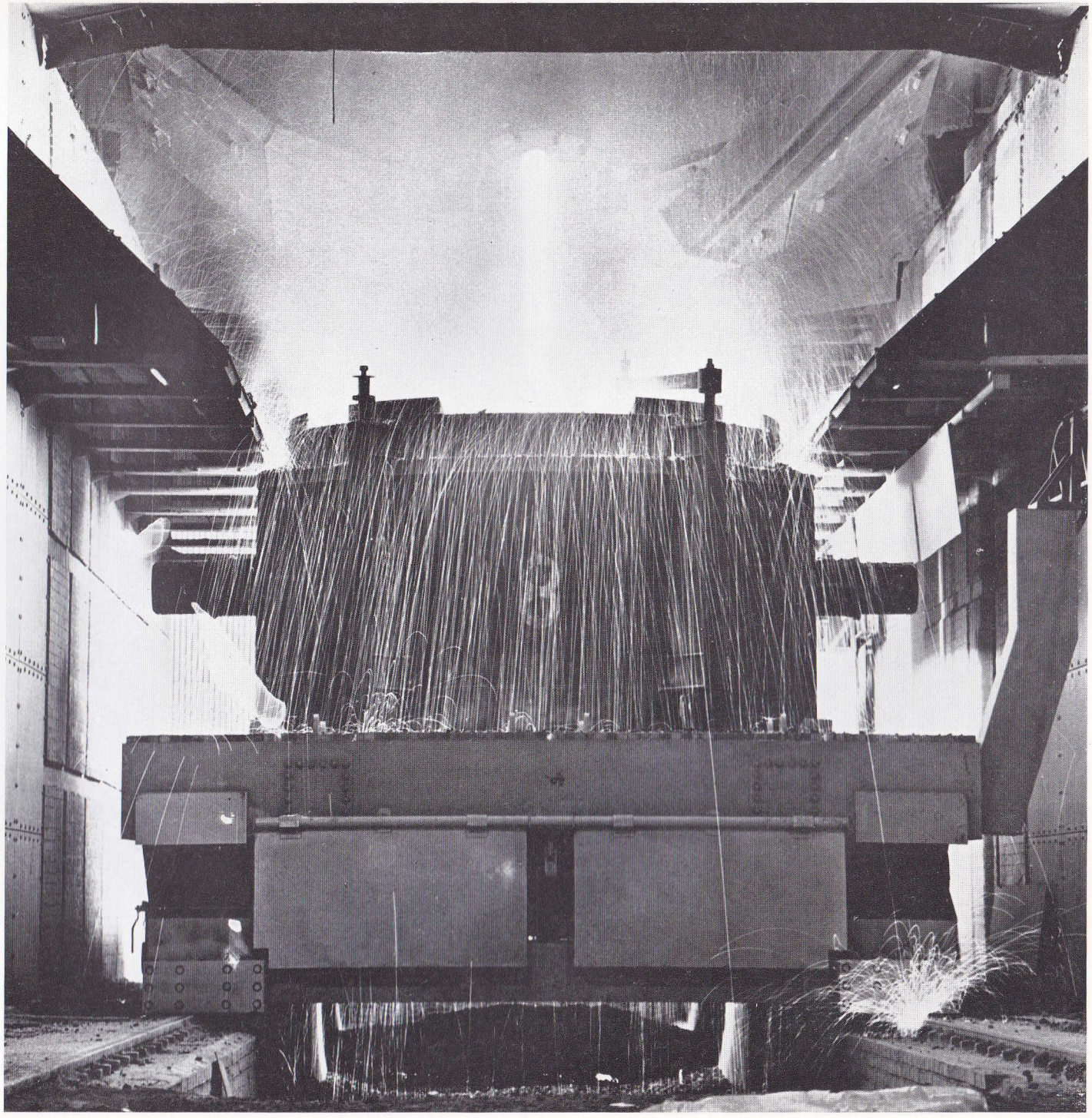
Scrap is charged via bottom discharge baskets, the furnace roof slewing to permit charging. The charge is either 100% scrap or scrap plus 15% cold pig iron depending on requirements. Oxygen is used to accelerate melt-down and to assist in refining.

Waste gases pass through an outlet in the roof of the furnace and thence to a combustion chamber and spray tower before being cleaned in a dry electrostatic precipitator prior to discharge from the stack.

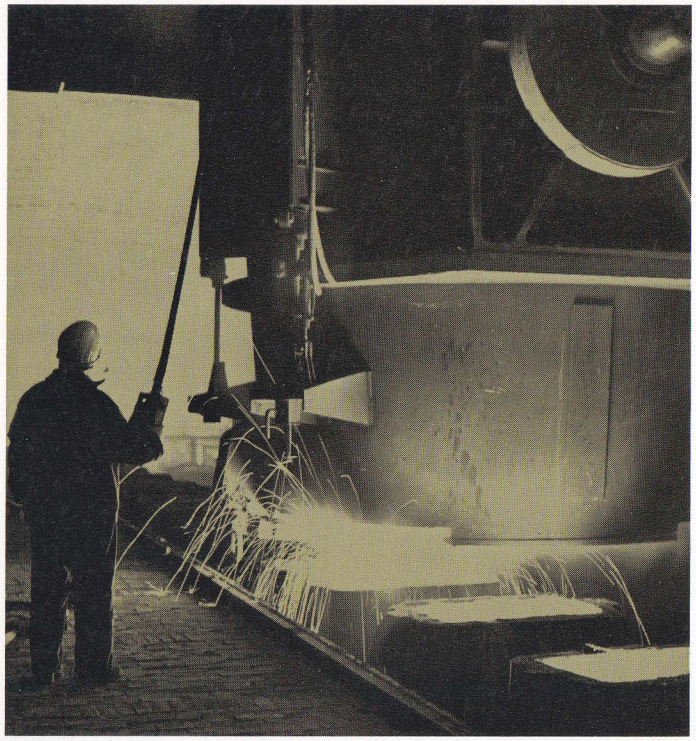
Steel produced includes carbon and low alloy varieties and the bulk of the output is teemed uphill in 5 – 6-tonne ingot moulds.

Concast Plant

The continuous casting facilities at Lackenby comprise an eight-strand 'S' type bloom casting machine — the largest of its type in the world — with a weekly capacity of over 17 000 tonnes, and a twin strand wide slab casting machine



Tapping one of the 240-tonne converters at Lackenby



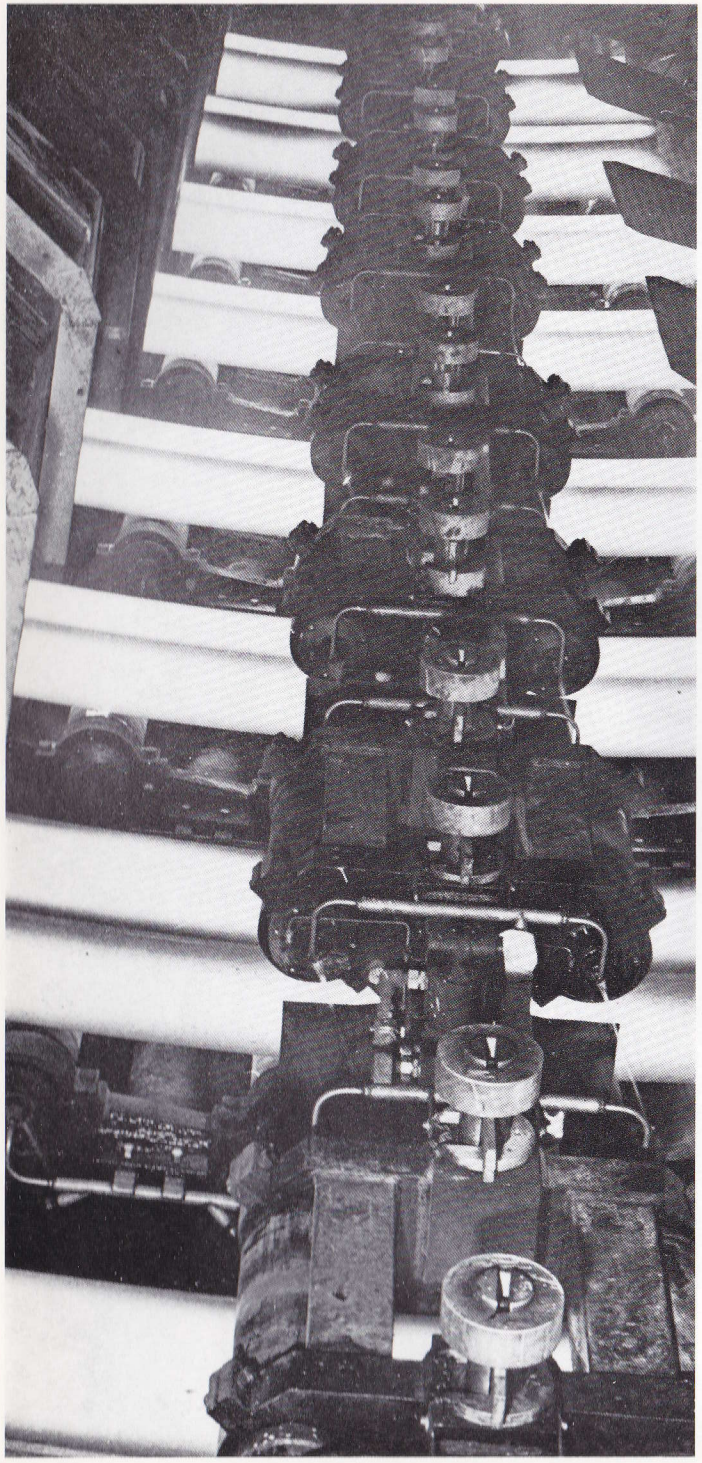
Ingot teeming at the Lackenby BOS plant, and *right* ladle feeding the bloom casting machine

capable of producing some 20 000 tonnes weekly. Both machines employ the curved mould principle with casting radii of 10 m.

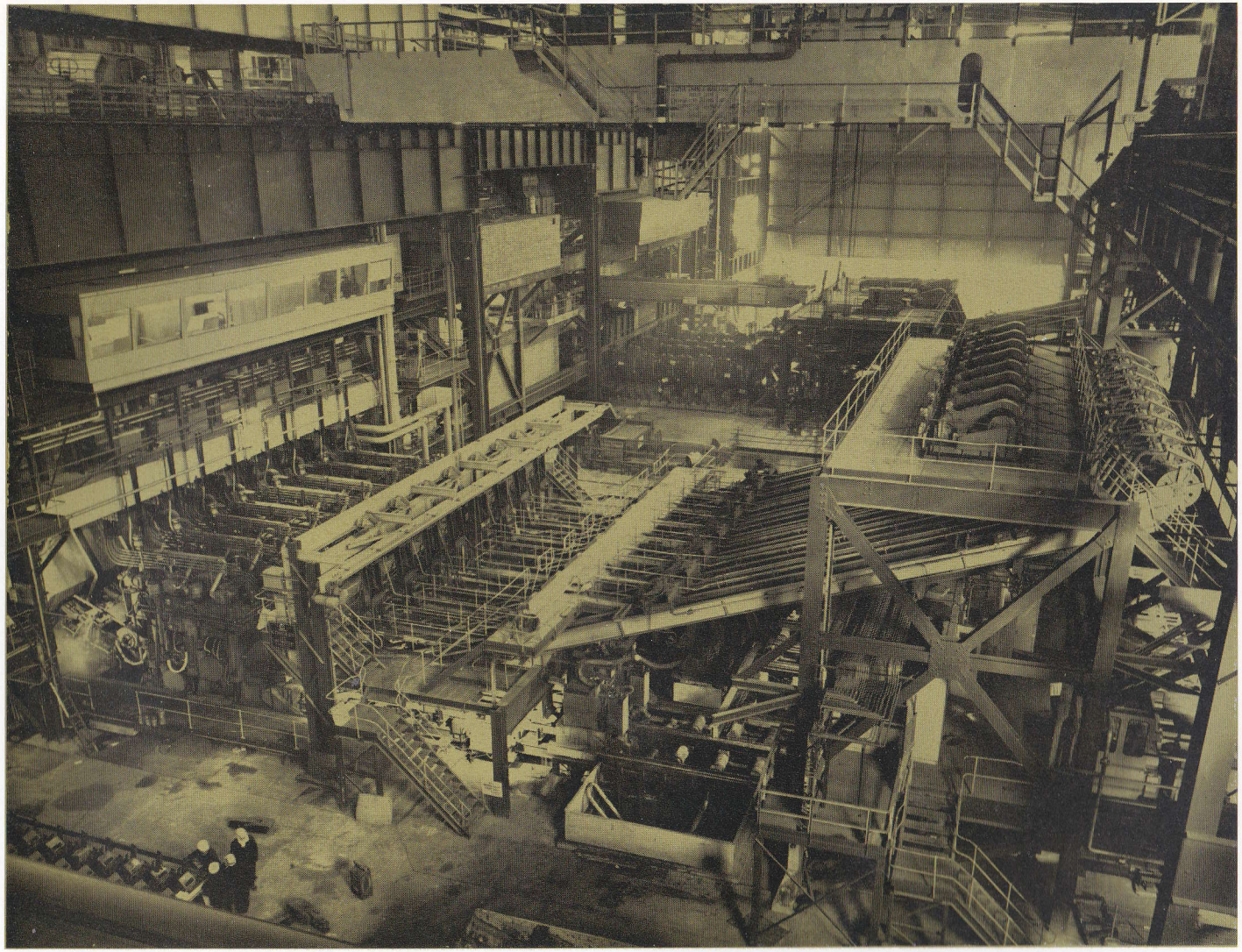
The bloom caster produces primarily structural and rolled steel grades for the Group's rolling mills at Skinningrove, Cargo Fleet and Workington in five main sizes ranging from 254 mm × 254 mm (10″ × 10″) to 483 mm × 305 mm (19″ × 12″).

All operations are fully automatic with facilities for manual control when necessary. On completion of casting and cutting, the blooms are automatically tabbed and identified with the casting and strand number, relevant metallurgical data and calculated weight.

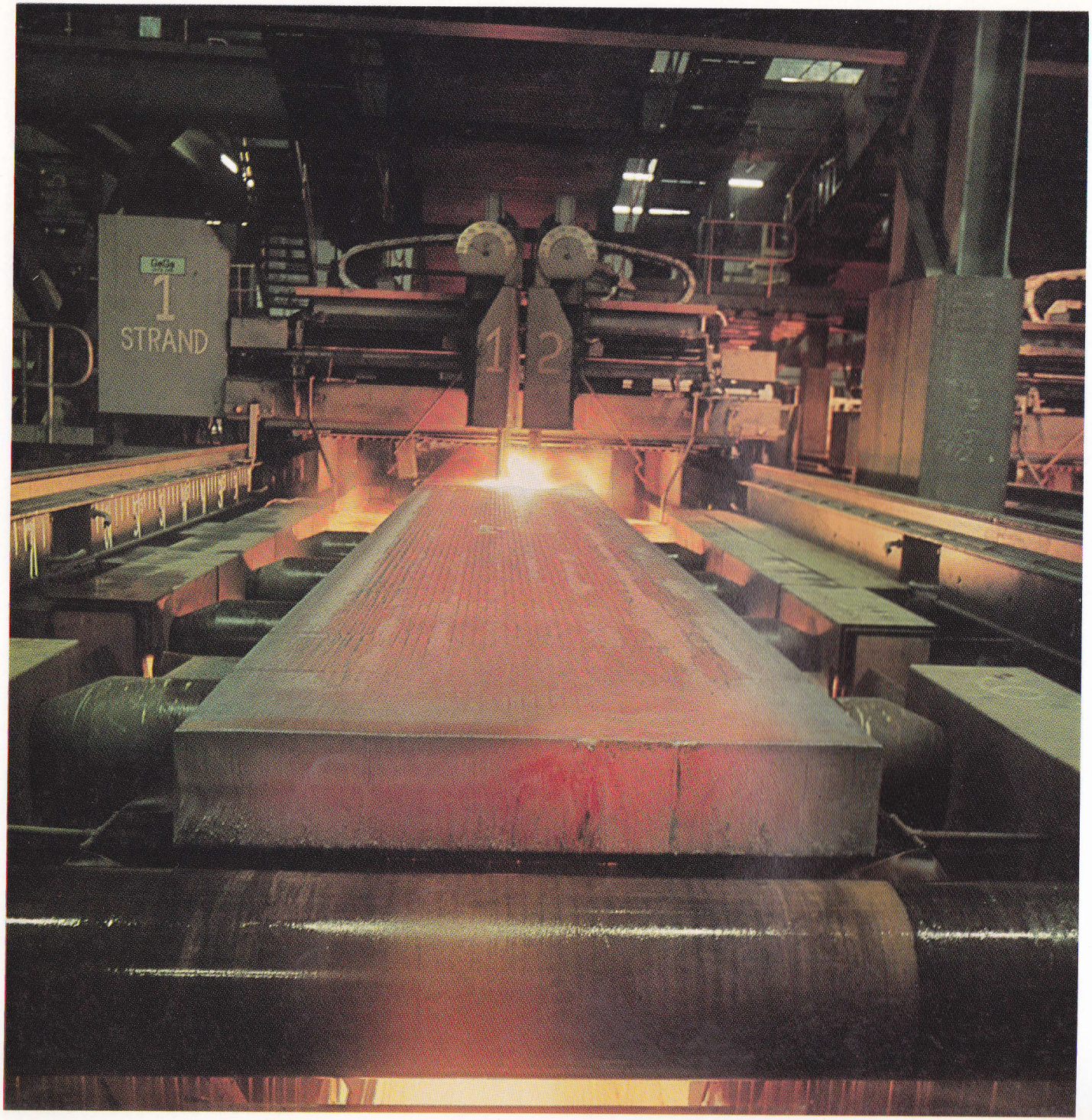
The slab caster produces slabs from 152 mm to 254 mm thick (6″ to 10″) and from 1016 mm to 1879 mm wide (40″ to 74″) for use in the production of plate and coil at the Group's plate mills, thus supplementing slabs produced from the primary mills.



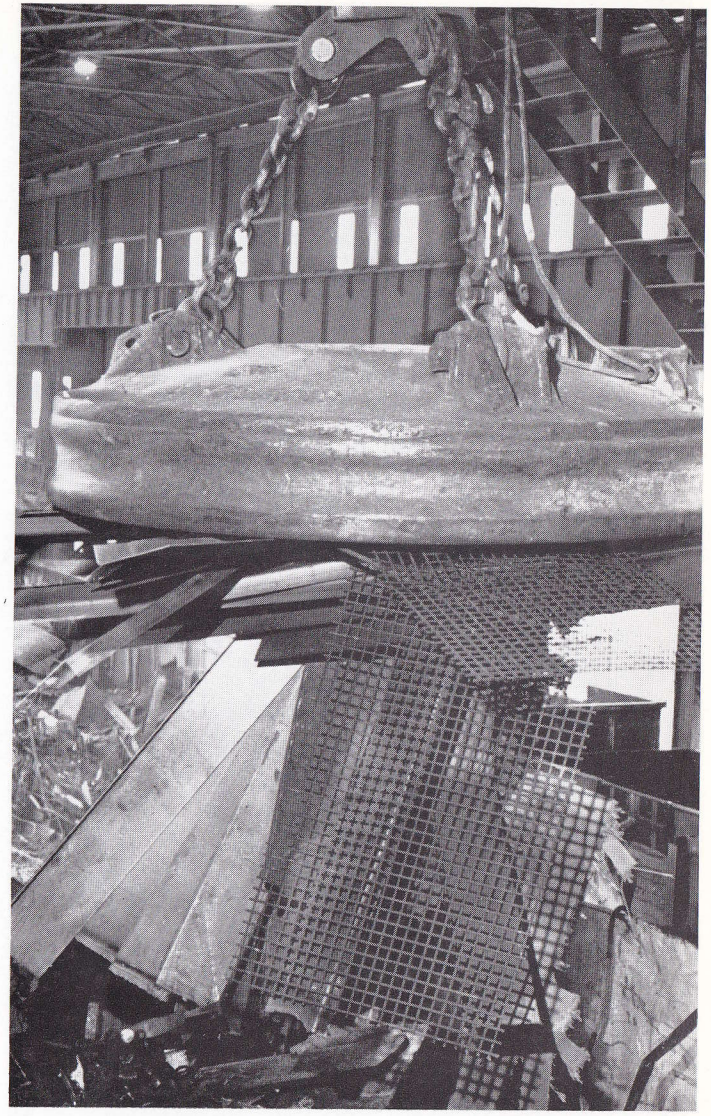
Eight strands being cast on the bloom casting machine



Exit end of the Lackenby bloom caster

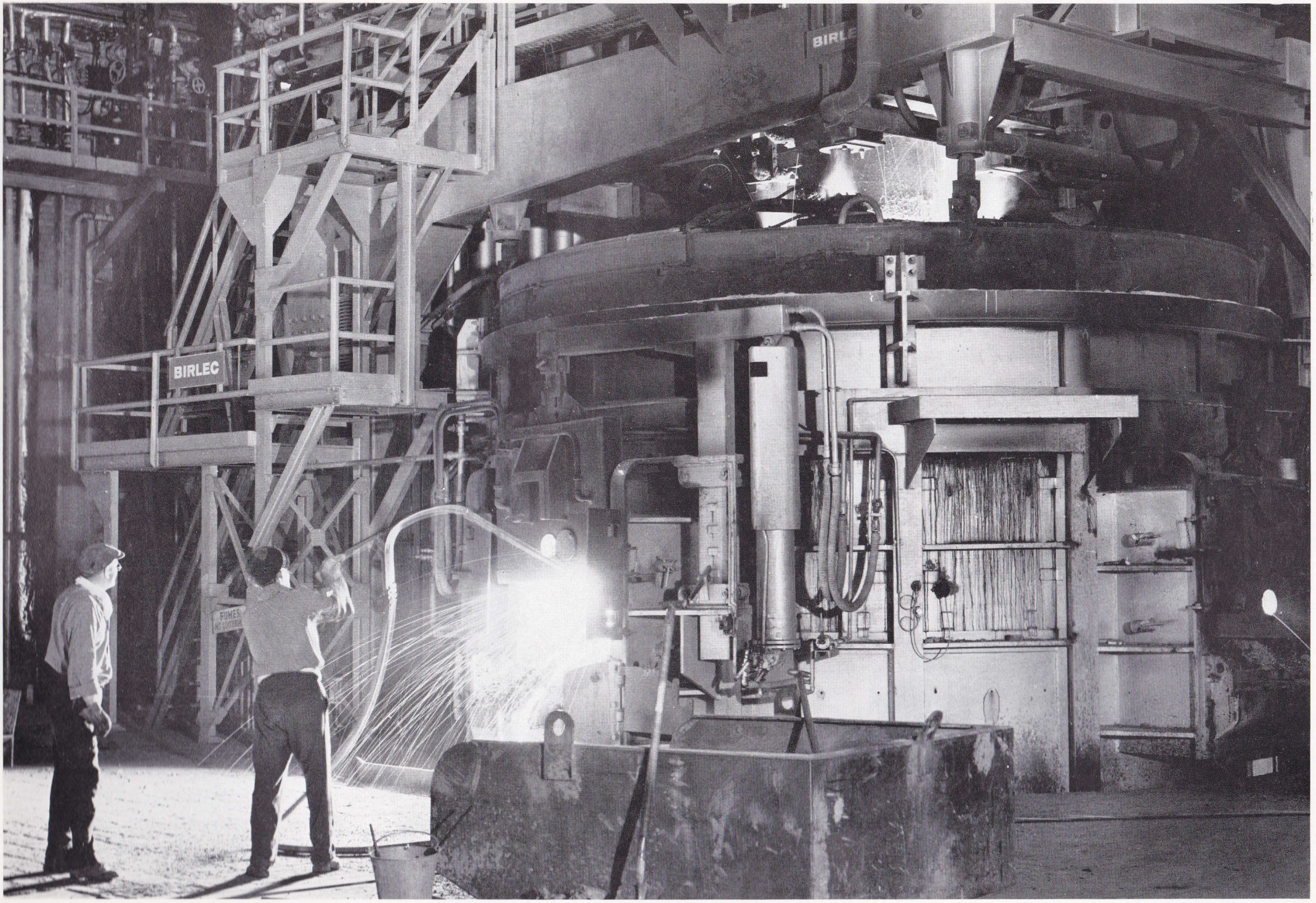


A continuously cast slab from the 2-strand slab machine, Lackenby



Scrap handling at the electric arc plant, Cleveland

One of the three electric arc furnaces at Cleveland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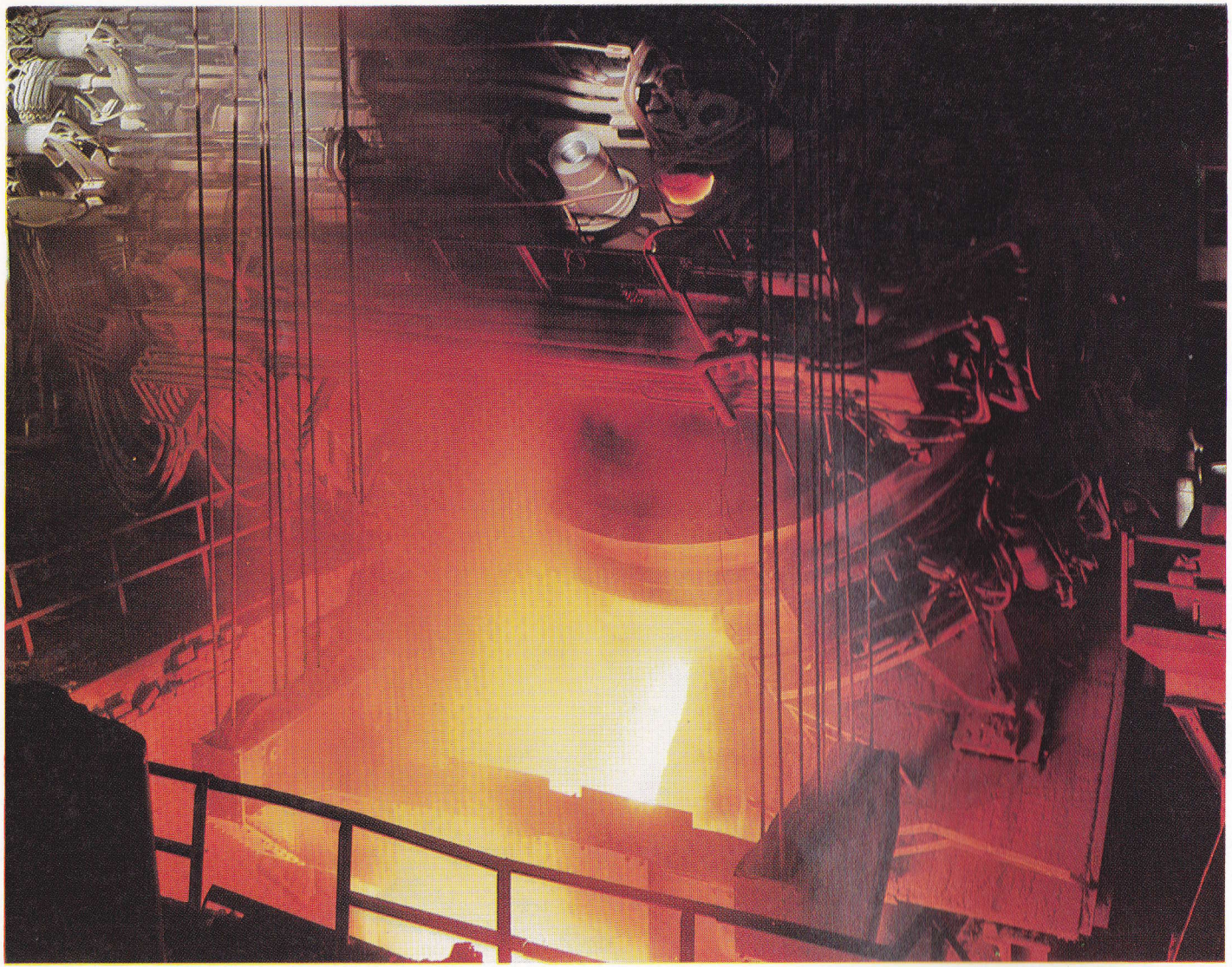
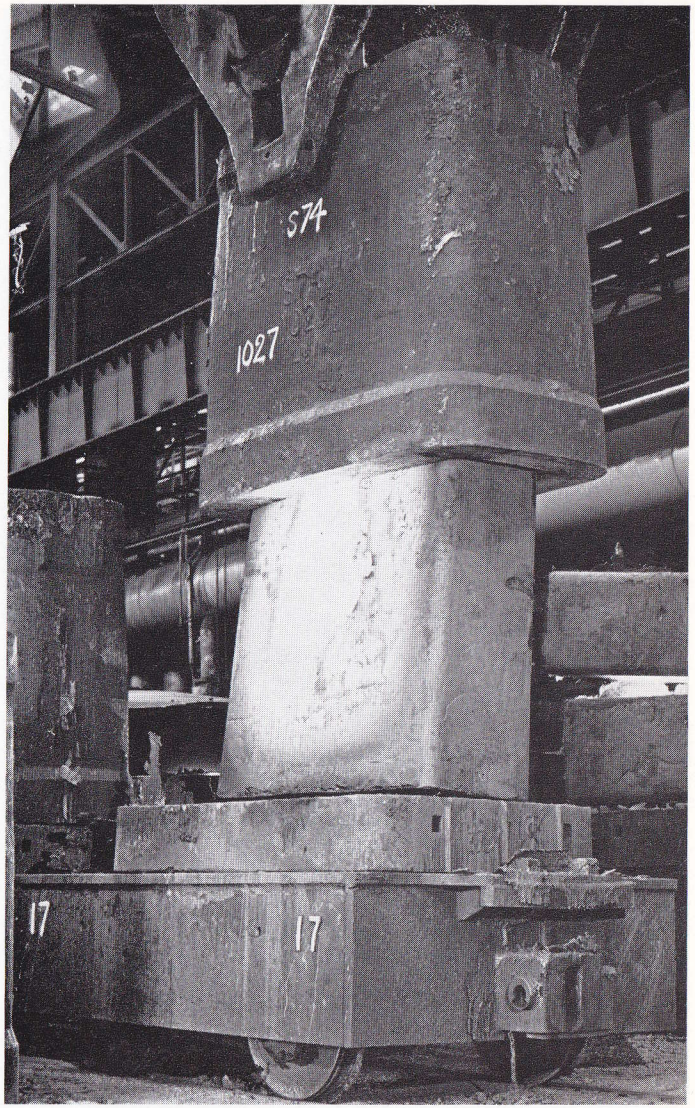


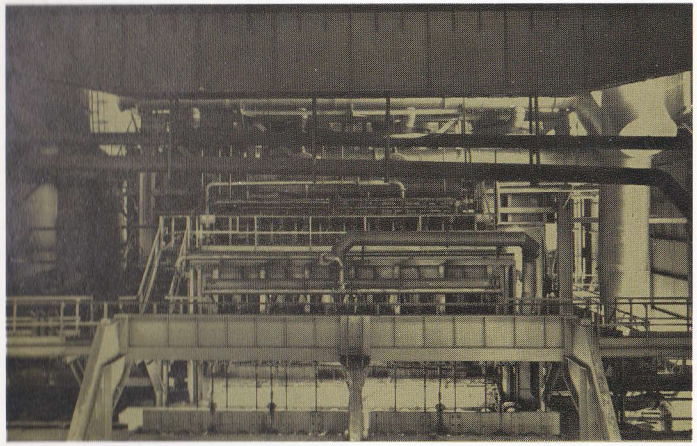
Tapping an electric arc furnace



Ingot stripping at South Teesside Works

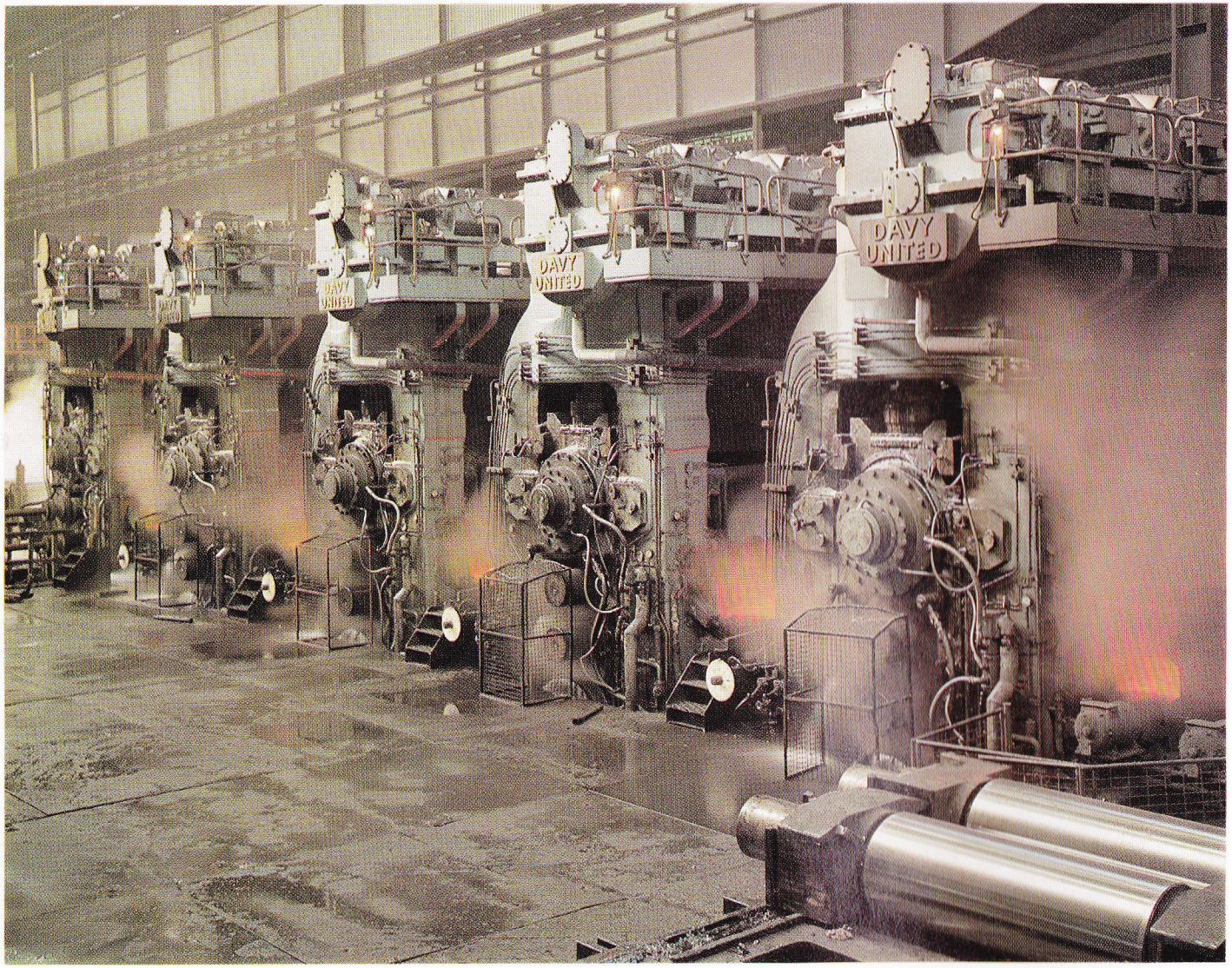
Rolling Mills and Finishing Processes

The South Teesside rolling mills, with a total finishing capacity of approaching 50 000 tonnes weekly, represents a heritage of relatively modern mills initially designed to cater for a broad market demand. In recent years their role has been substantially modified, in accordance with the Corporation's rationalisation policy, so that the mills now concentrate on the manufacture of those products to which they are individually most suited. This, allied to development improvements, has resulted in the attainment of higher outputs at lower operating costs.

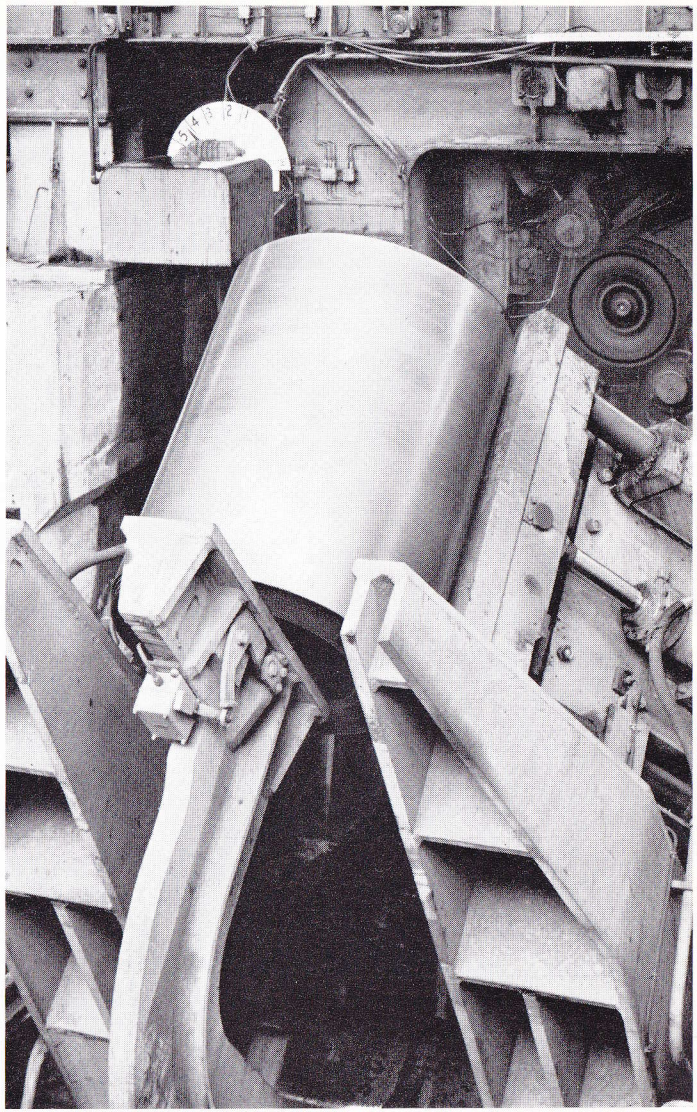


The new opposed zone slab reheating furnace

The roughing mill at the Lackenby coil plate mill



Finishing stands at the Lackenby coil plate mill



One of the mill's two down coilers

Nevertheless, the South Teesside rolling mill programme embraces an interesting diversification of products ranging from wire rod at the lighter end to the largest rolled sections manufactured in the U.K. The following is a summary description of the principal mills:

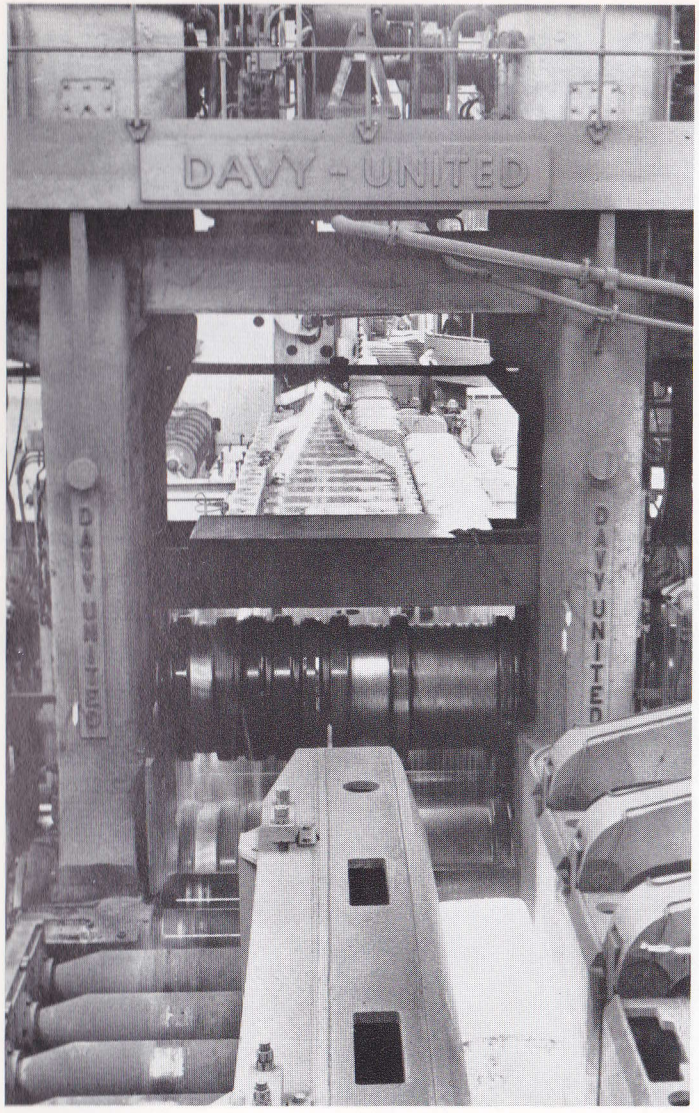
Flat Rolled Products

The main units of the flat products departments are the No. 2 primary mill (commissioned in 1963), producing slabs and a proportion of blooms for associated mills, a combination 80-inch roughing mill (1965), an 80-inch coil plate mill with two down coilers, and a cold processing section. (The latter mill was commissioned with five stands in 1967, a sixth stand being brought into operation early in 1975).

The coil plate mill, which is the centre piece of the flat products department, was designed to supply the expanding market for coiled plate — for which the principal outlets are general engineering, tank manufacture, the shipbuilding and pipe making industries and stockholders.

Recent developments include an additional cut-to-length line and the installation of a new type of re-heating furnace, incorporating reverse firing. The latter, working in tandem with the existing re-heating furnace, enables slabs to be supplied to the mill at a rate approaching 400 tonnes an hour. As a result, the mill's output potential has been increased to over 25 000 tonnes weekly. In addition to its standard range of product, which varies from 600 mm to 1850 mm wide and from 2·5 mm to 12·5 mm thick, the mill also rolls patterned floor plate and special stainless steels.

The cold processing section comprise a skin pass mill and

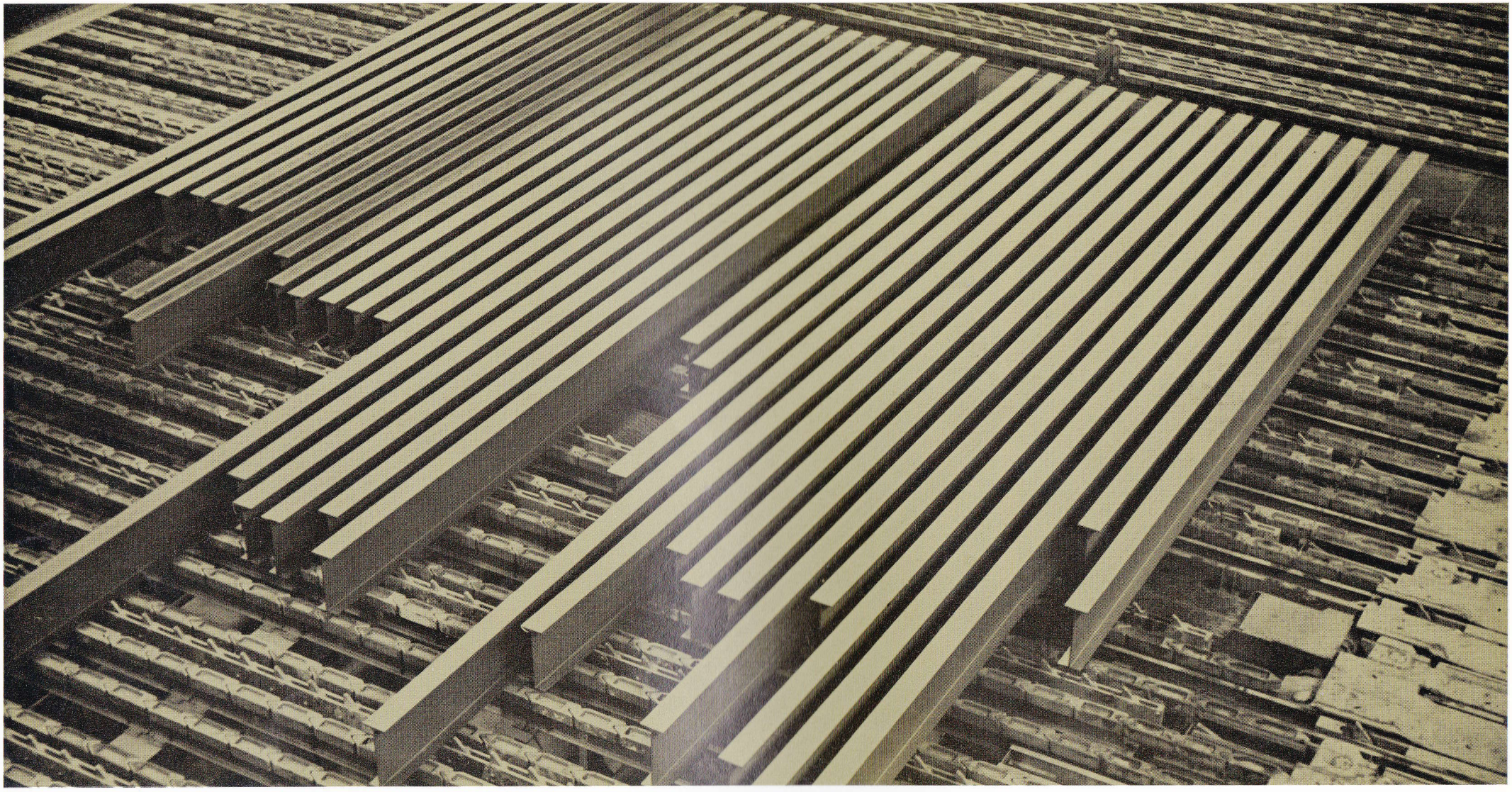


The blooming mill and *right* the rolling of large universal beams at the Lackenby beam mill

associated equipment for producing from coiled plate, slit coils, edge trimmed coils and flat plates. Typical applications for these products are commercial vehicle components, motorway crash barriers and light structures.

No. 1 Primary and No. 10 Beam Mill

The universal beam mill, commissioned in 1958, specialises in the production of a wide range of beam and column sections, used in structural and civil engineering, from 254 mm to 914 mm in depth and from 54 to 634 kilo-



Universal beams on the cooling banks

grams per metre in weight. Ingots, ranging from 5·60 tonnes to 21·30 tonnes in weight, are brought to rolling temperature in soaking pits, and passed through a primary mill for rough rolling into beam blanks.

After being cropped at the shear, these shapes are fed directly to the beam mill where they are successively rolled in the roughing and finishing stands. Both stands consist of a main and an edger housing. In the main stand two vertical and two horizontal rolls, all with their axes in the same vertical plane, apply pressure to all faces of the beam at the same time, suitable adjustments being made between successive passes to keep the elongations of web and flange equal. The edger stand, placed close to the main stand, works with two horizontal rolls on the edges of the flanges to keep them square and control their length.

After rolling, the beams (or columns) are hot sawn into customer's lengths and are passed to the finishing end of the mill to be cooled, straightened and sorted for despatch. Additional finishing services are available such as cambered beams and columns, and beams split into structural tees. The mill produces 8000 to 10 000 tonnes per week depending upon the mixture and an important feature is the large content of export orders which often make up 50% of the mill programme.

Rod and Bar Mills

Adjacent to the universal beam mill are the two Lackenby rod mills — No. 12 mill commissioned in 1959, and No. 14 mill which began operations in 1966. The products of both mills are used by the reinforcing and wire drawing industries.

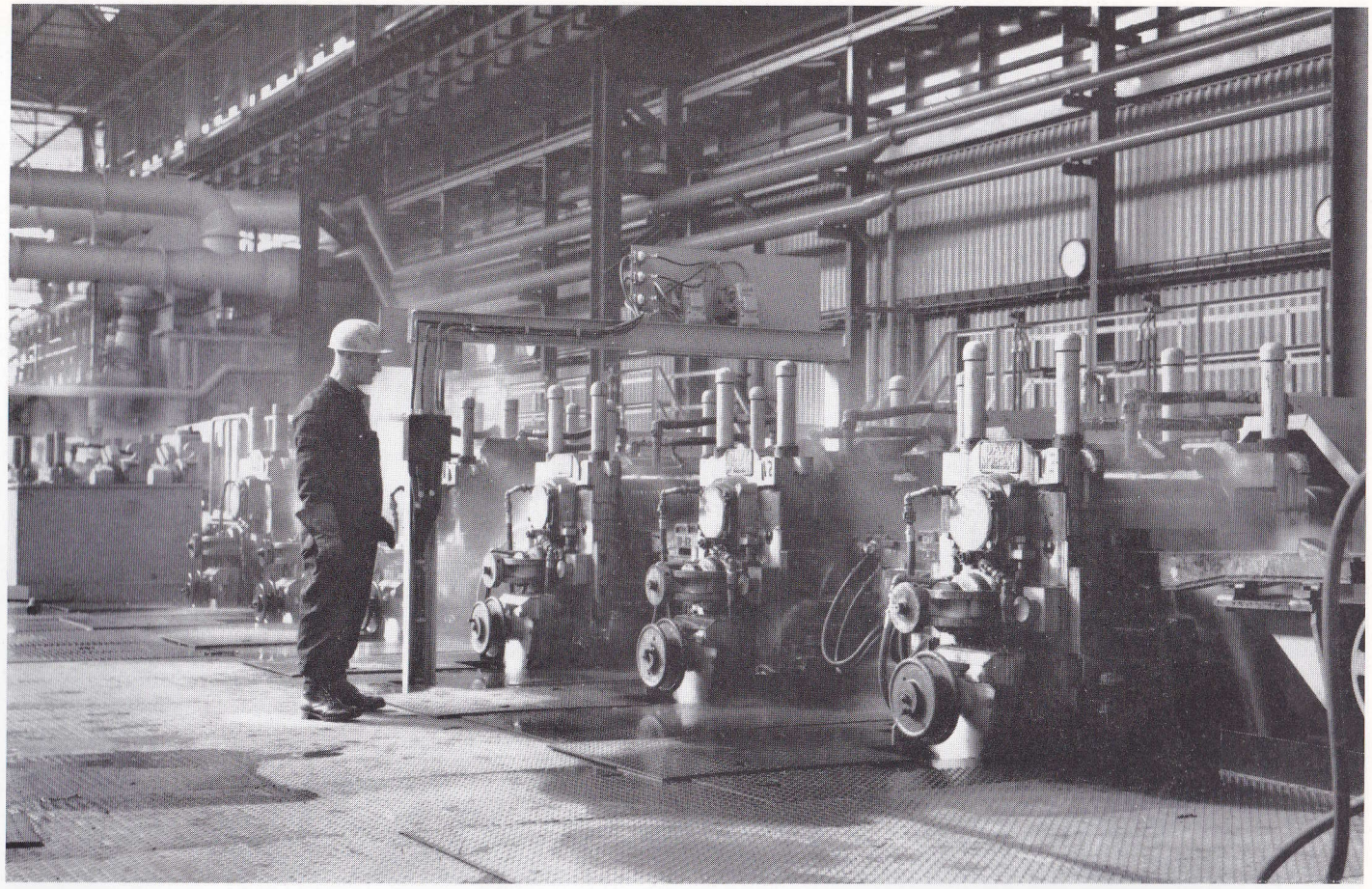
No. 12 mill produces both coiled rod in rounds and squares from 8 mm to 12 mm diameter and straight and ribbed bar in sizes ranging from 16 mm to 40 mm. The mill, which has 21 stands, is served by a re-heating furnace which supplies billets for rolling at a temperature of about 1150°C.

Depending on size, rod can be rolled out of stands 17, 19 or 21 into conventional laying reels where the coils are cooled before being taken by the conveyor system to the finishing department for despatch. Straight bar is mostly rolled out of stand 15 and delivered to run-out tables and then to shears which cuts the bar into long lengths and these are further sheared to meet customers' orders.

No. 14 mill produces wire rods from 5·5 mm to 9·5 mm diameter in coils weighing about 450 kg each. Mill operations begin with the reception, inspection and the dressing of 30 – 34 ft. lengths of $3\frac{1}{4}$″ square billets which are then heated to 1100°C in a re-heating furnace before discharge to the mill.

The two-strand mill consists of 25 in-line stands. Depending on the size being rolled, the rod finishes at stands 19, 21, 23 or 25. From the final stand the rod passes through delivery pipes and water-sprays to laying reels. The rod then travelling at a speed of 8000 ft./min. (90 m.p.h.) is made to spin through a laying-pipe which feeds it in 'rings' on to a conveyor moving at a relatively slow speed. The coiled rod is carried through an air-blow which cools the product to about 400°C. This method of controlled cooling gives a uniform metallurgical structure throughout the coil.

After cooling, the 'rings' are re-coiled in a re-form chamber ready for trimming, tying and despatch to the customer.



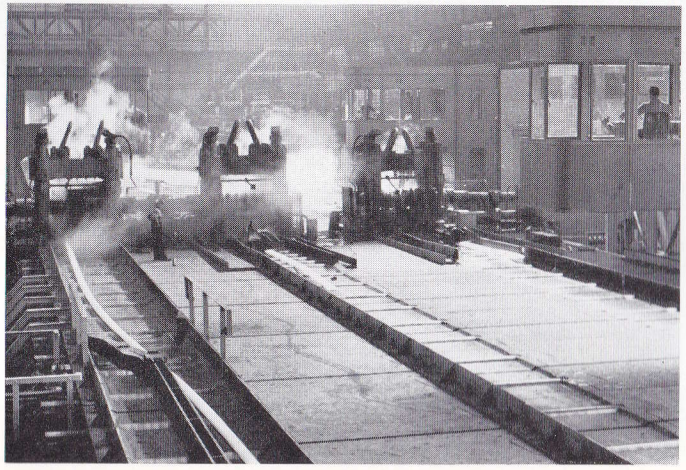
No. 14 rod mill, Lackenby

Cleveland Mills

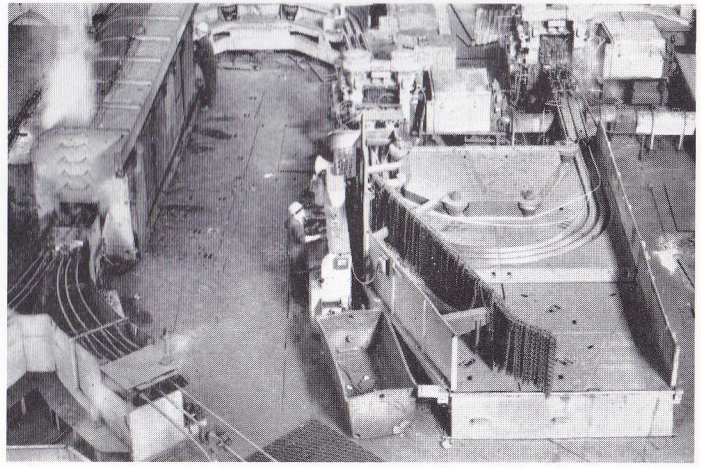
The Lackenby rod and bar mills are supplied with billet by No. 7 mill at Cleveland. This is a 3-high roughing and 6-stand finishing mill capable of rolling semi-finished material ranging from 2″ billets to 12″ wide slabs. Its bloom supply is derived from the adjoining No. 3 — 42″ primary mill with its 12 soaking pits and a bogie hearth ingot heating furnace.

This primary mill is the main supplier of blooms to the No. 9 medium section mill, a 3-high mill comprising a 30″ roughing stand and a 3-stand cross country 26″ finishing train. The hot saw, cooling and sorting banks, roller straightening machine and loading facility are in duplicate to allow direct loading at the mill output rate. Structural sections, joists and channels up to 30 kilograms per metre and angles up to 150 mm × 150 mm are the finished products. One quarter of the mill's 6000 tonne per week capacity is processed through the nearby colliery arch plant which is equipped with four joist cambering machines for the manufacture of roof supports for the National Coal Board.

No. 9 medium section mill at Cleveland



No 12 rod and bar mill, Lackenby

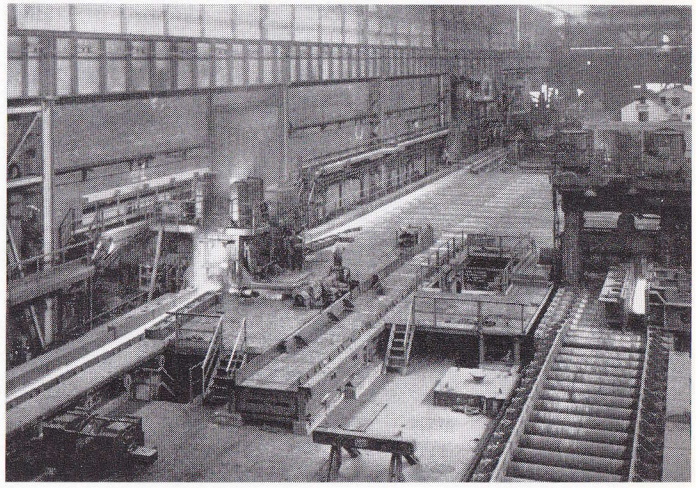


Cargo Fleet Mills

Since the closure of ironmaking and steelmaking at Cargo Fleet in 1971 the rolling mills have been supplied with blooms from the Lackenby steelmaking and continuous casting facilities and the works was subsequently integrated into the South Teesside Works organisation at the end of 1973.

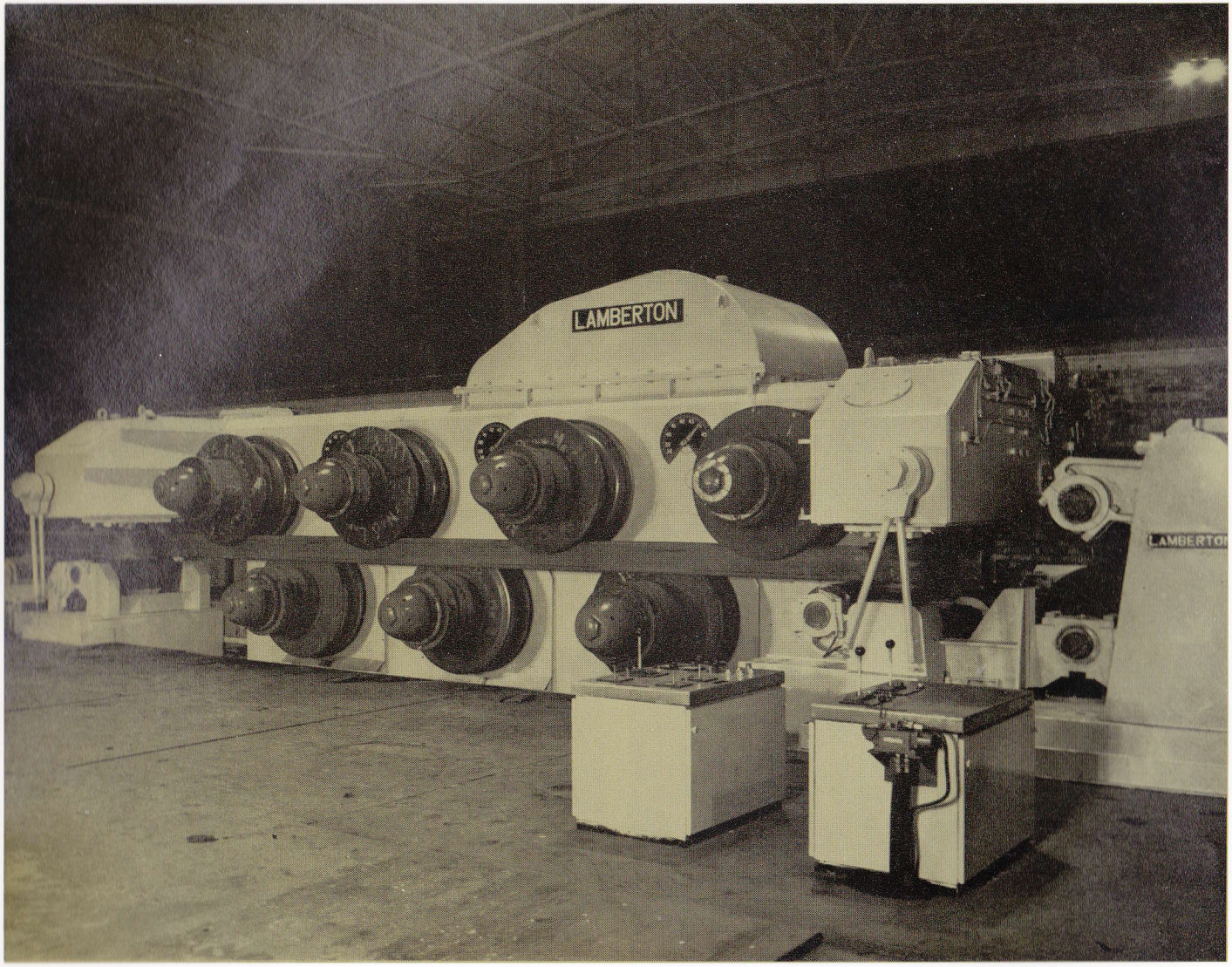
A top and bottom fired walking beam furnace, the only one of its type in this country, was commissioned in late 1972 to reheat blooms at a rated output of 95 tonnes per hour. Blooms from this furnace are supplied via a 42″ breakdown stand or direct to the five-stand two-high cross country 32″ section mill for rolling into 17 profiles of Larssen steel sheet piling, for which the mill is the UK's sole supplier. Other products rolled include heavy structural sections (channels and joists), Rendhex foundation columns and bridge, crane, conductor and track rails.

A 52″ universal beam mill is fed with formed blooms from the breakdown stand and works in conjunction with the 32″ section mill giving greater flexibility and reduced down time by eliminating stoppages for roll changing in either of



General view of the Cargo Fleet universal beam mill

Walking beam reheating furnace



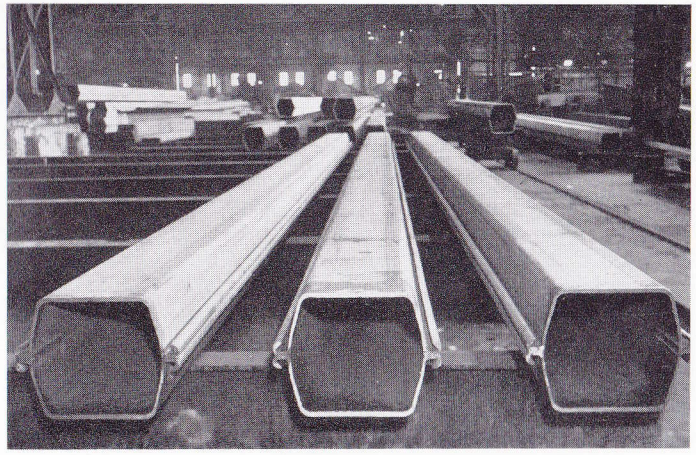
Seven-roller straightening machine

the mills. The universal beam mill, installed in 1961, was designed to roll parallel flange beams ranging from 203 × 133 mm to 610 × 305 mm and universal columns from 152 × 152 mm to 305 × 305 mm on the same principle as described for the larger Lackenby No. 10 Universal Beam Mill, but using the splayed flange method of rolling.

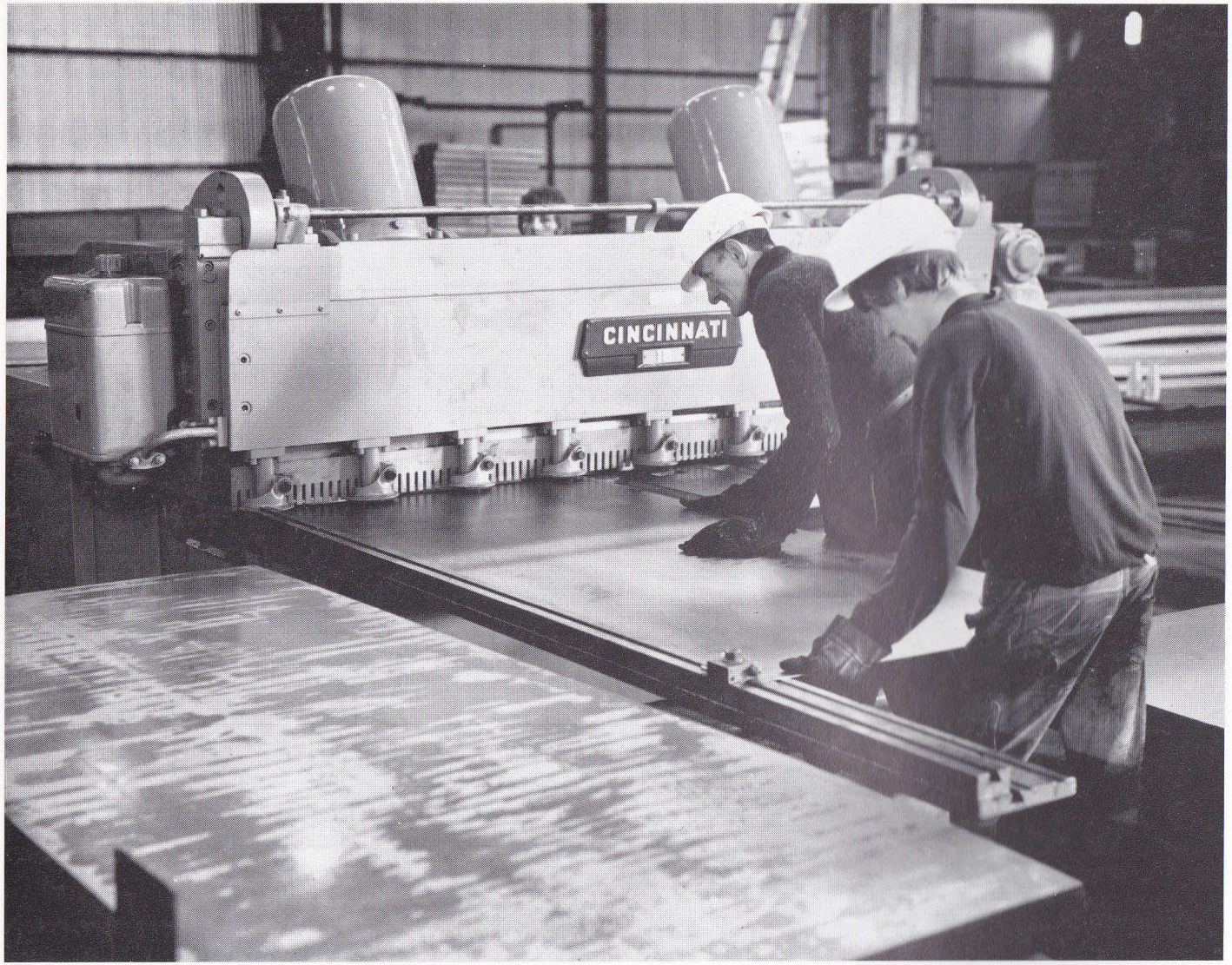
All rolled products can be straightened direct from the cooling banks by one of three roller straightening machines. The latest, a seven roller 80″ centre machine was installed in January 1966 and is the largest unit of its type in the UK, ensuring that the heaviest profiles rolled in the higher strength steels can be commercially straightened to customers' requirements.

The Rendhex and Piling Department fabricates Rendhex and box pile foundation columns as well as the newly developed high strength Unissen type of steel sheet piling which combines the strength of heavy universal beams with the unique interlocking properties of Larssen steel sheet piling.

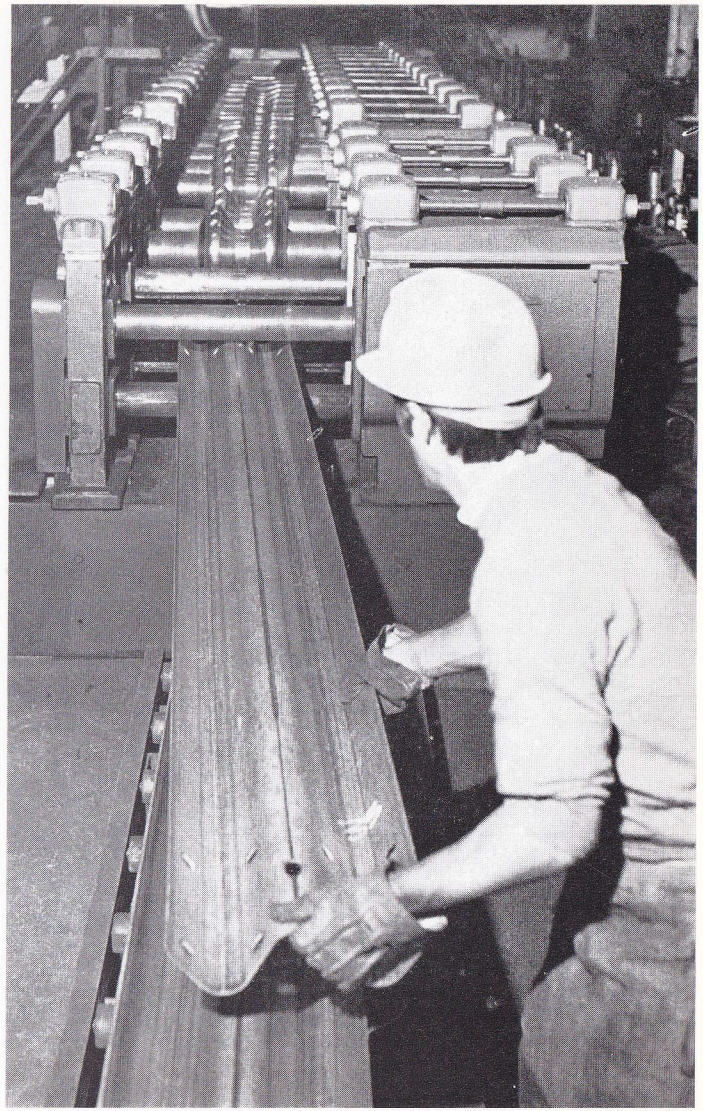
The Piling Design Department based at Cargo Fleet mills is available to give technical advice and assistance on all piling projects.



Box type foundation piles fabricated at Cargo Fleet



Shearing light plate in readiness for sheet metal fabrication at Ayrton



Roller forming of road safety fence sections at Ayrton Sheet Metal Department

Sheet Metal Department

Associated with the South Teesside Works rolling mill function is the Ayrton Sheet Metal Department which is situated in the old ironmasters district of Middlesbrough. This works undertakes the fabrication of a variety of products using light plate and sheet manufactured by the Lackenby coiled plate mill.

Ayrton has facilities for decoiling, re-shearing, punching, notching and forming by either cold rolling material up to 5 mm thick or pressing plate up to 9 mm in lengths up to 8 m. An extensive fabricating department produces a variety of light welded products, and there is an integral galvanizing plant for finishing purposes.

About 80 per cent of the output is concentrated on steel lintels for housing, safety fences for motorways, trench sheeting for the constructional industry and special pressings for manufacturing containers.

Skinningrove Mills

There are two finishing mills at Skinningrove Works which is situated on the Cleveland coast some 15 miles distant. These mills roll mainly special profiles for a variety of markets at home and abroad but they are administered as part of the South Teesside rolling facilities. (A separate publication is available on Skinningrove Works).

Engineering Services

The servicing of the massive installations which comprise South Teesside's iron and steelmaking and rolling facilities, many of which are required to operate on a virtually continuous basis, demands a comprehensive works' policy for the effective maintenance, repair and renewal of the vast range of plant involved.

This policy is based on the following set-up:

Each works' area and each major section of a works is self-supporting in labour, machine tools and equipment to enable the maintenance staff to deal adequately with day-to-day problems.

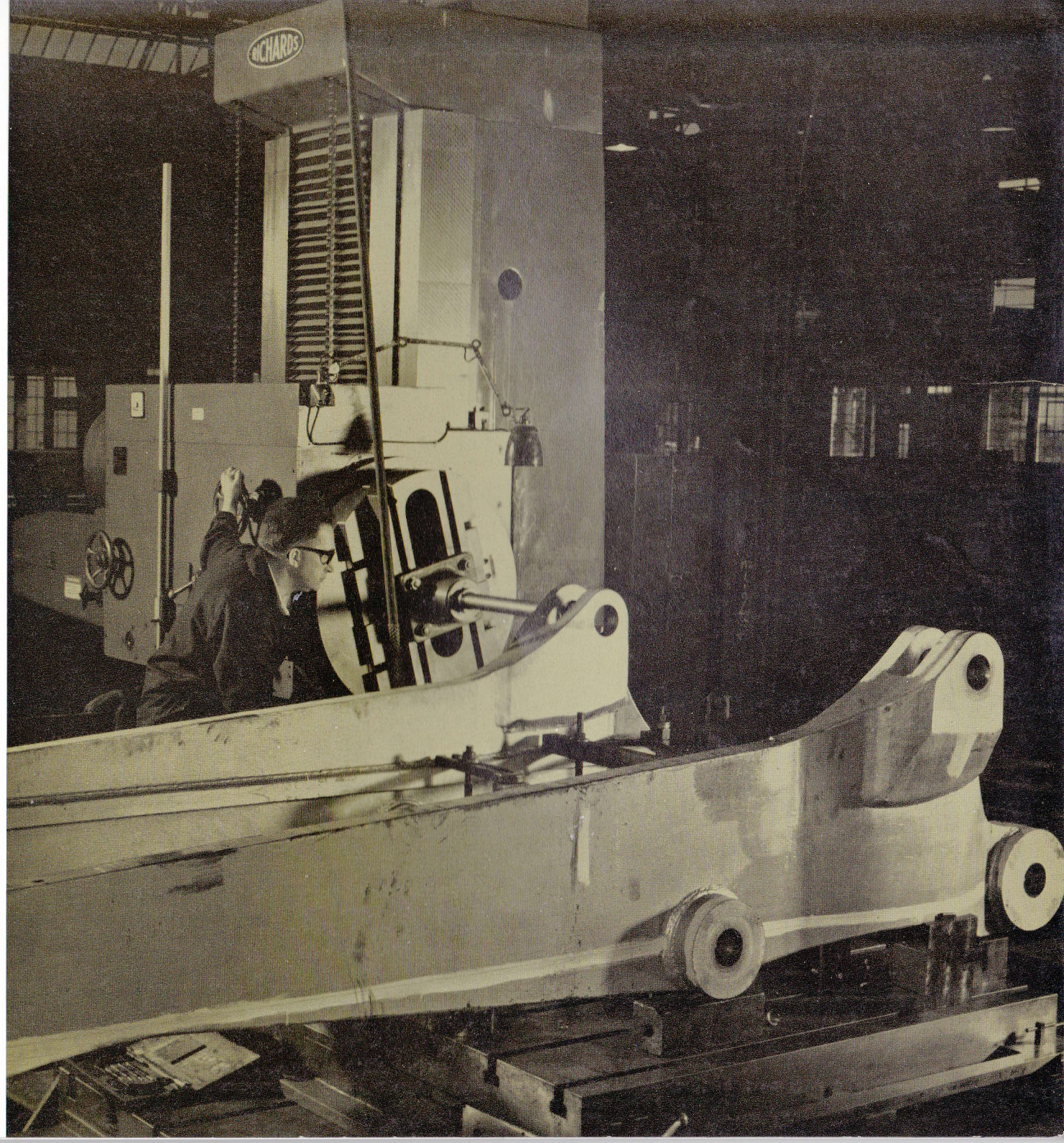
Centralised services are provided for special work, or for work common to all plants.

On the latest plants a system of maintenance planning, and the provision of spares based on the working life of wearing parts, has been adopted.

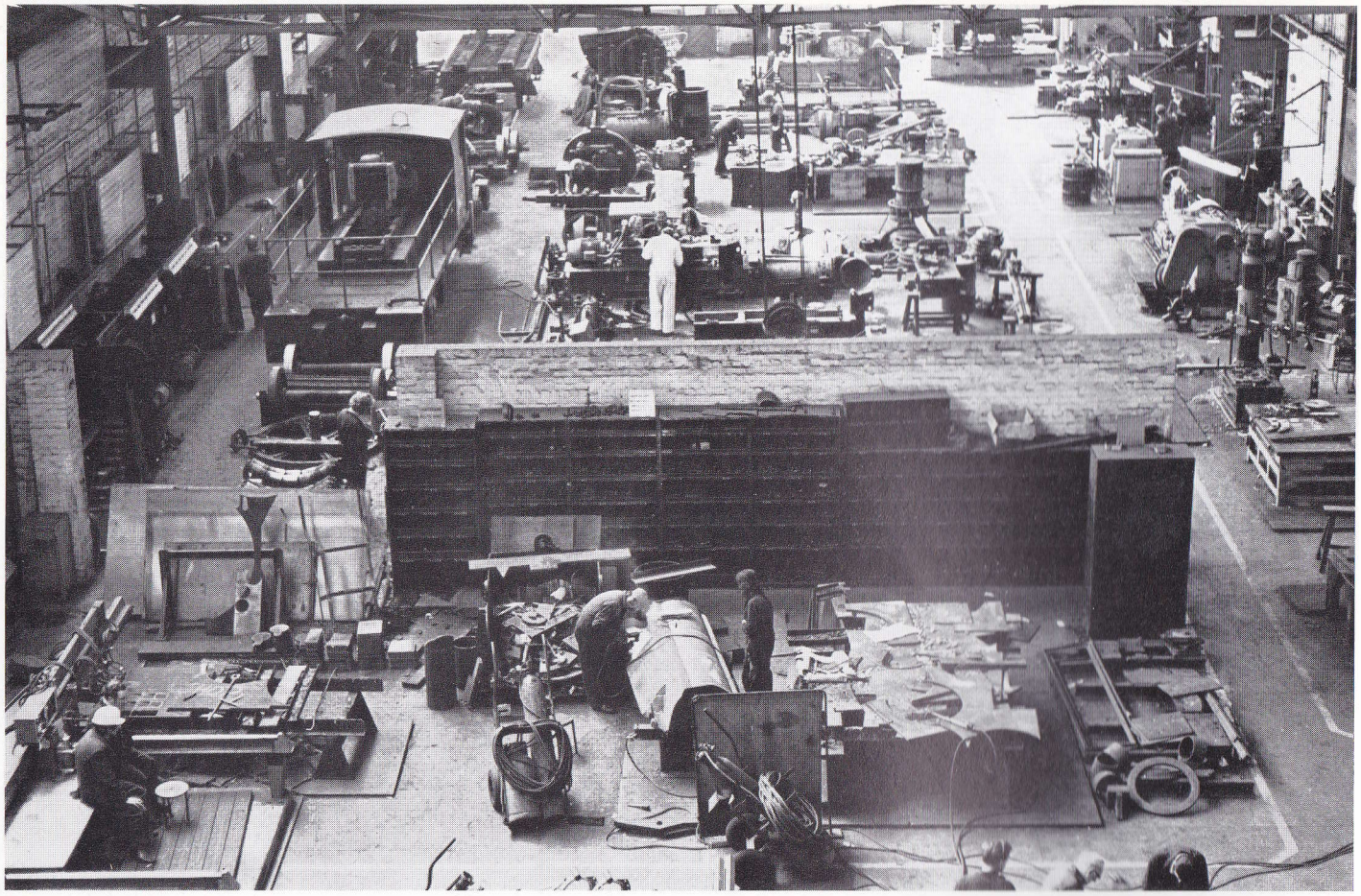
Maintenance and Repair

Comprehensive workshops, with a good range of machine tools, exist at Cleveland and Lackenby to deal with machine work, forging, boilersmithing, electrical work and joinery. There is also capacity to handle a certain amount of work for new plant installations.

In addition to the main workshops, a set of smaller, self-contained repair shops is provided at major plants under the control of the plant engineer. On plants such as rolling mills, where repair work tends to consist of renewal by spare parts, small workshops, equipped with drilling machines, shapers and grinding machines, are provided for the immediate use of the plant fitters.



Precision boring of a fabrication at Lackenby machine shops



View of the machine shop at Clay Lane blast furnaces and *right* the heavy fitting bay, Lackenby machine shop

Opposite page: Relining of torpedo ladles at Cleveland Works

A similar pattern of organisation exists on the electrical side with central shops, able to handle re-winding and impregnating, and section shops, generally sited close to the mechanical repair shop at major plants.

The maintenance of the many sophisticated electrical systems now used to monitor and control critical process operations is the responsibility of the electronics department based at Lackenby. Other duties include calibration and repairs of electronic weighing equipment and maintenance of complex communications systems.

Centralised Services

Technical engineering services for major developments are provided by specialist engineers of the General Steels Division's Development Engineering Department (Teesside). This service includes the supervision of erection and plant commissioning so that works' engineering resources are not diverted from the important job of maintaining working plants.

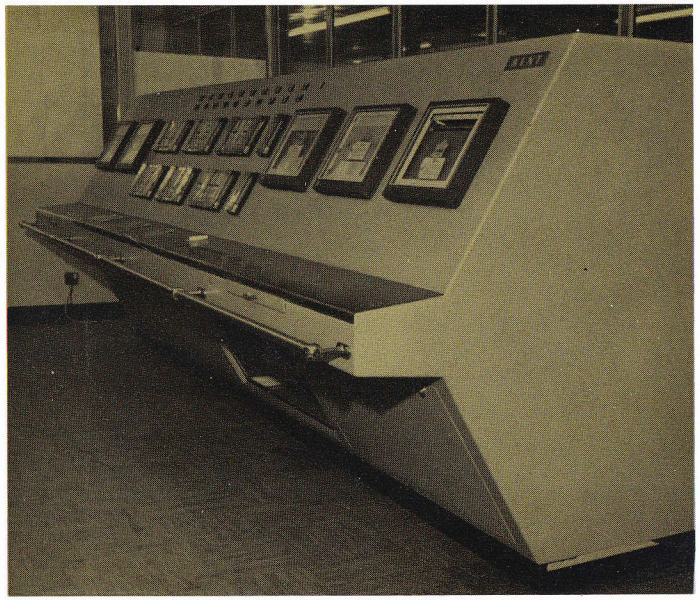
Capital jobs of a smaller nature, with the exception of blast furnace relines, are dealt with by the technical engineering department at Lackenby with its own drawing office to handle work submitted by both technical and plant engineers.

The maintenance and repair of railway wagons is carried out at a central shop at Redcar. An average of 30 light and six heavy repairs are carried out each month, in addition to special rebuilds.

A new repair shop at Cleveland handles the skulling, maintenance and relining of torpedo ladles. Major relines are

Skulling of torpedo ladles at Cleveland Works

Fuel control panel No. 3 slab reheating furnace



undertaken on completion of 100 000 tonnes service and interim repairs after 50 000 tonnes.

All steam turbines and condensers are inspected after 15,000 running hours by a specialist engineer who is responsible for arranging an overhaul at that stage.

The introduction of an increasing variety of centralised oil and grease systems has made lubrication an important subject — for example, extensive use has been made of oil circulating systems in modern rolling mills and nearly all overhead cranes are now equipped with two manual grease systems. A lubrication engineer advises on the choice of lubricant, the type of equipment to be used, and the organisation of the labour force dealing with lubrication.

A rope-splicing depot dealing with the manufacture of slings throughout the works is located at Lackenby where special equipment makes and tests up to 30,000 splices a year.

Maintenance Planning

South Teesside's maintenance planning scheme, aimed at eliminating production stoppages due to undiscovered mechanical and electrical faults in new plants, is based on a periodic inspection of every item.

Inspection reports help to assess the probable life of wearing parts so that the necessary replacements can be made available before a breakdown occurs. The frequency of inspection of each item of plant is determined by its vulnerability to wear, adjustment or other factors affecting its performance. In this way a case history is built up of each item on the plant inventory to give an accurate indication of the spares to be carried and at the same time aiding efficient planning of the work of the maintenance staff.

Control and Utilization of Fuel

The economic utilization of fuel in any integrated steelworks necessitates making the maximum use of the two main by-product fuels, blast furnace gas and coke oven gas, supplemented by heavy fuel oil. These three main fuels are used extensively throughout South Teesside Works.

Blast furnace gas is used mainly for steam raising, for heating blast furnace stoves and soaking pits. In general coke oven gas is reserved for heating mill furnaces and the coke ovens. Though not strictly a fuel, oxygen is now used in large quantities, particularly on the BOS plant where approximately 55 m^3 are required for every tonne of steel produced.

Production Planning and Control

Production planning and control at South Teesside is the responsibility of a specialist department set up in 1972 following rationalisation of steelmaking within the Teesside and Workington Group. Through the BOS and electric arc plants, South Teesside has to supply no less than six finishing mills at other Works as well as five rolling mills of its own. Liquid steel is processed by any one of five different routes — as a continuously cast product through the bloom and slab machines or in ingot form to three primary mills. The essential flexibility of Group operations can lead to additional mills being supplied with feedstock from South Teesside.

The complexity and scale of the operation makes production planning a vital factor in maintaining efficiency by co-ordinating manufacturing processes so as to maximise the cost effective use of production resources. This is achieved by developing, monitoring and modifying production schedules on appropriate time scales. The department operates within constraints set by the quality, quantity and delivery of customers orders, plants capability and Group planning objectives.

A steel scheduling computer has been provided to enable the planners and schedulers to optimise the available options. The computer complements the monitoring effected by manual planning aids, including control boards.

Above right: View of the main planning office showing the manually operated control boards and *below* view of the newly installed IBM 1800 steel scheduling computer

Quality Control

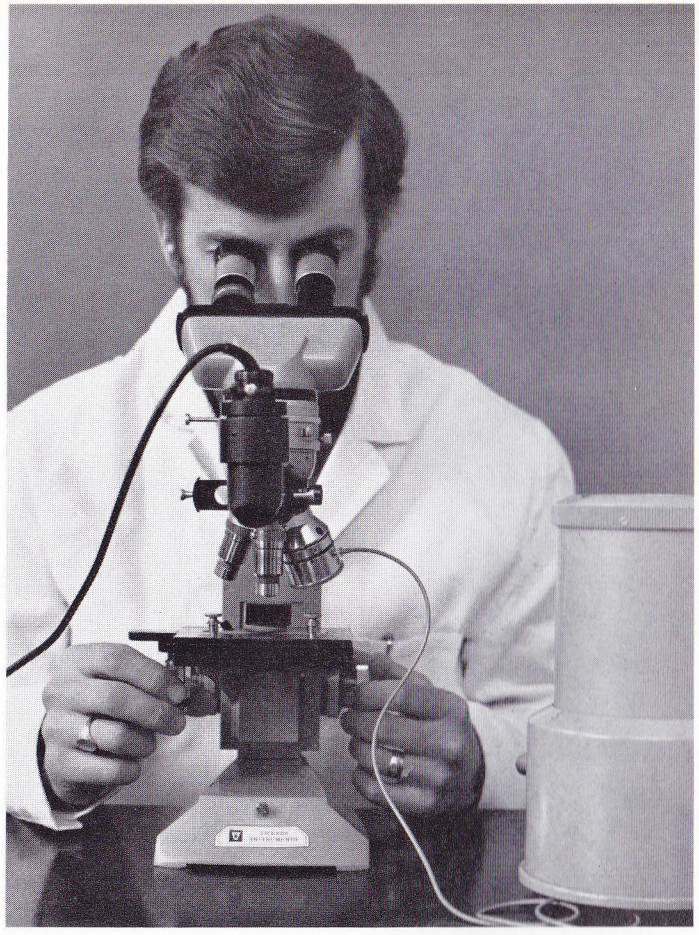
Special analytical equipment in the Central Laboratory

Quality control technician at work in the steelplant

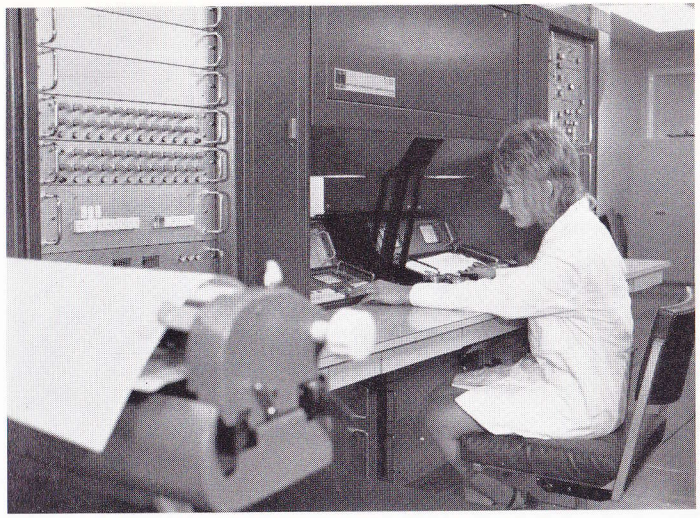
The quality control departments are responsible for establishing process routes for iron, steel, coke and by-products and finished products to ensure that yields are optimised and that product quality meets the required standards. The departments covering steelmaking, ironmaking, metallurgical and chemical services, keep in close contact with customers and generate much original development work.

Metallurgical services department undertakes both detailed and routine laboratory inspection of products, provides a

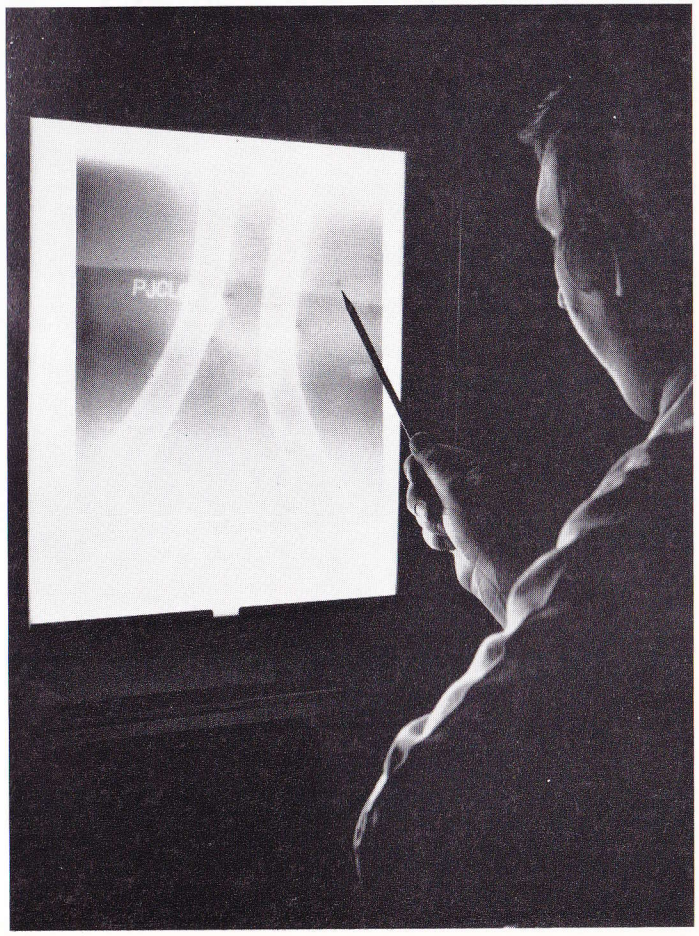
Physical testing



Metallography



Top right: Spectrographic equipment, BOS Laboratory



Testing incoming materials

service to engineering departments and carries out laboratory based development work, the testing of refractories and physical testing of finished products.

Chemical services department is responsible for analysing ores, sinters, fluxes, slags, iron and steel, using sophisticated instrumentation to provide the rapid analysis required.

New plant developments necessitate the participation of a technical services department to ensure that increased capacity and production rates are enhanced by a satisfactory quality of product. Quality control achieves this by controlling the blend of raw materials to the various processes through a knowledge of their chemical composition and by metallurgical inspection and testing of the finished product.

These principal functions are supplemented by maintaining a flow of technical advice and information to production and commercial departments, a technical service to customers and a comprehensive metallurgical service to the engineering department.

Production Services

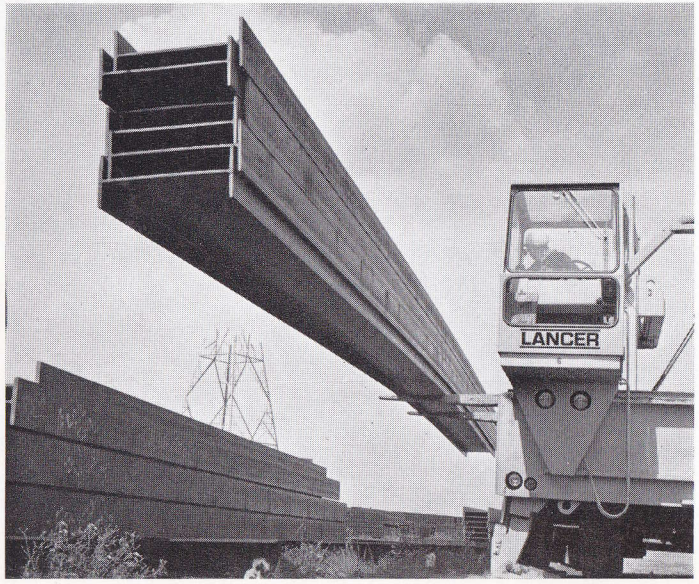
The principal role of the production services department is to handle the movement of all internal materials and the despatch of finished products. To deal with this formidable task there are comprehensive internal Works transport systems.

Production embraces the internal Works transport systems, including a fleet of 65 diesel hydraulic locomotives (H.P. 204 – 828) and a range of special vehicles and wagons for movement of slag, molten iron and hot steel, blooms, billets and other semi-finished materials.

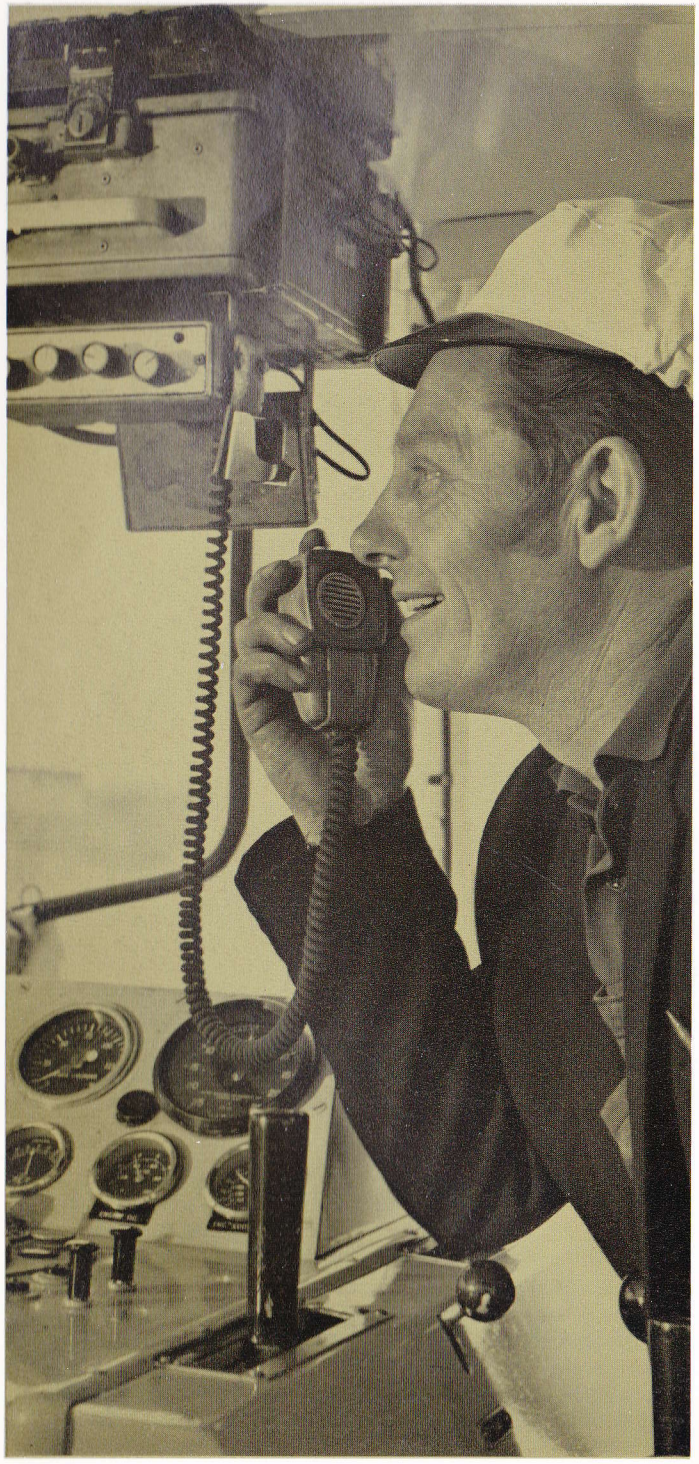
Locomotives are controlled by radio from a central office, which also works in close liaison with British Rail's traffic control at Middlesbrough. Extensive use is made of mobile equipment for stocking and reclaiming raw materials and scrap and for moving semi-finished steel.

All despatch bays are equipped for loading either road or rail vehicles, with extensive road trailer parks and railway sidings — there are nearly 200 miles of rail track in South Teesside Works. Weighbridges are provided for road and rail traffic at several locations and checked weekly by specially calibrated test vehicles.

A 25-tonne sideloader handling universal beams



Right: Coiled plate loaded on 100-tonne rail wagons, ready for despatch



Locomotive driver talking to central traffic control office

A member of the security force investigating a traffic incident

Security

Another important responsibility of the production services department is security which poses a constantly changing and widely varied problem in a large, modern iron and steelworks. A security force of 100, comprising senior officers and patrolmen, are concerned with road traffic movement, safety, crime prevention and accident control.

Modern aids such as radio patrol vans, personal radio, radar speed meters, and intruder detection devices are widely used, but the aim is to complement their effectiveness by maintaining a good personal relationship between the security corps and the entire work-force.

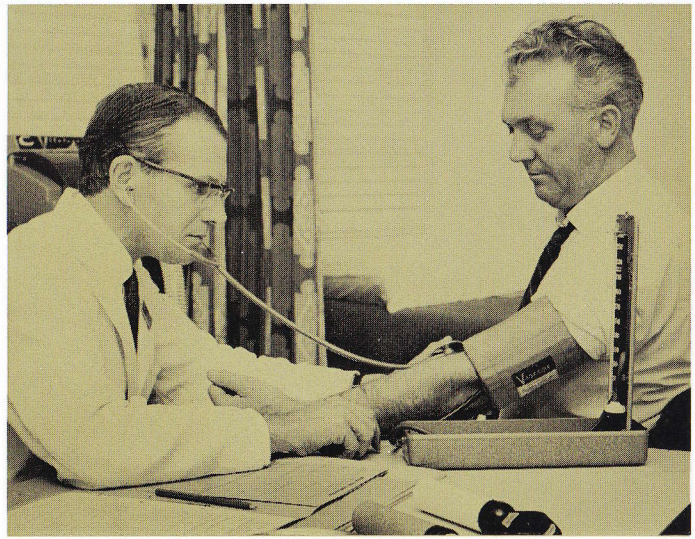
Personnel - a wide range of services

At South Teesside Works the personnel function covers a range of specialised services to management, and there is close liaison with the Group personnel department to ensure that BSC personnel and social policy is properly co-ordinated. These services encompass welfare, catering, education and training, accident prevention, industrial relations, joint consultation, the suggestions scheme and salaries administration.

The importance of the inter-relationship of these activities and the need for their co-ordination is reflected in the organisation of the personnel department and in the role it is required to play in the overall management of the Corporation.

Education and Training

A new training centre, manned by experienced training officers, accommodates the many educational requirements of the Teesside and Workington Group. Photograph left shows a training class in session, trainees sitting in chairs fitted with movable writing palettes. The extensive facilities of the machine tool section are also amply demonstrated in the colour picture above.



Safety

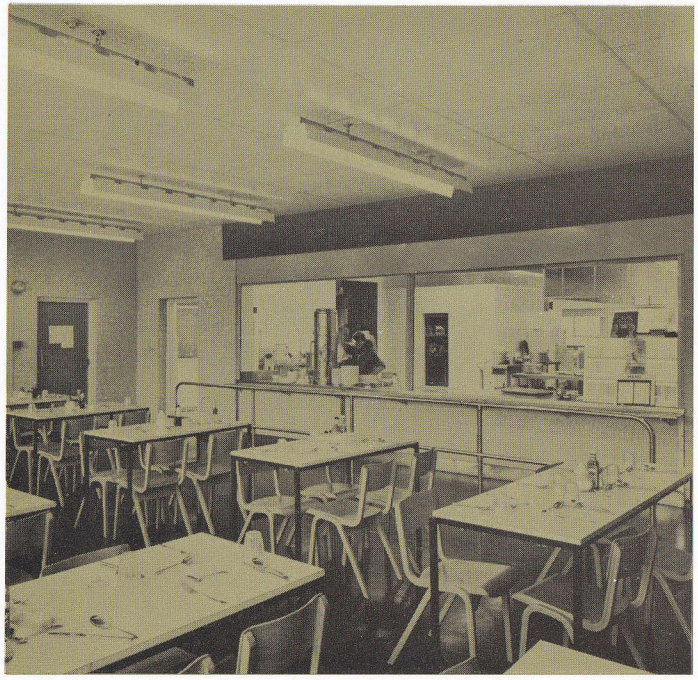
A team of safety advisers provide a round-the-clock service to South Teesside Works. All aspects of accident and fire prevention are covered, including training of employees. For example, in this picture, a safety adviser is explaining statutory regulations on radiation devices to a member of the Works safety committee.

Joint Consultation

An important feature of men-management relationships in a modern iron and steelworks are the regular joint consultative meetings (above right) held at departmental and works level. The consultative process is one that is being continually refined to improve its effectiveness.

Medical

The provision of medical services is a Group responsibility and the new Group health centre at Lackenby serves the South Teesside Works as well as acting as the hub for BSC medical care on the North-East and North-West coasts. The centre is staffed by full-time industrial medical officers, nurses and medical room attendants who are fully involved in the immediate treatment of illness and accident at work and in the expanding role of preventive medicine.



Welfare

A full-time welfare staff fulfils an important sociological service covering a wide range of subjects. For example, in the picture above, a welfare officer gives advice to an employee about to retire. Sick visiting, at home and in hospital, confidential personnel counselling and liaising with local services, including transport and housing, are among the services dealt with by the welfare team.

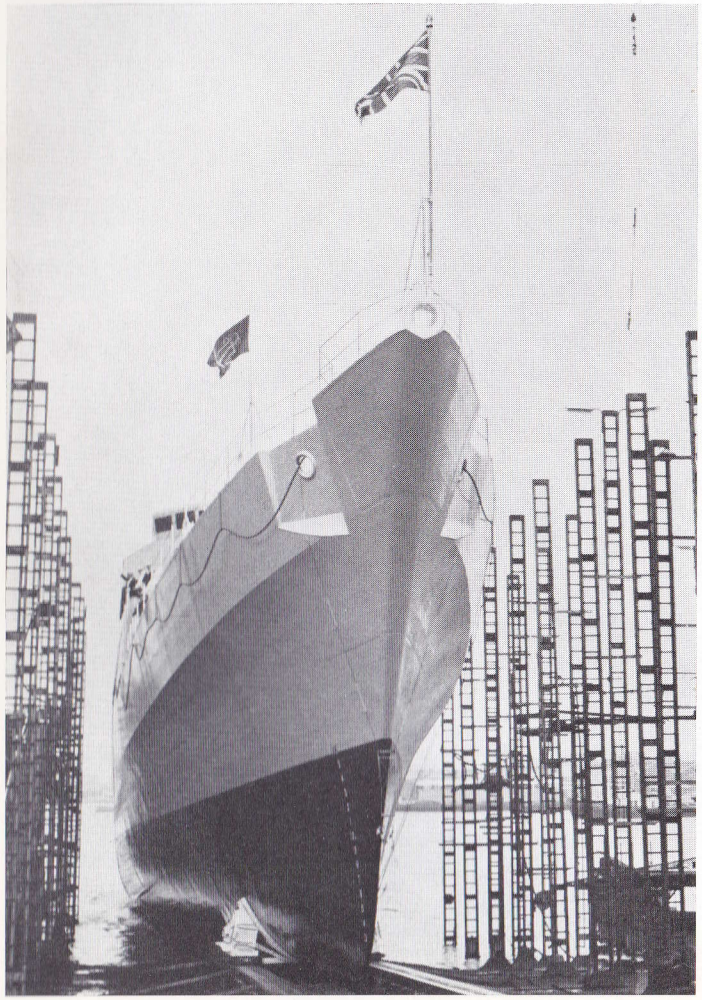
Catering

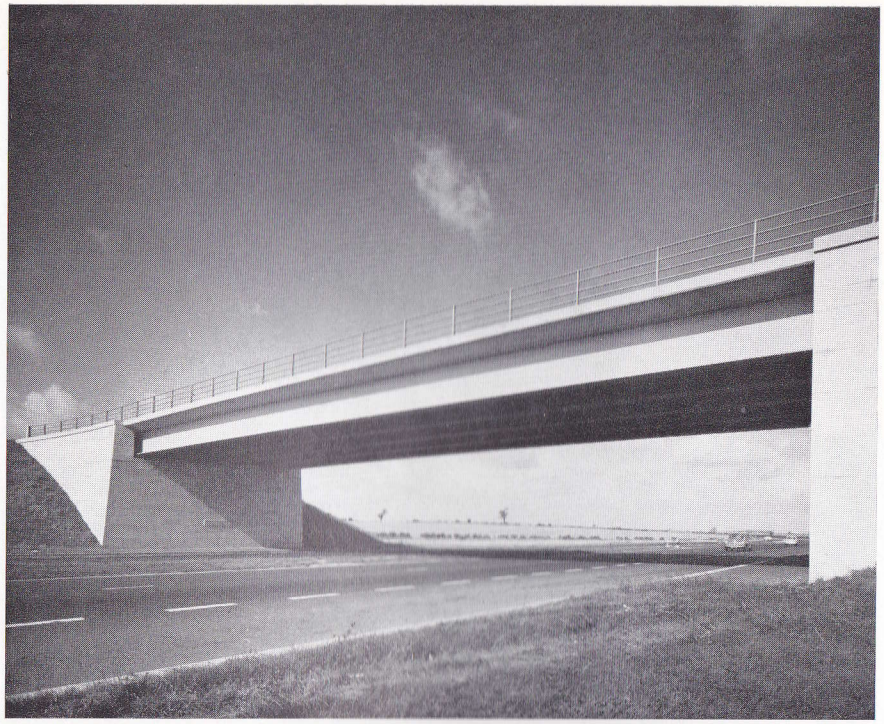
One of the many canteens operating at South Teesside Works, which together provide an average of 12 000 meals each week. Included in the weekly sale of beverages is no less than 8000 pints of milk. A total of nearly 140 catering employees are involved in providing this important service.

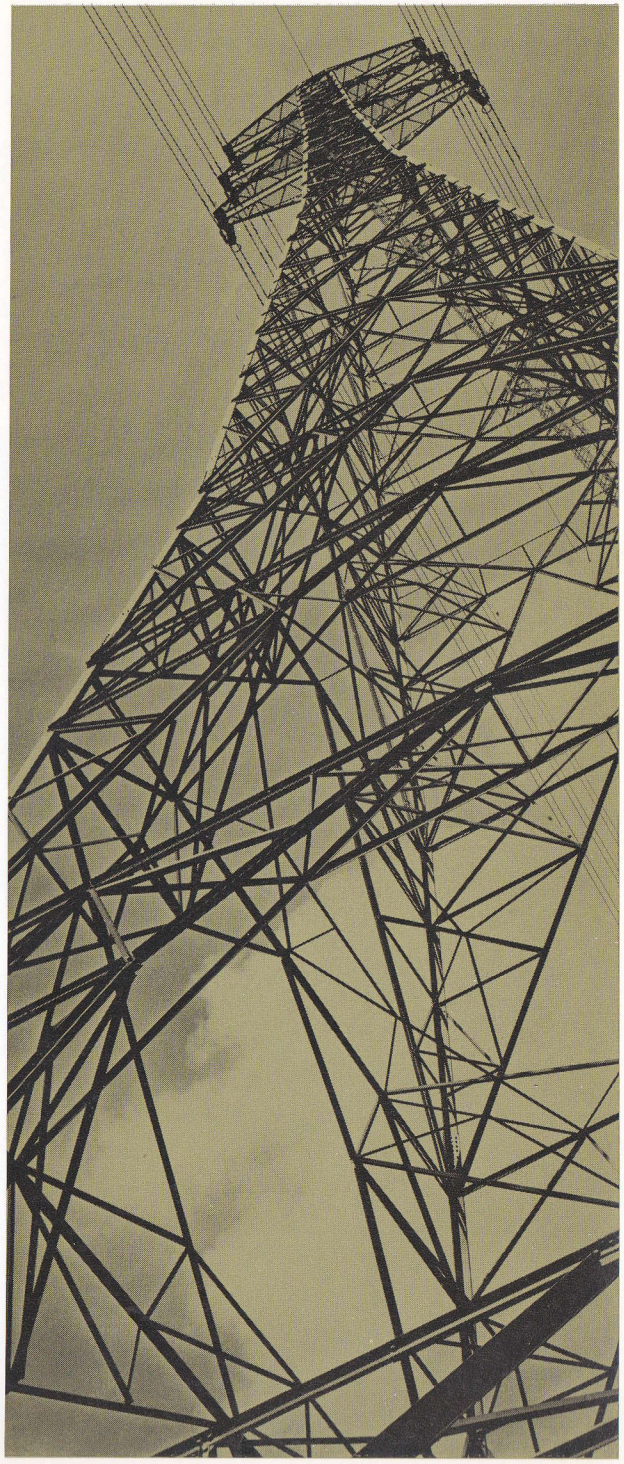
South Teesside steel - vital to industry

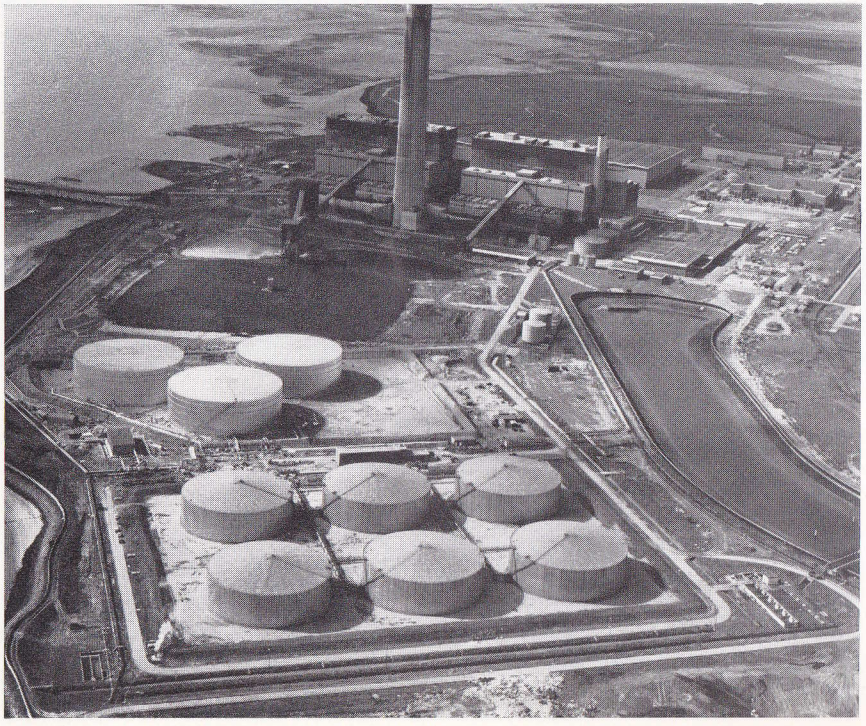
Steel from South Teesside Works serves major industries at home and abroad. Structural steel sections, including beams and columns, plate and reinforcing steel plays a vital part in important industrial and commercial projects – bridge building, power stations, fuel storage tanks, oil exploration rigs and production platforms, pipe making, transmission towers, multi-storey buildings and a wide variety of applications in general, civil and structural engineering.

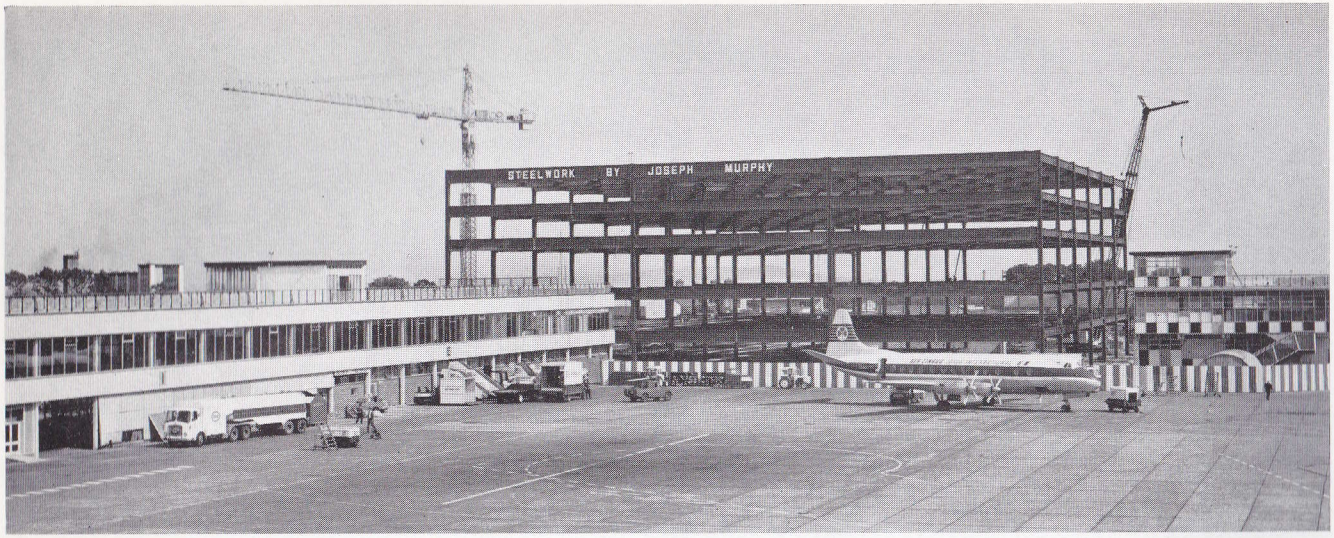
The following photographs illustrate just a few of the many applications of steel products manufactured at the British Steel Corporation's South Teesside Works.

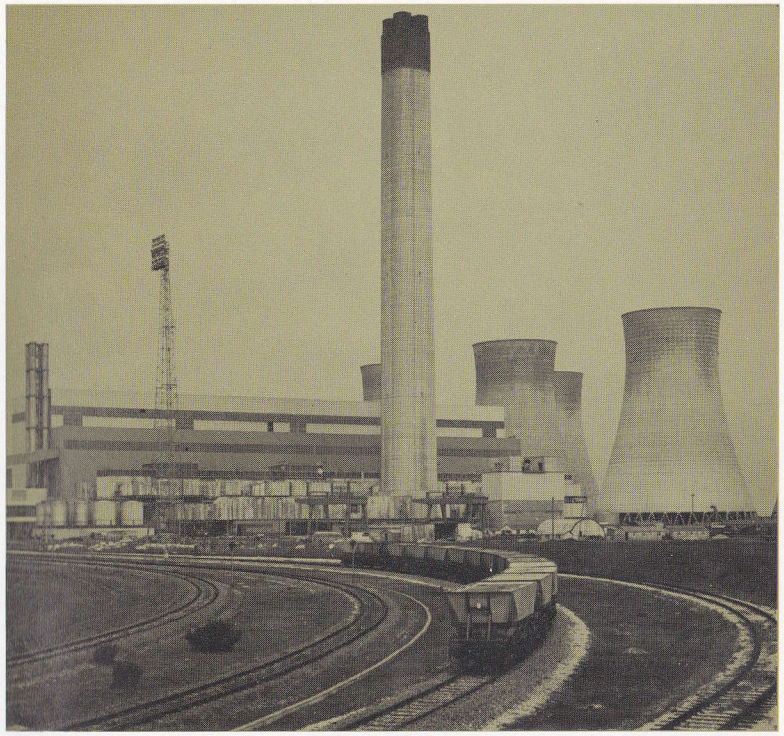


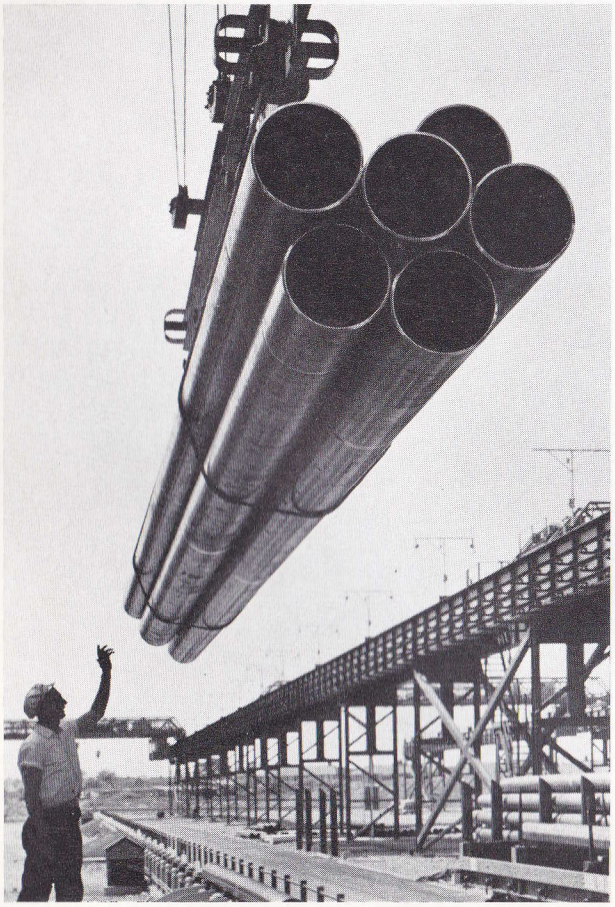


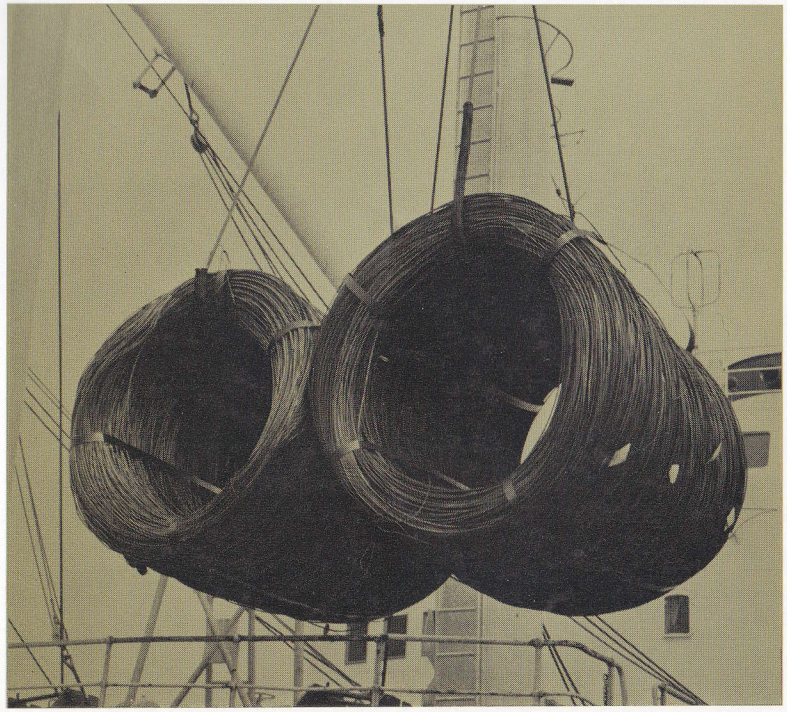





STEELWORK BY JOSEPH MURPHY



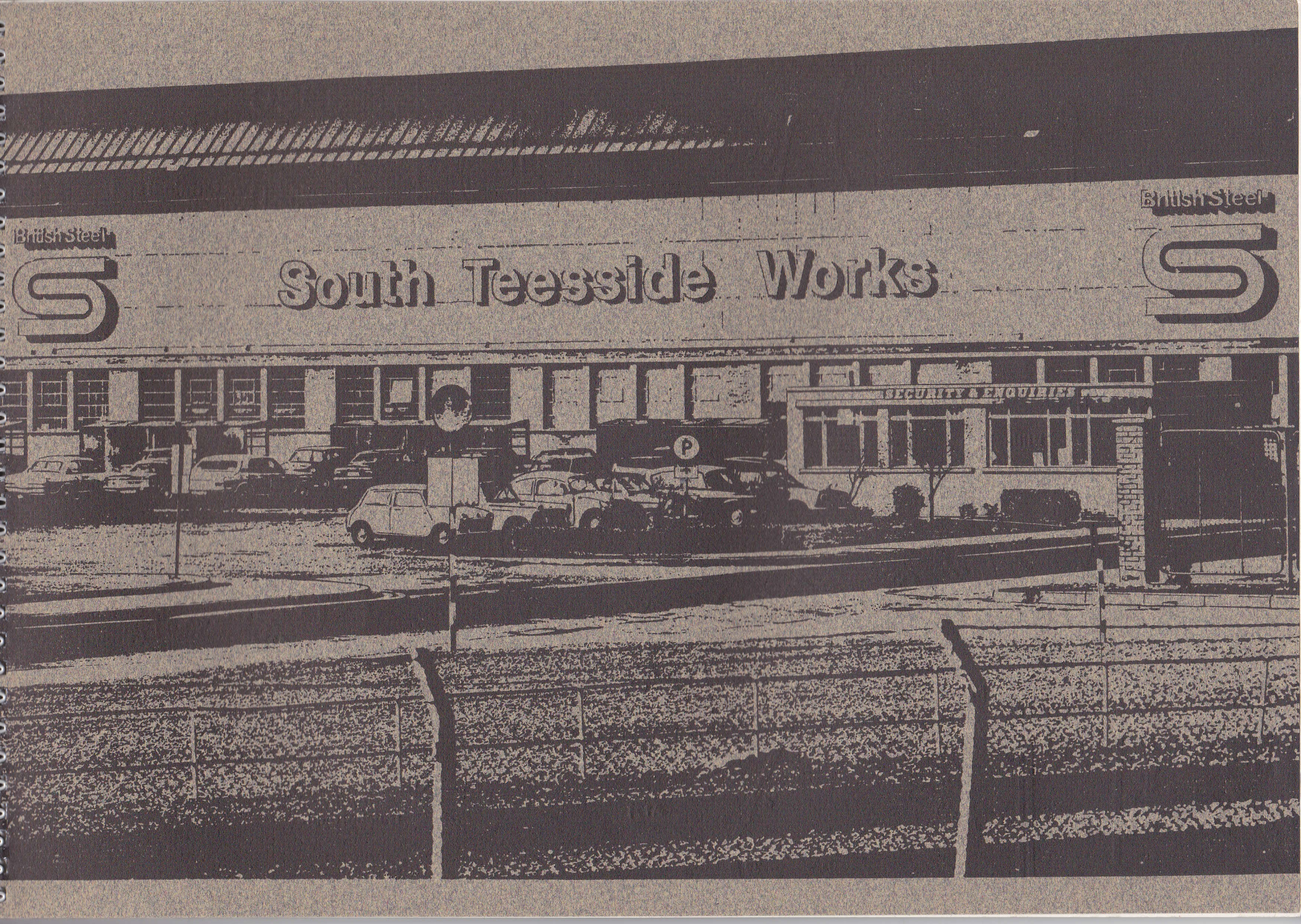




British Steel

South Teesside Works

British Steel




BSC
South Teesside Works
Comprising
1 Redcar Ore terminal and Redcar Project.
2 Lackenby.
3 Cleveland.
4 Cargo Fleet.
5 Ayrton.
0 1 2 3 4 miles
Approximate scale
N
Hartlepool
To Sunderland
To Newcastle
A19
A689
A178
Billingham
Stockton
River Tees
Redcar
A1042
A1085
A1053
A1046
A175
Marske
Saltburn
A174
A66
Middlesbrough
Thornaby
New Road
under construction
Eston
A1045
A1044
A171
A173
Guisborough
A1043
To A19

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