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Rautomead goes for Globe

with innovative Oxygen-free Copper Wire Casting Technology

Since its formation in the late nineteen seventies, Rautomead International Ltd has become a leading specialist in the design and manufacture of continuous casting equipment for processing non-ferrous metals.

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Today, with 90% of product destined for export, machine installations in over 40 countries, and a carefully selected network of sales agents operating worldwide, the company can proudly claim to be a true world leader in the design, construction and sale of specialised continuous casting equipment for the production of oxygen-free copper wire rod for the global wire and cable industry.

This success, however, is not simply down to an ethos of continuous improvement and innovation in casting technology, it also stems from Rautomead's uncompromising commitment to customer care.

For full details of the Rautomead service, turn over...

Moisture in the cathode feedstock?

THE PRE-HEAT IS ON!

Cathode quality has always been a major factor in the production of consistent, oxygen-free copper rod products.

Depending upon certain climate conditions and methods of storage, surface moisture can result in "wet" cathodes being fed into casting machines - with the associated risk of hydrogen entrapment affecting safety in operation.

Through the introduction of a new Preheat Oven option for their highly successful RS upwards-vertical copper rod casting machines, Rautomead now offers a highly cost-effective solution to problems created by moisture in the feedstock.

For full story, turn to page 2.

Global Service provides key for

From its headquarters in Dundee, Scotland, Rautomead proudly services customers across the world, providing Continuous Casting equipment that converts copper cathode sheets into 8mm diameter redraw rod by a process of melting, holding, coiling and cooling. The company's vast experience in Graphite Crucible and Electrical Resistance Heating is being found to offer significant quality benefits and savings for customers in the USA, Chile, UK, Belgium, Germany, Iran, Sudan, Malaysia, Taiwan, Japan, Australia - and more recently, both Sweden and Italy.

And the key to this international success? The highest level of organisation, and totally dedicated personnel who embrace a multitude of languages, cultures and business practices.

GLOBAL SERVICE

Although many Rautomead Customers meet their client service obligations locally by using manufacturer-provided specifications, the company also provides vital comprehensive training in machine operation and maintenance for personnel who may be unfamiliar with handling molten metal. This attention to detail - combined with efficient plant, delivery, installation, start-up programmes has led to highly professional, efficient performance with very real cost savings.

Ordering process

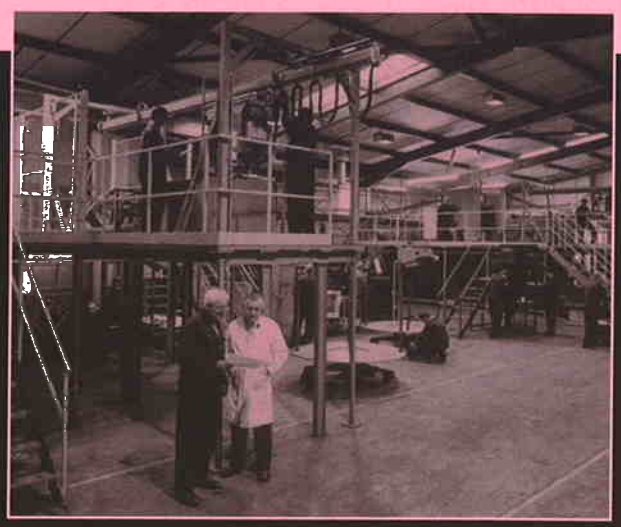
A detailed technical specification is drawn up

The ordering process begins with the plant specification based on a Rautomead quotation. Often the final details are discussed and agreed during a visit to Rautomead by the customers Project Manager and Engineers. Soon after contract details are finalised and the downpayment received, a Rautomead engineer will make a visit to the customers factory to discuss the details for services required and site preparation to ensure that everything is in place by the time the equipment is delivered.

Prior to commissioning, every new machine is fully tested

Plant functionality

Following manufacture, each casting machine is fully assembled and molten-metal tested prior to shipment. A comprehensive checklist, covering all aspects of operation is also completed.

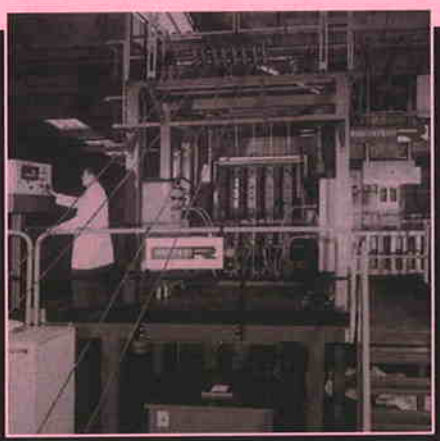


Rautomead's continued success.

Comprehensive training on site or at Dundee

Thorough training

Towards the end of the build period, customers' engineers, undergo comprehensive training at Dundee. They are also made familiar with a detailed, bespoke "user manual" that was prepared during machine manufacture and covers all aspects of machine operation and maintenance.



Commissioning engineer remains on site for up to 8 weeks

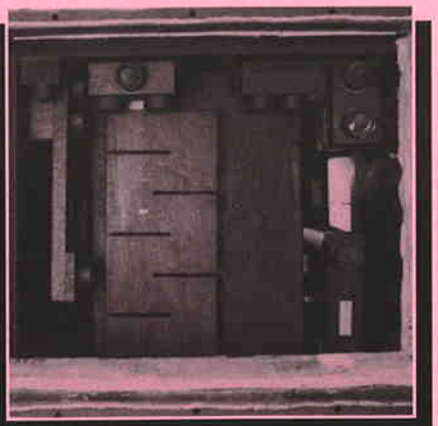
Commissioning time

Typically, commissioning on site can take up to eight weeks. A commissioning engineer remains on site for this period. A software engineer usually visits for one week to complete programming process. And a full pass-off test is then completed, followed by hand-over.

Thorough "cold" furnace inspection after 6 months of use

Post commissioning

After commissioning, a Rautomead Customer Services Supervisor takes over as key point of liaison. A Customer Service Engineer visits the customer to establish on-going links and deal with specific technical matters. And after six months continuous operation, the Customer Services Engineer will complete a thorough "cold" inspection of the furnace.



Routine spares for immediate despatch

Long-term service

As part of its commitment to providing long-term service, Rautomead gives continuous technical support from bases in Dundee and Malaysia. Routine spares are available for next day airfreight. And an emergency engineer can be sent to any site worldwide within 3 days. Every customer also receives a visit from a Rautomead representative at least every six months.

Preheat Oven option drives moisture from *Cathode Feedstock*

A Preheat Oven option, available for Rautomead's successful RS upwards vertical copper rod casting machines offers a highly cost-effective solution to the problems created by moisture in the feedstock.

Cathode quality is an important factor in achieving consistent, oxygen-free copper rod products. The cathode plates, however, must be free of surface moisture as the associated risks of hydrogen entrapment can affect safety in operation.

Since cathode plates are usually delivered in closely packed 3 tonne bundles, local climatic conditions and methods of storage can result in condensation occurring on the cold surfaces and lead to wet cathodes being fed to the casting machine.

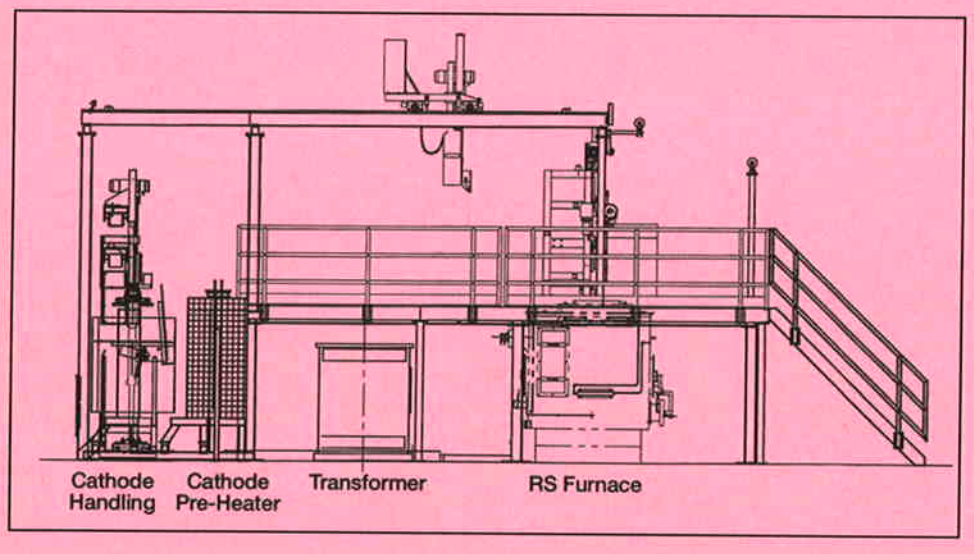
RAISING THE TEMPERATURE

With the new Preheat feature, cathodes are passed individually through a Preheat Oven, raising the temperature of the copper to 150 - 200 deg C and driving off any surface moisture before being fed to the casting machine itself. The oven is electrically heated and is rated at 30 kW and can be used in conjunction with either the automatic or manual cathode feed systems.

RETROFIT OPTION

The Preheat Oven option is offered as a component of two new Rautomead models, the RS 4000/8/8 and the RS 8000/16/8.

These machines have rated outputs of 7,500 tonnes and 15,000 tonnes per year respectively and feature new and larger graphite crucibles to match the higher throughput. The Preheat Oven can also be retrofitted to existing installations.



IMPROVED OUTPUT

As well as improving quality and consistency, the Cathode Preheat Oven can improve output by around 10%, while delivering lower maintenance costs by avoiding moisture-related damage to furnace linings and the crucible.

CONTINUOUS DEVELOPMENT

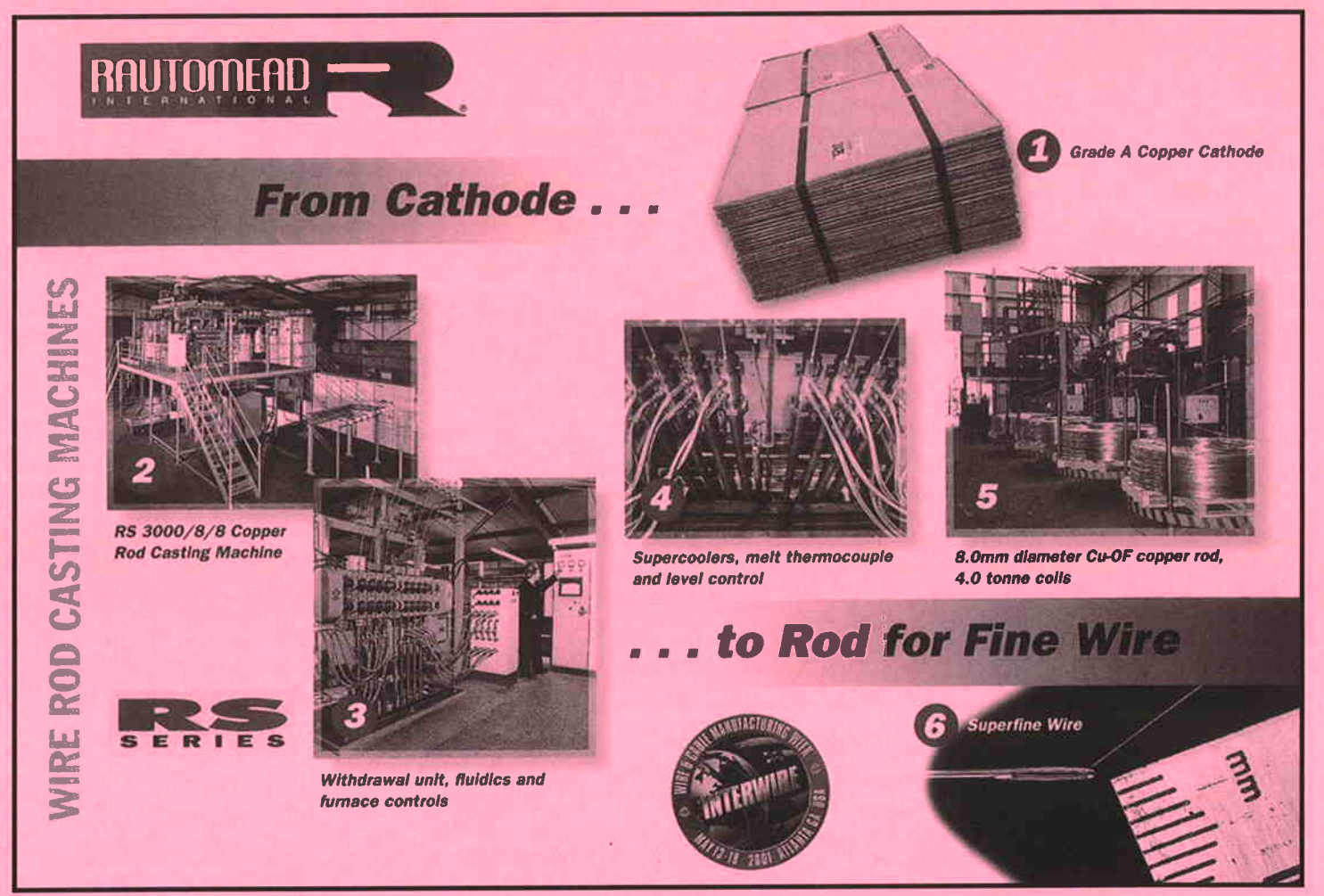
All Rautomead RS machines are designed to use grade A copper cathode as feedstock, with cathodes loaded, melted and cast from a single electrically heated furnace. And the Preheat Oven option is part of Rautomead's programme of continuous development in melting, holding and casting in a single graphite furnace, which has been the basis of the company's unique technology for many years.

PURITY ASSURED

By exposing the molten copper only to a carbon environment and with no hot metal transfer required, purity is maintained, hydrogen is excluded and oxygen reduced to very low levels, ensuring consistent quality, especially for drawing to superfine wire sizes of less than 0.050mm as well as for magnet wire production.

By Georgia - What a Success!

Rautomead demonstrates the latest upwards vertical casting technology at Interwire 2001!



Interwire 2001, the exhibition for the International Wire & Cable Industry in Atlanta, Georgia (USA) proved a resounding success for Rautomead. Meetings and discussions were held with customers and potential customers from 15 different countries during the course of the week, as expected the majority of enquiries were from customers in North and South America.

A FINE SOLUTION

Allowing the production of oxygen free copper wire rod from 2,000 to 20,000 tonnes per year of 8.0mm (0.315") diameter, each Rautomead Upward Vertical Continuous casting machine's furnace utilises a graphite crucible. It may be used either as an integrated melting and casting machine, fed directly with copper cathodes, or act as a holding and casting furnace fed with liquid metal tapped from a shaft furnace or from a dedicated cathode melting furnace.

CONSISTENT QUALITY

Rautomead wire rod has been found to be ideal for the use in drawing down to fine wire (0.05mm, 44 A WG), making magnet wire or being used as feedstock to continuous extrusion equipment. The consistency of the quality of the cast wire rod enables improvements to the productivity in the downstream drawing and enamelling operations.

COMPLETE SUPPORT

With turnkey packages for all continuous casting equipment, including delivery, installation, commissioning, furnace platform and all interconnecting plumbing and wiring, Rautomead offers the ultimate in pre, during and after sales support.

In addition, the training of customers' engineers is provided at the Rautomead factory in Dundee during pre -shipment testing of the equipment and continues during commissioning at the customer's site.

Elektrokoppar of Sweden - Upwardly Mobile

Swedish Copper-silver specialists, Elektrokoppar, ordered a new Rautomead RS upward vertical wire rod casting machine earlier this year. The machine is designed to produce silver bearing oxygen free copper wire rod feedstock for their continuous extrusion equipment.

Elektrokoppar conducted a very thorough evaluation procedure when considering the alternative suppliers and casting technologies. Sample rod products were produced by Rautomead at the R&D facility in Dundee and these were examined and processed, satisfactorily, to finished products within Elektrokoppar group companies.

Several visits were made by Elektrokoppar to existing Rautomead customers and also to the Rautomead head Office and factory in Scotland to gain a better understanding of the graphite technology and also to assess the available technical service support and after sales service. On the basis of this analysis, despite fierce competition, Rautomead equipment was selected.

The equipment completed pre shipment casting tests in Dundee in August and is due to be installed at Elektrokoppar in Helsingborg during September.

CONTINUOUS CASTING CONTINUOUS AT WIRE SINGAPORE 2001

The all-Asia Wire & Cable Trade Fair, 25 - 27 September 2001

Following on from their successes at Interwire 2001, Rautomead International Ltd will also be exhibiting its latest Upward Vertical Continuous Casting Technology at September's Wire Singapore Exhibition.

Using a graphite crucible and an electric resistance heating system, Rautomead Upward Vertical continuous casting equipment facilitates the production of top quality oxygen free high conductivity copper wire rod (less than 5ppm oxygen). The Rautomead rod has been found to be ideal for the production of fine wires (0.05mm, 44 AWG), enamelled wires and also as feedstock for a continuous extrusion process to manufacture copper shapes.

The Rautomead equipment may be supplied, dedicated to the production of 8.0mm diameter rod, 2500 - 15,000 tonnes per year. Alternatively, it can be configured to produce a range of sizes varying in diameter from 8.0mm to 30mm. A separate range of machines is available for the production of copper alloy wires.

SEE US ON STAND No. 3E14

• Stop PRESS • Stop PRESS • Stop PRESS • Stop PRESS • Stop PRESS •

Demonstration Cast 17 - 21 September 2001 at Rautomead International factory in Dundee. RS3000/8/8 (6,000 tonne per year machine, automatic cathode feed) will be demonstrated casting 8.0mm diameter Cu-OF wire rod. Visitors are welcome and should arrange flights to Edinburgh, contact Rautomead with flight details and they will arrange hotel accomodation and airport transfer.

Sample Rods for Testing and Evaluation

Rautomead can assist in arranging for the supply of 20 tonne or 40 tonne sample batches of "as cast" 8.0mm diameter Cu-OF produced using installed production equiment from a variety of locations around the world.

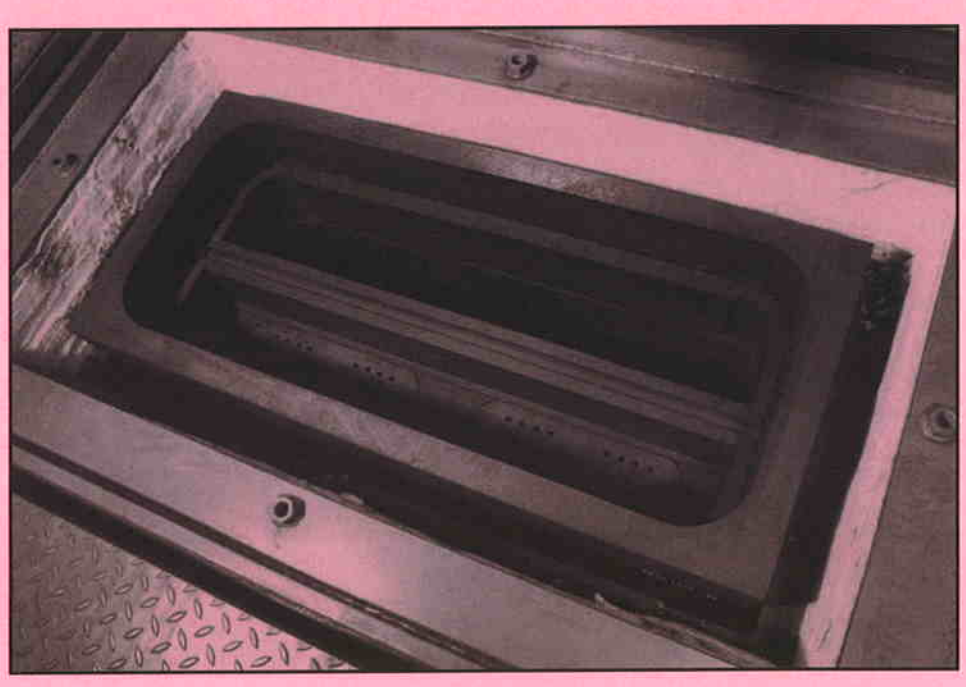
Iran

The Fourth Rautomead RS 2200 casting machine has been installed and commissioned at Toos Copper Company in Torbat. This brings the installed capacity at Toos up to 20,000 tonnes per year of 8.0mm diameter Cu-OF wire rod. The first RS2200 machine has been installed at Simcat Wire & Cable, Tabriz.

Rautomead's *Graphite Furnace* Technology

Production of high purity oxygen-free copper re-draw rod

Recent studies into wire breaks occurring in Cu-ETP in drawing to 0.05mm have been carried out in USA, involving examination and categorisation of over 2,500 wire break samples.



This work established that over 90% of all wire breaks were particle failures and that within this total, over 50% were ferrous inclusions and over 30% refractory inclusions. While the ferrous inclusions could originate from and of the continuous casting, hot rolling or wire drawing stages of the whole process, the refractory inclusions point directly towards the linings of the melting and casting furnaces used.

In the Rautomead RS upwards vertical casting machine, the graphite furnace crucible takes the place of the traditional rammed and fritted ceramic furnace lining, thus greatly reducing the risk of refractory particle contamination as a source of subsequent wire breaks. Great attention is also given to reduction in the risk of ferrous contamination. Contact with steel is limited to the profiled withdrawal rolls and coiler rolls, all of which are specially hardened. By casting directly at 8 mm, rolling is also eliminated altogether.

Copper (together with tin, gold, silver and lead) is virtually inert relative to graphite at the temperatures necessary for continuous casting. Investigation has shown that the solubility in wt. % C, is about 0.0001 at 1100(C, 0.00015 at 1300(C, 0.0005 at 1500(C, and 0.003 at 1700(C. As carbon does not diffuse through solid copper, solubility is exceedingly small. Claims that the copper processed in the Rautomead system can somehow become contaminated by carbon can thus be easily dismissed.

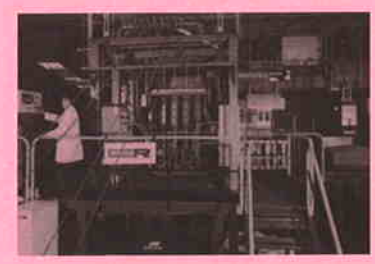
This technology is thus particularly well-suited to production of fine and superfine wires and to making best use of modern multiwire drawing machines.

Rautomead International at Metals Engineering 2001

Rautomead International Limited, specialists in the design and construction of continuous casting machines for the non-ferrous metals industry will show a full range of equipment at the Metals Engineering 2001 Exhibition.

Among the exhibits will be Rautomead's Upwards, Vertical and Horizontal Continuous Casting machines, used in the production of semi-finished rods and hollow sections in brasses and bronzes for the engineering industry.

Also on display will be Upwards Vertical Casting machines used in the manufacture of oxygen-free copper wire rod and copper-based conductor alloys such as CuAg, CuMg and CuSn in the wire and cable industries.



Smaller Continuous Casting machines for processing precious metals in the jewellery, electronics, minting and dental industries will also be shown.

Rautomead has been building continuous casting machines with unique design features since 1978. These include a graphite metal containment system, electric resistance furnace heating and inert gas protection.

A specialist foundry facility is maintained by Rautomead in Dundee. Continuous casting machines are available for toll conversion of high quality low impurity non-ferrous alloys. Solid and hollow shapes up to 200mm diameter may be produced.

Introducing a Precious Development in Continuous Casting Technology

Since their introduction in 1983, the Rautomead RMJ series of machines has set the standard for the quality casting of precious metals.

However, up until 1998, it was the requirements of process rather than those of the market that had driven the product development programme. By 1998, Rautomead realised that along with its focus on engineering excellence there was room for other considerations.

A detailed market survey was commissioned and as a result, rather than simply tweak the existing RMJ series of models, the company decided on a detailed appraisal programme that would result in a highly distinctive new machine.

The reappraisal process

During September 1998, the engineering team began looking at a complete redesign under the direction of Rautomead chairman Sir Michael Nairn. The company also approached the PDE department of Glasgow School of Art to discuss embarking on a collaborative design programme that would address the key design issues.

This far-reaching project embraced a number of key issues. including; improving efficiency, safety and productivity, creating a consistent product language and designing a user-friendly control interface.

Designed with the user in mind

Launched in 2000, the new RMK series machines offer all the benefits of leading edge casting technology within a highly attractive and ergonomic design that is tailored to the needs of users.

For example, for safe and easy access, the furnace is arranged around the operator. The casting and monitoring process has also been simplified and the main areas of human/machine interaction made easy to use and understand.

Apart from a distinctive new appearance, one of the key differences between the new RMK machine and its predecessor is its simplicity.

Touch Screen Controls

With the new RMK series, operators can view trends on-screen in any selected four from nine production parameters, magnify for close up detail and choose from thirty pre-set production recipes. A 24-hour operating clock is also part of the standard package.

A Range of Products & Sizes

The new RMK series has also been designed to offer maximum flexibility in terms of the range of product sizes available, producing rods in the diameter range of 3mm to 40mm, with a provision for producing smaller rods of 11mm diameter and less as twin strands as well as hollow bars with wall thicknesses not usually less than 4.5mm.

Convenient Loading

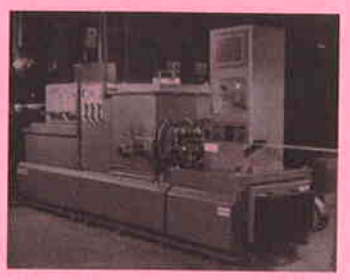
Ergonomic studies carried out during the development period showed that for maximum user comfort, the loading and product pass heights had to be reduced. After exhaustive modelling and testing, a furnace height of 1280mm and a product pass line height of 815mm were selected to provide the ideal combination.

Simplified Inspection & Drainage

Provision for dumping molten metal is an essential feature of any continuous casting process. Traditionally operators have checked for tap-hole leaks by opening it and observing inside. In the new RMK design, a quartz window is fitted, allowing checks for metal leakage without opening the tap hole. This is not only safer but also avoids the ingress of oxygen.

Rautomead has also introduced a furnace tilting facility to ensure total drainage at the end of a casting run. The mechanical tilting mechanism is easily activated from the touch screen.

Safety, Efficiency & Aesthetics



With greater levels of efficiency available through the addition of a non-corrosive stainless steel furnace body, water tracing and accelerated furnace cooling, productivity can be increased by a factor of three.

Careful design has also eliminated the chance of operators burning themselves during casting and reduced the potential for spillage of molten metal.

As well as appealing to engineers, many of the features of the new RMK series of machines are also designed to impress non-technical purchasers. With distinctive brand values, stylish good looks and that user-friendly operation. Despite these improvements, the new machine will cost no more than its predecessor.

In every sense of the word, the new RMK machine is a new machine for the new millennium. For a CD-ROM or PAL video showing the RMK and its features, call 44 1382 622341.

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