NICKEL

WHO increases guideline value

Carl Pott's sharp design

MARCH 2006 VOLUME 21, NUMBER 2 THE MAGAZINE DEVOTED TO NICKEL AND ITS APPLICATIONS

GERMANY'S WORLD CUP STADIUM

NICKEL TAKES CENTRE FIELD

NICKEL

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The Magazine Devoted to Nickel and its Applications

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Cover photo:
The Allianz Arena in Munich, Germany, host to the FIFA World Cup.

The next issue of Nickel Magazine will be published in July 2006.

WHAT'S NEW

UPON HIS RETIREMENT as President of the Nickel Institute on January 31st, Dr. Ivor Kirman told managers and staff that he'll be following the successes of the Nickel Institute in the years to come.

The sentiment was conveyed in much the same way that a father would wish his son or daughter well as he or she heads off to university or the workforce. After all, the Nickel Institute was created on Dr. Kirman's watch.

During his five and a half years in office, Dr. Kirman brought together two associations to form one whose membership represents more than 90% of global primary nickel production. He did so at a time when demand for nickel was growing so rapidly that the supply side struggled to keep pace (though the influence that the Nickel Institute has on demand should not be exaggerated).

STAINLESS STEEL is the favourite material of plumbers in Bavaria (see story, page 8).

VIEGA GMBH & CO

With the main battleground on the regulatory front currently being in Europe, Dr. Kirman orchestrated the formation of the European Nickel Industry Association (ENIA). Today that organization manages an important change -- from the comprehensive assessment of health and environmental risks of nickel by the Danish Environmental Protection Agency to the management of those risks in the workplace and elsewhere.

Dr. Kirman is departing at a time of transition. "We now have the makings of an industry which can work in a more intelligent way on an international basis," he said recently at an industry gathering. He went on to stress that the nickel industry has developed to the point where it is generating and communicating the knowledge that is necessary to meet the many challenges that lie ahead.

Stephen Barnett, Dr. Kirman's successor, prefers to look ahead and then design processes that will get us to the desired endpoint. He likes to emphasize the contribution nickel and nickel-containing materials are making to sustainable energy production, sustainable food supply, and water treatment and distribution systems, especially in the booming economies of China, India and Brazil. After all, this is where nickel's strengths lie.

Handovers to a new President of an industry association are always a time to rethink strategy. Starting with this issue, for example, Nickel Magazine will be adding content on the science of nickel and the sustainable business practices of companies that use, and re-use, nickel, whereas traditionally we have concentrated on the uses of nickel.

In May, we will publish a special issue on the uses of nickel in European industry, focusing on applications where nickel has no economic substitute. The goal is to draw attention to the valuable uses of nickel that society sometimes takes for granted.

Another of our projects over the coming years will be online streaming video presentations – the kind that do not require the user to download a special piece of software in order to view. Our first venture into this communication medium is available on the Nickel Institute website at: www.nickelinstitute.org/magic-of-nickel (see details on page 2).

As always, we encourage and welcome your feedback on these and other efforts we make to communicate the benefits of nickel and nickel-containing materials.

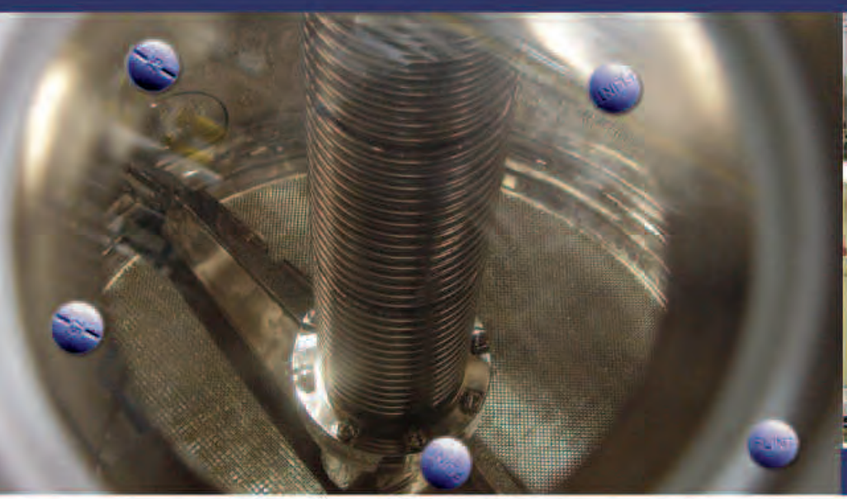
Patrick Whiteway

Patrick Whiteway
Editor

inuse

THE LATEST NICKEL APPLICATIONS WORLDWIDE

High-Nickel Alloy Key to Effectiveness of Pharmaceutical Filter-Dryers



FILTER DRYER (interior view at left)

CARROLL MCCORMICK FOR NICKEL INSTITUTE

The global market for pharmaceutical and biotechnology products is very large and growing fast. Estimated to be nearly US$500 billion a year, it is growing at a rate of about 9% a year.

The U.S. market represents about 41% of the total while Europe and Japan account for an additional 39%.

To manufacture pharmaceutical ingredients requires extremely clean working conditions to which nickel-containing alloys play a vital role. Equipment needs to be cleanable on the product side and highly resistant to corrosive ingredients and cleaning solvents.

The alloy most widely used for pharmaceutical equipment is S31603 stainless steel. However, the material of choice for certain pieces of equipment is alloy N06022, which contains 59.5% nickel and is used in components where the surface comes into contact with pharmaceutical ingredients.

One such piece of equipment is used by Sepracor Canada, which manufactures active pharmaceutical ingredients and other drug products at its plant in Windsor, Nova Scotia.

Many of these ingredients, once they have been chemically constructed in reaction chambers, are piped to a filter-dryer to separate out the waste liquid and dry the crystallized product.

Italian pharmaceutical equipment manufacturer 3V Cogeim uses large quantities of N06022 in the manufacture of its filter-dryers.

In addition to pure N06022 plate, the company uses plate made of 6.35 millimetre (mm)-thick N06022 welded to a 6.35 mm-thick S30400 substrate. "We're among the biggest users of N06022 in Europe," says Peter Studer, 3V's business manager for North America. "We use N06022 in 80 to 90 percent of our filter-dryers." The company sells around 50 of these units a year.

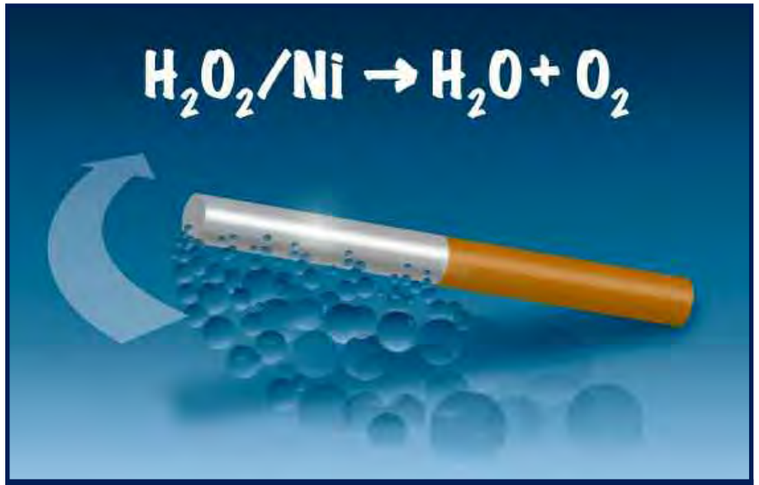
MORE INFORMATION:
www.nickelmagazine.org/dryer

Locomotion on the Nanoscale

Nickel's ability to catalyze hydrogen propels a nanodevice through a fluid

Nickel's ability to catalyze the breakdown of hydrogen fuel is being harnessed to propel nanodevices through fluid.

Researchers at the University of Toronto in Canada are using gold and nickel to make a rod about 500 times thinner than the average human hair. The nickel catalyses the decomposition of hydrogen peroxide into oxygen and water, propelling the nanorod through solution, while the gold anchors one end of the device to a silicon surface.



THIS TINY ROD, 100 nanometres long, is made of nickel (silver colour) and gold (yellow colour). It is attached to a silicon surface and is immersed in hydrogen peroxide. Nickel catalyzes a chemical reaction that generates oxygen bubbles, causing the rod to rotate.

CONSTRUCTIVE COMMUNICATIONS FOR NICKEL INSTITUTE

As the hydrogen peroxide decomposes at the nickel end of the nanorod, the rod is propelled into a circular orbit by bubbles of oxygen.

The nanorotors range from 100 nanometers (nm) to tens of micrometres in length, with nickel segments about 50 nm long, and 10 to 500 nm in width.

The beauty of the tiny machines is that they allow rotational motion, which is at the heart of many conventional machines, such as rotary engines, screws and clocks, says Sebastien Fournier, a member of the research team led by Professor Geoffrey Ozin of the Materials Chemistry Group at University of Toronto. The device also runs on an environmentally safe fuel and can be easily constructed from various elements.

But the technology needs to be further developed before it has commercial potential.

"We need to assemble and integrate our synthetic nanomachines into more complex architectures so that the rotary motion can be harnessed to accomplish a variety of tasks," says Fournier.

The team is also experimenting with nanomachines that move linearly, in elliptical orbits, and along arbitrary paths.

Some day these tiny machines could be used to transport medicine in the human body, conduct operations on the cellular level, or search and destroy toxic organic molecules in polluted water streams.

Fournier compares the synthesized machines to the workings of living cells insofar as natural nanomachines perform all sorts of different tasks, including transporting cargo and decomposing adenosine trihosphate (ATP) for energy to propel bacteria through liquid.

"To emulate this impressive skill in the laboratory is one of the grand challenges of contemporary bio-nanoengineering," the researchers write in a paper published in *Advanced Materials* last year.

MORE INFORMATION:
www.nickelmagazine.org/nano2

STAINLESS STEEL replaces lead in pin frogs

CONSTRUCTIVE COMMUNICATIONS FOR NICKEL INSTITUTE

You guessed it: Pin Frogs

The stainless steel objects featured in the last issue of Nickel Magazine are called pin frogs. They are made of S30400 stainless steel and are used to keep flowers from floating in a vase and to maintain a flower arrangement.

Placed in water at the bottom of a flower vase, stems of flowers are pushed onto the pins. The weight of the pin frog keeps the flowers from floating. These pin frogs were designed to replace units that were previously made of lead.

Many thanks to those readers who sent in their answers to our quiz.

MORE INFORMATION:
www.nickelmagazine.org/pinfrog

Raising Drinking Water Guidelines

The World Health Association has increased the permitted concentration of nickel in drinking water

The trend toward lower permitted concentrations of nickel in drinking water has been broken by the World Health Organization (WHO), which has raised its guideline value to 70 µg/liter from 20 µg/liter.

The WHO focused on two studies produced since the organization's last guideline revision in 1998: a 2000 review of nickel in drinking water consumed by pregnant rats; and a 1999 study of humans previously diagnosed with nickel contact dermatitis.

The rat study determined that a level of 130 micrograms/liter, higher than the previous guideline value for nickel, is safe for humans. The increase was justified by the greater level of certainty in the new study over previous reproductive studies used to calculate guideline values.

But the WHO determined that 130 µg/liter, although safe from a reproductive standpoint, may not provide sufficient protection for humans who are highly allergic to nickel. As a result, the organization considered the 1999 study too.

In that study, nickel was given to nickel-sensitive patients under a worst-case scenario: on an empty stomach and/or at levels much higher than would normally be consumed in drinking-water, which generally contains less than 20 µg/liter. From the results, the WHO determined that a 60-kg adult drinking two liters of water per day can consume 70 µg/liter, a level considered protective of the primary group at risk: nickel-sensitive individuals.

Although the WHO revision will have little immediate impact on the use of stainless steels in water systems (which already meet the existing requirements for drinking water), the new guidelines provide a greater degree of comfort to stainless steel users, says Dr. Peter Cutler, European Director, Nickel Use Support for the Nickel Institute.

Bruce McKean, director of sustainable development and product stewardship for the Nickel Institute, agrees: "For the past decade, the regulatory trend has been down, down, down, to the point where we began to worry that even stainless steel would not be acceptable for water distribution. The clouds that users saw on the horizon have now receded."

Cutler says it could be some years before any related revision to the European Union's Drinking Water Directive finds its way through to national requirements in the EU member states.

THIS WATER TREATMENT PLANT IN SINGAPORE is a significant user of stainless steel piping and equipment. It uses reverse osmosis to create 110,000 cubic metres of fresh water per day from seawater.

TIM PELLING FOR NICKEL INSTITUTE

MORE INFORMATION:
www.nickelmagazine.org/who

Record Number of Nickel Inventions Expected

To be sustainable, businesses need to innovate continuously and many inventions need nickel

In the United States, the number of patents involving nickel is expected to reach a record high.

A search of the U.S. Patent Office's database reveals that in January 2006 about 1,000 patents contained the word "nickel" (see examples on this page).

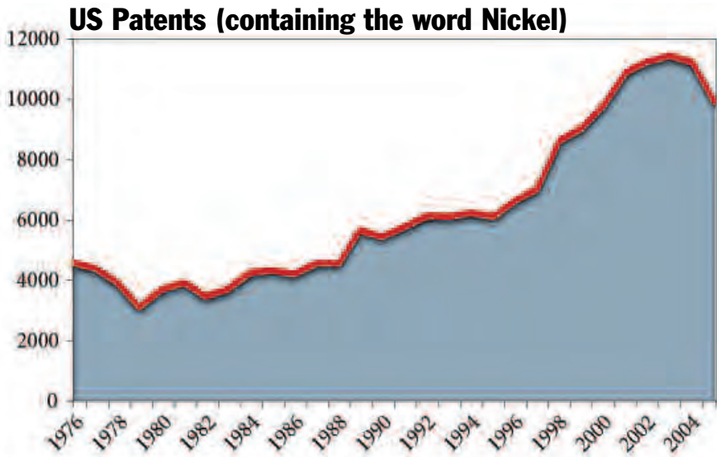
If this pace continues for the balance of 2006, more than 12,000 such patents will be issued; that's significantly more than the 11,389 recorded in 2003, the previous record.

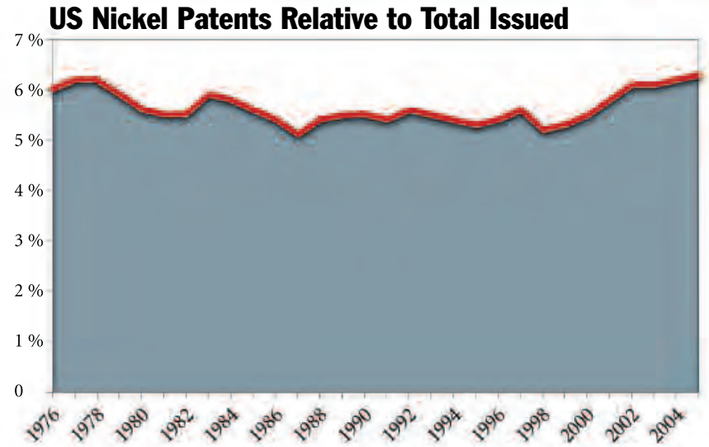
The data (presented in the accompanying chart) illustrate the important role nickel plays in technological innovation in the United States. The word "nickel" has appeared in an increasing number of documents of patented technologies in the country since 1979 whereas, over the same period, the percentage of the total number of patents issued remained constant at between 5% and 6%.

What does this tell us about the sustainability of the nickel industry in the United States? "The numbers are impressive, but what nickel is bringing to all these processes and products is even more so," says Bruce McKean, Director, Sustainable Development and Stewardship for the Nickel Institute. "Society will be doing more with less, because of nickel."

The United States grants more patents than any other jurisdiction, followed by Japan, Europe and China. A patent gives the right to exclude others from using an invention for 20 years.

MORE INFORMATION:
www.nickelmagazine.org/patents





Recent US Patents with nickel component (all issued since Jan. 1, 2005):

1)	**Patent # 6,999,810**	**issued to Animas Technologies LLC (West Chester, PA)**
	A biosensor to detect certain chemical compounds, using a reactive surface made of nickel or other metals.	
2)	**# 6,999,314**	**issued to Sony Corporation (Tokyo)**
	A miniature cooling device for electronic equipment, using either nickel or copper to provide high thermal conductivity.	
3)	**# 6,998,662**	**issued to Hewlett-Packard Development Company (Houston, TX).**
	Method of making magnetic tunnel junction devices (memory cells) that make up a magnetoresistance random access memory (MRAM), using layers of nickel iron (NiFe) and nickel iron cobalt (NiFeCo).	
4)	**#6,998,493**	**issued to Xerox Corporation (Stamford, CT)**
	Colorant compounds for use in hot melt or phase change ink, created using metal ions from nickel and other metals.	
5)	**# 6,998,445**	**issued to Acushnet Company (Fairhaven, MA)**
	Low compression, resilient golf balls with rubber core, made from layers of copolymer or terpolymer containing salts of nickel or other metals.	
6)	**# 6,998,448**	**issued to the Goodyear Tire & Rubber Company (Akron, OH)**
	Tire with tread of CIS 1,4-polybutadiene rich rubber composition, manufactured using a nickel salt of a carboxylic acid, namely nickel octanoate.	

A SPECTACULAR VENUE

Why Stainless Steel Water Pipes Were Chosen For Munich's World Cup Arena

It has been nicknamed the Schlauchboot (German for inflatable raft), and it's not hard to see why. The outer walls of Munich's tire-shaped Allianz Arena soccer stadium, completed in mid-2005 at a cost of 340 million euros, are covered with thousands of inflated fabric panels that make it appear to float above ground.

When Germany hosts the FIFA World Cup of Soccer, beginning in June, the futuristic stadium will be the venue for the opening ceremonies and six games, including one of the semi-final matches. Munich, a city of 1.3 million, together with eleven other centres, including Berlin, will host the tournament, which rivals the Olympics as the world's most-watched sporting event.

The arena's eye-catching design hides a utilitarian feat of engineering. Viega GmbH & Co., based in Attendorn, Germany, supplied the stainless steel piping that carries drinking water to every restroom, kitchen and luxury box in a stadium that can accommodate almost 70,000 spectators. The total length of pipe used is a staggering 8.5 kilometres.

"They wanted a corrosion-resistant material with the highest stability," says Dr. Peter Arens, head of product management/drinking water systems for Viega. Durability and hygiene were other reasons for choosing stainless, and Arens says the material had to be lightweight, given the long lengths of pipe needed to service the 250-metre-long, 50-metre-high stadium. The pipe used runs from 35 to 108 millimetres (mm) in diameter, but the bulk of it is larger than 76 mm.

The grade of pipe used is S31600, which contains between 10.5% and 13.5% nickel. (Viega pipe destined to carry drinking water is custom-made by another German firm, Fischer Edelstahlrohre GmbH of Achern-Fautenbach.)

Under German law, stainless steel piping that carries drinking water must contain at least 2% molybdenum to ensure it will resist corrosion from any disinfectants in the water. Viega's specifications call for at least 2.3% molybdenum, which will ensure even greater resistance.

The builder wanted to use a more flexible material to make the final connections, so plastic was used for all pipes smaller that 35 mm in diameter and for the last few metres of piping that connect to faucets.

In addition to 550 toilets, the stadium has two restaurants, each of which can seat 1,500 fans.

Viega had no problem selling the arena's builders on the idea of using stainless steel rather than less-expensive copper piping. "Stainless steel is absolutely the favourite material of plumbers in Bavaria," Arens says. "They really like it in that area of Germany." (Munich is Bavaria's capital.) The use of stainless for drinking water pipes can be traced back about 30 years to a major wholesaler who preferred it to copper, Arens says, adding that German builders in other areas of the country mostly use copper pipe to supply drinking water.

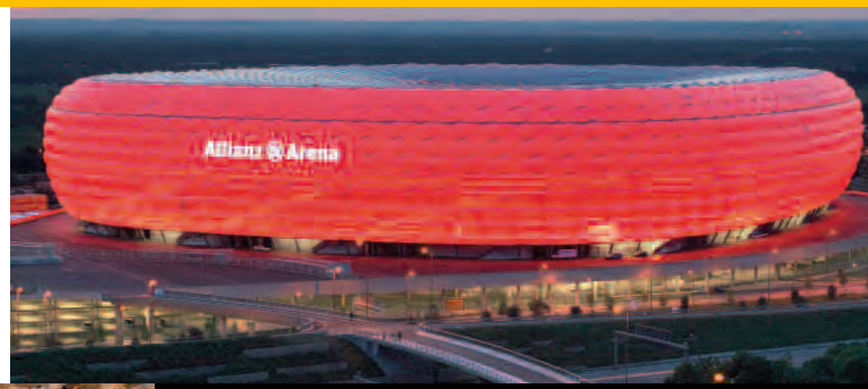
Viega supplied bronze fittings for the Allianz Arena project, but last year the company introduced a line of stainless steel fittings. "More and more plumbers are starting to prefer one material only," Arens notes.

Allianz Arena, named for Allianz AG, an international finance and insurance firm based in Munich, opened in May 2005 and is jointly owned by two soccer clubs, FC Bayern and TSV 1860, which use it as their home field. Lighting installed in the walls enables the fabric to be bathed in the colour of the home team on the field – red for Bayern and blue for TSV 1860. The diamond-shaped fabric panels are supported by a framework of steel and can be illuminated in alternating colours like a giant LED screen.

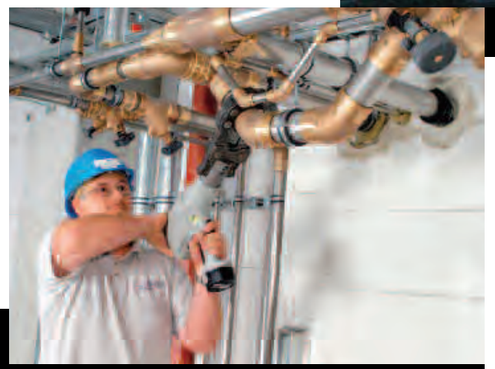
The arena replaces Munich's ageing Olympic Stadium, which was built for the 1972 Olympics and was the main venue when Germany hosted the World Cup in 1974.

INTERIOR OF ALLANZ ARENA

EXTERIOR VIEW



A WORLD CLASS VENUE



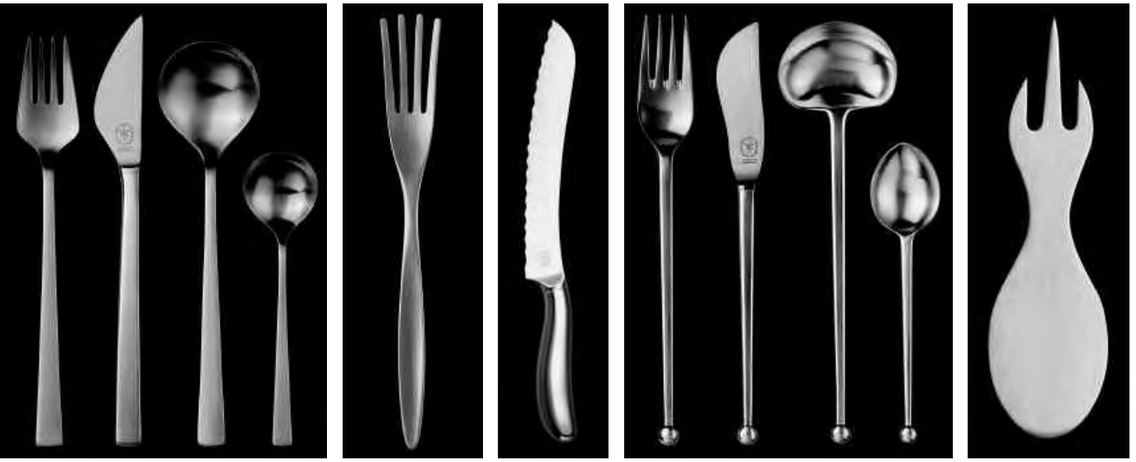
STAINLESS STEEL: EASILY INSTALLED

PHOTO: VIEGA GMBH & CO.

PHOTOS: ALLIANZ AG

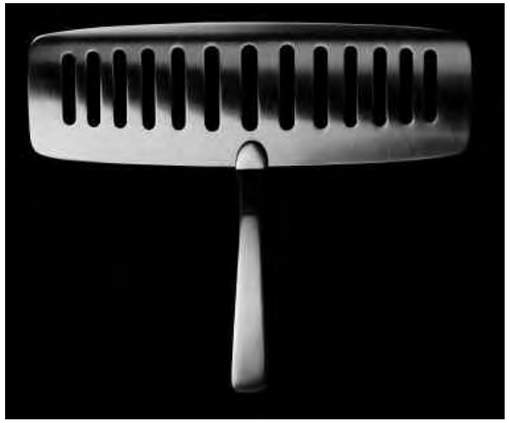
MORE INFORMATION:
www.nickelmagazine.org/worldcup





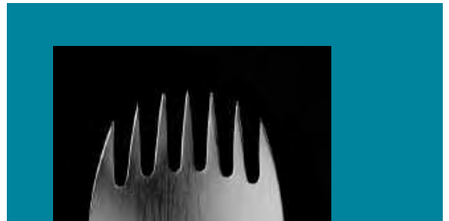
SLEEK, SIMPLE AND SHARP DESIGN

SINCE 1935 CARL POTT HAS BEEN LEADING THE WAY IN FLATWARE DESIGN


"EVERY DESIGN EMBODIES THE POWER OF A THOUGHT."

CARL POTT



In 1932 Carl Pott joined his father's firm in Solingen, Germany, and apprenticed for three years before he developed a progressive generation of cutlery design. Influenced by both the Bauhaus and Werkbund schools of thought, Carl Pott renounced florid ornamentation and decorative adornment, preferring a more fluid, sculptural form. Aesthetically pleasing in its simplicity and functionality, the Model 2716, designed in 1935, transformed modern cutlery. Its sleek and simple look was awarded the Diplom d'Honneur at the World Fair of 1937 and encouraged Pott to expand upon this clean new form.

He designed a range of flatware that was durable in style and quality. The Pott style reflected both the traditional handcrafting taught to him by his father, Carl Pott, Sr., and the creative contributions of many leading names in the field of applied arts.

Using the raw material S30400, or chromium-nickel steel (which contains up to 10% nickel), and employing up to 90 different manufacturing stages, the Pott factory has created a product that has sculptural appeal, ergonomic function, and harmony of form. The use of chromium-nickel steel has also ensured a durability that is unsurpassed.

Carl Pott's fine line of cutlery and tableware has gained worldwide recognition for its superb design and high quality. More than 30 design exhibitions and museums, including the Museum of Modern Art in New York City, have displayed the Pott line. The products' distinctive design and craftsmanship are part of a lasting cultural heritage.

Carl Pott died in 1985. His son, Hanspeter Pott, continues to run the family's third generation business.

MORE INFORMATION:
www.nickelmagazine.org/pott

LASTING LIGHTS

Corrosion-Resistant Stainless Steel Outlasts The Elements

Sales of stainless steel light poles have increased in the past five to seven years in the snow belt in the United States, according to one of the country's leading light pole manufacturers.

Constructed mainly from S20103, with a 4.5% nickel content, the light poles have much to offer, including light weight, zero maintenance, excellent corrosion and vibration resistance, and an expected life span of a century. Moreover, if damaged beyond repair in a highway accident, they're recyclable.

"Departments of Transport [DoTs] are continually looking for more effective de-icing chemicals to melt ice and snow quickly," says Trevor Millerbernd, vice-president and chief operating officer of the Millerbernd Manufacturing Company in Winsted, Minnesota, U.S.A. "On roads, over the past three to five years, DoTs have used mixtures that are considerably more aggressive than sea salt."

Dick Clark, Millerbernd's marketing manager, says the company has been building stainless steel poles for about 45 years and hasn't had a single corrosion-related failure.

Stainless steel light poles account for about 10% of Millerbernd's total output of standard and custom light poles.

The company uses S20103 in the pole shafts, with a wall thickness of typically either 1.83 or 2.77 millimetres. The stainless steel in the transformer-bases (t-bases) is 2.77 mm thick. When S20103 plate is unavailable, S30403, with a 10% nickel content, is used.

"We use S20103 because it gives excellent performance and is cost-effective," says Millerbernd, "so wherever possible we try to use it." Adds Clark: "A key reason for using S20103 is malleability; it takes considerable power to form a stainless steel pole."

Other components, such as luminaire mastarms, are constructed out of 5.08-mm-thick S30403, again, because it's more available than S20103. For high-mast lights, which can soar 48.8 metres over the road, the lowering cables, winch drums, luminaire rings, and other mast head components are fabricated from S20103 and S30403, depending on the availability of raw stock.

The rivets connecting the poles to the breakaway bases are made of S31600 so as to meet the shear requirements of the American Association of State Highway and Transportation Officials, the ruling body for U.S. highways.

Stainless steel light poles have additional advantages: Because of the higher yield strength of stainless steel, they can be made with a thinner wall thickness, and are lighter than aluminum or steel poles. Also, about 70% of toppled poles can be refurbished by Millerbernd for re-use.

MORE INFORMATION:
www.nickelmagazine.org/lightpoles

MILLERBERND MANUFACTURING COMPANY

IF DAMAGED BEYOND REPAIR IN AN ACCIDENT, THEY ARE RECYCLABLE.

PHOTO: TOM SKUDRA FOR NICKEL INSTITUTE

New Nickel Institute President

NICKEL INSTITUTE

Stephen Barnett, President, Nickel Institute

Stephen Barnett has been appointed President of the Nickel Institute effective January 1st 2006

Steve is on secondment to the Nickel Institute from BHP Billiton, where he was Vice-President, Health, Safety and the Community in BHP Billiton's Stainless Steel Materials Division.

He was born in the U.K. in 1954 and graduated in metallurgy from the Royal School of Mines, Imperial College, UK, in 1975. He has a wide experience of non-ferrous metallurgical engineering and has had specific nickel-related responsibilities in Australia, Colombia and South Africa.

Steve will be based in the U.K. and in the Nickel Institute office in Brussels.

He takes over as President from Dr. Ivor Kirman, who retired from the Institute at the end of January 2006.

With many years of experience as Marketing Director, Inco Europe, Dr. Kirman was known for his ability to lead the nickel industry's response to the many marketing opportunities and environmental, health and safety challenges that faced the industry in the past five years.

In June 2000, he joined what was then the Nickel Development Institute (NiDI), operating from an office in London. Ivor provided effective leadership as NiDI redirected its programs to deal with ongoing and emerging regulatory issues. He also successfully guided the reorganization which combined NiDI with the Nickel Producers Environmental Research Association (NiPERA) to form the Nickel Institute in January 2004.

He recently commented: "We now have the makings of an industry which can work in an intelligent way on an international basis and we can pick our way through the incredible maze/minefield of which the world seems to be constructed."

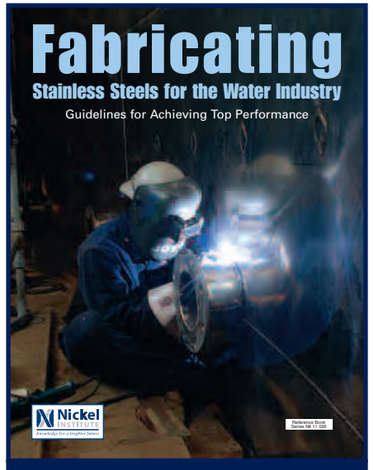
NICKEL INSTITUTE

OUTGOING PRESIDENT Dr. Ivor Kirman (left) recieves a gift from Nickel Institute Chairman Aaron W. Regent (President of Falconbridge Ltd)

Best Practices in the Water Industry

The corrosion behaviour of stainless steels can be adversely affected by poor work practices during fabrication. For this reason, in the U.K., for example, products for use in the water industry must pass strict guidelines as issued by the U.K. Drinking Water Inspectorate.

Another way to maintain the excellent corrosion resistance and durability characteristics of stainless steels in water and waste water applications, is for fabricators, designers, specifiers and end users to understand the fundamental behaviour of stainless steels. If these fundamentals are introduced into design requirements and are observed during the manufacture and assembly of stainless steel products, then problems can be avoided.



NEW TECHNICAL PAPER from the Nickel Institute.

NICKEL INSTITUTE

To assist fabricators and designers understand these fundamentals, the Nickel Institute has published a new booklet that describes some of the important issues related to fabrication which can influence the performance of stainless steel.

The publication describes the protective oxide film on the surface of stainless steel that provides its resistance to corrosion. Everything that follows in the publication relates to the protection of this atoms-thick layer during the fabrication, assembly and commissioning of stainless steel products.

Careful handling and preparation techniques are described, cutting and forming is explained and considerable space is devoted to welding. The transport and installation of stainless steel projects are also discussed and good practices to observe during commissioning are outlined.

The publication also includes some useful information in the appendix, including chemical compositions, mechanical properties, physical properties, surface finishes, guidelines for alloy selection, design for corrosion resistance and health and safety.

Entitled "Fabricating Stainless Steels for the Water Industry: Guidelines for Achieving Top Performance" the publication (Reference Book Series No. 11 026) was written by Nickel Institute consultants Carol Powell and David Jordan.

MORE INFORMATION:
www.nickelmagazine.org/11026

UNS details

Chemical compositions (in percent by weight) of the nickel-containing alloys and stainless steels mentioned in this issue of *Nickel*.

Alloy	Al	C	Cb	Co	Cr	Cu	Fe	Mn	Mo	N	Ni	P	Pb	S	Si	Sn	Ti	V	W	Y	Zn
N06022 P.4	-	0.015 max	-	2.5 max	20.0-22.5	-	2.0 6.0	0.50 max	12.5-14.5	-	rem	0.02 max	-	0.02 max	0.08 max	-	-	0.35 max	2.5-3.5	-	-
S20103 P.13	-	0.03 max	-	-	16.0-18.0	-	-	5.5-7.5	-	0.25 max	3.5-5.5	0.045 max	-	0.030 max	0.75 max	-	-	-	-	-	-
S30400 P.5, 11, 16	-	0.08 max	-	-	18.0-20.0	-	-	2.00 max	-	-	8.00-10.5	0.045 max	-	0.030 max	1.00 max	-	-	-	-	-	-
S30403 P.13	-	0.03 max	-	-	18.0-20.0	-	-	2.00 max	-	-	8.00-12.00	0.045 max	-	0.030 max	1.00 max	-	-	-	-	-	-
S31600 P.8, 13	-	0.08 max	-	-	16.0-18.0	-	-	2.00 max	2.00-3.00	-	10.00-14.00	0.045 max	-	0.030 max	1.00 max	-	-	-	-	-	-

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The number of people who get an email notifying them when Nickel is online.

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COMING EVENTS

CHINA NICKEL 2006

The Nickel Institute is supporting a two-day international conference in Shanghai, China. The 3rd such conference to be organized by IBC Conference, it will be held May 22 and 23 at the Inter-Continental Pudong in Shanghai. Dr. David Jenkinson, Nickel Institute Director-Australasia, will give a paper "Nickel Stainless Steels – Uses now and in the future." The presentation will explain where stainless steel is being used. This will give attendees a good understanding of the plethora of uses to which this versatile material is being put. Dr. Jenkinson will then build on the panorama of current uses to show how these stainless steels will be just as desirable in the future. He will concentrate on the following macro-economic trends: globalization, tighter environmental controls, the shortage of drinking water, widening demand for medical care and pharmaceuticals and the need for us to arrange our affairs on this planet so that our presence is sustainable. For more details, please contact:
E-mail: registration@informa.com.au
Website: www.informa.com.au/chinanickel06

SHANGHAI, CHINA

TIM PELLING FOR NICKEL INSTITUTE

TECHNICAL SEMINAR A one-day seminar "Fabricating Stainless Steels for the Water Industry: Guidelines for Achieving Top Performance" will be held April 5, 2006 in Manukau City, New Zealand. Presented by Nickel Institute consultant Les Boulton, this seminar will cover many aspects of stainless steel usage in the water industry, including: applications in waters and waste waters; careful handling and preparation; cutting and forming; welding and welding specifications; post-fabrication cleaning; transportation and installation and commissioning. For more information, contact: Raewyn Porter, HERA House, 17-19 Gladding Place, P.O. Box 76 134, Manukau City, New Zealand.
Tel: +64-9-262-2885. Fax: +46-9-262-2855. E-mail: admin@hera.org.nz

METAL IONS IN MEDICINE The Ninth International Symposium on Metal Ions in Biology and Medicine will be held May 21-24, 2006, in Lisbon, Portugal. Supported by the University of Coimbra, the Instituto Superior Tecnico, and the Portuguese Society for Biochemistry, the symposium will focus on interdisciplinary research and productive collaborations, while facilitating contacts among scientists. Among the scientists slated to participate is Dr. Adriana Oller, Manager, Mutagenicity and Carcinogenicity Program for NiPERA, a division of the Nickel Institute.
Please contact: E-mail: 9ismibm@ci.uc.pt Website: www.uc.pt/9ismibm

STAINLESS STEELS The second module of an advanced modular course on stainless steels will be held June 7-8, 14-15 and 21-22, 2006 in Milan, Italy. Organized by Associazione Italiana di Metallurgia in collaboration with Centro Inox, it is the sixth such course offered. The course consists of 60 lessons, which are divided into two modules of 30 lessons each. The first module, which was introductory in nature, was held in January and February 2006. The second module, is dedicated to production technologies (hot and cold rolling, forging, extrusion and castings), chip removal, non-conventional technologies, welding, joining, surface finishes, selection and design criteria, and applications. The course language is Italian. Contact: Centro Inox. Tel: +39-02-86450559. E-mail: info@centroinox.it

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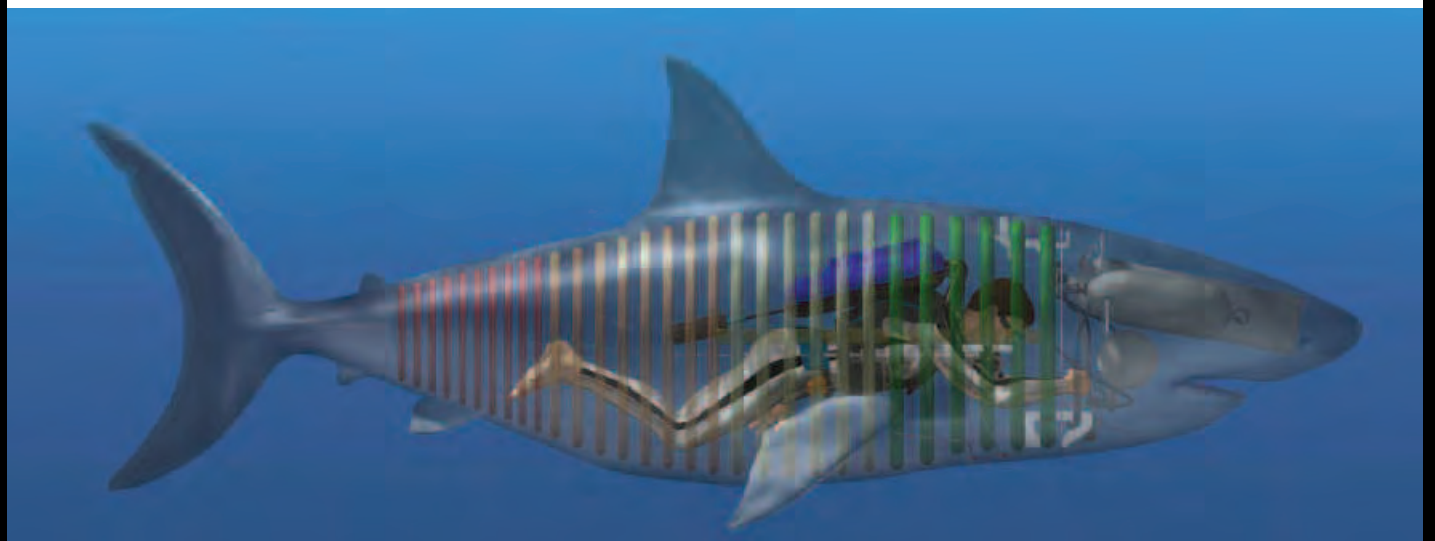
COUSTEAU'S SHARK SUIT



Taking The Bite Out Of Shark Research

Eddie Paul has built a better shark – make that a better *fake* shark.

The California-based movie-prop maker and inventor has designed a one-man submarine that looks and swims like a real shark and features a protective shell of stainless steel.

Paul, president and chief executive officer of E.P. Industries in El Segundo, created the 4-metre-long submersible at the request of Fabien Cousteau, grandson of Jacques Cousteau (1910-1997), the famed underwater explorer. Cousteau was a customer with a vision: he wanted to swim alongside the feared great white shark while videotaping the creature close up.

The result was a prototype Paul nicknamed "Sushi," with a tough, rubber-like skin stretched over a framework of S30400 stainless steel tubing bent into oval shapes to simulate a shark's ribs.

"They needed something strong, so I chose stainless steel, which I use quite a bit," says Paul, whose company has built three other mechanical sharks and makes an array of hotrods and motorcycles for Hollywood movies and car shows. "Stainless is rigid and corrosion-resistant, and you can use a lighter weight design than carbon steel."

About 570 kilograms of tubing went into Sushi. The ribs closest to the head, which is mounted on a hinge to allow a diver to get inside, are 50 mm in diameter, and the wall thickness is 1.6 millimetres.

The sub fills with water when in use, so stainless steel was chosen to prevent corrosion. The stainless ribs provided a measure of safety in case of shark attack, says Paul, though, in the end, none of the beasts turned on the final man-made companion.

MORE INFORMATION:
www.nickelmagazine.org/shark

EDDIE PAUL (RIGHT)

FABIEN COUSTEAU WITH PROTOTYPE

PHOTOS: E.P.INDUSTRIES