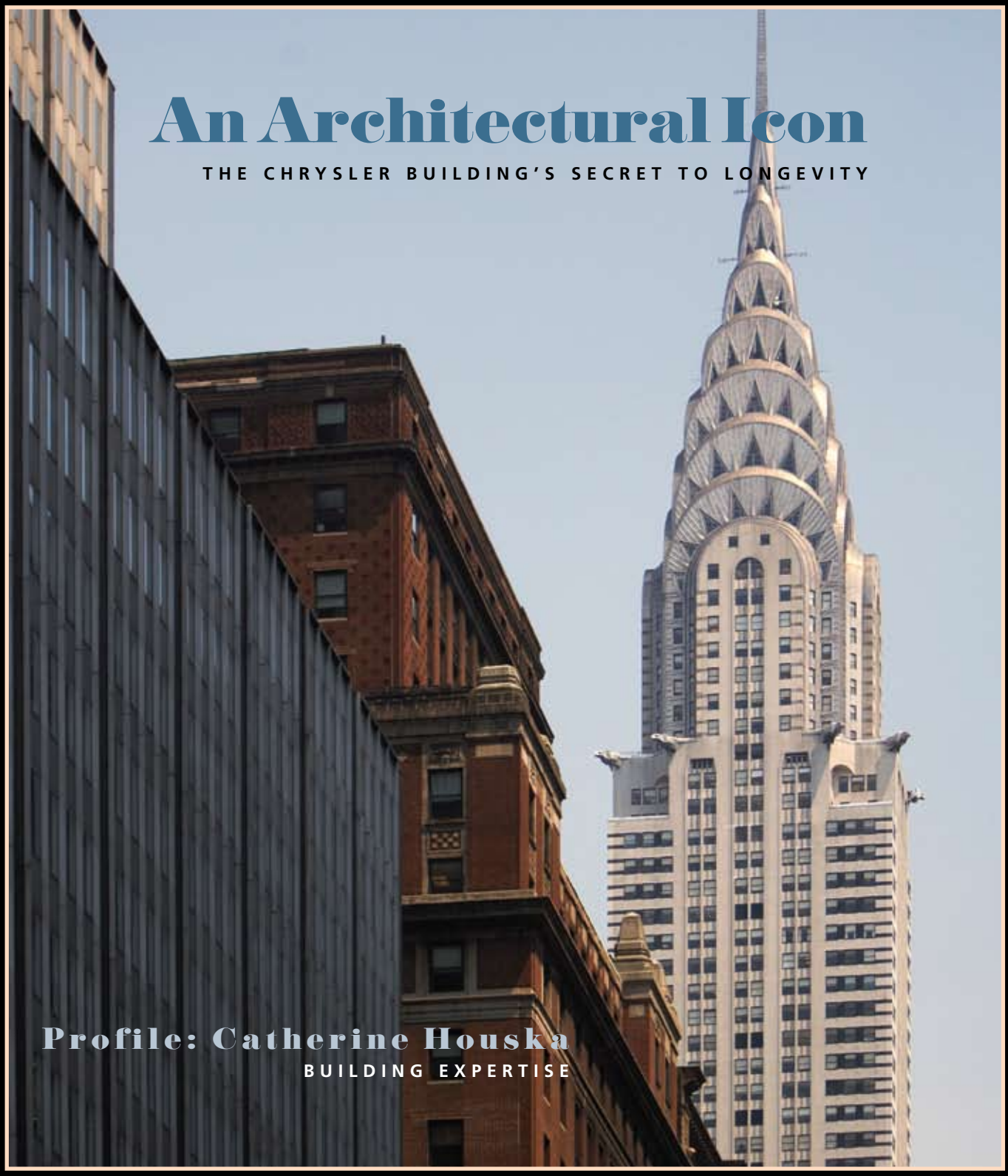
NICKEL

Japan's earthquake simulation results

The outlook for fuel cells in Europe

OCTOBER 2008 VOLUME 23, NUMBER 4 THE MAGAZINE DEVOTED TO NICKEL AND ITS APPLICATIONS



An Architectural Icon

THE CHRYSLER BUILDING'S SECRET TO LONGEVITY

Profile: Catherine Houska

BUILDING EXPERTISE

NICKEL

Volume 23, Number 4, October 2008

The Magazine Devoted to Nickel and its Applications

Nickel is published four times per year by
The Nickel Institute
55 University Avenue, Suite 1801
Toronto, Canada M5J 2H7
Tel. +1 416 591 7999
Website: www.nickelinstitute.org
E-mail: ni_toronto@nickelinstitute.org

Stephen Barnett, President
Patrick Whiteway, Editor
Mark Crozier, Design

Circulation, 27,000 in 95 countries

Other Nickel Institute offices:

Europe
Sixth Floor
Avenue des Arts 13
Brussels 1210, Belgium
Tel. 32 2 290 3200
E-mail: euronickel@euronickel.org

European Technical Information Centre
The Holloway, Alvechurch
Birmingham, England B48 7QB
Tel. 44 1527 584777
E-mail: ni_birmingham_uk@nickelinstitute.org

Japan
11-3, 5-chome, Shimbashi,
Minato-ku, Tokyo, Japan
Tel. 81 3 3436 7953
E-mail: ni_japan@nickelinstitute.org

Central & South America
Nucleo Inox
Av. Brig. faria Lima, 1234 Conj. 141
01451-913 São Paulo – SP, Brazil
Tel. 55 11 38130969
E-mail: nucleoinox@nucleoinox.org.br

India
K-36, 1st Floor
Hauz Khas Enclave,
New Delhi 110 016, India
Tel. 91 11 2686 5631, 2686 3389
E-mail: ni_india@nickelinstitute.org

Australasia
c/o ASSDA, Level 15, 215 Adelaide Street
Brisbane, Queensland 4000, Australia
Tel. 61 7 3220 0722
E-mail: ni_australasia@nickelinstitute.org

South Korea
Olympia Building - Room 811
196-7 Jamsilbon-Dong, Songpa-Ku,
Seoul 138 229, South Korea
Tel. 82 2 419 6465
E-mail: ni_korea@nickelinstitute.org
Website: www.nidikorea.org

China
Room 677, Poly Plaza Office Building
14 Dongzhimen Nandajie
Beijing, China 100027
Tel. 86 10 6500 1188 (ext. 3677)
E-mail: ni_china@nickelinstitute.org

United States
NiPERA
2605 Meridian Parkway, Suite 200
Durham, North Carolina, U.S.A.
(Health and environment inquires only)
Tel. +1 919 544 7722
E-mail: csmyth@nipera.org

For a free print subscription, please go to: www.nickelmagazine.org. To receive e-mail notices for Nickel Magazine Online, please go to: www.nickelonline.org/subscribe

ISSN 0829-8351

Printed on recycled paper in Canada.

Cover:
Chrysler Building, New York City

The next issue of Nickel Magazine will be published in December 2008.

CREATING BEAUTIFUL BUILDINGS

THIS ISSUE OF NICKEL MAGAZINE IS DEVOTED ALMOST ENTIRELY TO THE APPLICATION OF NICKEL-CONTAINING STAINLESS STEELS IN ARCHITECTURE.

Included is a feature story on two of the oldest buildings involving stainless steel cladding: the Chrysler and Empire State buildings in New York City. Built in the late 1920s, these landmarks continue to demonstrate the longevity of austenitic stainless steels.

Architects are major specifiers of nickel stainless steels

TIM PELLING FOR NICKEL INSTITUTE

One of the world's leading authorities on nickel-containing stainless steels in architecture, Catherine Houska, is also profiled in this issue. A longtime consultant to the Nickel Institute, Catherine has authored many papers, provides technical assistance and has conducted workshops for thousands of high-level decision-makers over the past 15 years.

Also of interest to architects is a report in this issue on stainless steel interior details in the recently expanded Miami International Airport, which went through a recent expansion and modernization.

Four shorter architecture-related stories shed light on: stainless steel handrails in near-shore marine environments; a unique interior stainless steel staircase; a life-cycle costing analysis from Australia; and results from earthquake simulations on interior stainless steel water distribution piping in Japan.

We have selected these stories to illustrate to architects – major specifiers of nickel-containing stainless steels – the attributes which are worthy of their attention. These attributes include longevity, dependability, aesthetics, strength, durability, as well as recycled content.

With respect to architectural applications of nickel-containing stainless steels, we invite our readers to participate in the development of an online source of information available at www.stainlessarchitecture.org.

This web site, or portal, is being re-designed and improved by the Nickel Institute. With your help, we hope to make it the number-one destination for architects, builders and constructors who want to get the goods on stainless steel.

In addition to providing a wealth of technical information about why nickel is added to stainless steel, the portal will feature an online products and services guide with valuable product and contact information. Visitors to the site can add listings for their own companies and products, and in the language of their choice. (Note: to be included, products must use a nickel-containing grade of stainless steel; also, product descriptions should be factual and avoid promotional language.)

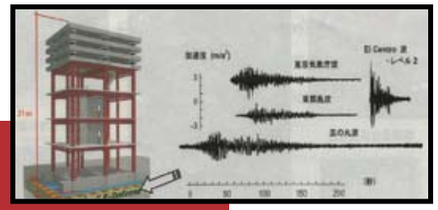
This free service will improve over time with the benefit of your feedback. If you have any suggestions for improvement or expansion, please let us know.

Regards,

Patrick Whiteway

Patrick Whiteway
Editor

NICKEL IN USE



Stainless Steel Piping Survives Shocks

Japanese tests show stainless steel piping withstands simulated earthquakes

Earthquake-resistance tests by the Japanese Stainless Steel Association (JSSA) have shown that stainless steel piping systems (joined by mechanical couplings) exhibit good air tightness and do not leak.

The tests were intended to assist development of durable stainless steel domestic piping systems and are part of the Japanese government's Special Research Project on Earthquake Disaster Mitigation for Urban Regions.

At a full-scale earthquake-testing facility, nicknamed "E-Defense," the JSSA tested the resistance of various building materials and components.

The evaluation entailed building a 21-story "skeleton" high-rise. Between the first and fourth floors, a system was built to simulate earthquake shocks on floors 5 to 21. The power of the simulated shocks was based on the strength of earthquakes anticipated to occur in the Tokai and Tonankai regions of Japan.

The tests were part of a broad, 3-year program designed to expand the use of long-lasting nickel-containing stainless steel in residential high-rise piping systems throughout Japan. A big advantage of all-stainless piping is that plumbing systems in high-rise buildings will last longer and require fewer repairs, because stainless steel neither degrades nor corrodes in service.

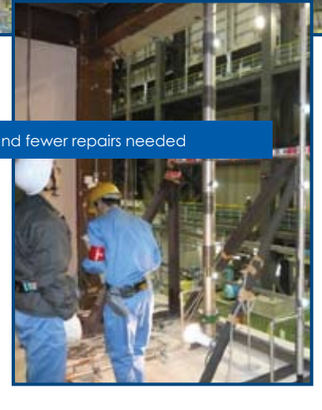
The JSSA proposed this program in response to a report tabled in May 2007 by the Housing and Land Investigation Committee of the then-governing Liberal Democratic Party of Japan.

The report urges the housing industry to adopt, as its goal, an average lifespan for all residential housing (including high-rise buildings) of 200 years. Future high-rises will be characterized by energy conservation, harmony with the surrounding environment, earthquake resistance, and regular and easy maintenance.

MORE INFORMATION:
www.stainlessarchitecture.org/jssa

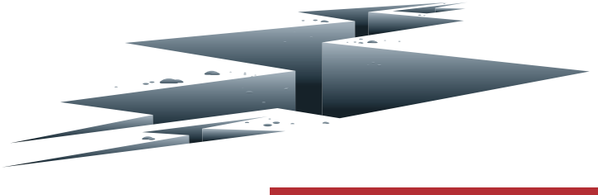
Earthquake simulation tests showed no leaks

JAPAN STAINLESS STEEL ASSOCIATION



Longer lasting and fewer repairs needed

©ISTOCKPHOTO.COM/APPLEUZR



A Step Up in Stainless Design

Stainless steel adds strength and aesthetic appeal to a hanging staircase

When a design company in Melbourne, New South Wales, Australia, decided to expand its business to a neighbouring space, a challenge was set: the adjoining office was on an upper level, and a walkway was needed to connect the two.

The challenge was met by Daniel Stellini, Associate Director, Interiors of the Carr Design Group, who envisioned a simple, strong and aesthetically refined stainless steel hanging staircase to provide transit between the two levels.

"Considering that this portal represents such a high traffic area, we needed a material that was durable, strong and low-maintenance: stainless steel met our requirements on all three counts," Stellini says. "It was our intent to express the raw-edge detail of the 3-mm thick stainless steel, highlighting its fine yet strong characteristics."

Fabricator Hi-Tech Stainless Fabrications Pty Ltd., based in Victoria, New South Wales, and accredited by the Australian Stainless Steel Design Association, used 620 kilograms of grade S30400 stainless steel to construct the skeleton of the stairwell off-site. The pieces were assembled, welded and polished on-site.

From the reception area, the portal presents itself as a crisp, polished insertion to the building's brickwork, representing a refined sculptural element against the raw, distressed solid wall. It is fixed only to the upper level of the tenancy, allowing it to hover, as it were, over the lower floor despite its weight of 340 kilograms.

The stair's profile has been left exposed, making it a feature of the space.

Challenging the conventional use of materials such as stainless steel is something Stellini continues to enjoy. Not a bad idea when you look at the results.

MORE INFORMATION:
www.stainlessarchitecture.org/staircase

"Floating" stainless steel staircase: A refined sculptural element

AUSTRALIAN STAINLESS STEEL DEVELOPMENT ASSOCIATION

Fabricating for Time and Tide

Manhattan Park railing is built to last for decades

The Hudson River Park is a waterside park under development on Manhattan Island in New York City. Integral to the project is a 13-kilometre walkway which, when completed, will wend its way from Battery City Park at the southwestern tip of Lower Manhattan north to 59th Street.

The Hudson River Park Trust, the joint New York state and city organization whose mission is to build and operate the park, has completed 5 kilometres of the walkway since 2002, when construction began. Bordering the walkway is a 106-centimetre-high railing assembled from 110 tonnes of S31600 stainless steel tubing, including 1,900 cast J92900 posts and the occasional bollard. The next 2.4 km of railing will be installed in 2009.

The Pennsylvania, U.S.A.-based engineering firm Forms+Surfaces selected S31600 after first considering S31700 stainless steel.

"The Hudson River Park Trust wanted a matte finish which would have a surface roughness greater than 20 micro-inches," explains Matt Vizzini, vice-president of engineering for Forms+Surfaces.

"The Trust wanted a railing that was maintenance-free and would last at least 30 years despite the combination of constant salt water spray, dirt and high summer temperatures," Vizzini adds. S31600 combined with a protective maintenance coating produced by Florida-based Adsil Inc. proved to be the best solution.

The railing consists of posts mounted to the concrete piers or granite bulkheads. Three-millimetre thick walled tubing, 38-76 mm in diameter is discretely bolted to the posts and can be removed in case of damage.

MORE INFORMATION:
www.stainlessarchitecture.org/hudsonriver

FORMS + SURFACES

Lasting Landmarks

Venerable New York City landmarks reflect the durability of stainless steel

They're two of the most venerable and recognizable landmarks on New York City's famous skyline. They're also soaring testaments to the beauty and durability of stainless steel as an exterior finish in architectural applications.

The Chrysler Building, 77 stories tall, and the 85-floor Empire State Building were completed within a year of one another during the Depression years, in a race to claim bragging rights to the world's tallest building – a title the Empire State held for 41 years.

The buildings are as innovative as they are tall, thanks to the foresight of architects and builders who chose to clad the exteriors with stainless steel.

"It was the first ever large installation of stainless steel in an architectural application," says Catherine Houska, an architectural metals consultant with Pittsburgh-based TMR Consulting. "Nothing on this scale had been built using stainless steel."

"These were cutting-edge buildings," says Houska, who researched both buildings for the Nickel Institute's reference manual Timeless Stainless Architecture. "The owners wanted to make a statement about the progressiveness of their building and their companies. It was a substantial risk."

The first risk-taker was Walter P. Chrysler, the brash automaker who returned from a trip to Paris determined to erect a building that would eclipse the Eiffel Tower, the tallest structure of the day.

Chrysler's architects topped the landmark with a six-tier spire of Art Deco arches clad in stainless steel, creating a shimmering beacon above the city's otherwise gray skyline. Winged gargoyles, eagle heads and other stainless-steel flourishes were added, evoking the chrome-plated hood ornaments and hubcaps of Chrysler's cars. It was probably Walter Chrysler's own idea to encase the spire in stainless steel. He specified additional finishes and recalled, in his memoirs, spending hours on his hands and knees on his office floor poring over blueprints.

Samples of the Chrysler Building's roof cladding were tested in the mid-1990s, revealing that S30200 was the alloy used (the chromium and nickel contents of S30200 are quite similar to those of modern S30400). The same alloy was used to cover the gargoyles. The Chrysler's lobby and street-level entrance doors were trimmed in a nickel-silver alloy known as "German silver," a copper-nickel-zinc alloy (which has the appearance of silver) containing 12-20% nickel.

Just 10 city blocks to the south is the 382-metre-high Empire State Building, which

©DEAN JOBB

©BIGSTOCKPHOTO.COM

©ISTOCKPHOTO.COM/LISA MARZANO

officially opened in May 1931, a year after the Chrysler Building was completed. Despite the building's iconic status (it is once again New York's tallest building, following the destruction of the World Trade Centre), the use of stainless cladding in its construction was rediscovered when the exterior was cleaned in 1995.

More than 300 tonnes of S30200 stainless was used to fashion the ladder-like spandrel panels that trim the thousands of windows above the sixth floor. "Because those spandrel panels had been dirty for so long, nobody had any idea they were stainless until they were cleaned," says Houska. Another 25 tonnes of S30200 stainless was used in the observation deck and in the mast that tops the building.

It appears that the Empire State has been cleaned only once, Houska says, whereas the Chrysler was cleaned twice, in 1961 and 1995. Their stainless steel has held up remarkably well in both buildings, withstanding decades of pollution and the ravages of New York's coastal climate.

Today's architects would likely specify more corrosion-resistant S31600 for such applications, but the buildings' height enables them to stay clean and avoid salt accumulation. The Chrysler and Empire State essentially get pressure-washed with every rainstorm, thanks to the strong winds at their summits, says Houska.

That's not the case at street level, though: a few of the Chrysler Building's doors succumbed to the ravages of de-icing salt and had to be replaced. As for the Empire State, its original spandrel panels are intact except for a small number that were destroyed in 1945 when a bomber crashed into the 79th floor.

Urban legend has it that the Chrysler's builders ordered enough stainless steel components to re-clad the roof and put them in storage, expecting the untested metal would have a short lifespan. In any event, in almost 80 years, only the odd batten has had to be replaced.

Adds Houska: "There's no reason why the Chrysler Building roof won't be there for hundreds of years."

MORE INFORMATION:
www.stainlessarchitecture.org/landmarks

©ISTOCKPHOTO.COM/ BRANDON JENNINGS

©ISTOCKPHOTO.COM/MARC DE OLIVEIRA

Both of these buildings are excellent examples of using sustainable stainless steel and performance with minimal maintenance.

Thanks in part to the pioneering use of stainless steel in these landmarks, the metal's use has become commonplace in the new generation of skyscrapers.

Building Expertise

Architectural consultant Catherine Houska takes pride in helping make the world more 'stainless'

U.S. Embassy in Beijing

New Bangkok International Airport

Entrance to 7 World Trade Centre

When she was a little girl growing up in Spring Valley, a suburb of New York City, Catherine Houska and her parents lived in a 250-year-old house that was being restored. One day her father happened to lean against a wall which suddenly opened up to reveal a secret staircase and room that had been used to hide slaves escaping to freedom on the Underground Railroad (between about 1810 and 1850). From then on, Houska was interested in architecture. It wasn't long before she was spending endless hours with Lego®, Lincoln Logs – building blocks, it would turn out, for a varied and successful career.

Houska is now among the world's leading experts on architectural metals, particularly stainless steel. The list of people who consult her include architects, building owners, contractors and fabricators on new projects and on existing buildings that are experiencing problems. As an architectural consultant for the Nickel Institute, as well as the International Molybdenum Association, the Ornamental Metal Institute of New York, and the Specialty Steel Industry of North America, she provides technical assistance and arranges workshops for thousands of high-level decision-makers.

When she was a student, Houska was frustrated by the fact that drawing did not come naturally to her (at the time, drawing was considered a prerequisite for architects). "But I was always good in math and the sciences and loved solving problems, so engineering seemed like a good option. Besides, my father and two uncles were engineers, as were my grandfather and great grandfather, so it's not surprising that I was encouraged in that direction."

Her father, Dr. Charles Houska, was a metallurgy professor; her mother taught economics. Catherine received her undergraduate degree in metallurgical engineering and materials science from Carnegie Mellon University (Pittsburgh) and an MBA with an emphasis on international and industrial marketing from Case Western Reserve University (Cleveland).

Main photo: Hyatt hotel in New York City

"I had not planned to major in metallurgical engineering, but all engineers have to take an introductory metallurgy course. My dad had an international reputation in his field, and Dr. Bernstein, the department head, soon found that I was much like my father. He decided that the best way to recruit me into his department was to offer me a lucrative summer job working with his grad students. By the end of the summer, I had changed majors."

BankBoston in Brazil

Most of her university roommates were architecture or design majors and she was often the "materials consultant" on their projects. This gave her an opportunity to learn more about the field and gain insight into how architects think.

Houska started consulting in architecture in 1990 after joining TMR Architectural Metals Consulting in Pittsburgh, Pennsylvania, U.S.A., where she resides. As TMR's senior market development manager, she performs market research, analysis, development and strategy work for a broad range of metals and markets. Houska's market experience is in fact wide-ranging and includes not only architecture but plastic moulds, electronics, and industrial equipment.

Among the prestigious firms she has assisted are Gehry Partners, Skidmore Owings & Merrill, HOK, Pei Cobb Freed & Partners, Cesar Pelli & Associates, Murphy/Jahn, FXFowle, Goettsch Partners Inc., RA Heintges, Gensler, Perkins & Will, WTW, Arup, Cantor Seinuk, Polshek Partners, Perkins Eastman, Leo A Daly, Kohn Pedersen Fox, Walt Disney, Universal Studios, Davis Brody Bond, Norman Foster, Figg Bridge, Moshe Safdie, and the Port Authorities of many major U.S. cities.

In 1993, the Nickel Institute announced it was looking for an architecture, building and construction consultant. "Since architecture and architectural materials such as stainless steel had remained a hobby of mine over the years, I volunteered and was accepted," she says. Houska has managed the Institute's market development program to promote increased use of stainless steel in North America.

"Stainless steel is an incredibly versatile material because it can be obtained in such a variety of finishes and product forms. Its unique characteristics make it suitable for a great many practical and aesthetic applications. The only limitation is our imagination. Designers and suppliers regularly come up with wonderful new ideas, and it's wonderful to work in a constantly evolving field."

That evolution is reflected in the Nickel Institute's web portal for architects (stainlessarchitecture.org), to which Houska contributes and which she calls "an excellent resource for architectural decision-makers.

"There's a tremendous range of literature and other resources available on the portal, and recent changes have made it an even more valuable resource, taking it to a totally new level. I would encourage decision-makers to visit it and make full use of all it has to offer."

Although Houska is unquestionably an international expert on architectural applications of stainless steels, she rejects such labels.

"No one ever knows everything and life is a continuous learning experience. Every 'problem' or new design is an opportunity for me to learn about the unique atmospheric conditions, design challenges, and aesthetic and cultural preferences involved in the project. I love being able to help the people I work with and I hope my ideas can help expand their design vision."

Architectural Consultant Catherine Houska

Sometimes, maybe years later (architectural projects can be slow in coming to fruition), Houska will receive an e-mail with photos or come across an article about a project on which she provided advice. When that happens, she feels proud knowing she has helped make the world more "stainless".

Continued online at:

MORE INFORMATION:
www.stainlessarchitecture/houska

"Stainless Steel is an incredibly versatile material because of the broad variety of its finishes and product forms. Unique characteristics make it suitable for a great many practical and aesthetic applications. The only limitation is our imagination."

Museum of Glass, Tacoma, Washington, U.S.A.

A Growing Opportunity for Nickel

Renewed interest in solid oxide fuel cells in Europe

©ISTOCKPHOTO.COM/ALEXANDR TOVSTENKO

Despite the hype of various early fuel cell developers in the 1990s, these devices captured very little of the energy supply market. Recently, however, interest in solid oxide fuel cells (SOFCs), has been growing, particularly in Europe, where they are being used for decentralized power generation in kilowatt to megawatt-size outputs.

All of this is good news for nickel, which is a significant component of SOFCs.

The capacity of SOFCs can range from one kilowatt for domestic use (heat and power) up to several megawatts for industrial co-generation and electricity production, according to a consultant study for the Nickel Institute on the growing importance of nickel in the European Union. Places where fuel cells have been installed include: hospitals, prisons, waste water treatment plants, and manufacturing.

The increasing availability of reliable and efficient fuel cell technology will improve the economic and environmental performance of power production. In 2005, the generation, transmission and distribution of power, including suppliers, accounted for more than a million jobs and contributed more than 110 billion Euros of gross added value to the EU's gross domestic product.

By 2015, the global market for SOFC power generation is expected to be valued at 11 billion Euros, of which the EU represents about 3 billion Euros. Major companies engaged in this field include Ceran Tec and Siemens AG in Germany, Ceres Power and Rolls-Royce plc in the UK, Haldor Topsøe A/S in Denmark, Saint-Gobain SA in France, and Wärtsilä Corporation in Finland.

A fuel cell is an electrochemical device that converts the energy produced by reactions between a fuel (such as hydrogen) and an oxidant (such as oxygen) directly and continuously into electrical energy. Like all electrochemical cells, fuel cells have two electrodes – a positive anode and a negative cathode.

In SOFCs, nickel is utilized in the anode as a nickel-yttria stabilized zirconia composite. The nickel component is nickel oxide, synthesized from either nickel acetate or nickel citrate. The anode is constructed using powder metallurgy and electrochemical vapour deposition technologies to produce a layered, porous structure in which the hydrogen oxidation process can take place.

One of the advantages of SOFCs is that they can operate on a wide range of fuels. Since they operate at high temperatures, fuels can be "reformed" within the anode. So SOFCs can operate not only on methane, propane or natural gas, but also gases from fermentation or biomass gasification.

Anode materials must be porous to offer a very high surface area for the oxidation reactions, retain electrical conductivity at high temperatures and have compatible thermal expansion properties. The nickel-bearing anodes meet all these requirements without using costly precious metals.

Fuel cell power generators enjoy several fundamental advantages over large, centralized, conventional power facilities. Chief among these are greater energy efficiency, which means lower greenhouse gas emissions, and decentralized generation, which avoids long-distance transmission line losses.

SOFCs provide 50-65% energy efficiency, rising to 85% if waste heat is used in a co-generation system, compared with significantly lower traditional steam and gas turbine efficiencies in the range of 30-55%. Furthermore, installing fuel cell power plants where the power will be consumed avoids the power losses and capital costs associated with long-distance transmission lines.

For all the above reasons, SOFCs are likely to play a growing role in European power generation, and that translates into greater demand for nickel.

MORE INFORMATION:
www.nickelmagazine.org/eufuelcells

Greater energy efficiency equals lower greenhouse gas emissions

WÄRTSILÄ CORPORATION

Withstanding the Test of Time

Life-cycle costing analysis rates stainless steel over alternatives

©ISTOCKPHOTO.COM/APPLEUZR

Inspired by the successful performance of austenitic stainless steel street furniture, the city council of Melbourne, Southeastern Australia, recently conducted a life-cycle costing analysis. The results show that stainless steel enables design flexibility and ensures low maintenance costs.

"Using S30400 stainless steel instead of powder-coated steel significantly reduces ongoing maintenance costs," says Marika Mulqueen, one of Australia's most renowned industrial designers. "A comparison found that while stainless steel can initially cost more, but over a 20-year period, maintenance costs can be up to 50% less than those for steel protected by powder-coated paint. Maintenance involves a once-a-year pressure cleaning instead of regular repainting to repair scratched and peeling paint.

"Scratches do not show up easily because the furniture is brushed stainless steel. Unlike coatings, stainless steel is not prone to fading," she adds.

A case in point is the $10-million stainless steel revamp of the Bourke Street Mall, a pedestrian and streetcar-only strip in Melbourne's central business district. The mall has a simple, clean, linear design.

MME Surface Finishing (Vic) Pty Ltd., a member of the Australian Stainless Steel Development Association (ASSDA), provided smooth mechanical finishing that minimizes dirt retention while optimizing corrosion resistance.

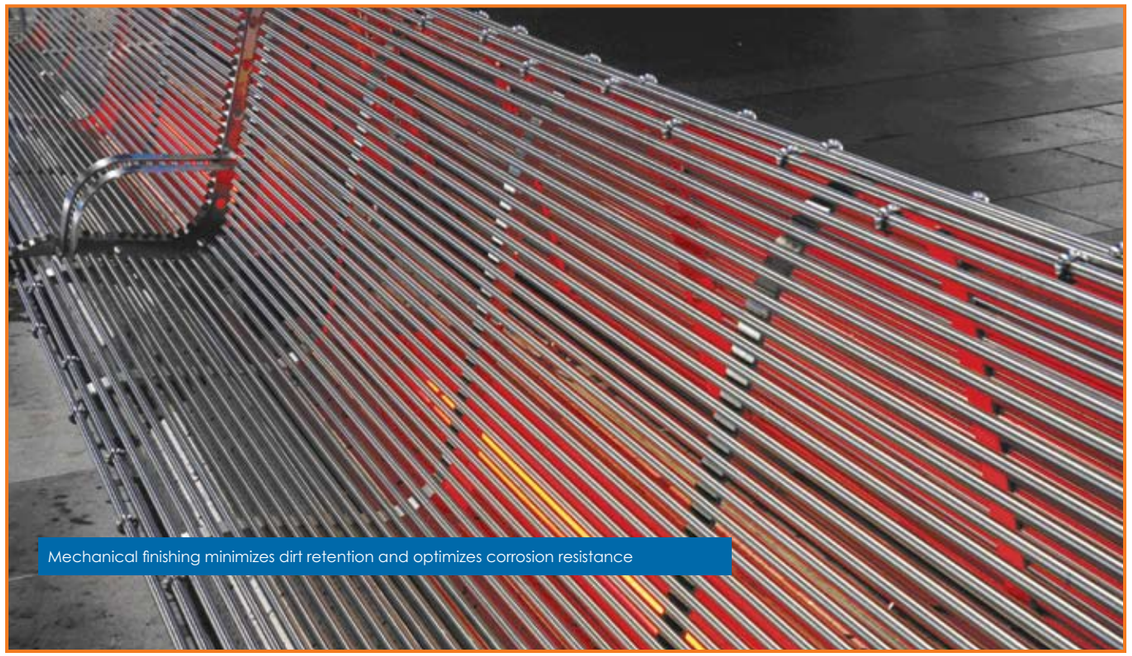
The Mall features new stainless steel seating, drinking fountains, recycle bins, banner poles and a new fit-out (shell space) for the streetcar zone.

Stainless steel was chosen because it essentially requires no maintenance when the correct surface finish is applied, says MME representative John Bainbridge.

Among the other stainless steel architectural pieces in Melbourne are commemorative totem poles fabricated by ASSDA member TRJ Engineering of Southeastern Australia. The poles use grade S31600 stainless steel with a No. 4 polished finish. Each pole has a base consisting of two rolled half-cylinders with LED lights mounted between them. The cylinders were formed in a brake press which reduced the risk of surface damage.

The Melbourne Technical Design Department has recommended that all future street furniture commissioned by the council be made of stainless steel.

MORE INFORMATION:
www.stainlessarchitecture.org/melbourne



Mechanical finishing minimizes dirt retention and optimizes corrosion resistance

MME SURFACE FINISHING

Miami International Airport

Ready for Heavy TRAFFIC

Nickel-containing stainless steels reduce wear and tear on architectural design elements

In July 2008, over 3.1 million passengers passed through the Miami Airport (MIA). By year's end annual traffic through the airport could exceed 34 million. Fortunately the airport has used large amounts of stainless steel sheet in its renovation and expansion projects. This should keep interior surfaces looking new while minimizing maintenance costs.

"We chose stainless steel because it's clean, easy to maintain, and durable," says Carlos José, the airport's assistant facilities and landside manager.

Nickel-containing stainless steel, typically S30400 or S31600, meets requirements for finish materials in the airport terminal. These include low life-cycle cost (durability), ease of maintenance, durability and safety, according to James Armstrong, change work assignment manager for Miami-based Dade Aviation Consultants.

High traffic areas call for stainless steel's durability

Says John Murphy, a principal of the Texas-based Corgan Associates, which is the main executive architect for the MIA: "A terminal receives a tremendous amount of wear -- much more than other public buildings. The materials chosen must be durable and easy to clean." He adds that although other materials are available, they're typically more expensive then stainless steel when maintenance costs are included.

Textured stainless steel is desirable because it masks fingerprints, small dents and scratches more effectively than polished or satin finishes. In addition, textured stainless steel's high strength-to-weight ratio allows the use of thinner sheet.

Rimex Metals (USA) Inc. of New Jersey has supplied some 28,000 square metres of textured stainless steel to the airport in the past three years. Bruce Kardos, the company's regional sales manager, says the MIA needed to avoid shabbiness. "Passengers are terrible with walls. Often, for example, you'll see a passenger talking on his cell phone with one foot propped against a wall. And it shows immediately. Also, the walls are regularly bumped by motorized carts and floor polishers."

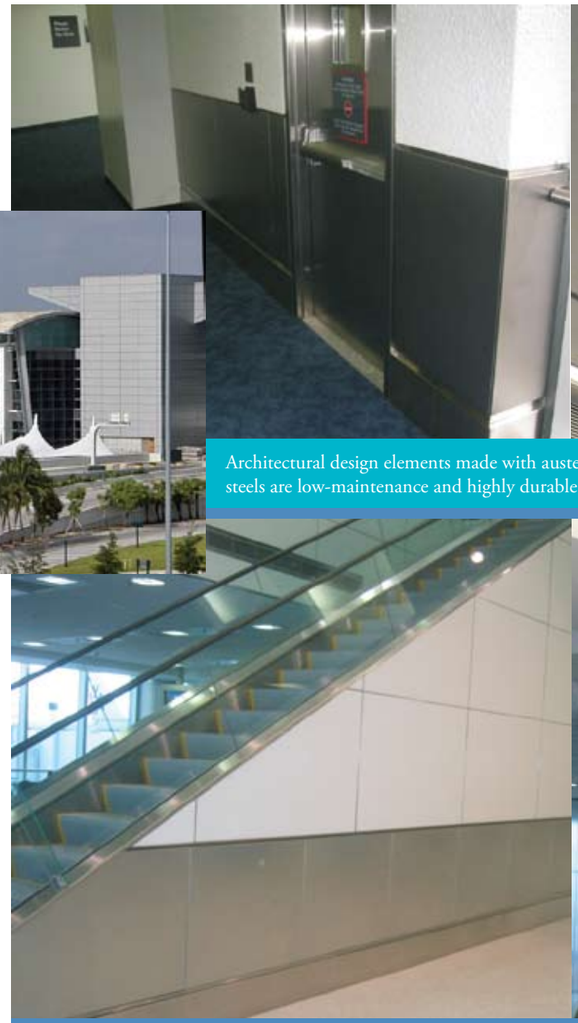
The use of stainless steel sheet on terminal walls is still limited to wainscoting, but full-height stainless steel column covers have been used for 10 years. Says José: "Some people hit these column covers pretty hard, and the stainless steel will sometimes get a dent, but we can repair dents by pulling them out with suction cups. Fibreglass column covers, on the other hand, often have to be pulled off and thrown away. We would like to replace all of these with stainless."

He stresses that stainless steel contributes to a terminal's aesthetics: "It's smooth, gives a sense of richness, creates a good atmosphere, and comes in many different finishes and product forms. In short, it adds a touch of class."

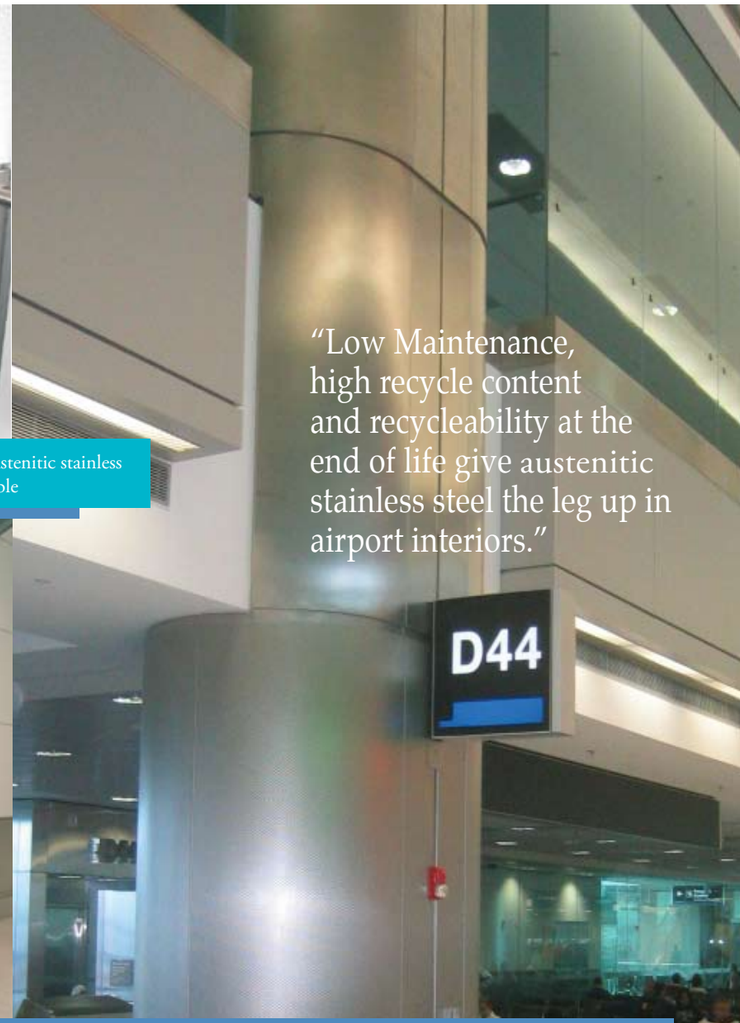
Other applications of nickel-containing stainless steel at MIA include walls, floors and doors for elevator cabs, rail trim for escalators, handrails, guard-rails, counter trim, baggage scales, flight information display racks, trash receptacles, and plant holders.

MORE INFORMATION:
www.stainlessarchitecture.org/miami

RIMEX METALS (USA) INC.

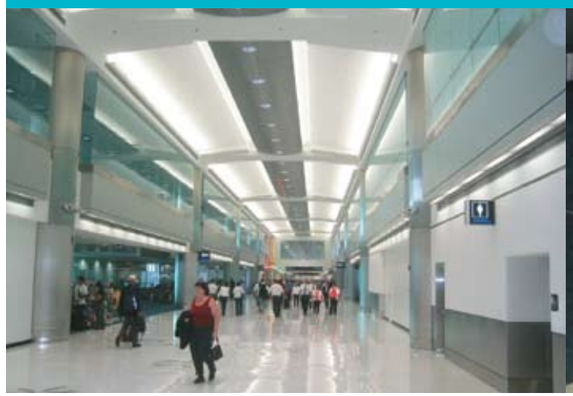


Architectural design elements made with austenitic stainless steels are low-maintenance and highly durable



"Low Maintenance, high recycle content and recycleability at the end of life give austenitic stainless steel the leg up in airport interiors."

"I expect the stainless steel to last as long as the terminals - 30 to 40 years." - Carlos José



Textured S30400 stainless steel masks fingerprints and small dents.

©ISTOCKPHOTO.COM/RENÉ MANSI

Nickel: Enabling Sustainability

Explaining how the attributes of nickel enable resource-efficient design is not an easy task. Fortunately, a concise, tastefully illustrated brochure recently published by the Nickel Institute explains, in clear terms, how nickel does just that.

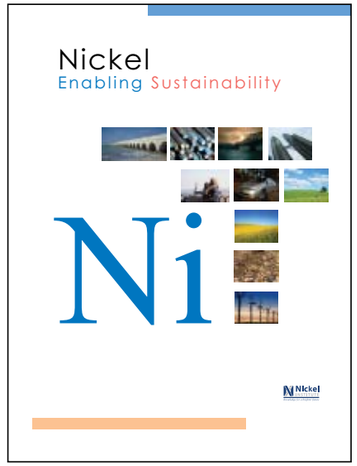
The brochure demonstrates how nickel is essential in gas turbines – those sophisticated pieces of machinery that are used to generate electricity from bio-gases produced by landfill waste.

A photograph of a 75-year-old concrete pier in the Gulf of Mexico shows how nickel-containing stainless steel reinforcing bar can be used to create long-lasting, durable infrastructure.

Readers also learn that nickel-containing stainless steels are the dependable material of choice in the food processing industry (using oil seeds and the pasteurization of milk as illustrative examples), owing to their strength, durability, toughness and hygienic qualities.

The brochure illustrates two examples of enduring architectural landmarks: the Chrysler Building in New York City and the Quebec City Bridge, built in 1929 and 1917, respectively. Still in use today, they exemplify the durability and dependability of nickel-containing stainless steels.

Lastly, the brochure reminds the reader that materials that contain nickel can be fully recycled. On average, stainless steels today contain 60% recycled material, and that percentage is increasing year by year.The brochure is free to users or nickel-containing materials and is ideal for communications programs designed to illustrate the attributes of nickel. It is available from the Nickel Institute.



DESIGNED BY MARK CROZIER

Conference Presentations by the Nickel Institute

The Nickel Institute participates in many technical conferences, workshops and seminar throughout the year. Following are a few recent examples.

The Nickel Institute's Technical Director, Europe, Dr. Peter Cutler presented a paper on the use of nickel stainless steels railcars at the Innovative Stainless Steel Applications in Transport Vehicles (INSAPTRANS) seminar, held in Berlin on September 25, 2008. The presentation was done in conjunction with Arcelor and ISER, the German stainless steel development association. A similar presentation was also given in association with ID Inox, the French stainless steel development association on September 30.

New and revised wording for various sections of the ASME BioProcessing Equipment standards, including standards on rouging and surface finishes, were approved at a recent meeting. Nickel Institute Consultant Richard Avery participated in the meeting and will chair a new subcommittee on grinding/polishing/buffing. These issues are important because they will allow stainless producers and users to make cost-effective equipment of stainless steel.

Nickel Institute Consultant Bud Ross chaired a session and also presented a paper at the 17th International Corrosion Conference held Oct. 6-10 in Las Vegas, Nevada, U.S.A. The conference was subtitled "Corrosion Control in the Service of Society" and provided a forum for leading international corrosion researches to get together and exchange ideas.

Nickel Institute Technical Director Gary Coates gave a talk at the North Alberta section of the American Welding Society's one day conference, held Oct. 17 in Edmonton, Alberta, Canada. This section covers the area where much of the tar sands development is engineered and taking place. His presentation was entitled "Welding Considerations for Corrosive Service Applications", and included the important role of nickel in making stainless alloys "more forgiving" to welding processes.

For additional information on any of these conferences, please contact: gcoates@nickelinstitute.org

JSSA

UNS details

The most widely used grades of stainless steel used in architectural applications are as follows:

Alloy	Al	B	C	Cb	Co	Cr	Cu	Fe	Mn	Mo	Nb	N	Ni	P	Pb	S	Si	Sn	Tl	V	W	Zn	Zr	Other
S30400 p. 5,6,12, 13	-	-	0.08 max	-	-	18.00-20.00	-	-	2.00 max	-	-	-	8.00-10.50	0.045 max	-	0.030 max	1.00 max	-	-	-	-	-	-	-
S30403	-	-	0.03 max	-	-	18.00-20.00	-	-	2.00 max	-	-	-	8.00-12.00	0.045 max	-	0.030 max	1.00 max	-	-	-	-	-	-	-
S31600 p. 5,7,11,12	-	-	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	-	-	-	-	-	-	-
S31603	-	-	0.030 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	-	-	-	-	-	-	-
S32205	-	-	0.030 max	-	-	22.0-23.0	-	-	2.00 max	3.00-3.50	-	0.14-0.20	4.50-6.50	0.030 max	-	0.020 max	1.00 max	-	-	-	-	-	-	-
S42000	-	-	over 0.15	-	-	12.0-14.0	-	-	1.00 max	-	-	-	-	0.040 max	-	0.030 max	1.00 max	-	-	-	-	-	-	-

Recent Appointments

Mark Mistry has joined the Nickel Institute as EU Director Sustainability. He will be responsible for managing the Business Advocacy programs not related to REACH. Mark has extensive experience in the European Union environmental health and safety matters. Previously he was employed by Eurometaux and Norddeutsche Affinerie. He will be based in the Nickel Institute office in Brussels.

Dr. Tara Lyons-Darden has joined the Nickel Producers Environmental Research Association (NiPERA) as Scientific Technical Writer. Dr. Darden's doctorate is in pathology and laboratory medicine from the University of North Carolina at Chapel Hill. Her scientific background includes research in carcinogenesis, toxicology, biomarkers, pathology and molecular biology. Dr. Darden directed her career toward scientific/medial writing after finishing her post-doctoral studies at Duke University and then the U.S. EPA. She will be based in the NiPERA office in Raighly-Durham, North Carolina.

Alex Gao has joined the Nickel Institute's office in Beijing as Nickel Applications Manager. **Christine Li** has also joined Nickel Institute Beijing as Office Administration Assistant.

@www.nickelinstitute.org

- **SUBSCRIBE** to Nickel Magazine free of charge and receive an e-mail notice when a new issue is posted online. www.nickelonline.org/subscribe
- **IN 7 LANGUAGES**, read Nickel Magazine online. Chinese, Japanese, Russian, French, German and Spanish. www.nickelmagazine.org/language
- **SEARCH BACK ISSUES** of Nickel Magazine from our online archive, going back to June 1998. www.nickelmagazine.org/archive
- **WATCH** nine short nickel videos on You Tube. Search for "Nickel Institute" and visit the Nickel Institute Channel. Includes our new "Climate Action" video, three BBC World commercials and three recyclable stainless steel commercials. www.youtube.com/user/NickelInstitute

COMING EVENTS

CLIMATEACTION Assisting business towards carbon neutrality — In partnership with: SDI Sustainable Development International — UNEP

The United Nations Climate Change Conference will be held in Poznan, Poland December 1-12, 2008. Participants are expected to agree to a plan of action to implement the Kyoto Protocol with further negotiations expected in 2009. The Nickel Institute will have a presence at that conference as one of several sponsors of an international communications program produced by Sustainable Development International, which is operated by the Henley Media Group of London. It is endorsed by the United Nations Environment Program (UNEP) and is designed to assist the private and public sectors to achieve carbon neutrality by providing practical actions to reduce global carbon footprints. The program includes a publication called "Climate Action," which was launched in December 2007 at the UN climate change conference in Bali. The next issue will be distributed at the Poznan conference. This magazine will feature an article by Nickel Institute President Stephen Barnett on how nickel production is an investment that society makes in order to create innovative ways to reduce greenhouse gas emissions (through the many applications of nickel-containing materials). For more information on the conference, see http://unfccc.int/meetings/items/2654.php. For information on Climate Action, see http://www.climateactionprogramme.org/

NICKEL LIFE CYCLE TOUR In the first week of November 2008, a group of EU regulators will tour four facilities in Finland that specialize in the mining, processing, using and re-using of nickel. Sponsored by the Nickel Institute, the two-day visit is the first in a series of tours planned for 2009 that will demonstrate to regulators the socio-economic benefits that nickel brings to the European Union. The tours will also introduce regulators to the key players at the Nickel Institute. For more information, see obeaunay@nickelinstitute.org

FOOD CONGRESS Eric Partington, a consultant for the Nickel Institute will be present a paper entitled "Selection of Materials for Equipment in Contact with Food – EHEDG Guideline No. 32" at the First European Food Congress which will be held Nov. 4-9, 2008 in Ljubljana, Slovenia. For more information, please see: http://www.foodcongress.eu/

PETROCHEMICAL WORKSHOPS Nickel Institute Consultants Don Bagnoli and Don Tillack will present a series of petrochemical workshops in India in December. The workshops are organized by Ramesh Gopal of the Nickel Institute's office in New Delhi, India. Dr. A.K. Lahiri , a Nickel Institute consultant in India, will also participate in the workshop series. For more information, please contact: ni_india@nickelinstitute.org

HYGIENIC PROCESS EQUIPMENT Welding and construction of hygienic process equipment in six industries – pharmaceutical, bio-technology, semiconductor, personal care, food and beverage, and dairy processing – will be the topic of a 2-day conference in New Orleans, U.S.A., February 10-12, 2009. The Welding Research Council-EUROWELD conference is sponsored by the Materials Technology Institute, the Nickel Institute, 3-A Sanitary Standards, and ASME BPE. Gary Coates, technical director of the Nickel Institute, will chair a session on hygienic industry materials. In addition, Nickel Institute consultants Richard Avery and Donald Tillack will present papers. For more information, see http://www.forengineers.org/conferences/WRC_CONFERENCE_BROCHURE%20.pdf

CORROSION 2009 CONFERENCE NACE International will hold its annual corrosion convention and tradeshow in Atlanta, Georgia, March 22-26, 2009. This annual event for corrosion professionals combines technical and research symposia, meetings, forums, networking and social events and a huge trade show of exhibitors. Of particular interest to the users of nickel alloys are sessions on bio-fuels corrosion, refining industry corrosion, recent experiences with corrosion-resistant materials, marine corrosion, high temperature concerns, and corrosion in the pulp and paper industry. For more information, see http://events.nace.org/conferences/c2009/index.asp

Building Ocean Ecosystems

©ISTOCKPHOTO.COM/DENNIS SABO

New York City's subway cars prove useful even after retirement

At a time when scrap dealers can't get their hands on enough stainless steel, it seems surprising that New York is dumping its subway cars into the ocean to serve as artificial reefs. That is, until you consider the cost and human health risks of recycling them.

New York City's Metropolitan Transit Authority (MTA) has been sinking its retired subway cars to provide "fish condos" for years. As a result, 1,269 Redbird carbon steel cars rest on marine reef sites all along the Eastern seaboard. Now the first generation of cars clad in 2 tonnes of S30100 and S30200 stainless steel are joining them.

"There is certainly a lot of salvageable metal on these cars but to get them from our property to a place where they can be lawfully remediated would be a very costly endeavour," says Mike Zacchea, assistant chief operations officer for the MTA.

The biggest problem is the asbestos that lines the floor and walls of the cars. While asbestos is not a danger underwater, precautions would have to be taken if the cars were dismantled aboveground. The cars also contain other materials that cannot be readily recycled including glass, fibreglass and plastic.

"We've chosen a solution we think is environmentally positive," says Zacchea. "And because the cars are clad in stainless steel, their structural integrity will remain intact longer than the carbon cars that are already on these reefs."

The life estimate is 30-40 years for the stainless steel cars compared to 15- 25 years for the carbon steel cars.

"Fish Condos" rest in marine reef sites along Eastern seaboard

NEW YORK METROPOLITAN TRANSIT AUTHORITY

MORE INFORMATION:
www.nickelmagazine.org/subwaycars