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construction *innovation*

CCHT houses "cogen-ready"

To assist manufacturers in developing and evaluating cogeneration systems, the Canadian Centre for Housing Technology has made changes to both its test and reference houses.

Twin research houses at the Canadian Centre for Housing Technology

Cogeneration, or "cogen," usually refers to industrial processes, such as the combustion of residues from the fabrication of pulp and paper, in which waste heat is recovered to generate steam, which can in turn be used to produce electricity. It can also refer to systems that generate electricity as the primary output, such as micro-turbines and fuel cells, in which heat from the process is used to produce additional power or to heat water and buildings.

Small cogeneration plants may be a viable alternative to large and expensive power generating stations in some circumstances: electricity is produced where it is needed, heat recovery boosts efficiency, and emissions can be reduced by using clean fuel sources.

Events like the 1998 Ice Storm in Eastern Canada and the recent rolling brownouts in California have increased homeowners' interest in small power plants that can provide primary or back-up power for their houses. New and remote communities not yet connected to the power grid are also looking at this option.

Manufacturers in Canada and many other countries realize that there are market opportunities in such technologies and they have been busy developing cogen systems for residential applications. Machines ranging in size from 1 to 5 kWh are capable of providing all or part of

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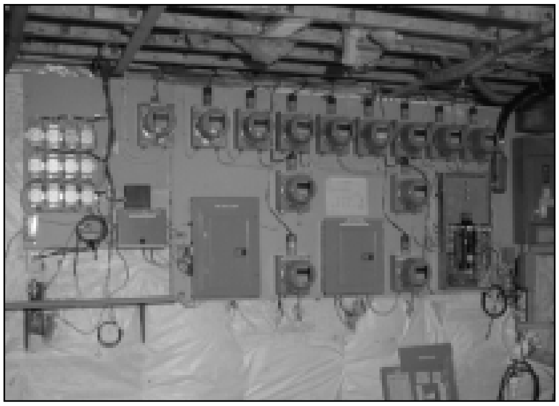
Highlights

The Canadian Centre for Housing Technology (CCHT), a joint venture of the National Research Council, Canada Mortgage and Housing Corporation and Natural Resources Canada, was created to assist Canadian manufacturers in developing new technologies and getting them to market.

CCHT has two research houses, a reference house and a test house, that are side by side and identical in orientation, size and construction. Both houses are fully instrumented and use automated controls to simulate human activity. The reference house serves as a control unit while the test house can be modified according to research requirements.

For more information about CCHT, see *Construction Innovation*, Winter 2000 or visit http://www.ccht-cctr.gc.ca.



New meters at CCHT are able to characterize the electrical consumption of the houses for each five minutes of a 24-hour period.

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Construction codes

Updating the technical content of the national model codes

The standing committees of the Canadian Commission on Building and Fire Codes (CCBFC) have now completed their work to update the technical content of the National Building Code, the National Fire Code and the National Plumbing Code. The changes proposed during this process—approximately 950 in number—are being reviewed by the provinces and territories to ensure that there are no significant conflicts with provincial/territorial building regulatory policies. Their review is expected to be completed in the fall of 2002.

At that time, a coordinated national public consultation will take place to explain the proposed changes and to provide code users with the opportunity to comment. Although the details of the consultation have not yet been confirmed, the provinces and territories are expected to take a lead role in organizing public seminars and workshops. In most provinces and territories, staff from the Canadian Codes Centre will prepare the documents and make presentations on the changes to the national model code documents.

Following the public consultation process, the CCBFC standing committees will meet to review the comments received and determine which changes will proceed. These changes will be recommended to the Commission for inclusion in the new objective-based national model codes. Those that are accepted will be published in the new documents by mid-2004.

Although code users may propose changes to any of the national code documents at any time, they should be aware that except when there is an urgent health or safety issue that needs to be addressed or when there is a code requirement that places an undue restriction on the use of construction materials, the date for proposing changes to the 2004 codes has passed. Proposed changes will now be evaluated by the CCBFC standing committees and considered for inclusion in the next edition of the codes, expected to be published in 2007.

For more information about the proposed technical changes and the related public consultation process, please visit www.ccbfc.org/ccbfc/home_E.shtml, or contact Mr. John Archer at (613) 993-5569, fax (613) 952-4040, or e-mail codes@nrc.ca.

National Construction Codes and Guides Special Edition CD-ROM now available

The Institute for Research in Construction is pleased to announce the release of five national code documents on CD-ROM:

- Quebec Construction Code – Chapter I, Building, and National Building Code of Canada 1995 (amended)
- National Housing Code of Canada 1998 and Illustrated Guide
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- User's Guide NBC 1995: Application of Part 9 to Existing Buildings
- User's Guide – National Plumbing Code of Canada 1995.

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Field quality control: CCMC has a role to play

In today's construction industry, staying competitive in the marketplace is a daily challenge that depends heavily on the selection of innovative construction materials, products, systems and services. Through its evaluation process and product listings, IRC's Canadian Construction Materials Centre (CCMC) helps manufacturers to introduce new products and others in the construction industry to make cost-effective product choices and produce reliable buildings.

On the basis of expert opinion and the latest research, CCMC reviews a product's performance and quality control program to make sure that the product stands up to the manufacturer's claims, is suited to the indicated purpose, and complies with the requirements of the National Building Code (NBC). CCMC follows a strict evaluation process that requires manufacturers to provide proof of their quality control procedures for raw materials, processes and finished products.

The quality control program for finished products or components manufactured in-plant, has to first consider what happens within the limits of the plant. A manufacturer can demonstrate compliance with CCMC's requirements by providing a quality control manual or certification from an accredited quality assurance agency. However, the product's field performance can only be assessed once the product is installed.

Products can be: (1) site-installed as part of a generic system, (2) site-assembled as a proprietary system or (3) site-manufactured. So, CCMC not only requires that a manufacturing quality control program is in place for the finished products or components, but also that there is an acceptable field delivery system, which is verified by building officials.

Site-installed products

Products like structural engineered wood joists are site-installed as part of a generic system. Because the joist is only one of the components that affect proper floor performance, the CCMC review of the field application of the joist includes both a check on components and on the entire floor construction as outlined by the joist manufacturer. The CCMC evaluation report also refers to proprietary details, if any, needed to ensure satisfactory performance, such as a nailing schedule or special bracing.

Site-assembled products

For proprietary systems assembled in the field, such as exterior insulation and finish systems (EIFS) and air barrier systems (ABS), manufacturers are required to specify quality control procedures as part of the field delivery system. For this type of product, they occasionally name a certified installer, but in most cases they simply provide a detailed installation manual, which CCMC references in its report, outlining all system components and accessories, and the construction sequencing to be followed by the installer. There is a final inspection by a building official.

Site-manufactured products

An example of a site-manufactured product is spray polyurethane foam (SPUF), which is used primarily as thermal insulation for buildings. For this application, the manufacturers of the chemical components specify a field delivery system for the end product, and only sell the components to licensed contractors. The contractors, in turn, hire licensed installers. Because the product's performance is dependent on how it is produced when installed in the field, a high degree of control is needed to ensure proper installation. Thus, CCMC reviews and reports on the manufacturer's field quality control program, which is administered by a third party. In this case, the Canadian Urethane Foam Contractors Association (CUFCA) oversees the program.

This type of field delivery system allows the manufacturer to control where and how the components are used. A final check by a building official at the time of application ensures that the installer is certified—thereby conforming to the manufacturer's specified procedure stipulated in the CCMC report—and that the NBC requirements are met.

For more information on the CCMC evaluation process and product reviews, visit the CCMC Web site at http://www.nrc.ca/ccmc.

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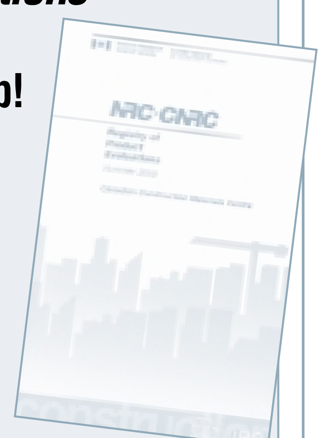

http://www.nrc.ca/ccmc

IRC looking for partners to test new fire risk assessment tool

IRC's innovative fire risk management tool can be used to evaluate the suitability of different fire protection systems for commercial buildings such as this one.

Researchers in IRC's Fire Risk Management Program are in the final stages of developing an innovative risk assessment tool to evaluate fire protection systems in light industrial and commercial buildings. They are currently looking for building and fire system designers, and university and fire safety researchers to participate in beta testing of the product.

Working with the Department of National Defence, IRC researchers have developed a computer model called FIERAsystem (**FI**re **E**valuation and **R**isk **A**ssessment **system**) to assist building and fire system designers in planning fire protection systems, and engineers and building officials in evaluating them.

Under development for the past five years, the model allows users to establish objectives for a fire protection system, select possible fire scenarios, and evaluate the impact of each scenario on occupant safety, property protection and business interruption.

To demonstrate the model's effectiveness, IRC researchers recently used FIERAsystem in a detailed case study involving a three-storey, 400-square-metre concrete building in which an extremely fast fire develops in a restaurant kitchen.

In addition, for selected fire scenarios, the model can provide information on the spread of smoke and fire, the activation of fire detection and suppression systems, the behaviour of building occupants, and the performance of building construction components. Users can then compare these results with established fire protection system objectives to determine whether the

Table 1. Outline of three design options

Option	Sprinkler	Detection	Alarm	Condition of doors	FRR
1	No	Throughout	Central	100% open	60 min
2	No	Throughout	Central	50% open (closing device)	60 min
3	Yes	Throughout	Central	100% open	60 min

Table 2. FIERAsystem results for three design options—elapsed times

	Option 1	Option 2	Option 3
Detection time	22 s	22 s	22 s
Time to flashover in kitchen	4 min 30 s	4 min 30 s	No flashover
Time required to evacuate	4 min 32 s	4 min 32 s	5 min 1 s
Time for fire department response*	8 min 15 s	8 min 15 s	8 min 2 s
Time for fire department intervention	13 min 15 s	13 min 15 s	13 min 2 s
Time to reach untenable conditions in staircase	6 min 50 s	8 min 45 s	9 min 0 s
Time for fire spread to adjacent compartments	No spread	No spread	No spread

* Times for fire department response are based on statistical information and empirical calculations of travel times (based on distances to the fire station).

Table 3. FIERAsystem results for three design options—meeting performance objectives

	Option 1	Option 2	Option 3
Meets Objective 1: No flashover	No	No	Yes
Meets Objective 2: No occupants in critical condition	Yes	Yes	Yes
Meets Objective 3: No spreading to adjacent areas before fire department intervenes	Yes	Yes	Yes
Meets Objective 4: No interruption of adjacent businesses before fire department intervenes	Yes	Yes	Yes

system complies with required standards.

To demonstrate the model's effectiveness, IRC researchers recently used FIERAsystem in a detailed case study involving a three-storey, 400-square-metre concrete building in which an extremely fast fire develops in a restaurant kitchen. As part of the scenario, the first level has a kitchen, a seating area and bookstore; the second level has a dentist office and a medical laboratory; and the third level has an open-space office. In addition, there are 72, 20 and 20 occupants on the first, second and third floors respectively.

With the scenario in place, IRC researchers chose four objectives to determine the performance of the fire protection system. These included:

1. No flashover in the room where the fire originated before occupants were evacuated;
2. No occupants subjected to critical conditions;
3. No fire spreading to adjacent areas before the fire department intervenes; and
4. No interruption of adjacent businesses before the fire department intervenes.

IRC researchers expect to have FIERAsystem ready for Beta testing by Fall 2002 and ready for use by Spring 2004.

The researchers then devised three design options for the system and ran them through FIERAsystem to see which option would best achieve their objectives. Table 1 summarizes these options, while Tables 2 and 3 summarize the findings. In the end, the third design option was the only one that satisfied all the performance objectives and that would therefore be an acceptable choice for the given scenario.

IRC researchers expect to have FIERAsystem ready for Beta testing by Fall 2002 and ready for use by Spring 2004. Further planned development will make it useful in the design of other types of building, such as industrial plants, arenas and shopping malls.

Specific questions can be directed to Dr. Noureddine Bénichou at (613) 993-7229, fax (613) 954-0483, or e-mail noureddine.benichou@nrc.ca.

Newsbrief

IRC fire researcher on team of experts studying World Trade Center collapse

The Sept. 11 terrorist attacks on the World Trade Center and the Pentagon caused significant damage and destruction to buildings and infrastructure in the vicinity of both complexes. In the aftermath of these attacks, civil engineers have assumed a prominent role and are leading the effort to evaluate not only the performance of the affected buildings but also the vulnerability of buildings and infrastructure in general to future attacks.

The American Society of Civil Engineers (ASCE), together with the Federal Emergency Management Agency (FEMA), has established a team of experts, the Building Performance Assessment Team (BPAT), to investigate the factors that led to the collapse of and damage to the World Trade Center towers and other buildings around them (see box below). The team will also identify and make recommendations on further research that needs to be done as a consequence of the terrorist attacks.

The BPAT team is made up of experts in tall buildings, steel structures, connections, fire engineering, blast effects, and structural investigations. Dr. Venkatesh Kodur, a research officer at NRC's Institute for Research in Construction and a leading world expert on the fire resistance of building materials, is the only expert from outside the United States invited to join the team.

At the beginning of October, the team visited the collapsed and damaged buildings at Ground Zero and over a period of six days collected a significant amount of data on building performance under extreme conditions. It is now in the process of analyzing this data to determine which parts of the buildings and, specifically, which columns were destroyed on initial impact, and how the fire grew and contributed to the collapse of the towers and the surrounding buildings.

Findings from the study will be published in Spring 2002 in a joint ASCE/FEMA report. Further details can be found on the ASCE's Web site at www.asce.org/emerg_document_pub.cfm.

Damage to the WTC and surrounding buildings

Significant damage occurred in the seven buildings of the WTC complex and to a number of high-rise buildings around the WTC (within a radius of about one kilometre):

- 4 buildings (Towers 1 and 2, Buildings 3 and 7 of the WTC) completely collapsed
- 4 buildings around the towers partially collapsed (beyond repair)
- 9 buildings incurred major structural damage
- 18 other buildings experienced minor damage
- 400 high-rise buildings required full structural assessment

The BPAT team represents a coalition of leading engineering organizations brought together and led by ASCE and FEMA, including the American Institute of Steel Construction Inc. (AISC), the American Concrete Institute (ACI), the Council on Tall Buildings and Urban Habitat (CTBUH), the International Code Council (ICC), the National Fire Protection Association (NFPA), the Society of Fire Protection Engineers (SFPE), the Structural Engineers Association of New York (SEAoNY), the Masonry Society (TMS), the National Council of Structural Engineers Associations (NCSEA), the Structural Engineering Institute (SEI) of the ASCE, and the New York Department of Design and Construction (DDC).

Project to establish realistic expectations about benefits of daylighting in office buildings

Using daylight to help fulfill lighting needs in office buildings is one of the best ways to save energy in these buildings. However at the present time, these savings cannot be reliably predicted.

Field studies have revealed that anticipated energy savings from daylighting tend to be overly optimistic. The main reason for these unrealistic expectations is that available methods for evaluating the use of daylight fail on two counts:

1. in acknowledging that daylighting systems often don't work because they have not been properly installed, and
2. in understanding the ways in which occupants actually use blinds and other anti-glare devices.

As part of its ongoing investigations into the real-life performance of automated lighting systems (see *Construction Innovation*, Spring 2000), IRC is collaborating with Natural Resources Canada in a new three-year project that will concentrate on how office occupants actually use both manually- and automatically-controlled blinds and lighting systems.

This deeper understanding of user/building-control interaction will help

- to establish a realistic baseline of daylight availability in buildings, taking occupant behavior into account, and
- to explore the benefit of typical energy-saving design measures, such as automated shading and lighting controls, in relation to this baseline.

The findings of this project will be validated and refined as part of an international collaborative effort launched by an International Energy Agency task group (Task 31), "Daylighting Buildings in the 21st Century."

To establish realistic expectations about the possible benefits of daylighting in office buildings, it is necessary to understand how occupants use blinds and other anti-glare devices.

Specific questions can be directed to Dr. Christoph Reinhart at (613) 993-9703, fax (613) 954-3733, or e-mail christoph.reinhart@nrc.ca.

Newsbrief

New software for designing buildings to minimize aircraft noise now available

IBANA-Calc

New software that provides designers with a tool for determining the best way of insulating a building against the noise from aircraft is now available. It does this by comparing various design options—either graphically or by listening to simulated indoor aircraft noises.

The software, IBANA-Calc, was derived from IRC's Insulating Buildings Against Aircraft Noise (IBANA) project, which included laboratory measurements of the sound insulation of various building envelope components as well as extensive field measurements in buildings exposed to actual aircraft noise (see *Construction Innovation*, Winter 2001 for full story).

The software, along with its database, is being sold as a CD accompanied by a printed manual. For more information or to receive a demo version of the software, contact Dr. John Bradley at (613) 993-9747, fax (613) 954-1495 or e-mail john.bradley@nrc.ca.

IRC continues its Canada-wide seminars

Since 1965 IRC has given seminars in cities across Canada, covering topics related to all aspects of building and infrastructure performance. Starting this fall, IRC will present a new seminar in the Building Science Insight series in 13 Canadian cities.

This year's seminar, "Sound Isolation and Fire Containment—Details That Work," will focus on the fire resistance and noise reduction provided by separations (walls and floors) between dwellings in multi-family buildings. Such separations are generally built of lightweight systems: traditional wood-framed assemblies, steel or engineered wood framing, all of which are addressed by Part 9 of the National Building Code of Canada.

The seminar will discuss the effect of specific combinations of materials and their installation on the fire resistance and sound transmission of both wall and floor assemblies. This information will be related to typical design criteria, such as those found in building codes.

The seminar will also cover:

- the junctions between assemblies—particularly those at the intersection of walls and floors—because effective overall control of noise or fire spread may be compromised by poorly conceived or executed details. Generic solutions using typical wood-frame assemblies to control both sound and fire will be featured.
- various design approaches for improving walls and floors. Both new construction and retrofit will be included in the discussion.

The first seminar will be presented in Ottawa in late September. Specific dates and locations will be announced in the next issue of *Construction Innovation*.

For more information about the series, visit our Web site at http://www.nrc.ca/irc/bsi/2002/index.html.

Research quantifies benefits of rooftop gardens

Rooftop gardens can provide benefits to urban areas by reducing the energy required to heat or cool buildings—thereby reducing greenhouse gas emissions—through shading, evapotranspiration of plants and improved insulation values. Other benefits include increased durability of roof membranes, additional green space and higher property values. These gardens can also play a role in storm water management by delaying input and reducing the amount of runoff into the sewage system, which in turn reduces the possibility of sewage overflow.

IRC, in a consortium with Environment Canada, the Climate Change Action Fund and members of the Canadian roofing industry, is conducting a study of rooftop gardens to identify sensitivities to climate variability and to quantify their benefits and impacts in different parts of Canada (see box below and previous article in *Construction Innovation*, Winter 2000).

Field research roofing facility

IRC researchers have constructed a field roofing facility on the NRC campus. The 70m^2 roof is divided into two equal areas separated by a median parapet. On one side there is a rooftop garden (the green roof) and on the other side, a conventional modified bituminous roofing assembly (the reference roof). While the green roof and the reference roof have the same basic components, the green roof incorporates extra elements, including root repellant in the membrane, a drainage layer, a filter membrane and a growing medium to support the vegetation—in this case, 150 mm of lightweight soil in which a wildflower meadow grows (see photo).

NRC's Field Roofing Facility shortly after construction. The median divider, where the weather station is located, separates the green roof (lower) from the reference roof (upper).

Both roofs are instrumented to measure the following:

- temperature profile
- heat flow
- solar reflectance
- soil moisture
- rooftop microclimate
- storm water runoff.

Local meteorological data are also monitored continuously by two weather stations—one located on the divider between the two roofs, the other near the site.

Project findings

Results from the first year of the study showed that the rooftop garden reduces the heat flow across the roofing system and lowers the energy required for space conditioning during the warmer months. In the spring and summer of 2001, the green roof reduced the overall heat entering the building (during the day) by more than 85% and that leaving the building (at night) by about 70%.

In addition to reducing heat flow, the green roof significantly moderated the daily temperature fluctuations experienced by the roofing membrane, especially in spring and summer. Median daily temperature fluctuations in the green roof membrane were reduced from 46°C (as measured on the reference roof membrane) to 6°C thereby reducing the thermal stress in the membrane and possibly extending its life (see box).

The project continues—more data will be collected to further evaluate the thermal performance of rooftop gardens and to quantify their storm water management potential.

Specific questions about the rooftop garden project can be directed to Dr. Karen Liu at (613) 993-4584, fax (613) 954-5984, or e-mail karen.liu@nrc.ca.

Rooftop Garden Consortium members

Bakor • Canadian Roofing Contractors Association (CRCA) • Climate Change Action Fund (CCAF) • EMCO • Environment Canada • Garland • Hydrotech • IKO • Oak Ridge National Laboratory (ORNL) • Public Works and Government Services Canada (PWGSC) • Roofing Consultants Institute (RCI) • Soprema • Tremco

Daily temperature fluctuations

During one hot summer day (with a peak outdoor temperature of 35°C), the grey membrane on the reference roof absorbed the incident solar radiation and reached 70°C. The membrane on the green roof, however, remained between 25 and 30°C because of the shade and insulation provided by the growing medium.

With an exposed membrane the solar radiation is absorbed during the day while the surface temperature rises and then re-radiates at night while the surface temperature drops. These fluctuations create thermal stresses in the membrane and could affect its long-term performance.

Newsbrief

IRC hosts Green Roof Infrastructure Workshop

The Green Roof Infrastructure Workshop held at IRC this past June attracted more than 60 professionals involved in the construction industry. The workshop, sponsored by NRC, Environment Canada, Canada Mortgage and Housing Corporation (CMHC) and Green Roofs for Healthy Cities, with some financial support from Hydrotech Membrane Corp. and Soprema Inc., provided an introduction to green roofs and their benefits, as well as a discussion of their design and implementation, and the selection and maintenance of plants. Public policy and various research directions were also discussed.

As part of the program, the participants toured IRC's rooftop garden Field Roofing Facility, constructed as part of the Rooftop Garden Consortium project, and met with manufacturers of green roof products.

To obtain the workshop proceedings, please contact Dr. Karen Liu at (613) 993-4584, fax (613) 954-5984, or e-mail karen.liu@nrc.ca.

IRC researchers tackle premature shrinkage cracking in concrete parking garages

IRC, in collaboration with Public Works and Government Services, is embarking on a consortium project to evaluate commercially available shrinkage-reducing admixtures used in the rehabilitation of concrete parking garage decks. Researchers will corroborate field performance with laboratory evaluation and mathematical modelling over a period of three years.

Deterioration of these parking garage decks occurs when harmful liquids percolate through cracks and joints in the slab, causing corrosion of the reinforcement and subsequent deterioration of the concrete. The concrete's durability and the structure's overall performance can also be affected by the shrinkage and cracking caused by the changes in volume that take place during the hardening process.

In recent years, this problem has become more acute because of the increased use of high-performance concrete. While this type of concrete has many advantages over normal strength concrete—including increased durability and lower porosity—it is more prone to shrinkage cracking.

One way to reduce shrinkage and related cracking is to use chemical shrinkage-reducing admixtures (SRAs) in the concrete. By using these admixtures, the number of joints can be minimized at the design stage, resulting in improved durability right from the start.

IRC invites interested industry and public-sector partners to join the project, which will provide opportunities for both product manufacturers and parking garage owners. Manufacturers will be able to obtain performance records under real-life conditions, and owners will be able to use leading-edge technologies for the prevention of premature cracking in their garages.

Typical deterioration found in parking garages

If you are interested in joining this research consortium, contact Dr. Daniel Cusson at (613) 998-7361, fax (613) 952-8102 or e-mail daniel.cusson@nrc.ca.

New Revisions and Errata to the National Plumbing Code now available

Second Revisions and Errata to the National Plumbing Code of Canada (NPC) 1995 are now available to all users of the NPC. The Revisions and Errata document identifies Code revisions approved by the Canadian Commission on Building and Fire Codes, and provides corrections and information updates to facilitate the use of the NPC. Revisions are identified by an ***r2*** in the margin; errata are identified by an ***e2***.

Second Revisions and Errata packages are being mailed to NPC binder and soft cover users who purchased their codes directly from NRC or who returned the reply cards at the front of their books to NRC. CD-ROM users have been sent a notification of the availability of the updates in electronic format. PDF versions of the Second Revisions and Errata can also be downloaded from IRC's Web site at http://codes.nrc.ca/codes/home_E.shtml. CD-ROM users can go to the same site and click on **CD-ROM** and then **CD-ROM Errata and Revisions**.

If you own the NPC and do not receive your copy of the Second Revisions and Errata, please contact IRC's Publication Sales Department:

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ISIS Canada seeks to expand use of composite materials in structures

The high cost of maintaining and replacing new infrastructure today means that governments and industry are looking for systems that are stronger, longer lasting and cheaper to build, maintain and repair. ISIS Canada (Intelligent Sensing for Innovative Structures), created in 1995, is helping civil engineers find better ways to do this through its fundamental and applied research into the innovative use of high-strength, non-corroding fibre-reinforced polymers (FRPs) and fibre optic sensors (FOSs).

Recently, in an effort to expand the use of these composite materials in the construction and repair of structures, ISIS Canada took a major step and published design manuals for engineers, covering the following topics:

- installation, use and repair of FOSs
- guidelines for structural health monitoring
- reinforcing concrete structures with FRPs
- strengthening reinforced concrete structures with externally bonded FRPs.

ISIS Canada is a Networks of Centres of Excellence program that links Canadian universities with public- and private-sector organizations. For more information about ISIS Canada and the design manuals, visit the Web site www.isiscanada.com.

CCHT houses "cogen-ready"

Continued from cover page

the electricity and heat required by a typical Canadian household.

Some systems are intended for houses connected to the power grid, so that for periods of peak power consumption additional electricity can be obtained from the utility, while others are intended for houses not connected to the power grid and thus require battery backup to handle peak demands. Waste heat produced when generating electricity can be recovered to meet the space and water heating needs of the household.

Changes made to CCHT houses

Wiring changes have recently been made to the CCHT test and reference houses so that cogeneration systems, such as fuel cells, can be installed, evaluated and compared.

These changes allow all normal house circuits to be fed by a cogen system. The control room and devices simulating internal heat gains from human activity, however, remain on-grid because they are not standard features of a house. New meters 1,667 times more accurate than the previous ones are able to characterize the electrical consumption of the houses for each five minutes of a 24-hour period.

Both houses are equipped with state-of-the-art power quality meters, which monitor and analyze the power quality delivered by the cogen system in one house and compare it to that delivered by the utility in the other house. It is important to know whether the power quality (which refers to characteristics such as fluctuation and reliability) generated by the cogen system is as good as that from the utility, as poor quality power can negatively affect such things as computers and health monitoring equipment.

The way in which electricity is currently being delivered and distributed in each house permits the use of off-grid systems and, with some modifications, it will be possible to connect systems that are designed to operate on-grid.

In order to make use of recovered heat, each cogen system will have to be customized to meet the space and water heating needs of the house. With only minor changes required, water heaters and air handlers in the test house could be adapted for heat-recovery purposes.

Testing and commissioning of the CCHT houses in cogen-mode are expected to be completed by the spring, which means that the evaluation of commercial systems could start as early as July.

Specific questions about the CCHT cogen-ready houses can be directed to Mr. Luc Saint-Martin at (613) 991-0960, fax (613) 991-0976, or e-mail luc.saint-martin@nrc.ca.

NOTICE

For information on IRC's High Performance Insulation Special Interest Group, go to www.nrc.ca/irc/bes/hiptis/ircinit.html.

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Upcoming events

APRIL

28-30
No-Dig 2002. Montreal.
http://www.nastt.org/nodig.html

29-30
2nd International Workshop on Developments in Repair Materials, Techniques and Maintenance Strategies for Infrastructure and Buildings. Toronto.
http://www.nrc.ca/irc/whatsnew/april2002.pdf

MAY

19-23
National Fire Protection Association World Safety Conference and Exposition. Minneapolis. www.nfpa.org

22-25
ARCC/EAAE 2002 International Conference on Architectural Research.
http://www.polaris.net/~arcc/web/call2002.htm

31-June 3
FCM Annual Conference and Municipal Expo. Hamilton. www.conventionconnections.com

JUNE

2-5
15th Engineering Mechanics Conference of the American Society of Civil Engineers. New York.
http://www.civil.columbia.edu/em2002/

5-8
30th CSCE Annual Conference. Montreal.
http://www.csce2002.ca/

16-20
American Water Works Association Annual Conference & Exposition 2002. New Orleans.
http://www.awwa.org/ace2002/

24-26
6th International Conference on the Bearing Capacity of Roads, Railways and Airfields. Lisbon. http://alfa.ist.utl.pt/%7Ecgeo/bcra/

30-July 5
The 9th International Conference on Indoor Air Quality and Climate, IndoorAir 2002, Monterey, CA. www.indoorair2002.org

JULY

31-August 2
6th International Conference on Short and Medium Span Bridges. Vancouver.
www.bridgeconference.com

AUGUST

4-7
Pipelines 2002. Cleveland.
http://www.asce.org/conferences/pipelines2002/

5-7
American Society of Civil Engineers 7th International Conference on Applications of Advanced Technology in Transportation. Cambridge, MA.
www.asce.org/conferences/aatt2002

SEPTEMBER

23-25
ISARC 2002 International Symposium on Automation and Robotics in Construction. Washington, DC.
http://www.bfrl.nist.gov/isarc2002

25-27
12th International Roofing and Waterproofing Conference. Orlando, FL. Tel: (847) 299-9070 or (800) 323-9545 (within the United States and Canada); e-mail nrca@nrca.net

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