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## **International Co-operation in the Technical Assessment Field**

CIB 2004 Conference

T5S1 Performance Concepts and Requirements

Luc Cécire, Gilles Poirier, Bruno Di Lenardo, Alphonse Caouette, Eleni Deroukakis

### **ABSTRACT**

Proponents of new and innovative construction products do not want to limit their products to one geographical area. They are looking at expanding their sales to other countries and even build new manufacturing plants abroad to supply manufactured construction goods. With today's communication facilities and the Internet, the world is becoming a global village. Therefore, construction products that may improve quality of life are being sought for import and export from all corners of the globe.

However, these manufacturers face many challenges in exporting their products including high cost in repeating tests and analysis for technical assessment. Presently, there are no means of recognition for the technical assessment from one country to another.

This paper highlights the different Canadian organizations that support manufacturers wanting to export their product and possibly obtain a technical assessment where required. Assistance provided by Canadian organizations is discussed and the Canadian Construction Materials Centre (CCMC) work on the international scene is presented with examples of how CCMC has interfaced on behalf of Canadian clients. This paper discusses CCMC experience with Russia, Japan, China, and the United Kingdom, with particular emphasis on the type of different agreements achieved and methods of approval accepted by these countries. It examines more closely construction products with a technical assessment in Canada and the need for a new assessment in another country. The paper looks at the performance requirements and technical assessment differences from one country to another, international standard testing procedures as a means of acceptance for product assessment and the testing laboratories accreditation and test results validation. This will represent a beginning to facilitate the understanding of differences between technical assessment in countries and establishing similar performance requirements while applying international testing procedures.

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There is a need for an international organization to become recognized as the world network for co-coordinating and facilitating innovation assessment in the construction field. WFTAO is one organization that can take the lead to facilitate understanding and develop mutually beneficial co-

## **INTRODUCTION**

To develop a new or an innovative construction product requires effort, time and financial support. The development phase of a new product requires a lot of investment, and proponents do want a maximum return on their investment. Therefore, if possible, a proponent wants to sell their new product as soon as possible, starting in their geographical area and eventually extending to other areas and to certain extent, when it means good business, even build new manufacturing plants on other areas and countries. It may be more cost effective to build a manufacturing plant rather than transporting construction products from one area to another. Marketing a new product is a difficult task and requires sound technical data and valid test results to convince authorities, users and designers of the usefulness of a proposed or replacement for an existing construction product. The construction community is a very conservative world. The evaluation process provides reliable third party technical assessment and access to markets.

Countries are very conservative and most will require testing to be done in their country with a recognize laboratory. The focus of this document is to examine the international co-operation in the technical assessment field, which should help proponents exporting new or innovative construction products. A technical assessment will determine criteria, requirements for a product and the testing procedure to be performed. The technical assessment report provides sound technical data and test results to be recognized by users of the product in the country where the data is produced.

Once a sound technical assessment by a reputable organization has been completed for a product, other countries should recognize the new or innovative product, with verification of the technical data and with extra requirements that may be required due to special environmental conditions and social expectations. But in reality, the proponent of a new or innovative construction product encounters many difficulties when wanting to export their product. Most problems, however, are not technical in nature but policies in place, which slows down the assessment process, creates large amount of paper work and increases costs.

This paper is more directed to Canadian proponents ready to export construction products, but certainly can be useful to any proponent from other countries exporting construction products. Some examples are provided to demonstrate the possibilities in co-operation among technical assessment organizations and the support to exportation. There are numerous organizations, either public or private, that can provide support to a proponent wanting to export its construction product. Canadian organizations involved in helping exporters are presented. Other countries probably do have similar organizations to assist manufacturers to export their product. The main focus is to discuss the co-operation between different technical assessment organizations to bring down trade barriers and to reduce or eliminate unnecessary costs in re-testing for proponents.

Today's facility to find a new or innovative construction products or proponents is relatively easy with Internet. This indicates that the world has become a global village and everybody can find new and innovative construction products that will suit their needs. Therefore new construction products that can increase the standard of living of people should be readily available anywhere in the world. But is it the case?

With this in mind, we want to help proponents who are looking at expanding their sales to other countries and even build new manufacturing plants abroad to supply new or innovative manufactured construction goods.

### **CANADIAN ORGANIZATIONS PROVIDING EXPORT SUPPORT**

There are several organizations (federal, provincial, associations, private) that provide assistance to construction manufacturers wanting to export their products or services. To list all of them and provide details on each organization would be a tremendous task and a deviation of our main focus, which is the co-operation of technical assessment organizations in the world.

One of the key objectives of the Department of Foreign Affairs and International Trade (DFAIT) is to promote prosperity and employment by advancing Canada's international trade and economic interest abroad by maintaining market access for Canadian goods and services. DFAIT provides substantial help to proponents with information on foreign market prospects, advice on doing business in the foreign country, indication of major barriers, regulations and certifications. Through Canadian embassies and commercial attachés, proponents may find notification of upcoming events, interested partners, potential buyers and contacts willing to invest and market the product in their own country. DFAIT will also provide visit information if the proponent wishes to visit the country, organize face-to-face briefings and provide local company information.

Export Development Canada (EDC) is another organization that provides Canadian proponents with financing, insurance and bonding services as well as foreign market expertise. EDC can help protect businesses against non-payment on export contracts.

Canada Mortgage and Housing Corporation (CMHC) is the Government of Canada national housing agency helping Canadians gain access to a wide choice of quality, affordable homes. CMHC shares its housing expertise with the world. CMHC wants to help other countries make housing more accessible and help Canadian companies find opportunities in new markets. CMHC will organize matchmaking for Canadian proponents with key decision makers in foreign housing construction and share exhibit space in Canadian booths at International Trade Shows.

The National Research Council through its Canadian Construction Materials Centre at the Institute for Research in Construction (IRC) can provide the proponent with a technical evaluation of national scope for new or innovative construction product that will assist the proponent achieve international recognition more quickly. The international credibility that CCMC enjoys benefits proponents wanting to export construction-related products. CCMC is a member of the World Federation of Technical Assessment Organizations (WFTAO) and supports the federations' mission, which is to enhance and promote the role of technical assessment of innovative and non-standardized systems and products in the construction field.

A national organization with great international credibility acting as a third party that provides technical assessment for construction products can benefit the exporter. This national organization when being part of the WFTAO can provide that extra help that a construction product manufacturer may need when a technical assessment report is required for a construction product.

### **WORLD FEDERATION OF TECHNICAL ASSESSMENT ORGANIZATIONS**

WFTAO states that in order for the technical assessment of a construction product to show "fitness to purpose" it needs to take into account all essential requirements which apply to the works in which the product is intended to be used and takes into account regulations and user needs.

Among others, these essential requirements to the works (as a whole and in their separate parts) may be:

- mechanical resistance and stability against normal and extraordinary actions (e.g., seismic actions)
- safety in case of fire
- non threat to hygiene, health and environment
- safety in use
- protection against noise
- energy economy and thermal comfort
- protection against moisture (watertightness, airtightness, weathertightness, etc.)

Additional requirements may be necessary to facilitate the proper erection of construction. All requirements, subject to normal maintenance, must be satisfied for an economically reasonable working life (durability).

A bilateral Model Liaison Agreement was developed by WFTAO, which stipulates:

- Two National Organizations will establish communication concerning the operational relationship between them.
- Two National Organizations will routinely exchange non-proprietary information, both technical and otherwise, on assessment matters of mutual interest.
- Two National Organizations will be responsive to proposal from each other, without impinging on their respective autonomy.
- Two National Organizations will take into consideration technical evidence supplied by each other in order to facilitate the acceptance of building and construction technologies, systems and products intended for export between the two countries and to minimize costs to their clients.
- Two National Organizations will work together to develop procedures that will enable the future mutual acceptance of technical assessments and test results.
- Two National Organizations recognize that the final authority for the acceptance of building and construction products rests with the importing country.

The Federation and its approach can be considered a step in providing excellent assistance to exporters of construction products. However, for now, the solution is through co-operation between different national organizations to accelerate the technical assessment process. The proponent of a product may use the technical assessment report obtained in one country and present this as evidence in support of a technical assessment in another country. The information presented by the proponent will be reviewed by the organization, and they will determine the completeness of the supporting evidence, indicate the additional information required and inform the proponent of the procedures to complete the technical assessment. In most cases, retesting will be necessary because laboratory test results may not be recognized from one country to another.

## **CCMC COOPERATION AGREEMENTS WITH OTHER COUNTRIES**

CCMC has signed agreements in response to the need of reducing technical barriers (different technical requirement for the evaluation of building products in the context of building code requirements) in key foreign markets, which restrict the acceptance of and Canadian trade in building products and services. These agreements represent a commitment to work with the foreign country towards establishing compatibility of their technical requirements, and will result in

enhanced communication and information exchange in the area of trade, to the benefit of Canadian exporters and users. This will certainly help to increase the standard of living in many countries. CCMC has signed agreements with the following organizations/countries:

- Gosstroy (Russia)
- The Centre for Better Living (Japan)
- The Building Centre of Japan
- British Board of Agrément
- Agrément South Africa
- Building Research Association of New Zealand
- Civil Engineering Research Foundation (U.S.A.)
- National Evaluation Service (U.S.A.)
- National Building Institute of Israel

## **INTERNATIONAL COOPERATION PROJECTS**

This brings us to discuss the work and co-operation achieved by CCMC on the international scene and the assistance it can provide on technical matters related to construction product or services.

### **Gosstroy (Russia)**

CCMC has completed a Canadian International Development Agency (CIDA) funded project to facilitate Russia's transition to a market-based economy and to promote Canadian housing technologies. The project resulted in the Russian adoption of new building codes for low-rise housing, which permit light frame technology. The project was managed by CMHC, with technical support from NRC. The project had many components, including

- Setting up a mortgage financing system to make houses affordable
- Training builders, to ensure quality and consistency
- Reducing trade barriers, and
- Providing technical support for the development of codes and standards.

Russia did not have a code for small buildings and limited the construction to concrete, brick, and masonry block in the past. The development of new codes would permit new technologies such as wood-frame and light-frame homes construction for single, semi-detached and row housing to be accepted. Russia would gain by increasing choices of material to build houses, by building houses more rapidly and having units better insulated.

To address their needs, the Russians have developed and adopted 3 codes for housing:

- a code on "Single Family Houses" for single, semi-detached and row housing
- a code on light-framed construction, based on Canada's National Housing Code
- a code on mechanical, electrical and engineering systems for low-rise construction

While there was many differences between Russian and Canadian approaches to housing construction, the sound technical information provided by NRC has convinced Russian construction specialists that Canadian housing construction practices are safe and of high quality. The adoption of these new codes in February 2002, represent a successful harmonization of foreign codes to Canada's. The challenge was to get all three Russian organizations (Russian Federation State Committee on Construction and Housing (Gosstroy Russia); Russian Federation State Committee on Standardization and Metrology (Gosstandart Russia); and the Russian

Federation Ministry of Internal Affairs Principal Directorate of National Firefighting Services (MIA Russia PD NFS)) to agree that wood frame houses are safe and that life threatening fire risks for the occupants was not higher than their traditional construction. To convince Russians, a delegation was invited to Canada to witness a fire test on a wall and a floor section and to attend presentations by Canadian fire specialists. Finally the Russian delegation agreed that wood frame houses were safe but still included some of their fire requirements. Canadian specialists agreed with the importance of these requirements to be added in the Russian code to address the fire protection expectations in Russia.

The first code is designed for housing, single unit, semi-detached or row housing and limited to one or two storeys. The code provides general requirements such as: design of areas and spaces; doors; windows; stairs, ramps, handrails and guards; means of egress; fire protection; heat transfer, air leakage and condensation control; interior wall and ceiling finishes; without specifying the type of structures.

The second code presents the requirements for light-frame technologies, which include wood and steel for studs and joists used in the construction.

The third code adopted, deals with mechanical components such as plumbing, ventilation and heating and air-conditioning, electrical requirements and engineered systems such as roof trusses, prefabricated walls water supply and wastewater management.

Other accomplishments during the project included:

1. A joint declaration on Certification and Technical Approval signed by Canada and Russia. The declaration paves the way for CCMC and Canadian certification and testing organizations to be recognized under the Russian product assessment system.
2. A letter of Agreement on Cooperation between CCMC and the Federal Center of Certification in Construction of Russia's Gosstroy to facilitate the technical assessment of exports from and in both countries.

The joint declaration paved the way for the Canadian Construction Materials Centre of NRC and Canadian certification and testing organizations to be recognized under the Russian acceptance system for construction products. This should help create favourable conditions for the introduction of modern technologies to the Russian housing market. The Canadian signatories to the declaration were CMHC, NRC and Underwriters' Laboratories of Canada (ULC). Russian parties involved in the signing were the Russian Federation State Committee on Construction and Housing (Gosstroy Russia); Russian Federation State Committee on Standardization and Metrology (Gosstandart Russia); and the Russian Federation Ministry of Internal Affairs Principal Directorate of National Firefighting Services (MIA Russia PD NFS).

The letter of agreement signed by CCMC and the Russian Federation's Centre of Certification in Construction is to share material from Canadian technical guides to be used as a basis for the evaluation of innovative products in Russia. This agreement has established a working relationship for product approval between Canada and Russia. It also builds on the joint declaration to increase cooperation and help eliminate technical barriers to trade related to construction products and systems.

The increasing popularity of wood-frame and light-frame homes is creating a greater demand for Canadian construction products in Russia. With the joint declaration and letter of agreement, it is

now possible for Russia to get the construction products and services they need, while Canadian manufacturers will get easier access to the Russian market.

### **Japan's Centre for Better Living**

CCMC has entered into an agreement with the Japanese Center for Better Living (CBL) that will facilitate penetration of the Japanese housing market for Canadian manufacturers of housing components.

Selling products in highly regulated foreign markets is a definite challenge. Testing and approval procedures required by foreign regulation bodies are typically performed within the given country's borders, making sale and shipment of non-approved products risky or impossible. The agreement reached between CCMC and CBL solves this problem for manufacturers in the Canadian housing industry desirous of selling to Japan.

The agreement stipulates that certain Canadian products, such as windows, can be tested in Canada to CBL requirements. Products that already meet the Canadian window standard "CSA A440-00 Windows" only need to conduct parts of the CBL required testing to meet the Japan window requirements. CCMC will compile a technical assessment of the product under review that will be accepted by CBL, eliminating the need for testing in Japan. This will save Canadian manufacturers significant amounts of time and money as will the fact that all documentation can be submitted in English.

A further benefit that Canadian manufacturers will realize from the agreement stems from the fact that they are welcome to witness the testing procedure. This means that they can better assess the performance of the product for further development - something that would not be possible if the testing was done in Japan.

On the administrative side, CBL continues to perform an assessment that covers such concerns as security of supply, the distribution network for the product in Japan and price. If this review and the CCMC technical assessment are found to be satisfactory, the product will be awarded the coveted Better Living (BL) label.

Products bearing the BL label are promoted in all Japanese public housing as well as in any other housing project with a public component to its financing. Private sector builders serving the upscale market also seek the BL label because of its assurance of quality. Canadian products can now benefit from this exclusive designation.

### **Japanese Ministry of Land, Infrastructure and Transport**

CCMC worked with the Coast Forest and Lumber Association of Canada to assist them in seeking approval from the Japanese Ministry of Land, Infrastructure and Transport for their new JPS 1 grading rule. This means that a new line of Hem-Fir lumber products is now accepted under the Japanese Building Standard Law. This was the first time the Japanese have accepted a foreign grading rule and the Canadian industry felt that this decision will enable them to gain greater access to the Japanese market and to realize increased returns. The Canadian wood industry stated that official recognition and approval by the Japanese of the grading rule would not have happened without CCMC's assistance.

### **Building Center of Japan (BCJ)**

CCMC has entered into a cooperation agreement with BCJ. A Canadian wood-I joist manufacturer has requested CCMC's assistance in seeking a technical assessment from BCJ in

order to access the Japanese market.

CCMC informed the wood-I joist manufacturer on the technical assessment procedures. CCMC liaised with BCJ to discuss and coordinate detailed technical issues raised either by the manufacturer or by BCJ. CCMC negotiated the following items with BCJ:

- BCJ conducted a review of draft application package so that final copy can incorporate their comments prior to translation;
- If additional testing is identified by BCJ, CCMC can request the permission to conduct the testing in Canada;
- Obtain English copies of detailed procedures for preparing technical assessment case;
- Close communication between CCMC and BCJ with a view to eliminate the need of a presence at the technical assessment committee and subcommittee meetings; and
- Any other information required to successfully completing the technical assessment case.

The manufacturer then needed to prepare a submission package that met BCJ requirements for technical assessment. The scope of work to address the differences in the assessment criteria included:

- Review and restructure existing test data and analysis;
- Write a report to comply with the requirements of BCJ;
- May require additional testing; and
- Restructure and translate literature to comply with BCJ requirements for the installation manual, quality control manual and other documents required by BCJ.

CCMC was to review and then forward the submission package to BCJ requesting a technical appraisal. Unfortunately the housing market in Japan stalled and the manufacturer was unable to justify the cost to proceed. The manufacturer stated that they were pleased by the level of cooperation by BCJ and CCMC, and now knew what was expected of them.

## **China**

China is experiencing a dramatic growth in its construction industry.

A great deal of new activities has been taking place in China's wood-frame housing market. Due in large part to developments in the Chinese building code, more builders and developers are looking to wood frame construction as an attractive alternative to western style concrete villas, which have been the standard in high-end detached housing.

A China-Canada building code sub-committee has been formed under a memorandum of understanding between CMHC and China's Ministry of Construction. CCMC co-chaired this sub-committee and participated in the revision of China's construction code, which will include wood-frame technology in a similar way to the Canadian code. The new code will help proponents in exporting their construction products and services to China.

China is in the process of adopting two codes that apply to wood-frame construction, the Timber Structure Inspection Code (GBJ 206) and the Timber Structure Design Code (GBJ 5). The Inspection Code, the first of the two codes to be passed, has already had a substantial impact on the wood frame housing market in China. Prior to the adoption of the Inspection Code, there were no inspection standards for wood-frame structures, meaning that wood-frame buildings could not legally be approved and certified without official certification, developers and builders have been unable to sell the houses they build. Instead, they have only been able to lease the homes. The

Inspection Code, adopted in early August, is primarily directed toward concrete construction, but in a landmark move, a chapter addressing 2x4 wood-frame construction was included in the latest version. While the Inspection Code does not outline specific design parameters for wood-frame structures, it details inspection methods and certification rules. It also includes a section covering grading rules for dimension lumber and panelized products. Not only does adoption of the Inspection code allow builders to legally sell wood-frame homes, it also allows builders and developers to point to a national standard when marketing wood-frame projects. The Timber Structure Design Code, expected to be adopted by the end of 2002, details specific design values for building 2x4 structures. The Design Code will be more comprehensive and technically detailed than the Inspection Code, and the two will eventually be used in tandem. The draft Design Code includes fire resistance requirements for wood frame construction. Assuming that this version of the code is approved without major changes, there will be no major barriers for wood-frame construction from a design or construction perspective. The adoption of the Inspection Code and the development of the draft Design Code have had immediate impacts on China's construction market.

### **United Kingdom**

CCMC has a Liaison Agreement and close working relationship with the British Board of Agrément (BBA) that is intended to facilitate the acceptance of products in each other's markets. This relationship has led to a comparison study with BBA to undertake a comparison study to determine the feasibility of accepting Canadian windows that already have demonstrated conformity to the Canadian standard CSA A440. CCMC's interest in the project is to ensure that the study clearly identify differences in performance for windows and what process is needed for a manufacturer to move to full BBA certification without going through the full assessment program normally required.

### **OBJECTIVES OF COOPERATION**

As you can see, countries have different technical assessment methods and the process varies tremendously. Some countries will have prescriptive requirements, while some others will be based on performance requirements, and some countries will be a mixture of prescriptive and performance. Construction authorities with the assistance of professionals and product manufacturers developed these requirements to meet general public expectations. Variation in these requirements is based on traditional construction practices, availability of products, people perceptions, knowledge and affordability. Therefore, proponents with a technical assessment for a product must redo the work when requesting a technical assessment from another country. New international standards (ISO) are being developed with the cooperation of several countries. Testing procedures from other countries are reviewed and compared, while more laboratories are seeking accreditation in several countries in an effort to reduce trade barriers. All these measures are to the benefit of importers and exporters of products. To further reduce trade barriers more technical discussions and negotiations between different organizations will be required.

For the time being, a third party technical assessment of national scope helps a proponent get their products to international markets more quickly. The cooperation in the field is just beginning and already provides substantial help to exporters of new and innovative construction products. To facilitate the exportation of construction goods, the objectives and services of different assessment organization should be similar. An objective each organization should have is to facilitate favorable conditions for quicker introduction into the construction practice of new, advanced and efficient product types, to eliminate technical barriers in the field of construction and duplication in product fitness evaluation, and to provide building authorities and practitioners with trustworthy information on new construction product types. A second objective is the desire

to facilitate the transfer of national products into the global marketplace by collaborating in the technical assessment of innovative and non-standardized building products and systems.

With such objectives, cooperation to establish communication between organizations with the aim of operational relationship in the field of technical assessment of fitness of new construction product for construction is possible. Each organization should routinely exchange information, both technical and otherwise, on product technical assessment matters of mutual interest. If technical assessment organizations take into proper account technical evidence supplied by each other in order to eliminate technical obstacles in the field of technical assessment and thereby facilitate the acceptance of construction technologies, systems and products intended for export, proponent efforts in obtaining a technical assessment in another country will be greatly reduced.

## **CONCLUSION**

The technical assessment of new or innovative construction products facilitates the introduction and acceptance of these new products by regulators designers and specifiers. An organization such as the WFTAO, that promotes cooperation between different countries by reducing trade barriers benefits exporters and proponents of new construction products. Also, new technologies introduced into a country usually benefit the public in general by having a wider choice of materials, new constructions methods or healthier building and environment. The cooperation must continue between countries so as to find ways to further reduce barriers and at the same time respect the cultural and environmental specification of each country.

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