Innovative Technology Transfer of Nondestructive Evaluation Research

Brian Brashaw, Robert J. Ross, and Xiping Wang

Abstract

Technology transfer is often an afterthought for many nondestructive evaluation (NDE) researchers. Effective technology transfer should be considered during the planning and execution of research projects. This paper outlines strategies for using technology transfer in NDE research and presents a wide variety of technology transfer methods used by a cooperative research team from the University of Minnesota Duluth, the USDA Forest Products Laboratory, and other public and private cooperators.

Background

Since 1995, the USDA Forest Products Laboratory (FPL) has worked cooperatively with the American Society of Civil Engineers (ASCE) and other cooperators (University of Minnesota Duluth, Washington State University, Forest Products Society) to develop and teach a short course on inspection of structures. ASCE has taken the lead by providing overall coordination of these efforts and scheduling and marketing support. The Forest Products Society has provided technical literature, including the recently published *Wood and Ember Condition Assessment Manual.* The resulting course has been presented over 100 times throughout the United States with over 1,000 attendees.

Brashaw:
Program Director, Natural Resources Research Institute, University of Minnesota Duluth, Duluth, Minnesota, USA
Ross:
Project Leader, USDA Forest Products Laboratory, Madison, Wisconsin, USA
Wang:
Senior Research Associate, Natural Resources Research Institute and USDA Forest Products Laboratory, Madison, Wisconsin, USA

As part of our ongoing efforts to further transfer information related to inspection of structures, we are frequently called upon to answer technical questions posed by a wide variety of users. Local municipalities, state and federal agencies, and individuals call on a regular basis asking for help in assessing the in-service condition of wood in their structure.

Traditional means of technology transfer include short courses offered by a variety of organizations, such as the course, Condition Assessment of Existing Structures offered through ASCE, written publications and journal articles, manuals, hands-on demonstrations, or some combination of the above.

Research partners from the University of Minnesota Duluth, Natural Resources Research Institute, and the FPL conducted a technology transfer demonstration project so that the people responsible for maintaining the structural integrity of wood structures would be able to use web-based information systems to share results from on-going research, knowledge from past inspections and research efforts, and other pertinent information. This project included several phases, including the development of a web portal for the inspection of historic wood structures.

Development of a Secure Web-Based Platform

The Northern Tier High Technology (NTHT) Corridor, located at Bemidji State University provided a secure web-based platform for use in this project. They cooperated with the project team to develop a custom suite for this community. Specifically, a home page was developed that includes tools such as instant messaging, team meetings, discussion forums, team calendar, task manager, e-newsletter, and a virtual library which allows for uploading documents, images, graphics, spreadsheets, and videos. Interfaces were developed for conducting webinars and short courses. Training was provided to the pro-

ject team so that they could modify the site and complete the activities planned for this project. This web community is known as the Inspection of Historic Wood Structures, located at http://qp.ntht.org/historicwoodstructures. This web portal is an open community of practice, although site viewers are encouraged to request formal membership. NTHT opened the site to search engines, and it appears in the first three hits on a Google search for "historic wood structures." A screenshot of the web home page is shown in Figure 1. It contains specific tabs or folders for discussion forums, equipment marketplace (includes demonstration videos and links to vendors), library (scientific and technical reports and presentations), webinars, continuing education, e-newsletters, and a calendar.

Figure 1.—*Inspection of Historic Wood Structures Web Community home page located at http://qp.ntht.org/historicwoodstructures.*

Activate and Operate the Community of Practice for the Historic Inspection of Wood Structures

The community of practice for the general public was activated following its development. A press release was prepared by the Forest Products Society and submitted to over 50 trade associations for release to their membership. Further, e-mail distribution lists were compiled and used from the project leaders, the ASCE, and the USDA Forest Products Laboratory.

Our project staff has actively monitored the community and has worked with our cooperators to continue to update the site with new technical reports, articles, webinars, and continuing education opportunities. This site is a depository for all information, reports, and archived webinars. We have been disappointed in the use of the site as a discussion forum for professionals and the lack of external information that has been provided. It has become a very good site for professionals looking for technical information and serves more as a traditional web site than as an interactive community of practice.

Historic Structures Inspections

Our project team conducted inspections of several historic structures during the project period. The inspections included:

- Superior National Forest - Bearskin Lake cabin, Gunflint Trail, Minnesota
- Ottawa National Forest - inspection of camp/lodges located at Camp Nesbitt, Kenton, Michigan
- 1894 Hoist House and the Blacksmith Shop of the Keweenaw National Historic Park, Quincy Mine Unit, Hancock, Michigan
- Cheboygan River Front Range Light Station, Cheboygan, Michigan
- WAPAMA National Historic Landmark, San Francisco National Maritime Park
- Woodframe construction homes affected by flooding from Hurricane Katrina, New Orleans, Louisiana

These inspections were completed by members of our project team and our cooperators and served as the basis for the development of technical inspection reports and our webinar series.

Development of Web Seminars and Short Courses

Our project team used the results of previously completed inspections of historic wood structures at Grey Towers National Historic Landmark and the new inspections outlined in the previous section to develop web seminars "webinars" and short courses.

Our initial short course/webinar took place with the City of New Orleans Department of Permits and Public Safety following Hurricane Katrina. Bob Ross of the USDA Forest Products Laboratory was contacted by Mike Centineo, Director of Permits and Safety and asked to provide independent scientific information on inspection of wood structures with specific attention to long-term flooding. Since it was not possible to conduct this short course in New Orleans within 30 days of the flood, an online platform, Lotus SameTime, provided by the Northern Tier High Technology Corridor was used. This web package allowed our project team to provide valuable information to over 15 members of the Department of Permits and Safety. Project leader Brian Brashaw was ultimately able to visit New Orleans several times and interact with Mike Centineo, touring the damage areas and conducting inspections of woodframe construction.

A decision was made to use a University of Minnesota product, Breeze Presenter and Meeting for the remainder of the webinars. This was done to limit technical challenges, based on ease of access for attendees, ease in recording the meeting for archive purposes, and reduced

costs for conference call features. An electronic newsletter service, Constant Contact, was used to create attractive newsletters announcing the webinars. Attendees were asked to register for each webinar and then an information sheet was sent to them with access instructions for each webinar. A conference call partner with Breeze, Premiere Global, was used as a conference call feature. Each of the speakers entered the conference call as a moderator, which allowed us to mute all of the participants, ensuring smooth and uninterrupted presentations. Breeze also has a recording feature which allowed us to archive most of the webinars. To capture the conference call sound feed, a Rolls Phone Patch II was used. The proper Breeze settings were selected to also allow us to audiostream each webinar. The conference call feature ensured that a reliable audio feature was present, especially for participants with slow internet access.

Table 1 provides details on each webinar conducted during the project. We know that often more than one person was present at each computer.

The attendees reported that these webinars were extremely valuable to public and private individuals and organizations by providing an overview and detail of inspection procedures and equipment used for wood historic structures. These inspection webinars were developed using a PowerPoint platform which was then uploaded to Breeze. Each web seminar was approximately 75 minutes long. For example, each moderated seminar focused on wood structure inspection techniques and available equipment, a detailed presentation of the structure, the inspection findings and recommendations, and a question and answer period. **Figure 2** shows a screenshot from the Grey Towers Webinar.

Accomplishments and Conclusions

The following key accomplishments resulted from this project:

- A community of practice was developed for the Inspection of Historic Wood Structures. This web-based community provided a secure web-based platform for use in this project. This community contains specific tabs or folders for discussion forums, equipment marketplace (includes demonstration videos and links to vendors), library (scientific and technical reports and presentations), webinars, continuing education, e-newsletters, and a calendar. It is a comprehensive web location for professional inspectors, engineers, and facility owners and managers.
- Technical inspections and condition assessments of several historic wood structures were completed in this project. These included: 1) 1894 Hoist House and the Blacksmith Shop of the Keweenaw National Historic Park, Quincy Mine Unit; 2) Cheboygan River Front Range Light Station: 3) WAPAMA Schooner National Historic Landmark, San Francisco National Maritime Park 4) Bearskin Lake CCC Cabin on the U.S. Forest Service Superior National Forest; 5) Camp Nesbitt on the U.S. Forest Service Ottawa National Forest; and 6) several woodframe houses in New Orleans, Louisiana.
- Four webinars were developed and presented highlighting inspection techniques and equipment for the wood structures inspected during the project. Breeze Presenter, a presentation package licensed by Adobe to the University of Minnesota, was used as the platform for these webinars. Over 250 people participated in these webinars which were recorded for future viewing.
- Valuable technical information on wood structure condition assessment techniques and equipment was presented to City of New Orleans staff 2

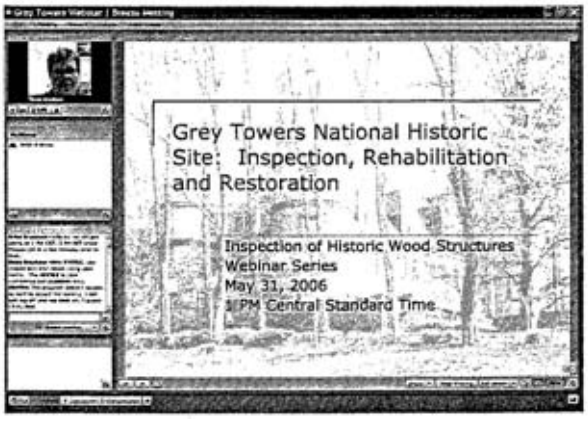

Figure 2.—*Frontpage of the Grey Towers webinar using Breeze Presenter.*

Table 1.—*Webinar details.*

Webinar	Number of registrations	Number of computers logged on	Audio-streaming
New Orleans	15	4	No
Grey Towers National Historic Site	65	52	No
Keweenaw National Historic Park, Quincy Mine Unit	70	45	Yes
WAPAMA Historic Schooner, San Francisco National Maritime Park	68	56	Yes
Cheboygan River Front Range Light Station	64	43	Yes

months after the flooding associated with Hurricane Katrina. This interactive 2-hour web-based short course linked our project team with staff from the Department of Permits and Safety and provided scientific information on the effect of long-term flooding on wood structures.

The following conclusions can be made from this project:

- The development of web communities of practice are an effective way to bring a wide variety of interested parties together to focus on a specific topic. In this case, our community of practice focused on inspections of historic wood structures and was used by professional inspectors, architects, engineers, facility owners, and maintenance staff. The primary interest in this site was as a repository for technical information, reports, presentations, webinars, continuing education opportunities, and professional contacts. It was seldom used as an interactive web community during this project. Efforts will be made to continue to develop this portal for this use in the next 6 to 12 months, depending on identification of funding.
- Webinars are very effective tools for presenting technical information and training. The webinars in this project were free, but this tool has the potential to create revenue. The webinar delivery platform used in this project, Breeze, is very user-friendly, has a short learning curve, connects presenters in various locations, and has a recording feature to archive the webinar.
- The inspection techniques and equipment available for inspection of historic wood structures have improved steadily over the past decade. It is critical that we continue to use a wide range of delivery models, including on-site seminars, technical reports, inspection manuals, webinars, and short courses to transfer this information to the target audience.

Acknowledgments

This project was funded through a grant awarded by Northern Initiatives and the USDA Forest Service Electronic Commons Project. Match funding was provided by Northern Tier High Technology Corridor at Bemidji State University, the Forest Products Society, U.P. Engineers & Architects, and the University of Minnesota Duluth.

Project Technical Reports and Webinars

These technical papers, inspection reports, and webinars may be accessed through the Inspection of Historic Wood Structures web portal at http://qp.ntht.org/historicwoodstructures or by accessing the hyperlink given with each reference.

Cover Story

Ross, R.J., B.K. Brashaw, and X. Wang. 2006. Condition assessment of in-service wood. Forest Products Journal, Forest Products Society. 2006. www.forestprod.org/june06.pdf

Condition Assessment Reports

Detailed inspection reports were prepared for the following inspections completed during the project.

- 1894 Hoist House and the Blacksmith Shop of the Keweenaw National Historic Park, Quincy Mine Unit.
- Cheboygan River Front Range Light Station
- WAPAMA Schooner National Historic Landmark, San Francisco National Maritime Park

These reports can be accessed at the following web location within the Historic Structures web community: http://qp.ntht.org/QuickPlace/historicwoodstructures/PageLibrary862571420059EA9A.nsf/h_Toc/92be13faec1b58390525670800167238/?OpenDocument

Short Course

Condition Assessment of Wood Structures. Presented to the Department of Permits and Public Safety, City of New Orleans. Nov. 2005.
http://qp.ntht.org/QuickPlace/historicwoodstructures/PageLibrary862571420059EA9A.nsf/h-Toc/92be13faec1b58390525670800167238/?0penDocument

Inspection of Historic Wood Structures Webinar Series

All of the following webinars and access information can be accessed at the following web location
http://qp.ntht.org/QuickPlace/historicwoodstructures/PageLibrary862571420059EA9A.nsf/h-Toc/92be13faec1b58390525670800167238/?0penDocument

Each specificwebinar that has a recorded archive can be directly accessed as the link provided for each webinar.

- Condition Assessment and Rehabilitation of Grey Towers National Historic Landmark
- Condition Assessment of the 1894 Hoist House and the Blacksmith Shop of the Keweenaw National Historic Park, Quincy Mine Unit.
  https://breeze5.umn.edu/p72033235/
- Condition Assessment of Cheboygan River Front Range Light Station
  https://breeze5.umn.edu/p39434094/
- Condition Assessment of the WAPAMA Schooner National Historic Landmark, San Francisco National Maritime Park
  Part 1. https://breeze5.umn.edu/p80958725/
  Part 2. https://breeze5.umn.edu/p93705733/
  Part 3. https://breeze5.umn.edu/p46209983/

ISBN-13: 978-1-892529-52-7

Publication No. 7221

Printed in the United States of America.

0810160

Proceedings of the 15th International Symposium on Nondestructive Testing of Wood

September 10–12, 2007
Duluth, Minnesota, USA

Sponsored by

Natural Resources Research Institute
University of Minnesota Duluth
Duluth, Minnesota, USA

and

USDA Forest Products Laboratory
Madison, Wisconsin, USA

Proceedings published by the
Forest Products Society, Madison, Wisconsin