



## IMPLEMENTATION SUMMARY

### Questions?

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### Technical Liaison:

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### Investigators:

Peter Johnson, Web Explorations  
Tanja Stading, South Central College  
Jean-Francois Tendron,  
Kadrant Gestion des Connaissances

### PROJECT COST:

\$192,450



Gordon Bruhn shows Concrete Pavement Rehabilitation Book users how to test pavement cores in the lab.

# Putting Research Into Practice: Learning Guides Preserve Expertise of Retiring Workers

## What Was the Need?

By 2023, 31% of MnDOT's workforce will be eligible for retirement. The departure of highly experienced engineers, administrators and other staff may carry with it a significant loss of accumulated knowledge and expertise about MnDOT's highway and bridge infrastructure, best practices, successful and unsuccessful approaches to construction and maintenance, and other topics.

As MnDOT's workforce welcomes younger engineers and program specialists, construction and maintenance groups have been looking for ways to capture the cumulative knowledge of veteran employees who will soon be handing their responsibilities over to a new generation of MnDOT employees.

In 2015, MnDOT learned about a process for retaining knowledge that was developed for France's nuclear energy sector. Known as MASK—Method for Analyzing and Structuring Knowledge—the process allows interviewers to preserve the deep technical knowledge of experienced experts.

The method was first embraced in the United States by Kraft Foods Group to retain the knowledge of its departing long-term employees. A former Kraft executive described the use of MASK in a 2016 journal article, "[Preserving Institutional Knowledge Through Knowledge Books: Models, Insights and Impacts.](#)"

## What Was Our Goal?

MnDOT hired MASK expert Jean-Francois Tendron to interview long-term experts at MnDOT and detail expert insight on concrete pavement rehabilitation, asphalt pavements and aggregates, and steel bridge construction. Minnesota-based educational media experts were also hired to convert two of the knowledge retention presentations into a mobile-friendly platform that is also compliant with the Americans with Disabilities Act (ADA) requirements and more accessible to both the public and Minnesota road agency administrators, engineers and field crews.

## What Did We Implement?

MnDOT developed the Concrete Pavement Rehabilitation Book and [Bituminous Book](#) as interactive, multimedia electronic-learning documents, and the Structural Steel Bridge Construction Book as a slide presentation.

## How Did We Do It?

From early 2017 through fall 2019, Tendron conducted interviews with one current and two retired MnDOT engineers—Gordon Bruhn, David Linell and Todd Niemann..

*MnDOT's new learning guides preserve the expertise of experienced retiring engineers. The multimedia books combine graphics, video and written material about concrete pavements, asphalt pavements and steel bridges in interactive formats posted for internal and public use on MnDOT websites.*

*“When Gordy Bruhn walks out the door, you wouldn’t really be able to put his knowledge and expertise together. This e-book allows users to almost have Gordy stand there next to them.”*

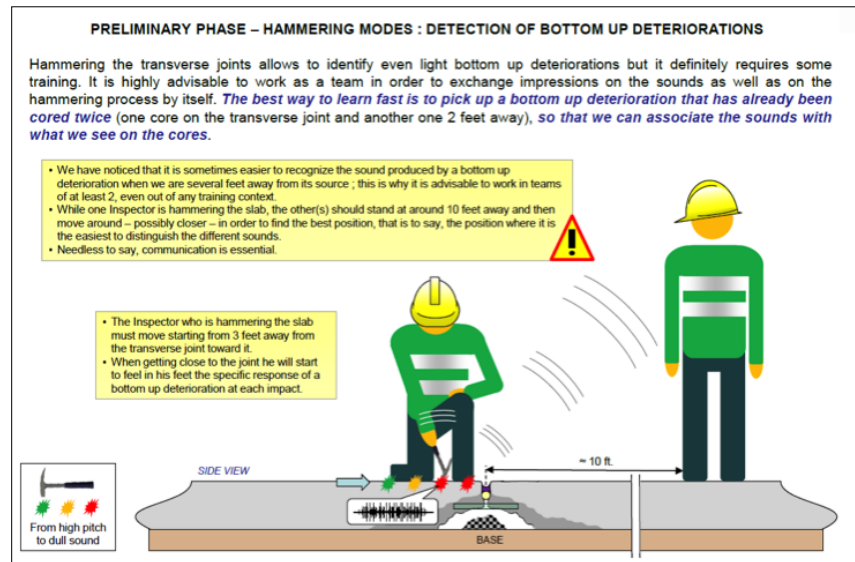
—Mike Leegard,  
Contract Administration  
Engineer, MnDOT Office  
of Construction and  
Innovative Contracting

*“Typically we need to pull a pavement core sample where the transverse and longitudinal joints meet, but traffic control may not allow it for safety reasons. This book explains why it’s important to have engineers examine the pavement site.”*

—Gordon Bruhn,  
Senior Engineering  
Specialist, MnDOT Office  
of Materials and Road  
Research

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This image and instructions from the Concrete Pavement Rehabilitation Book describe hammering to locate deterioration under slabs.

Interview results were compiled into slide presentations with video segments and relevant documents that users can view in any order. Media consultants reformatted the content from two of the slide presentations into electronic-learning books that can be accessed with desktops, tablet computers and other mobile devices.

### What Was the Impact?

The Concrete Pavement Rehabilitation Book, completed first, is currently being used by MnDOT materials engineers and will be available online as an e-book in 2021. This book allows readers to review concrete rehabilitation approaches during planning and fieldwork. It guides users through estimating work, materials and traffic control needs; selecting and coring samples from concrete pads; chain-dragging inspection at joints; and lab testing, with techniques demonstrated by Bruhn based on his 33 years (and counting) of work in the field with concrete rehabilitation.

The [Bituminous Book](#), the second project, was made available online in April 2020. In this e-book, Linell—retired after more than 40 years with MnDOT—describes various aggregates available in different areas of Minnesota and their uses in pavement applications. He also reviews various applications and approaches to paving, repairing and maintaining roadways with asphalt mixtures.

The Structural Steel Bridge Construction Book is available on request as a slide presentation. Niemann, a retired MnDOT metallurgical engineer, draws upon his 27 years of expertise at MnDOT in steel bridge fabrication, construction and maintenance to guide users through evaluating project needs, identifying materials and quantities, planning and scheduling work, and budgeting for repairs and new construction.

### What’s Next?

The three books allow users to virtually consult with Bruhn, Linell and Niemann about pavement and bridge projects. Project champions expect that the knowledge books will prove particularly valuable to newer employees after key topical experts retire. MnDOT may use the MASK method to develop e-books on other topics.

*This Implementation Summary pertains to MnDOT project 2020-11, Knowledge Retention Pilot Project, described at [researchprojects.dot.state.mn.us/projectpages/pages/projectDetails.jsf?id=17928&type=CONTRACT&jftfdi=&jffi=projectDetails%3Fid%3D17928%26type%3DCONTRACT](https://researchprojects.dot.state.mn.us/projectpages/pages/projectDetails.jsf?id=17928&type=CONTRACT&jftfdi=&jffi=projectDetails%3Fid%3D17928%26type%3DCONTRACT).*