Using the World-Wide Web to facilitate communications of Non-Destructive Evaluation

Sean McBurney

Mentor:
Lawrence Cooper III

Abstract

The high reliability required for Aeronautical components is a major reason for extensive Nondestructive Testing and Evaluation. Here at Langley Research Center (LaRC), there are highly trained and certified personal to conduct such testing to prevent hazards from occurring in the workplace and on the research projects for the National Aeronautics and Space Administration (NASA). The purpose of my studies was to develop a communication source to educate others of the services and equipment offered here. This was accomplished by creating documents that are accessible to all in the industry via the World Wide Web.

Introduction

Man has always been concerned with the quality and reliability of the things he fashions upon his immediate senses as instruments by which to test these products. Nondestructive evaluation (NDE) is a serious business. The health and lives of people are at stake. Cracks in fuselages, combustion chambers of aircraft engines, steam pipes, wind tunnel turbine blades are just some of the bigger obstacles that have surfaced as potentially dangerous problems. Our space program suffered a serious setback with the loss of the seven young men and women. Although the shuttle disaster appears to have been caused by several factors, including weather, design, and failure to follow established procedures, the investigation committee has also recommended that additional inspection methods be instituted. [1]

NDE involves use of various non-invasive measurement techniques to determine the integrity of a structure, component, or material without destroying the usefulness of the item. The field of nondestructive evaluation is more alive today than ever before. Many of the major technical societies, such as the American Society for Nondestructive Testing (ASNT) and the American Society for Testing and Materials, are deeply involved in nondestructive evaluation and are leading the drive for better understanding through universal standardization and information disbursement.

With the recent addition of a Power Macintosh 6100/60AV and a World Wide Web server connection to the Models and Materials Technology Branch, it has given us the opportunity to publish information about NDE. It provides the means to make selected information (in the form of text, graphs, tables, and images) available to interested parties. During last years Langley Aerospace Research Summers Scholarship program (LARSS), I became familiar with the fundamentals of NDE. With the adequate background, equipment and some research, I was able to create information pages regarding NDE. General information about NDE services is now accessible to the whole world via the Internet.

The Internet and the World Wide Web

The Internet is a network of networks. You can use electronic mail to contact other people on the Internet. From your computer, you can logon to another computer, called a remote computer. The remote computer may be thousands of miles away, and you can run programs on it as if it were in the same room. You can search libraries of information around the world and transfer that information back to your own computer.

The World Wide Web (WWW) is a menu system. It gathers Internet resources from all over the world into a series of menu pages, or screens that appear on your computer. The

WWW is also a distributed system. A distributed system stores data of information on many computers. WWW servers maintain points or links to data that are spread out over the entire Internet, and can go out and get that data when you ask for it.

Hypermedia is the foundation of the WWW. Media refers to the type of data you find on the Internet. One can "click " on a section and visit other hypermedia. Media can be ASCII text, a PostScript file, an audio file, a graphic image, or any other sort of data that can be stored in a computer file.

A WWW browser like Mosaic, Netscape, or MacWeb allows you to "see and hear" the information on the Internet. A WWW browser uses data about links to accomplish this. The data is stored on a WWW server. WWW browsers all function in much the same manner. A WWW browser can link you to other Internet resources, not just text documents, graphics, or sound files. As you choose an item or resource, or move from one document to another, you may be jumping between computers on the Internet without knowing it. The WWW browser handles all the connections seamlessly. [2]

For this project, I solely used Netscape 1.1 which is the main browser licensed to LaRC. Netscape 1.1 is the "King" of all Web browsers at the moment. Documents, images or any sort of data are located by links and are displayed as pages. The objective of my research was to learn how to write these "pages".

You can write HTML (HyperText Markup Language) pages using any word processor or text editor. (To publish pages on the Internet, you need to submit your pages to a server computer.) HTML uses embedded codes (tags) to designate graphical elements and links. These codes can be produced simply from your keyboard using angled brackets and the slash character. For example, the tag <I> presents text in italic letters. An HTML source file containing the expression <I>This stands out.</I> is displayed on screen in italic. Notice that the tag </I> is required to notate the end of the italic expression.

HTML consists of many such tags, including tags for big headlines, underlining, italics, bold, titles, and paragraph breaks. One feature you'll use is the HTML link. Here's an example HTML that creates a link for users to click on:

   <A HREF="http://beginning.larc.nasa.gov/tct32home/ndes/NDES.html ">Non-Destructive Evaluation Section TCT #32</A>

The part of the tag between quotation marks is the URL of the page that clicking on the link brings. The text following the URL contains the highlighted text (Non-Destructive Evaluation Section TCT #32) the user sees on screen. The tag coding and brackets are also a required part of the link. The above URL is a link to our home page.

462

To understand how a single page is kept distinct in a world of electronic pages, you ought to recognize its URL, short for Uniform Resource Locator. Every page has a unique URL just like every person has a unique palm print. A URL is text used for identifying and addressing an item in a computer network. In short, a URL provides location information and Netscape displays a URL in the location field. Most often you don't need to know a page's URL because the location information is built into a highlighted link; Netscape already has the URL available when you click on highlighted text, press an arrow button, or select a menu item. But sometimes you won't have an automatic link and instead have only the text of the URL (perhaps from a friend or a newspaper article).

Upon studying various "HTML Writing Guides" on Netscape, I was able to construct pages for our section. All it takes is a lot of time and some basic programming knowledge. The NDE Section Home Page is located at the previously mentioned URL address. The information gathered to create the page came from our section head and my previous LARSS experience. The following is a print out of the NDE Section home page on the World Wide Web. It was printed out using Netscape 1.1.

Non-Destructive Evaluation Section

Under Construction.... Images coming soon!

OPERATION OVERVIEW

The Nondestructive Evaluation Section is charged with supporting the NDE requirements for all of NASA/Langley's operations. To accomplish this task various inspection techniques are employed to test the integrity of research facilities and equipment, materials, space flight projects and ground support equipment.

LOCATION

The NDE Section is part of the Models and Materials Technology Branch of the Fabrication Division, Internal Operations Group. The Section is located in Building 1296 (8 East Reid Street). The Phone number is (804)864-4110 and the fax number (804)864-8854.

- **Management:**
    - SECTION HEAD: HUGHES, JOHN T, III
    - FACILITY COORDINATOR: BENNETT, RICHARD W

HISTORY

The NDE Section was established in the early 1960's and during this time has gathered both the equipment and experience necessary to perform inspections and consultations for a variety of applications. The Section currently consists of a staff of eleven engineering technicians with an engineering technician Head. Each technician has been trained and certified in accordance with The American Society for Non-Destructive Testing and is re-certified as necessary to maintain proper credentials.

Many inspection problems have been approached and solved by the NDE section, affording the opportunity to establish an extensive list of NDE accomplishments, capabilities and services. This list is not complete, but provides an overview of the services and capabilities the Section has provided in the past.

SERVICES AND CAPABILITIES

UNDER CONSTRUCTION
- Ultrasonic Inspection - UT
- Magnetic Particle Inspection - MT
- Dye Penetrant Inspection - PT
- Eddy Current Inspection - ET
- Radiographic Inspection - RT
- Visual Inspection - VT
- Hardness Testing
- Special NDE Inspection Techniques
- Other NDE Services
- Other Section Services

NDES Technician Team Page

LANTERN   LaRC Home Page   NASA Home Page

Last Updated Mon August 7, 1995
Sean M. McBurney (smm4984@ritvax.isc.rit.edu)

TCT Home Page

TCT Operator #32 - E.T.Hall@LaRC - 8/95

464

The underline text are highlighted links which take you automatically to another page when selected. There are images in the different "Services and Capabilities" categories. The pictures were provided by taking captured images off of a camcorder and downloading them into files using "Video Monitor for the Macintosh" software. These files are viewed as images when a page is loaded by the Web browser.

HTML Text Sample

The following is a sample of the HTML codes used to create the top half of the Home Page. Starting with the "Title" section up to the end of the "Management" section.

NDES.html

```
<title>NASA LaRC NDES Home Page</TITLE><center>

<center><table border=6><tr align=center><td align=center><H1>Non-Destructive
Evaluation Section</H1></a></td></tr></table></center><br><h2>Under Constructic
Images coming soon!</h2></center>

<hr><H3>OPERATION OVERVIEW</H3>
<P align=left><BODY>The Nondestructive Evaluation Section is charged with
supporting the NDE requirements for all of NASA/Langley's operations. To accomp
this task various inspection techniques are employed to test the integrity of
research facilities and equipment, materials, space flight projects and ground
support equipment.</BODY><BR>

<HR><H3>LOCATION</H3>
<BODY>
The NDE Section is part of the Models and Materials Technology Branch of the
Fabrication Division, Internal Operations Group. The Section is located in Buil
1296 (8 East Reid Street). The Phone number is (804)864-4110 and the fax number
804)864-8854.</BODY><BR><HR>

<ul><li><h3>Management:</h3> <ul> <li>SECTION HEAD:   <a href="http://
pony.larc.nasa.gov/cgi-bin/whois.pl?emp=3032AE">HUGHES, JOHN T, III</a><BR><LI>
FACILITY COORDINATOR: <a href="http://pony.larc.nasa.gov/cgi-bin/whois.pl?emp=
3092AX">BENNETT, RICHARD W</a><br></ul></ul><p>
```

As you can see from the code sample, the HTML language is really just written in plain English with a few tags to identify the different characteristics and format of texts. Once HTML is understood, there are many advanced features available. From your basic background colors to large fancy borders and tables. A good beginner's guide to writing HTML documents can be reviewed in the World Wide Web by accessing the following URL: http://www.ncsa.uiuc.edu:80/demoweb/html-primer.html.

Results

Nondestructive testing is a serious business and will always have a place in the world of progress and technology. NASA has set the standards and contributed greatly to the industry. With the information now available to all at the touch of a computer, it eases technology transfer as well as gets the most bang for the buck out of the taxpayers funds.

Although the primary objective of my project was to make the NDE Section Services available on the web, I also constructed the Polymer Technology Section(PTS) Home Page. This proved a little more difficult due to my insufficient knowledge of PTS background and the short length of the intern. This page may be viewed at the following URL: http://beginning.larc.nasa.gov/tct32home/PTS/PTS.html.

References

1. John Wiley & Sons, Inc. 1987. Introduction to Nondestructive Testing; A Training Guide. Austin, TX. p 5.

2. Gretchen L. Gottlich. May 31, 1995. WWW Reference Sheet. Netscape Document; http://boardwalk.larc.nasa.gov/isd-www/cheatsheet.html.