"DropsEtc.com – the online advertising exchange for the metals industry"

By

Trina Anderson

Submitted to
the Faculty of the Information Engineering Technology Program
in Partial Fulfillment of the Requirements for
the Degree of Bachelor of Science
in Information Engineering Technology

University of Cincinnati
College of Applied Science

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Trina Anderson	Date
Thomas Wulf, Faculty Advisor	Date
James F. Sullivan, Department Head	Date

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Mr. Schmidt is the owner of Schmidt Equipment, Inc. of Geneva, Ohio and the recipient/beneficiate of this project. He answered many questions and created text for several areas of the web site. He was instrumental in creating the process that guides the sites function and led to the development of the data repository.

Chris Butler provided advice and recommendations relating to the use of Visual Studio.NET and code reusability. He was especially informative on strengths and weaknesses of both the built-in GUI tools and comparisons of .NET to other available web development options.

My husband Rob W. Anderson for his support and encouragement during the many weeks I practically lived at the lab.

Cathie Schmidt and Jeff Schmidt researched and typed text for the technical information sections of the database. Jeff also offered technical advice regarding integrating the new Website with existing objects and registration of the site name.

Karen Reitor allowed an unprecedented amount of flexibility in scheduling work hours in order to allow me to finish the project and was a constant source of support and encouragement throughout my schooling.

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Table of Contents

List of Figures

Abstract

The purpose of this project is to provide an online classifieds Website where odd sizes and quantities of metal can be purchased or sold. With the possible exception of local papers, there is no area, real or virtual, currently available to the public to buy or sell extremely small quantities of metals or odd sizes of materials. The Website provides the users a means of advertising to a global customer base, as compared to any local papers which have an extremely limited geographical area of exposure. This site provides easy-to-use screens for posting advertisements, managing multiple listings and searching for advertisements related to a specific user's needs. Based on the results of the search conducted, users can see a list of advertisers whom they wish to contact. In addition, there are many reference areas where users can look up information related to materials and the industries. A database stores user information for the contact lists and provides the data relationships that contribute to the automation of the site.

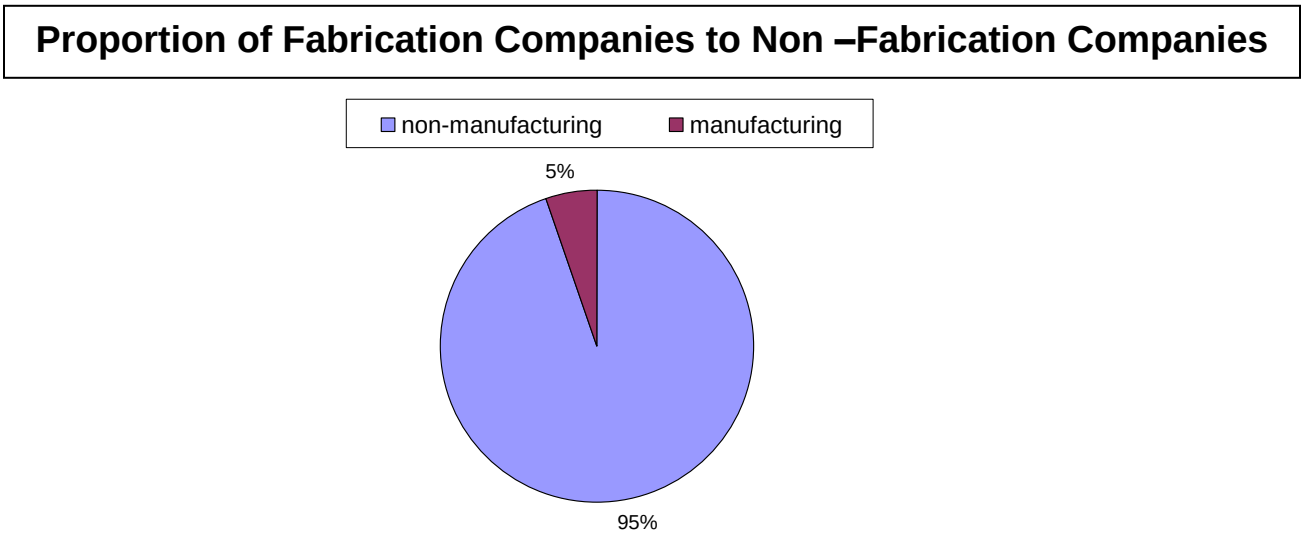
“DropsEtc.com – the online advertising exchange for the metals industry”

1. Statement of Need

In the field of metal fabrication, manufacturers often end up with remnants or scraps pieces after their patterns have been cut from the original product. These pieces have value to smaller companies who are trying to make small objects or custom orders. There does not appear to be an information exchange area where these two groups can meet or interact. To resolve this issue, I have designed an inexpensive and user friendly Web site that allows visitors to advertise what materials they have available or want to purchase. They also have the ability to search through posted advertisements to find any specific item they are searching for. This Web site promotes communication between the two groups.

According to the U.S. 1999 economic census, there are over 311,902 fabrication shops in operation today. This represents 5% of all companies in America.

Figure 1 "Chart of Percent of U.S. Manufacturing Companies"



These shops use a range of primary materials from plastics to wood to chemicals and metal. Each of these shops purchases its base resources in standard size or quantities. The primary suppliers specify the sizes and quantities they have available for purchase. It is not easy to get custom sizes from a primary vendor. Thus, the fabricating companies utilize only a portion of the base resource in their manufacturing process. The trimmings, cuttings or remnants that remain after the manufacturing process is finished are called "drops" or "overages". Each year, tons of this material is sold at a loss to scrap metal collectors. New carbon steel sells by the pound. The current cost of steel is $ 0.25/pound. Recyclers buy back scrap steel at approximately $ 0.02 per pound. Every pound of scrap metal that can be sold to another buyer represents a potential savings of $ 0.22 / lb. to the manufacturer.

Mr. Phil Schmidt of Geneva, Ohio has been in the metal manufacturing business for over 30 years. His company represents one of 57, 910 metal-fabricating firms in the United States. He indicated that the odd size pieces or scraps in his waste hoppers are often sought after by individuals or small companies (that wish to purchase on a much smaller size scale). The resulting sales are mutually beneficial to both parties. He has requests like these several times a week. He is not always able to supply what the potential customer is searching for. He would like to either locate the item for them or make recommendations for who might have it. However, he has not been able to locate any other resources he can use to guide these customers toward a requested item. Additionally, he has indicated that he has over a hundred pieces of rectangular steel tubing that is two to three feet long and 10 pieces of full size stainless steel angle that he

would like to sell to a buyer. However, no journal, business or trade classified, or Web site exists for locating or selling these items.

To determine the existence of sites like this or offering this service on the Internet, searches were conducted using known search engines. These included AltaVista, Google and Yahoo. Search topics included “metal drops”, “metal overages”, “steel scrap”, “metal sales”, “extras metal”, “metal classifieds” and “metal scrap”. The searches resulted in a limited number of responses related to this topic. None were exactly like the proposed Web site. Closest matches included a primary metals manufacturer’s own Web site where it advertised its own drops for sale and listing services/ online want ads for bulk scrap metal purchasing. The metal supplier’s site does not allow outsiders to post items, and the scrap dealer sites were neither sort able nor searchable. Additionally, eBay was searched to see if anyone was using this as a sales tool. There were several items for sale, but finding the ads was difficult. Using terminology that seemed obvious yielded no results. The only way the ads were located was by entering the word “metal” or “stainless” and scrolling through all objects that contained the key word. This gave results from earrings to I-bars and everything in between. The research seems to indicate that several needs have not been addressed, and those tools mentioned during the Web research can be significantly improved upon.

2. Description of the Solution

Dropsetc.com, a web based application, uses ASP.net and C#.net to create an online classified tool for users to locate or post ads for any excess production materials they may have need of or have available. A MS SQL 2000 database stores information about

various materials, sizes and shapes of the products for easier user navigation and data entry consistency. It is also the storage area for the user information and specifications about their various ads. The data is reached by the user through use of any web browser. The web based front end allows them to search and view available ads. To place an advertisement requires the user to login with a name and password. Use of the password protects their information and allows the owner of Dropsetc.com to compile general market information about the users, thus aiding him in future advertising campaigns. There are also several special tools available only to the owner's super-user accounts that enable those individuals to modify information in the database and maintain the product into the future.

2.1. The User Profile

There are two anticipated classes of users: General web visitors and the Owner Super User.

2.1.1. The Owner Super User

This individual is the representative of the company who is financing and requesting this site. This user has a medium level of technical knowledge of how to use computers and of how to navigate web pages. This level of knowledge will be sufficient to use the administrative tools provided to maintain and update database information (i.e. add materials, establish links for materials and dimensions, maintain users accounts, etc.). Additional directives are provided on the administrative pages to assist them in completing their tasks.

2.1.2. General Web Visitors

This user's skills will vary greatly since the web is exposed to the general public. However, the owner feels that the majority of users will have a very general or low understanding of computers and internet navigation. These users will most likely be owners of small machining shops or individuals searching for materials for a one-time project. This industry does not require familiarity with computers as a prerequisite to producing an end product. As a result, the web front end will assume limited knowledge and provide concise directions to assist in navigating the site.

2.2. Design Protocols

The primary goal of this project is to combine web page development for the user interface with a SQL database for storing data critical to the operation of the web pages to create a user friendly, searchable Website. The interaction of these two distinct entities provides seamless and very simplified functionality to the user. Where possible, data stored in the database prompts and guides the user into selecting options appropriate to their desired user goals.

2.2.1. Organizational Scheme

The site has two basic levels – areas available to the general public and areas available only to logged in users. Using the menu above, general

users can access 80% of the site. The remaining 20% of the site are reserved for pages that assist the logged in users in accomplishing various tasks. The flowchart on the following page illustrates the organization of the site and shows what areas require users to be logged in order to access. (See Figure 2 “DropsEtc.com Organizational Scheme”, page 12.)

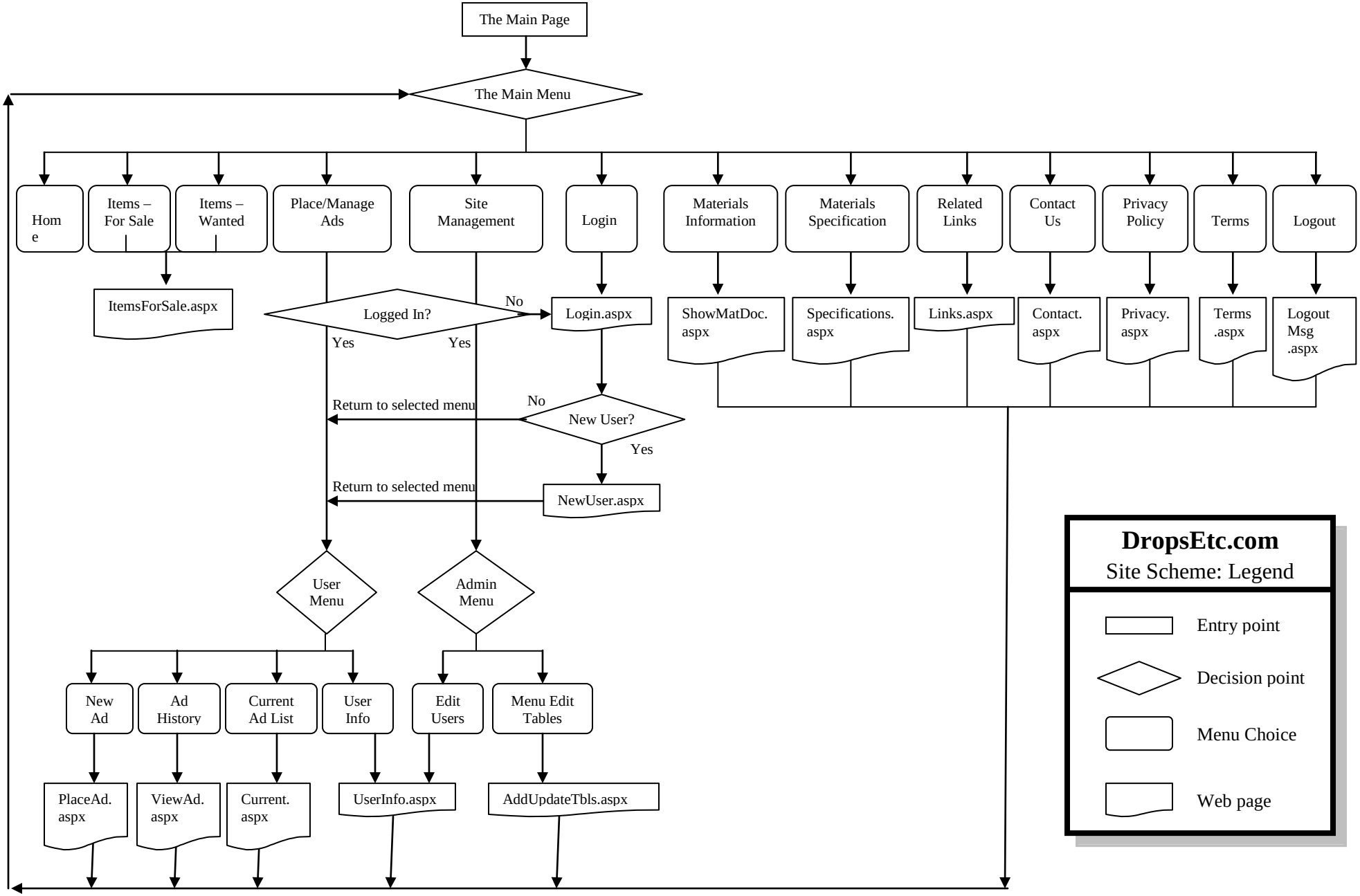
2.2.2. Interface design and navigation

The user enters the site through a centralized screen. This screen is divided into four sections that remain constant throughout their entire visit. The top most section is the Website’s title page. Just below that is a narrow section that contains a scrolling banner. To the far left is a constant menu. The largest section is where screen changes occur. This arrangement allows the user to feel more in control by limiting the amount of screen navigations and providing an always available menu for getting to other areas of the database.

To navigate in the site, a user merely selects an area from the menu and moves to it. If he or she desires to move to another area, they merely select another option from the ever present menu. This reduces the need to navigate pages via forward and back buttons, which some users find confusing.

Finally, there are occasional times when a user needs to initiate an action during their visit. On the pages where the user must

Figure 2 "DropsEtc.com Organizational Scheme"



communicate with the database or web browser, clearly marked on-screen buttons are provided. In a situation where a button needs to be clicked, guidelines or clear button titles help the user understand what will happen.

2.2.3. Icons and Graphical Symbols

In the upper left hand corner, the title of the site has been created as a .jpg image. This image remains on the screen for the duration of the visit as reinforcement of the site the user is visiting. The menu is comprised of a list of hyperlinks. Other actions required of the user can be accomplished by clicking on-screen buttons. No other special symbols are utilized.

2.2.4. Color Scheme

The use of a consistent color scheme, explicit written command options (links) and framed areas enable users of all levels to simply locate information. Neutral background and foreground color schemes prevent the page from becoming hard to read. Use of cream, white, red and blue prevent issues with color blindness from affecting user operations.

2.2.5. Help

After length discussions, it was decided not to create a separate help file but to include specific onscreen helps at the point at which an inexperienced user would be most likely to need them. For this reason,

there is no specific help button. Instead, the user will see sentences and paragraphs at critical points that explain how to accomplish the desired goals. Also, at certain key points, onscreen messages pop up to advise or warn the user of critical or informative information.

3. Deliverables

- A SQL database with: User table, User type table, User Placed Ads table, supporting tables for the ad table that normalizes its information (such as Ad type, material, coating, item type, shape, etc.)
- Any necessary SQL views, stored procedures as necessary for exchanging data between the site and the database
- Super User Administrative Management tools for performing common tasks including:
    - Table content editing for the various data tables for ongoing site maintenance
    - User data editing
    - Advertisement content editing and Activation/Inactivation
- General User Administrative Tools for performing tasks associated with tat specific user such as:
    - Account creation and ongoing maintenance
    - Placing and managing ads
- General Information pages including:

- Materials Information, Related Links, Contact Information, Terms and Conditions of Use, Privacy Statement

- A Login page for user specific sections
- A search tool for general visitors to browse ads in the database – both for sale and wanted

4. Design and Development

4.1.Budget

The following is a budget for the project. The client provided the funding to produce this application and will maintain ownership in continuum.

Figure 3 "Budget Table"

Software	Cost	Source
Microsoft Visual Studio.NET Standard	$498.00	VioSoftware.com
Internet Service Provider with SQL & .NET capabilities	$24.95/month	Host-manager.com
Enterprise Manager or Other SQL remote management tool	Free	Microsoft

4.2.Hardware

For client and customers, any machine that is capable of reaching the internet is able to use this application. As the client already owns several computers that meet this need, no special hardware was purchased. The application database and the web pages reside on an ISP host site and

do not require special hardware. However there are monthly fees associated with this. See below.

4.3.Software

The main fee associated with the project was the purchase of a licensed copy of Visual Studio .NET. (See Figure 3, page 11.) For this project, the client pays for the development software package and will pay ongoing web hosting fees directly.

4.4.Timeline

The projects timeline is as follows:

Figure 4 "Timeline Table"

Task	Timeframe
Senior Design 1	
Research Project possibilities	Autumn 2002 Weeks 1 – 3
Meet with Client, Confirm Project Description	Autumn 2002 Weeks 3 – 5
Write Project Proposal and Present Idea	Autumn 2002 Weeks 6 – 10
Senior Design 2	
Meet with Client, discuss content, page layout, colors, Data requirements, expected functionality, special needs or requests, define responsibilities of developer and client	Winter 2003 Weeks 1- 3
Develop Design Freeze and Begin designing database	Winter 2003 Weeks 3 – 5
Complete Design Freeze Draft and create Prototype in Access (tables easily converted to SQL and layout good for designing ASP next quarter	Winter 2003 Weeks 5 – 10
Complete Design Freeze and present Prototype	Winter 2003 Week 10
Senior Design 3	
Research asp.net code, find educational	Spring 2003 Weeks 1 – 5

resources, try mini pages similar to those I will be using	
Try to locate a local ISP provider who can help novice set up a Website capable of hosting an ASP.NET/SQL site with remote access. No local hosts. Look for other source.	Spring 2003 Weeks 6 - 7
After discussion with Advisor, change to developing application on school servers. Set up SQL server database. Troubleshoot problems with school setup	Spring 2003 Weeks 7 – 8
Resolve additional ongoing problems related to running application on schools server. Troubleshooting asp pages	Spring 2003 Weeks 8 – 10
Project not completed, extensions granted. Time available for working on project decreased and as a result time to complete objectives increased	
Design ASP.NET framework pages, layout modified flowchart and change anticipated design based on what was experienced and learned in trying it the way I had wanted to do it. Begin SQL / asp.net connections research	Summer 2003 Weeks 1- 3
Back to researching for more details on how to make connections exchange data and resolve error codes. Series of discussion with professors returns no assistance.	Summer 2003 Weeks 3 – 4
Problems between CAS lab and UCIT limit project design work to CAS lab – unable to work from home. This also contributed to increasing the amount of time required to complete objectives. Consult outside source for assistance. Series of meetings and practice with tutor provides understanding of how the key functionality needs to be done. Core asp.net and SQL pages defined, basic framework in place, basic text defined. Meet with corporate representative for more text for certain sections of site they were to provide and also receive approval for changes being made to planned execution. The several of the more involved asp.net pages have been completed.	Summer 2003 Weeks 4 - 10
Continue to build and check the remaining “complex” asp.net pages. Implement code	Autumn 2003 weeks 1 - 6

reusability, complete the requirements promised as deliverables from SrDes2, initial testing. Check with advisor for site approval.	
Resolve problems located by advisor, add additional functionality as promised in Senior Design 2. Resolve issue created when lab forced user password updates and all the SQL connections in the database failed. Showed results to Advisor, who found additional modifications.	Autumn 2003 weeks 7-8
Corrected the remaining minor issues located by advisor, tested the site again, contacted outside sources and had them test the site. Implemented some of the changes they requested. Worked on draft of final paper, asked two professors to review draft, made the modifications requested, copy and bind paper, get signatures, create a PowerPoint presentation and present to current Senior Design 2 students.	Autumn 2003 weeks 9 - 10

5. Proof of Design

5.1. A Microsoft SQL 2000 database

Much of the information in this field meets standardization requirements. There are consistent manners of describing the objects. For this reason, the data can be pre-constructed by the database, and specific choices selected from combo boxes. Establishing these relationships serves two goals:

1. The users are not envisioned to be strong typists. By allowing the majority of choices to be “click-based” the pages appear more user friendly and quicker to navigate

2. The developer maintains control for sorting and filtering purposes by eliminating the same typographical errors that cause problems in many text based searches.

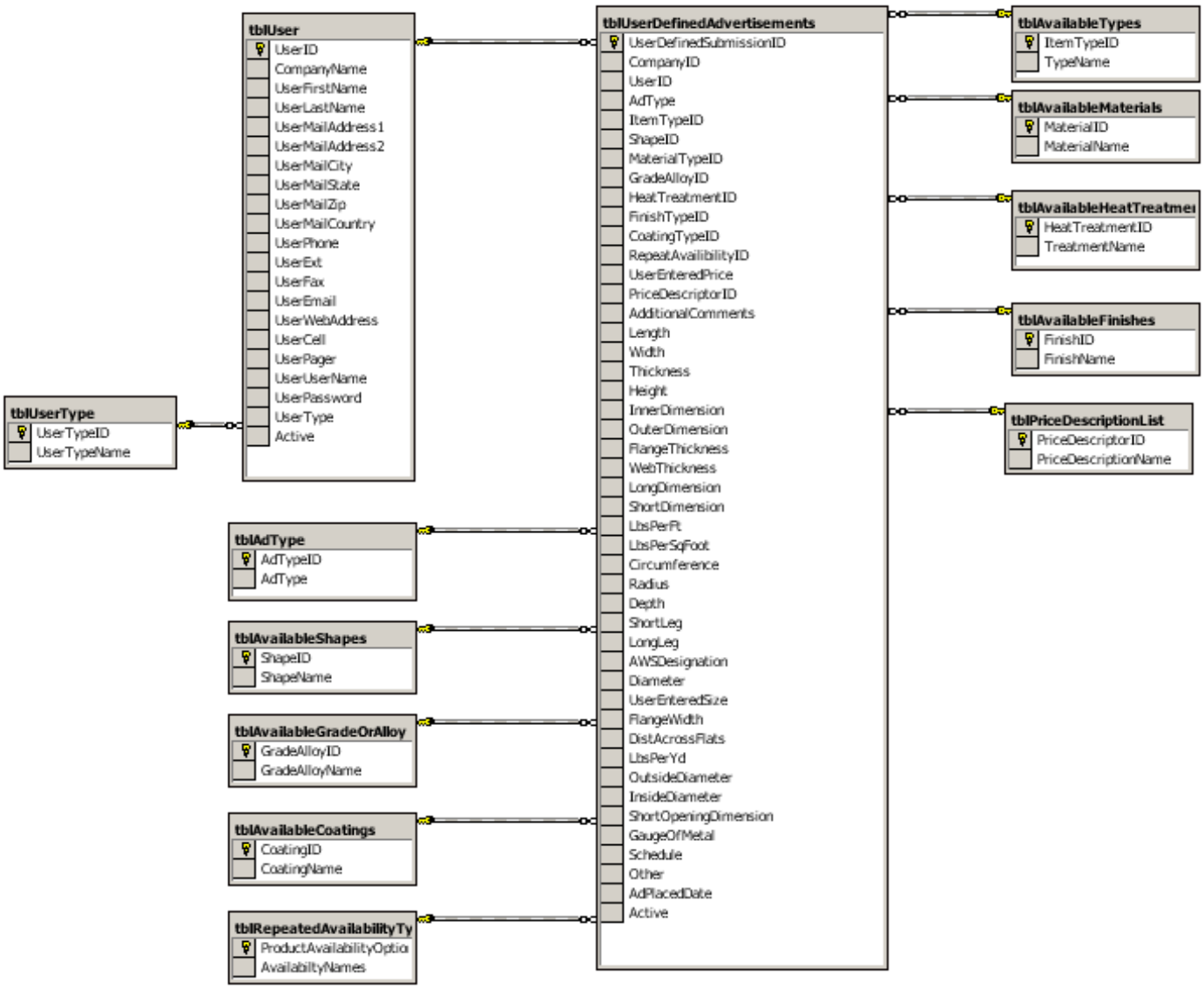
While it is true that any database program could have been used for this portion of the project, the author chose SQL 2000 since it was the most professional of the database applications she was exposed to. Using it ensured that the author gained more experience in a program that could have value to her career after graduation.

The diagram on the following page (See Figure 5 “Database Scheme”, page 16) illustrates the major tables in the database and their relationships. The main table is the tblUserDefinedAvertisements. The remaining tables indicate qualifying data that is provided in combo box fields that the user selects from in completing their current tasks. The available options in the combo boxes can be increased by adding new names or information to the appropriate table.

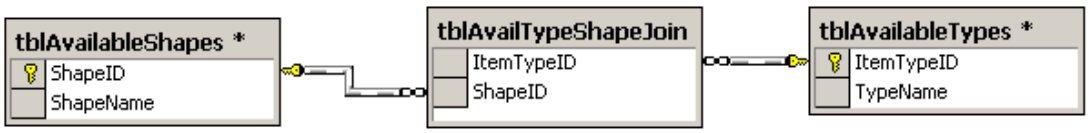
The second most important table is the tblUser. This is the main table that stores the users’ personal information and passwords. While this table is one of the most important tables in the database, the tblUserDefinedAdvertisements table ranks higher because it is accessed by all users of the site. The tblUser is only accessed by those users who need to login in order to perform some maintenance activity associated with their user account type (such as placing or maintaining their own personal ads or, in the case of the owner super user, performing administrative functions on the site).

The remaining tables in the database allow us to establish which dimensions are associated with a specific item type. This info is utilized to control which fields display for the users when they are entering dimensions for their

Figure 5 "Database Scheme"



Relationships between the items and the shapes associated with each item



selected objects when adding a new advertisement. They see only dimensions appropriate for what they are defining. For example, if the user is entering an advertisement for a sheet of metal of a certain size, he or she would select the sheet type. The computer would then display and store only dimension of height, width and length as these are the only dimensions appropriate for a flat piece of metal. The screenshot on the following page (See Figure 5 "Database Scheme, page 16) shows the tables that define this relationship for the database:

5.2. SQL 2000 tools for exchanging data with the browser

Having had only one class in SQL, the author decided to take advantage the project to try various types of SQL objects for linking data from various tables. For this reason, the project includes three views and two stored procedures that are created in SQL and whose results are passed to the browser. These objects include:

i. sp_UserAdHistory
ii. sp_UserAdCurrent
iii. AD_USER_VIEW
iv. UserAds
v. vwUserAdHistory

The following screenshots illustrate the proposed operation of the Website. Each shot represents a single screen view. Normal Navigation for 95% of the site is through a menu located at the left of the page. The exceptions to this are the user and administrative maintenance tasks. These types of tasks are assigned to their own menu pages. By adding a menu page for each of these

groups, the main menu was kept clean and orderly for unskilled users who desire only to browse the current listings.

5.3. Owner Super User Administrative Management Tools

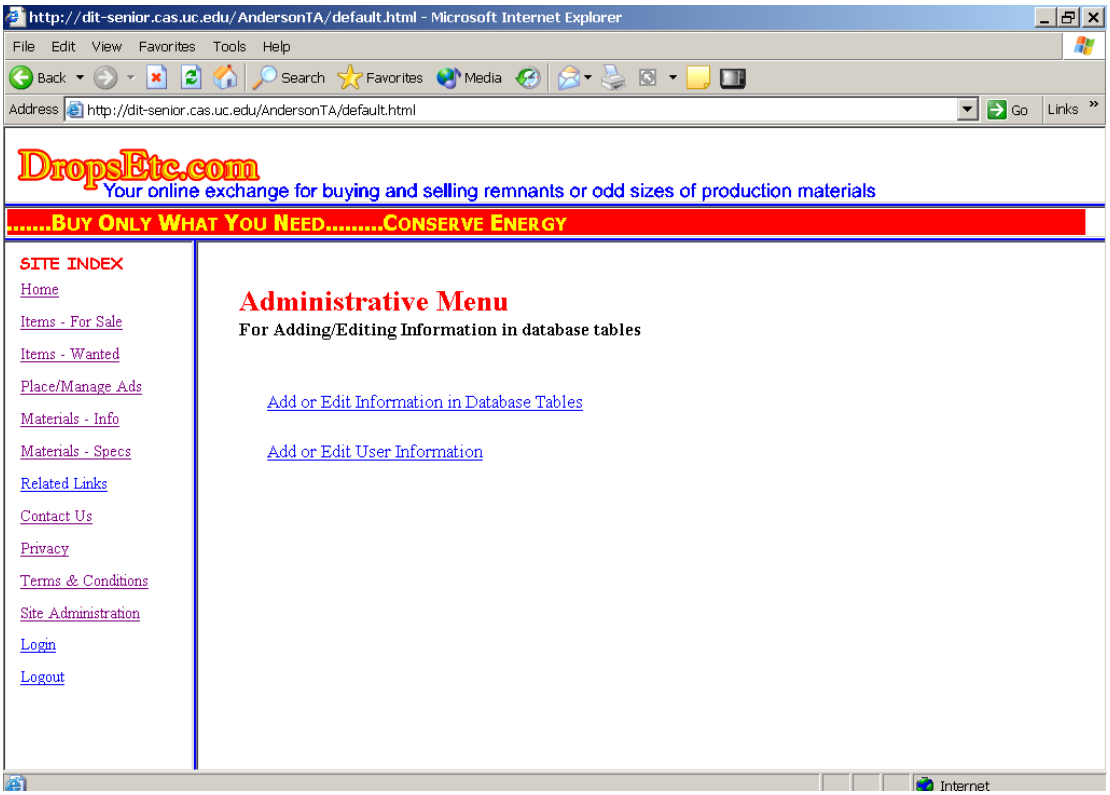
On clicking on “Site Management” and logging in, the owner super user is provided with a menu page which asks them to specify the type of administrative tasks they wish to perform. On the following page is a screenshot of the main Administrative Menu (See Figure 6 “Administrative Main Menu”, page 19).

Other promised administrative tasks include:

5.3.1. Table Editing for the SQL tables for ongoing site maintenance.

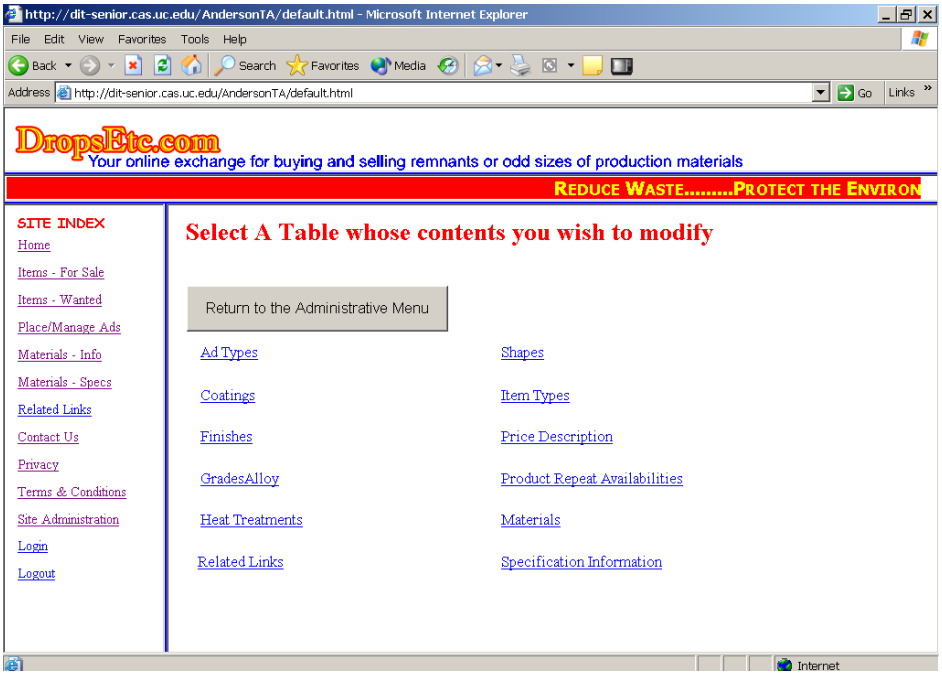
One of the main goals of this project was to provide the owner the ability to access and update information within the tables that comprised his site. This enables him to control when modifications to screen text are made and how they are worded. The challenge, from a design perspective was to design a method by which this could be accomplished without individually coding each as its own page. This challenge was met by providing the owner with an administrative menu page specifically listing all the tables available in his database. When the owner selects a table link, two pieces of information are sent through the html request using html query strings. The two pieces of information include the name of the table and the names of the columns within the table as they are spelled in the SQL database. On opening, the editing page for the table information receives and processes the request. The query string table and column names are

Figure 6 "Administrative Main Menu"



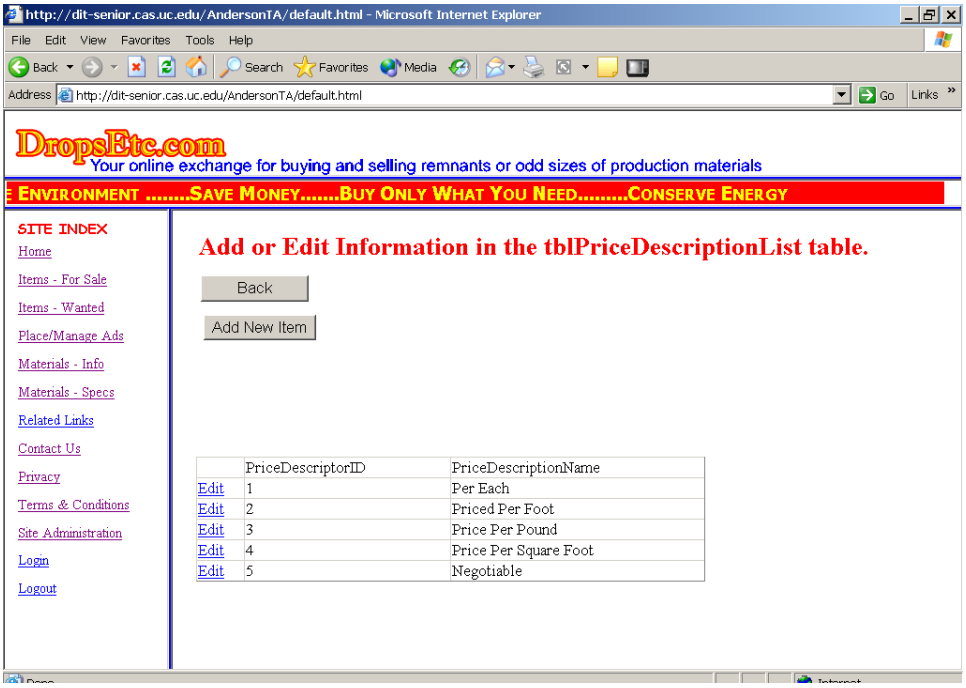
fed into a dynamic SQL select string and used to create the source of the data for the editing page. Additionally, the title label is modified to reflect the name of the SQL table the user will be making changes to. The following figure (See Figure 7 "Administrative Table Editing Menu", page 20) illustrates the Administrative menu screen for table modifications.

Figure 7 "Administrative Table Editing Menu"



Below is an example of a site page where an authorized user could edit the table's existing data.

Figure 8 "Screen for Editing Table Information"



In addition to modifying the data, the super user is also enabled to add additional items to the list. The following page (see Figure 9 “Adding a New Table Item”, page 22) shows an example of the page as it appears when a user clicks the “Add New Item” button.

5.3.2. Editing of User Information for anyone in the database

This is another example of an area where code reusability was practiced. The new user registration page contained all the same fields as would be needed by the owner super user to modify a user’s record. Instead of building a new page, the author placed objects on the new user registration page for searching for the names of all people in the database and an edit button for updating a specified record. Then code was added to the page load that checks for the type of user logged in. The user’s type determined which of the objects on the page were visible and useable by the logged in individual. This allowed dual functionality on one page. The following page contains a screenshot of the new user registration form with the administrative tools exposed (See Figure 10 “Administrative Editing of User Information”, page 22).

5.3.3. Advertisement content editing

This also reuses an existing page, with administrative objects added, to create the ability to modify the content of the ads. After discussing with the owner likely scenarios for when a user might need to change information in their ads, a decision was made that the easiest point of entry for finding the ad to be modified

Figure 9 "Adding a New Table Item"

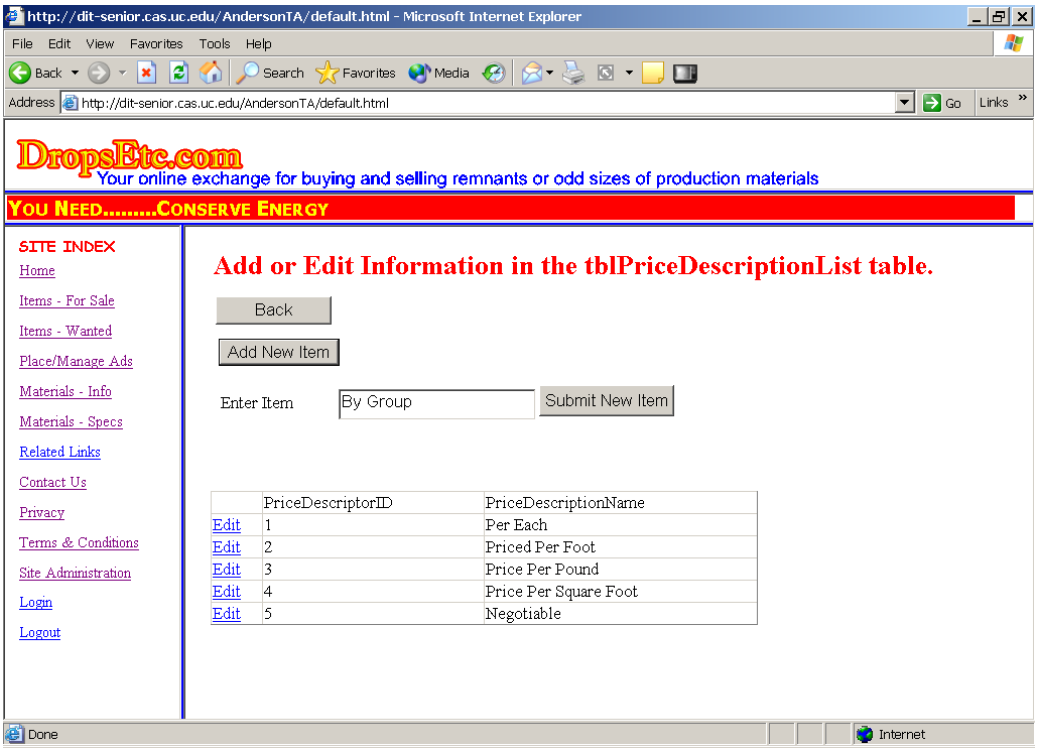
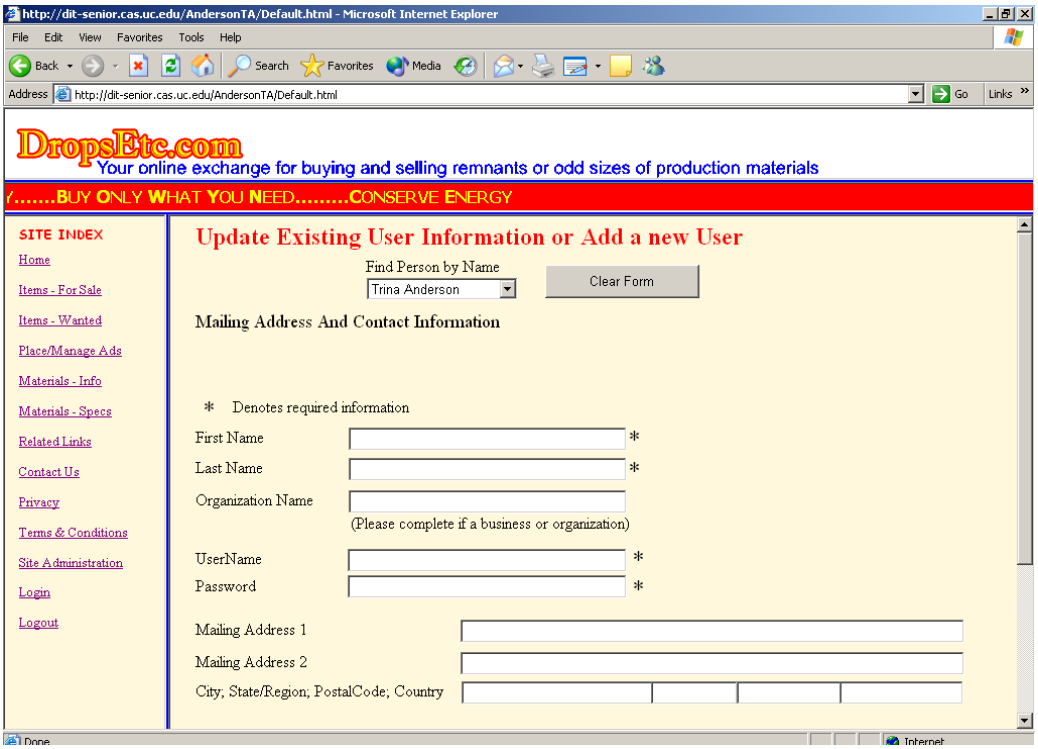


Figure 10 "Administrative Editing of User Information"



would be the search screen. The owner super user could enter the indicated specifications for the ad and quickly locate the specific ad in the returned results. What was needed was a way that the existing tools could allow the ad to be modified. This was a challenging section. The source of the information was a data view that tied together twelve related tables from the database and displayed the info in a manner that people could understand (words, not the numeric values that represent the words.) This type of object is not easily updateable from the data grid object used to display the info on screen. The resolution was to add a special link button in the first column of the data grid. When the link button was clicked, a URL redirected the user to the place ad page (code reusability) and stored a reference to the unique ad id of the data grid row that the click occurred in. When the Place Ad page opens, it receives the ad id, goes to the database and retrieves that Ad and then populates the Place Ad page with the current data for that Ad. It also checks, on opening, the user type of the logged in user and displays additional admin objects on the screen – such as an update add button. The user makes the changes and then submits the updates. At which point he/she is returned to the search page where they can either continue to search additional objects or move to another page. The figure on the next page (See Figure 11 "Specify an ad to be edited", page 24) shows the search screen with the edit ad link exposed. On the next page is the Place Ad page with its administrative tools exposed (See Figure 12 "Administrative Updating of a user's ad", page 24). The Administrator makes changes to the ad here and submits them to the database using this page.

Figure 11 “Specify an ad to be edited”

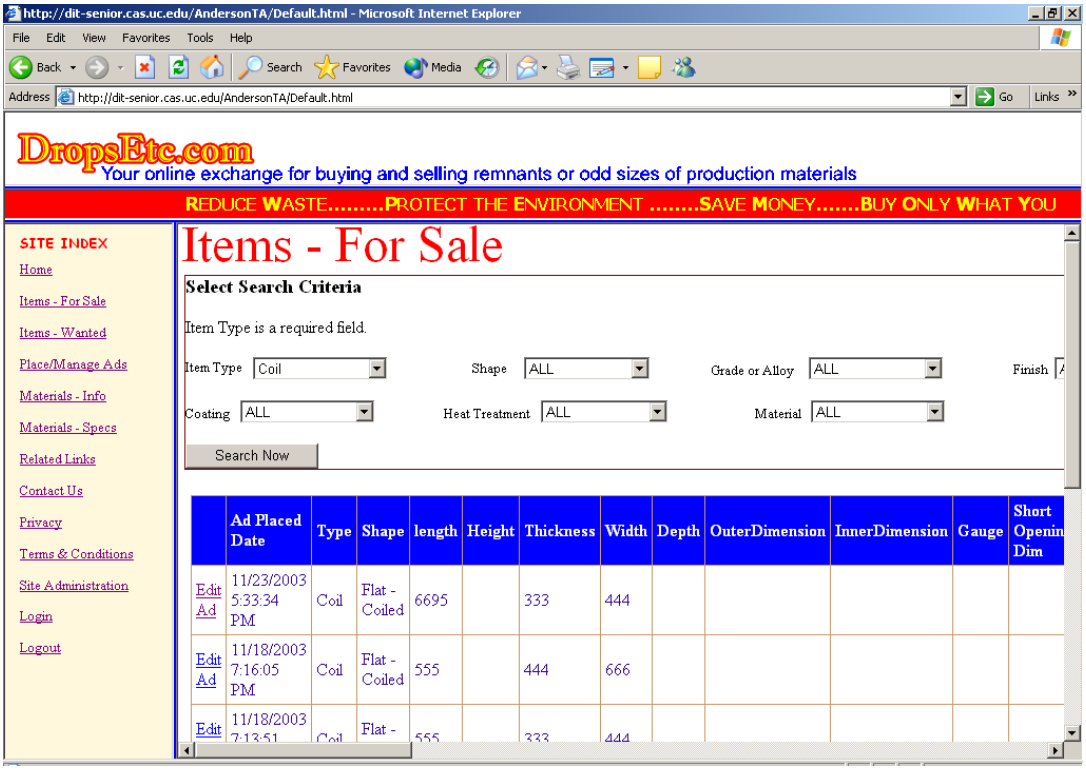
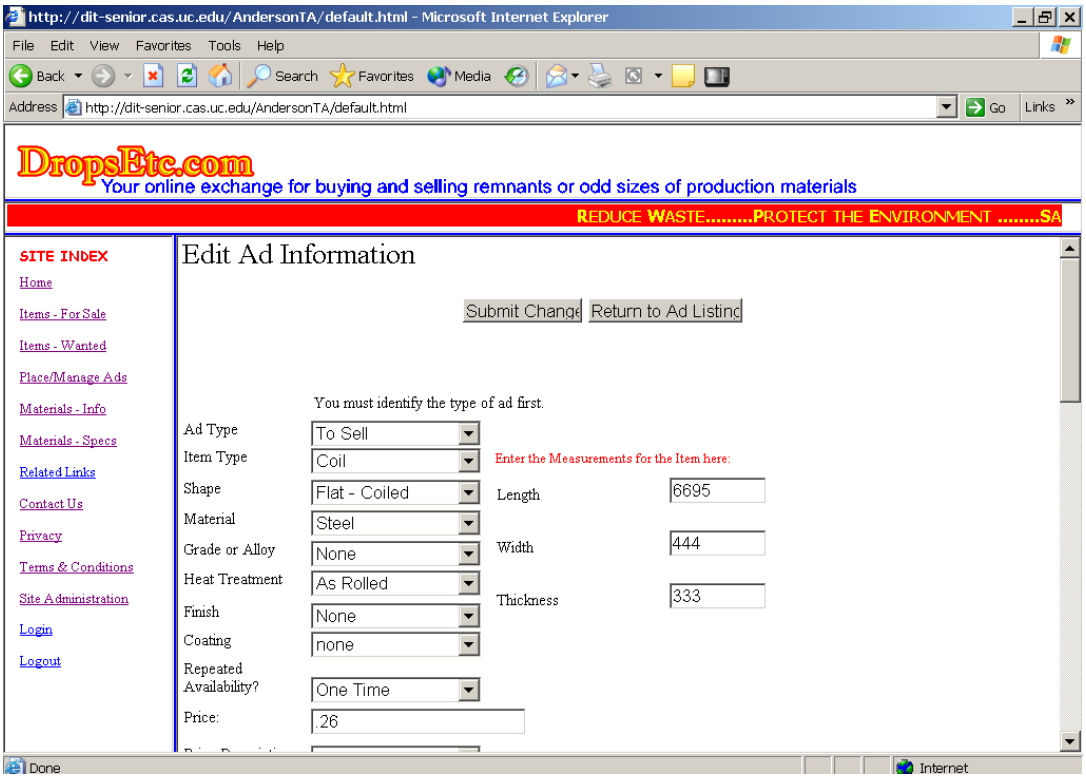


Figure 12 “Administrative Updating of a user’s ad”



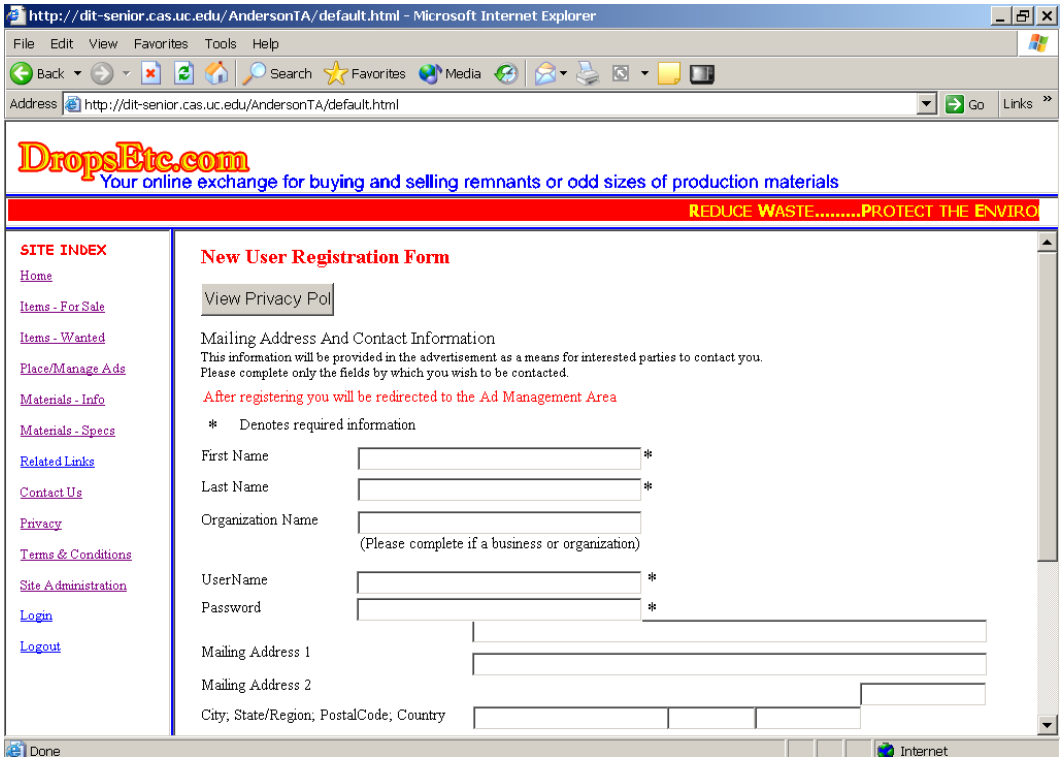
5.4. General User Maintenance Tools for common user oriented functions

An individual user needs to be able to have a way of accessing and editing information specific to their personal account or to any ads that they may have placed. The common functions associated with an individual user include Account creation, Account Updating, Viewing a history of ads placed, and viewing/canceling current ads. The following discusses the tools provided for accomplishing the specified task.

5.4.1. Account Creation and Ongoing maintenance

Account creation is the means by which a user can set up an account. It is in this area that their personal and username and password information is stored, address information is logged and any other contact information is provided. This page also allows the user to view the privacy policy in case they have questions about the use of this data. The user accesses this page through the "New User Registration" button on the login screen. If the user tries to add and advertisement or get to administrative tools they will automatically be sent to the login screen. At this time, they will be prompted to create an account or login with their existing account. The illustration on the following page (See Figure 13 "New User Registration", page 26) depicts the "New User Registration" page.

Figure 13 “New User Registration”



“Ongoing Maintenance” means the user is enabled to update any information on either their account or ads that they have placed using the site. The users logs into the site, then clicks on the link for Place/Manage Ads. This then takes them to a menu of options available for maintaining their accounts and ads. The following page contains a screenshot of this menu (See Figure 14 “Ad Management Menu”, page 27).

The “Edit User Information” link (See Figure 15 “User Editing of their Information”, page 27) illustrates where users can edit their personal and contact information.

Figure 14 "Ad Management Menu"

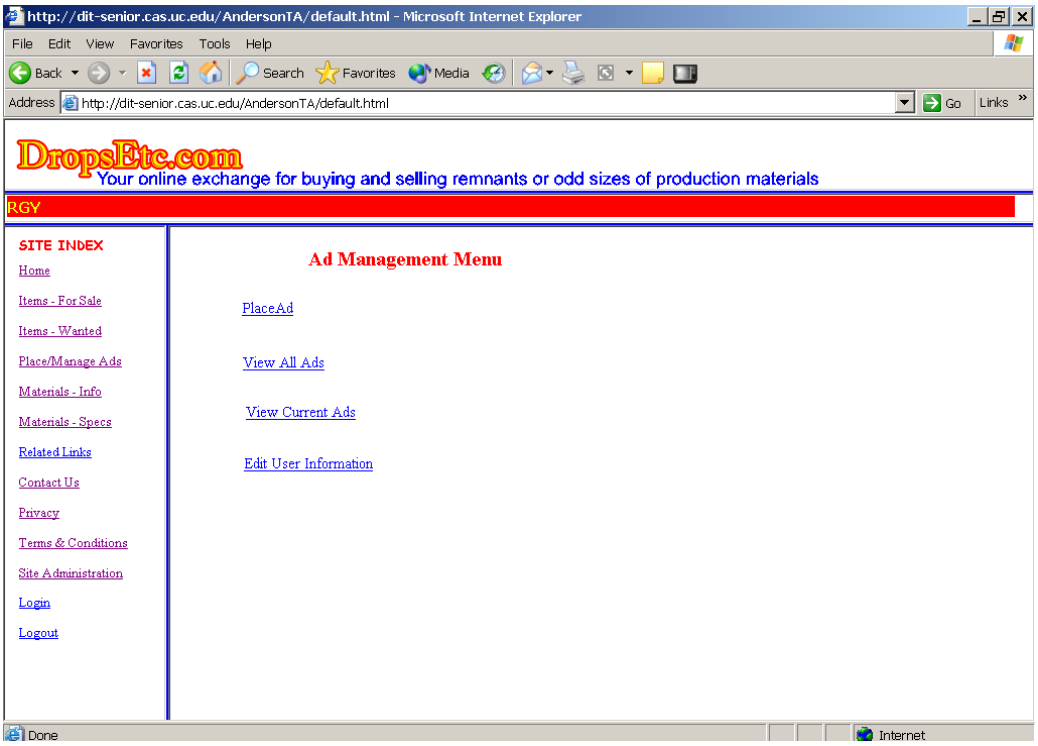
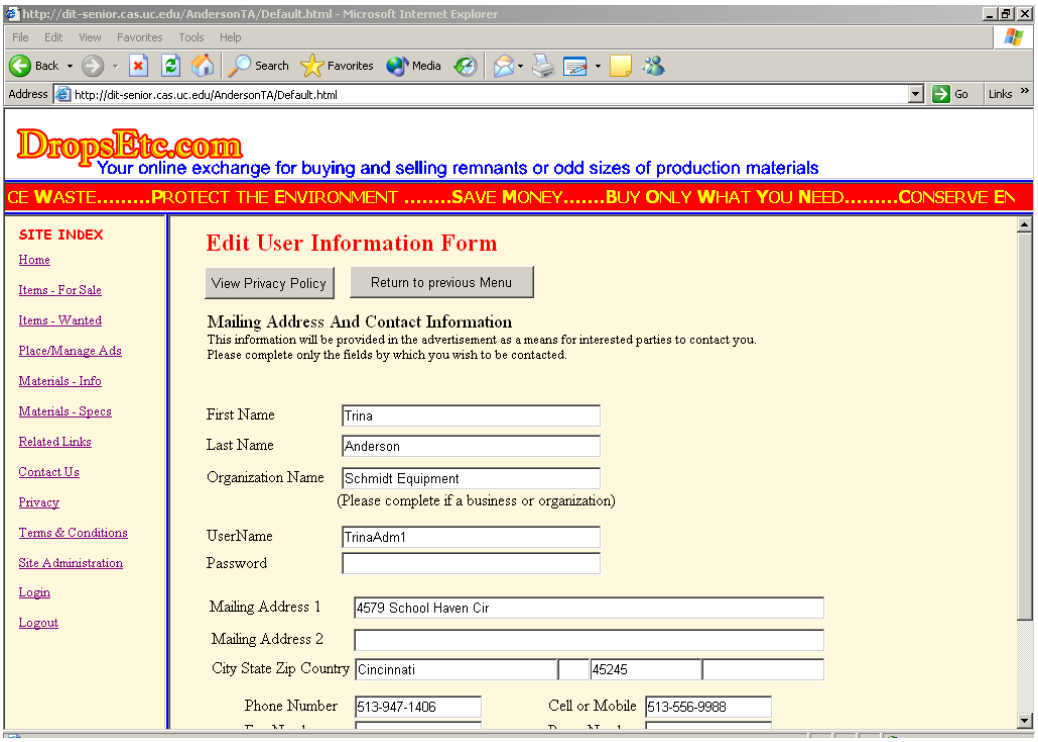


Figure 15 "User Editing of their Information"



5.4.2. Placing and Managing Ads

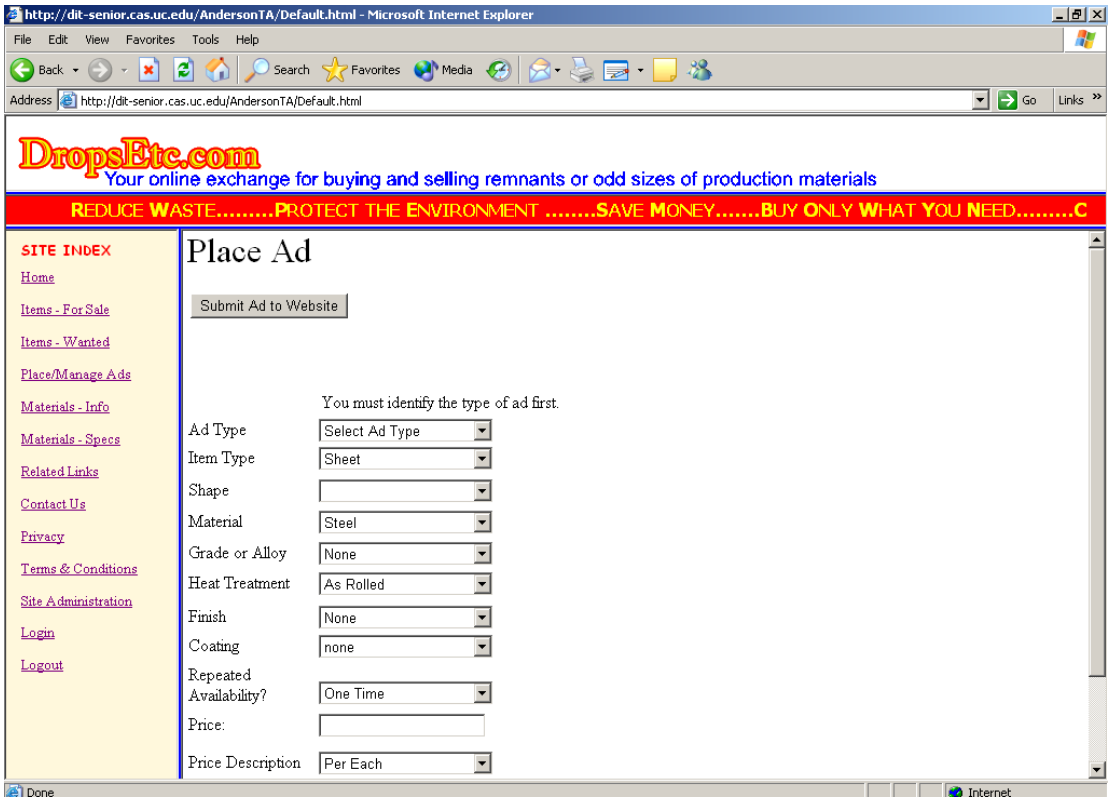
The remaining options on the Ad Management menu are for viewing and working with advertisements the user has placed.

The “Place Ad” link opens one of the most technically involved pages in the site. A general user can access the site only to place an ad. An owner super user, however, has access the same page in order to modify information for a user’s ad. The first technical consideration was to supply the page with a User Type check to see if the screen display should or should not display Administrative buttons and text. The biggest difference caused by the User Type is a change of label and the visibility of update ad buttons. The next technical consideration concerned the Type and Shapes of the item advertised and how to display only the measurements appropriate to the selection made by the user. For example, there are 30 available measurements in the database, but only Height, Width and Length would be appropriate for a flat, rectangular piece of metal. So the page must first change the list of available shapes once an item type is selected, then change the visible measurement boxes once the shape is selected.

The shape list is changed using the page post back event code that triggers when the item type combo box is selected. The measurement fields are changed by forcing another post back call after the shape combo box is selected. To keep the measurements neatly in line, they were placed on a “panel” object. One of the inherent benefits of panels is that visible objects automatically move up or down a fixed column area. The screenshot on the following page (See Figure 16 “User

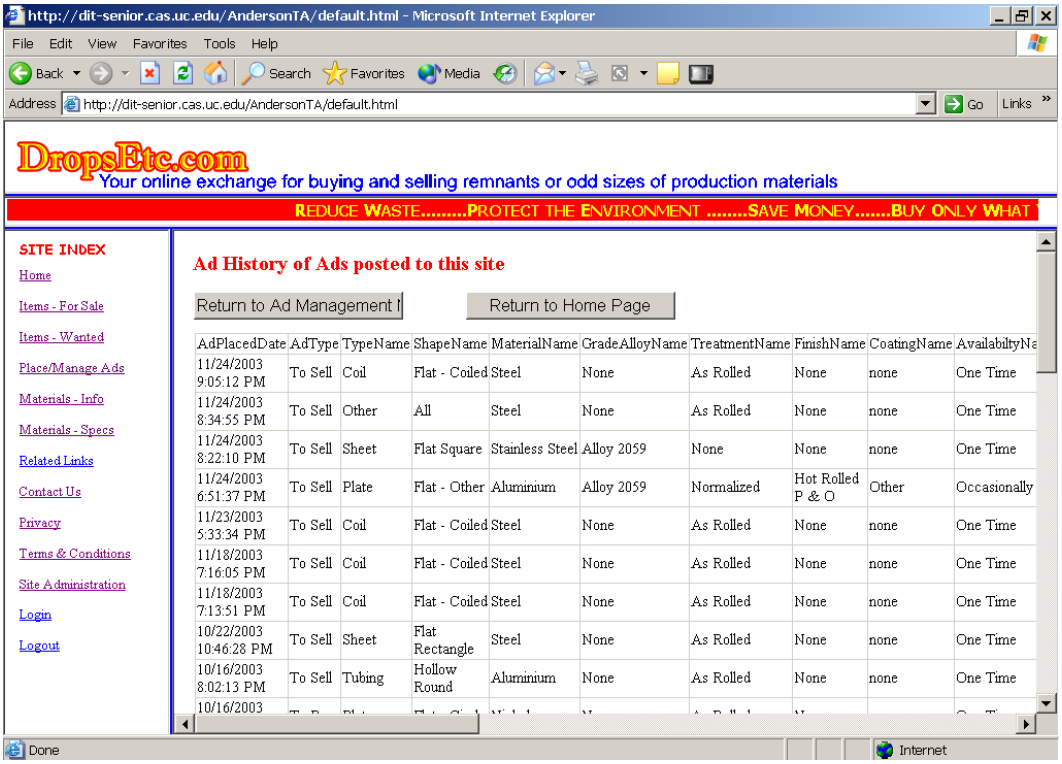
Page for Placing an Ad") illustrates an example of the "Place Ad" page with measurement fields for flat rectangular sheets displayed.

Figure 16 "User page for Placing an Ad"



The "View all Ads" link on the user menu allows the user to see and scroll through a table like listing of all ads that were ever placed by them using this site. If they have questions, they can refer back to this area to see what was displayed on the site by them. It serves the purpose of providing an advertising history for that specific user. The screenshot on the following page (See Figure 17 "User Ad History", page 30) shows a sample table of data for a logged in user.

Figure 17 "User Ad History"



The final menu option on the user based maintenance menu is the “View Current Ads”. This section allows users to see only ads that meet two criteria:

1. The ads place date must fall within 30 days of today’s current date.

2. The Ads must be marked as active.

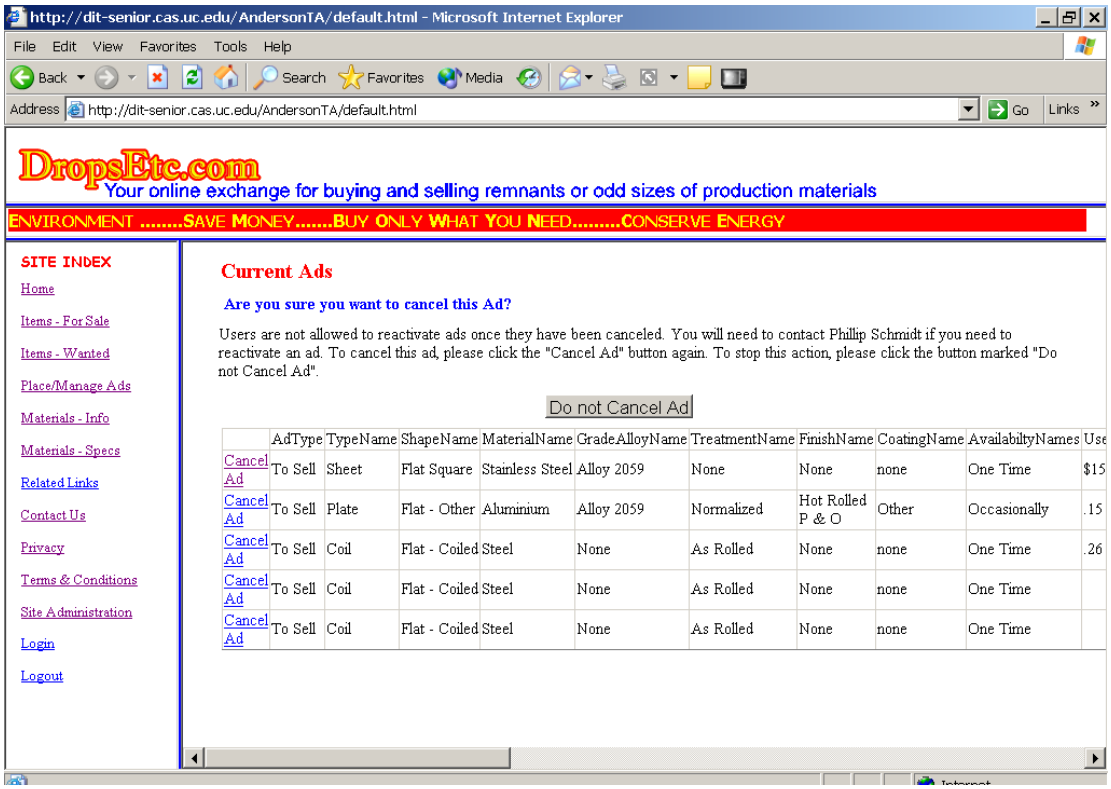
This area also provides a way for a user to cancel one of their ads from the listing. It is hoped that by providing this tool, users can prevent sold items from being displayed as available and can prevent themselves from receiving calls or inquires for items they no longer have available.

On the following page (See Figure 18 "Current Ads with Confirmation text displayed", page 32) is a screenshot showing the currently available ads for the logged in user. The figure also shows the confirmation message a user receives when they attempt to cancel an ad. This message is to prevent accidental cancellations. At the request of the owner, no tool was provided for reactivating the ad by the user. The owner envisions providing some sort of financial incentive in the future for the user who disable there own ads. For this reason, he does not want a general user activating and deactivating ads.

5.5.General Information Pages

The owner requested that additional pages be built into the site that provide reference or background information on the site or its content. The idea was to provide a means by which user could quickly access information that would make their visit more educational and their listing more accurate. These pages are: General Information on Materials, Sources for specifications about materials, Links to related Industry associations or organizations, a contact page for reaching an individual about technical or business questions, a statement of the site’s privacy policy and the Terms and conditions for using the Website.

Figure 18 "Current Ads with Confirmation text displayed"



The following screenshots show the various pages as they exist in the final project as proof that these requirements were achieved.

5.5.1. General Materials Information

The first request for a page that provides General Information on Materials is met by providing a menu screen first. The screenshot on the following page (Figure 19 “General Materials Menu”, page 33) shows the list of available materials related to the metals industry that the site is currently targeting. After the user has selected a material name from this menu, another page opens showing the actual information related to the selected material type. The following page contains a sample screenshot of the information provided when

the Aluminum link is selected from the menu (See Figure 20 "Sample General Materials Information Page").

Figure 19 "General Materials Menu"

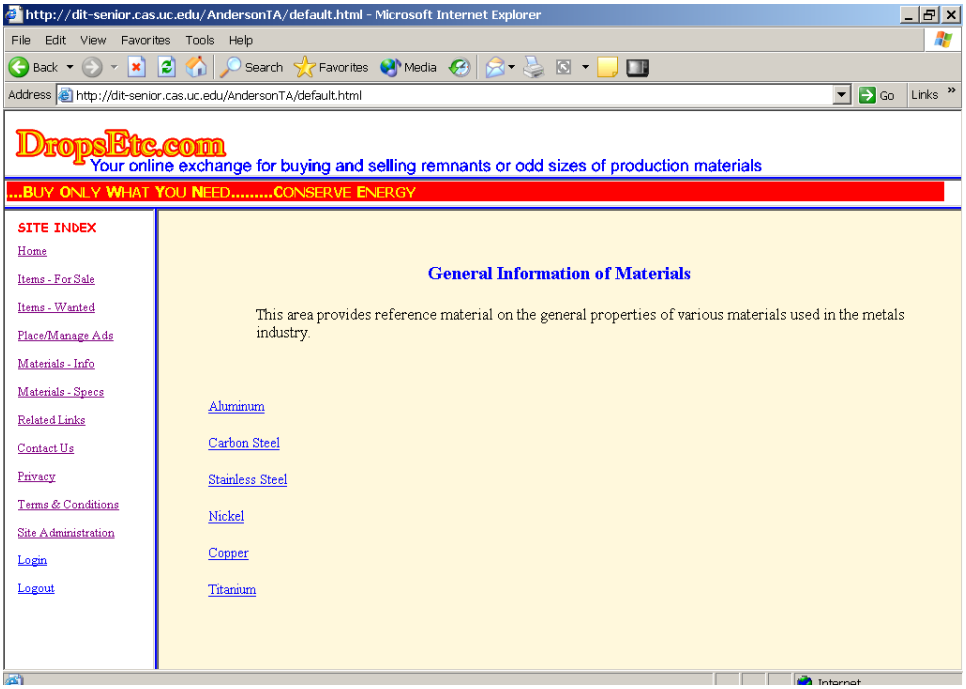
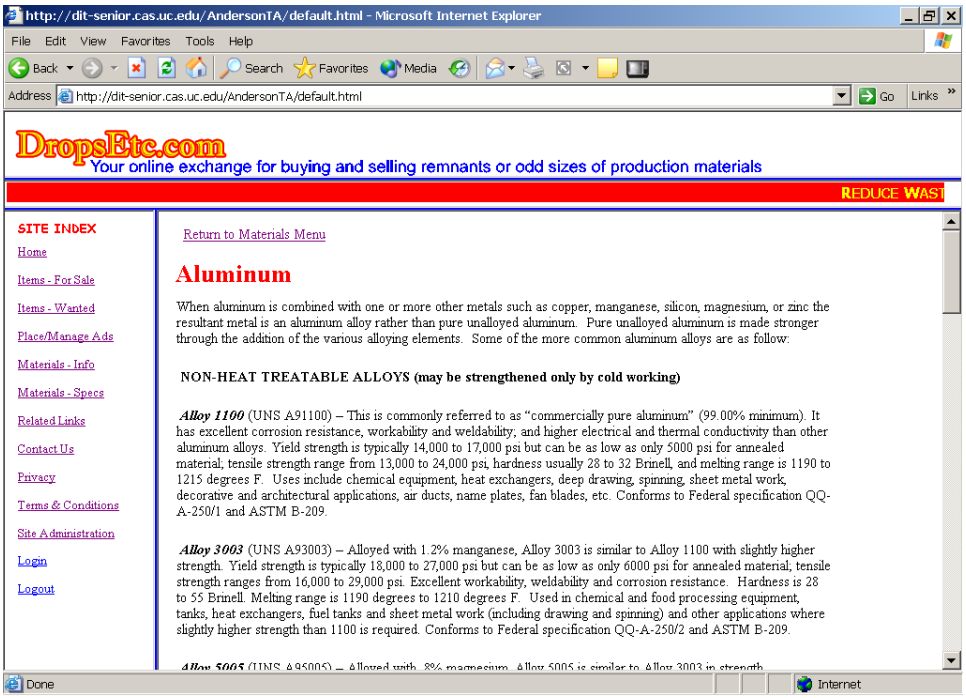


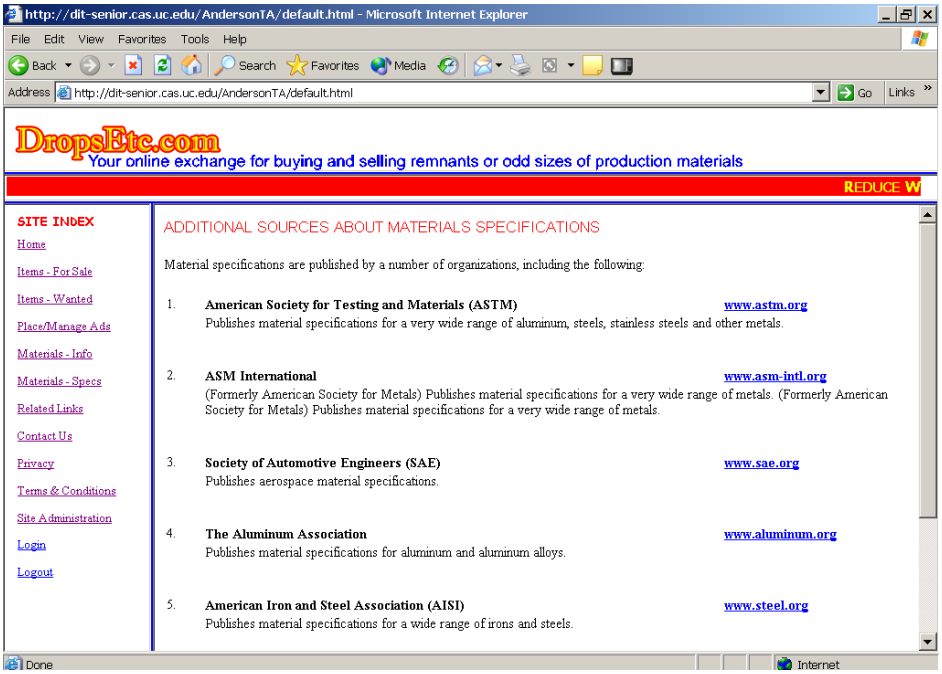
Figure 20 "Sample General Materials Information Page"



5.5.2. Materials Specification Information

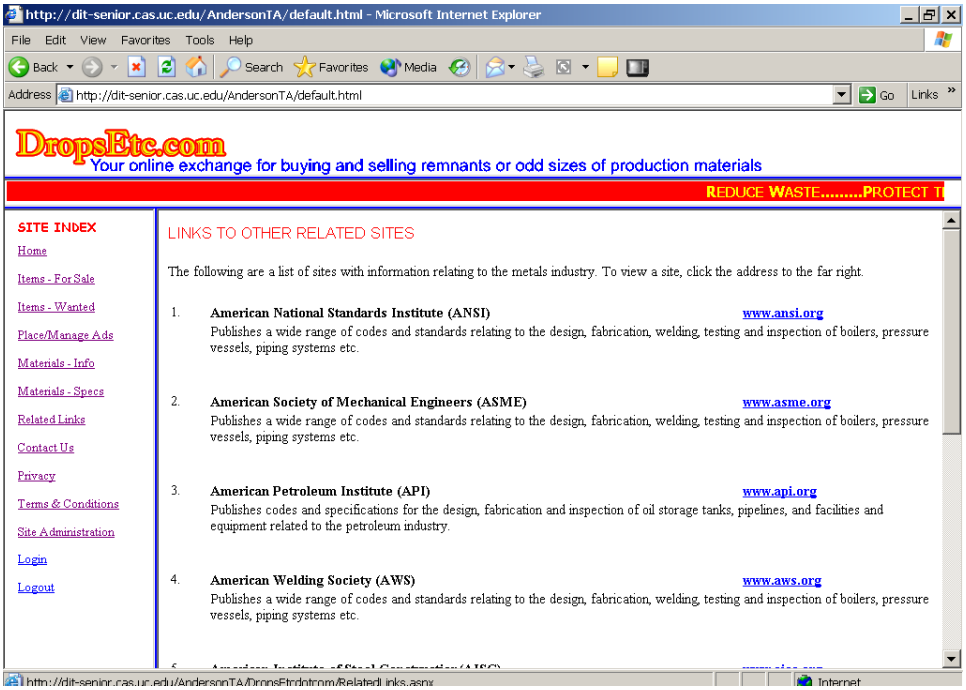
This is a list of sites that maintains accurate information about specifications of certain materials.

Figure 21 "Materials Specification Information"



5.5.3. Links to related industry associations and organizations

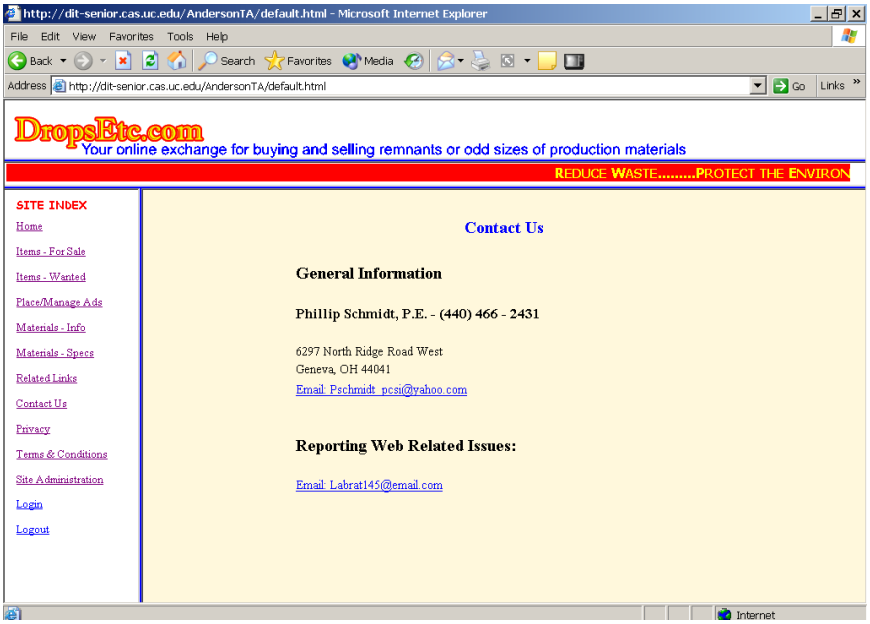
Figure 22 "Related Links"



5.5.4. Contact Us

Per the owners request, a feature that automatically opens the users local email, if they have one, and inserts the selected email address in the “To:” field has been included. Internet email users will need to copy and paste in the address. Below is a screenshot of the page that allows users to contact company representatives either by U.S. Mail, phone or email.

Figure 23 "Contact Us"

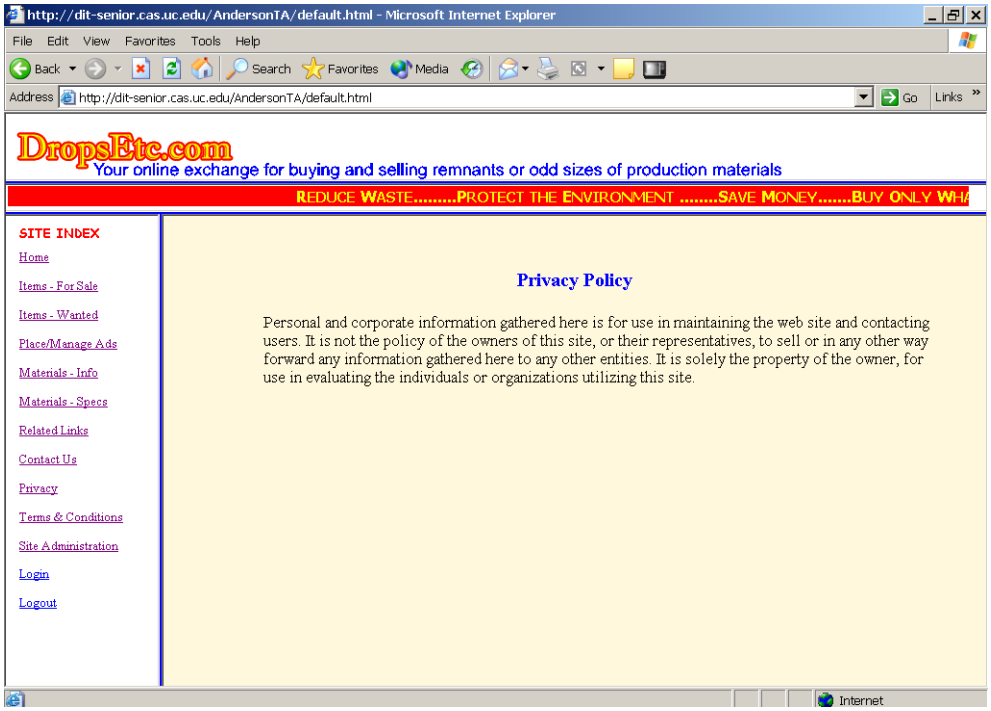


5.5.5. Privacy Policy

Since the site will be collecting personal and business information, both the author of the Website and the future owner both concurred that there was a need to include a page defining the intended use of the information collected. Those users who choose to place an ad are requested to provide a means for parties interested in purchasing the listed item to contact them. The means of

contact is left to their discretion. The site administrators state that they are using the information only as it relates to the site and do not intend to sell or otherwise release the information to any other parties. The illustration below is a screenshot showing the privacy policy page that is included in the final project.

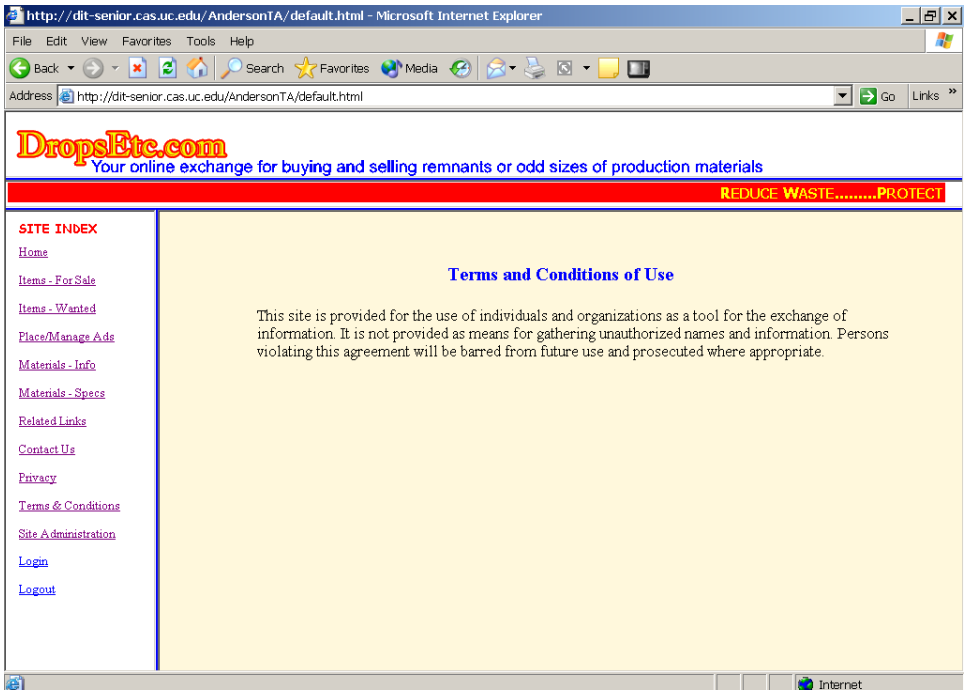
Figure 24 "Privacy Policy"



5.5.6. Terms and Conditions of Use

The developers of the site felt it necessary to include a disclaimer notifying users that the site is to be utilized as intended. It further states that if users are discovered to be using the site in an unauthorized manner that they will be penalized or prosecuted as befits the situation. The illustration on the following page demonstrates this text. (See Figure 25 “Terms and Conditions of Use”, page 37.)

Figure 25 "Terms and Conditions of Use"



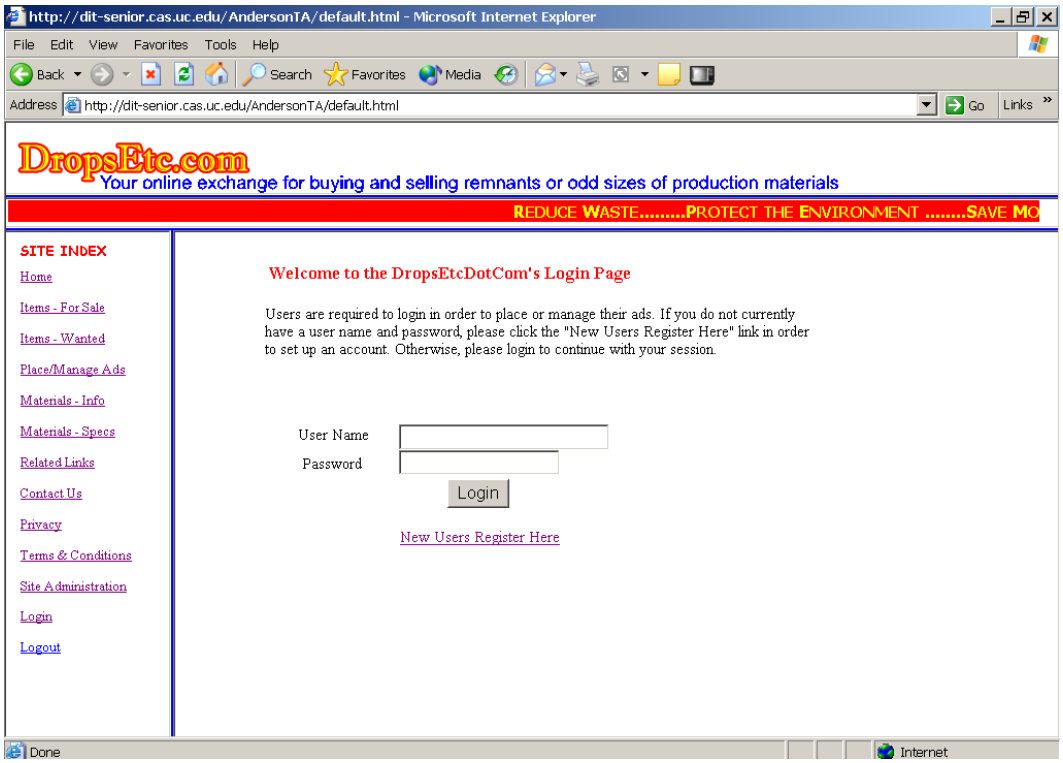
5.6. A Login Page

The general information pages and the search screens are available to all users without the need to login. However, the Place/Manage Ads section and the Site Administration section require special permissions to access. A login page was developed that is called whenever either of those two locations is selected. The login page's opening code checks to see if the user is checked in using a call to a session variable that was created to hold the login status. If they are logged in, and in the case of the site administration link they have the correct user type, then they are redirected the URL of the page they requested from the main menu. If they are already logged in, they do not even see the login screen again. The status is checked and the requested URL page opens without the user ever seeing the login screen more than the one initial time. However, if they are not logged in, the login page opens and forces them to either login or create an account prior to

opening the requested page. During development of the site, it also became apparent that a specific link directly to the login page could be useful under certain circumstances. For this reason, a separate login link on the main menu also exists.

Below is a screenshot of the Login screen that is displayed to the users who request certain pages.

Figure 26 "Login Screen"



5.7. Search Tools for browsing database Ad Entries

The ultimate purpose of the site is to provide a means for users to locate ads that match their needs quickly. The “Items - For Sale” and “Items – Wanted” menu options were created to meet this need. The expectation is that users will come to the site with two distinct search needs. Either they will be looking to buy

a certain type of item or they may be researching the postings to see if anyone is specifically asking for something they need to get rid of. In the last scenario, they could potentially contact that person and sell their item immediately. The two types of ads are stored in the same table in the database. The only difference between the two types of records is the "AdType" field. This field stores whether the ad was posted "To Sell" or posted "To Buy". This created another interesting code reusability opportunity in the Website's design. The resolution to this situation was to create one page that is used by both types of requests. While there are two menu options available, these both actually open the same .aspx page. This approach maintains a consistent user interface and reduces the amount of coding needed to produce very similar search results. To accomplish this, an http query string variable was create and attached at the end of the URL assigned to each of the links. In this project, the code for this as it was placed in the hyperlinks properties for the URL assigned to the link looks like:

"ItemsForSales.aspx?AdType=1" for the Items – Wanted link and "ItemsForSales.aspx?AdType=2" for the Items-For Sale link.

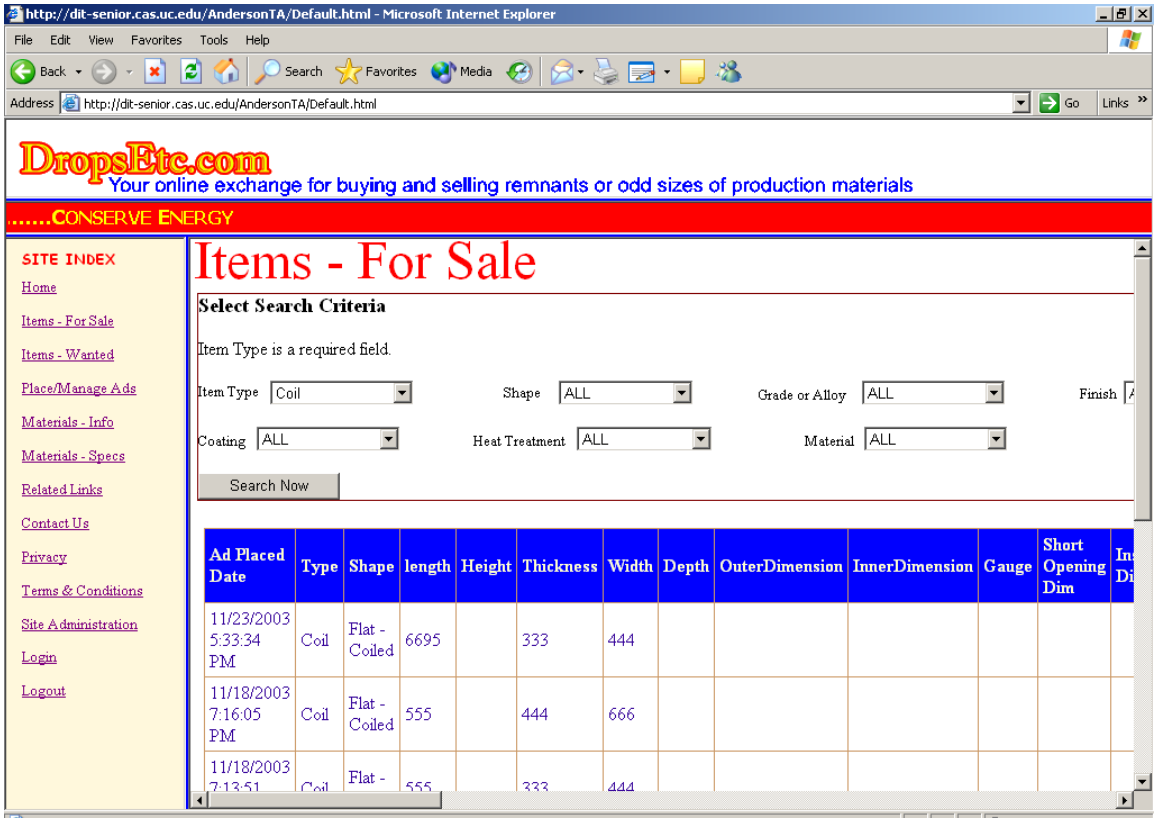
This arrangement allowed code to be placed in the page load section of the ItemsForSale.aspx web form that evaluates that condition through the use of a request object. The code on the main page for the request object looks like this:

```
"if (!Request["AdType"] = null)
{
        if Request["AdType"].value.equals("1")
```

```
        {
            lblPageTitle.text = “Items – Wanted”;
        }
        Else
        {
            lblPageTitle.text = “Items – For Sale”;
        }
    }
```

Another challenging part of this page was to dynamically feed in the values of seven different drop down list boxes into a SQL string in order to actually perform the requested search. One final element of the page is the need for an evaluation to be performed when the pages post back event is called and the results are displayed on the page. Since this tool is also used to help an administrator find and edit specific ads, the computer must determine the user type in order to know in which data grid to display the search results. Non-administrative users should not be able to view administrative objects. The figure on the following page (See Figure 27 “Items – For Sale Screenshot”, page 41) shows a screenshot of the “Items – For Sale” page as it would look to a user who has not logged into the site.

Figure 27 "Items - For Sale Screenshot"



6. Challenges, Recommendations and Conclusion

6.1.Experiences and Challenges in the Design Process

I specifically chose to use Microsoft products because that is what we are trained on in school. Having used other Microsoft Suites of products for developing applications, I had envisioned more automation and ease of use in developing this site because I chose to use Visual Studio .NET. To my surprise, the product was more difficult to work with and less documentation was available than I had anticipated. My previous experiences with computer programs were solely related to the mini projects we develop during our tenure in the IET program of the college. While beneficial, and important in learning programming basics, I was not yet prepared for most of the elements I had mentioned placing in

this project. Further complicating my experience was the fact that I first was exposed to .NET in its infancy – the beta version. During this portion of my education, .NET was still considered to be in a "test" phase and contained many Microsoft application level bugs. When .NET underwent a version change, code that previously worked failed or code samples on the web were outdated. This added another challenge to my development of the project. I really did not feel I had a strong understanding of how programming in .NET worked, but I had never used any other products out there. Despite my concerns, I decided to push forward with the project under these conditions hoping to find resources to utilize the highly promoted GUI interface tools.

I had originally intended to host all the SQL and .NET files on the server of the ISP we were going to use to provide the site in the future. The first several weeks of the third quarter were spent trying to locate a server in the Ohio area (or at least in the U.S.) that was capable of providing the site space and tools for remote Website development and file maintenance. Due to my inexperience in this area, I also wanted one that offered a human help desk feature. I tend to understand better when something is explained and I had envisioned needing help in setting up and populating this account. Our curriculum does not cover how to determine the quality of an ISP and how to research it in order to protect against "getting taken". I have never had an ISP before, and I had no clue where to start. I called Jeff Schmidt to determine where the company's other sites were hosted, and found out that the rest of their sites are developed using open source technologies and hosted on LINUX or UNIX ISPs. I needed to locate a Microsoft

host ISP. I got several names of companies from a site that rated my needs against advertised features of various ISPs. I then compared their prices for what I needed and chose a company who had a middle of the road price for comparable services. I then went to the Internet and researched the company to see if any sites, newsgroups or bulletin boards had information on them. I found a variety of responses, but mainly they seemed to be either issues that were resolved or ones that did not relate to what we were going to do so I decided to give them a try. I called my client and made my recommendation to him. He went to the site and posted an application and fee. We waited a week, and did not hear anything. I emailed the site contact, who said they had been hacked and lost data. Per his suggestion, we resubmitted. The charge cleared the bank after several days, and we thought we were ready to go. We could not log in. We called and emailed for support and did not get prompt responses. Additionally, while they advertised their own tools for remote SQL administration, they really wanted me to locate a copy of Enterprise Manager. I spent another week trying to locate a free standing version of Enterprise Manager that I could buy or download. That option does not exist. I knew I wanted to develop and test any code and data at home first, so I downloaded Microsoft's trial version of SQL Server 2000. Enterprise Manager was included as part of that package and the trial licensing was good past the due date for the project. During this phase, we found out that the company (M6.net) advertises itself as an American company but their server farm was located in Australia. They have a small sales office in the U.S. so they can claim to be an American company. Part of the delay was related to time zone issues. After

several attempts to get the situation resolved, we decided that this ISP was not one we wanted to do business with. At no time during the three weeks we were with them were we able to do any work on the project using their site. My client attempted to get back our money, but they were difficult to work with. At this point, it is into the 6th week of the semester and I still do not have anything on the web to demonstrate. I talked to my advisor who recommended placing the project on the school's "dit-senior" server.

Working on the school's server also exposed me to other kinds of problems. The first issue I encountered on the school site revolved around rights and permissions. The lab had undergone a server upgrade and the user accounts for the programs were not complete. I needed to be added as an administrative type user to the dit-senior server and to the SQL server program. It took a little over a week to locate and to work with the personnel involved to determine exactly the type of permissions I needed in order for the programs to work and to get the permissions implemented.

Next, I needed to connect to the server from home. The lab technician on duty did not know how to work with remote connections. I had never set one up and was worried about maintaining two connections to different areas of the same company, as my husband works for UC and we had an existing connection. The lab tech had me wait to talk to the lab director who told me that they were not responsible for remote connections. He told me to bring it up with UCIT. I called the UCIT help desk, which refer me to someone else who specialized in VPN activities. He told me that I could download the program and setup another

connection. When I tried to download the file it asked for a University login which, turned out to be different from any of my other UC logins. It took time again to locate the right person to find my account information for the login to that area of the UC site. Finally we got that resolved and I had connectivity from home, but another week had passed by.

I began developing from home or school and using the VPN connection to update both files to keep them concurrent. This worked up until the point at which I began to tie the ASP.NET web pages to the SQL server database. At this point, ASP.NET saved some connection information used to open the file. It would not let me open the .NET project from any place/server but the school lab. It was looking for a specific location on the network that it could not find. I know this now, but at the time the message received was a generic message about how it was "unable to locate the server named 'x'". Not knowing if it was a lab network problem, a code problem or an issue with the VPN connection I was stuck back in the loop of lab to UCIT to lab to books to professional contacts to lab. In the end, I never actually was able to open the project from any other machine, and I decided to work on the development from the physical CAS lab location only.

This worked for a while until CAS underwent another system upgrade. At this time, space limitations allotted to students were either implemented or reduced and a profile replication error in the lab began to cause file duplication. I had to start each session by manually deleting the all duplicated file entries in my z: drive folder that the network was automatically creating when I had last logged out. This reduced the time I had available for actually working on the project. In

the end, my project size combined with the replication problem caused storage warning messages to appear and ultimately crashed my profile. I had to rebuild and lost some information in the process. While I tended to save frequently as taught, I had missed some information.

During the actual times when I was able to work on the project, I ran into problems with the code. I found that if I researched a topic of something I wanted to do, every example could make it happen in a different way. It was hard as a beginner to pull out the similarities in order to determine which parts of the code actually caused the action I was trying to encourage. Additionally, .NET has two areas where some events can happen: the HTML level and the code-behind (C#, VB, etc.) area. It also took a while to figure out the conventions that drove the behavior of the page using these two areas. Finally, the error messages provided by the browser are often confusing and somewhat vague. It was not until toward the end of the development stage that I discovered that the first line that ended with cs: # on the browser error screen indicated the line of the code in the .NET file that the browser could not process. I had a more experienced user coach me on using the Debug window effectively in order to make troubleshooting much easier. All these things meant that I was learning by trial and error and spending a lot of time at the beginning on Websites and reference books.

The net effect of all of these complications is that my project experience covered 5 quarters instead of the normal 3 quarters allotted. The experience has been intensely self-taught, and I am grateful to my advisor for allowing me to continue working on it at my own pace. Looking back, I am glad I did not

promise all of the functions upfront that I had originally envisioned for this site. I am excited to have successfully met the basic requirements of the site as promised in the design freeze.

6.2.Recommendations for further Improvement

While the project meets the needs of the deliverables, there are several areas where I would like to see some improvements made:

The results data grids currently take up a lot of screen space and require excessive scrolling. I would like to find/implement code that causes the grid to dynamically display only the measurement column fields appropriate to the Item and shape selected above. This would improve the visual display of the Website page.

While approved by both the advisor and the owner to develop toward MS Internet Explorer browsers, I would like to change out certain objects which do not display in other browsers in order to make the site more universally compatible.

Finally, there are additional features that the owner and I have discussed as version enhancements. These include adding checkboxes the user can flag in order to create a printable ad listing they could use when contacting advertisers, possibly expanding the materials available to advertise into plastics or others and implementing an online fee system for posting ads that accepts electronic payment for the ads posted.

That last item is the potential third phase of development. The initial phase was to create an online presence and to market it free of charge in order to build a customer base and increase exposure. The second potential phase is to implement the changes mentioned above, to investigate using other products for designing and possibly migrating the site to one of those other options. The final phase, once the site is firmly established on its final platform is to implement the fee structure.

During my research process, I have had many people question why I did not use open source products and/or java to reduce hosting costs and make development easier. At the time, I replied that it was because I had some experience with the Microsoft products and none with the others. Now, I am researching costs and locations of courses using those tools. The owner of the site and I have discussed migrating this to other products, and he is open to whatever is easiest to develop in and least expensive to maintain.

6.3.Conclusions

This project successfully creates an environment where users with a very minimal amount of web experience can place advertisements to sell existing pieces or drops of materials or can search the existing ads to see if what they desire is available. Users have some control over the items they create or the information in the user account they set up. Administrators are provided with tools that allow them to perform common maintenance tasks in the site without involving an outside web or database developer. The programming code features

professional reusability and commenting, and checks are in place to prevent or reduce errors associated with the exchange of information.

While the process of developing the site has been difficult for me it has also been very educational. Even if it took me longer than it might have taken other students, I still have accomplished something I would not have been able to prior to attending the College of Applied Sciences. I do not yet consider myself marketable as a web developer, but I know that I CAN create Websites with the Microsoft tools. I have learned about using .NET and its strengths and weaknesses, I have learned more about how to search for ISPs and the questions to ask when finalizing a choice to be used, I have learned additional network and internet troubleshooting skills, I have learned about browser incompatibilities and I have learned mostly to trust myself. I tend to rely heavily on coaches, and this project really forced me to stretch myself intellectually. This project is my baby and I made it happen. There will be people out on the web who use an internet tool built by Trina Anderson and that was my goal when I came into this program. I will not call myself a web developer yet, but thanks to this project I am well and truly on my way to attaining my goal.

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