

POLITECNICO DI MILANO

Facoltà di Ingegneria dell'Informazione



POLO REGIONALE DI COMO

Master of Science in Computer Engineering

Automation of a Process in an

Aggregate Business Organization

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Corso di Laurea Specialistica in Ingegneria Informatica

Automazione di un processo di

Produzione industriale di aggregatione

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Abstract – English

Few decades back, almost all the processes, whether bank operations, purchasing tickets (travel, cinema, etc) were made manually. All of a sudden, from nowhere there arose the famous word ‘Automation’ which changed the entire world, the entire behaviour of the people and even the way human’s think. Now, automation or computerization as it is famously called is in almost all the fields (education, health care, transportation, space research etc). By the current thesis, I am discussing about Automation of an ‘Aggregate Business’ which I and my colleagues of *Dhithi Info serve (P) Ltd, India*, did for a company called *Arizona Fine Aggregate Business, USA (AZFAB)*.

The main problem faced by AZFAB is the difficulty in finding the right combination of inputs for their equipments. Since the manual operation is more complex, they asked us to develop a solution for their problem.

As a software development concern, we proposed a Window’s based application to help their business and solve their problem. This project was designed using Microsoft Dot Net 2005 and MS Access as the Database.

The development phase of the project is divided in to four different iterative phases for the deliverable product.

Iteration 1: Development of the database

Iteration 2: Development of the process and the equipments

Iteration 3: Development of material characteristics

Iteration 4: Calculation of Process Output

The end results can be exported or printed either in Excel or Word or in PDF format. The project is tested manually after each iteration. After extensive testing of the application the application is finally delivered to the Client (AZFAB).

Abstract - Italian

Pochi decenni indietro, quasi tutto il processo, che si tratti di operazioni di banca, l'acquisto dei biglietti (viaggi, cinema, etc) sono state effettuate manualmente. Tutto ad un tratto, dal nulla sorgono 'Automation' la famosa parola che ha cambiato il mondo intero, intero comportamento della gente e anche il modo di pensare umano. Ora, automazione o informatica come è notoriamente chiamato è in quasi tutti i settori (istruzione, sanità, trasporti, ricerca di spazio, ecc). Io sono qui per discutere di automazione di un 'aggregazione Business' che mi insieme ai colleghi di *Dhithi Info servire (P) Ltd, India*, ha fatto per una società chiamata *Arizona Fine Aggregate Business, USA (AZFAB)*.

Il problema principale AZFAB è la difficoltà nel trovare la giusta combinazione di ingressi per le loro attrezzature. Poiché il funzionamento manuale è più complesso, ci hanno chiesto di sviluppare una soluzione al loro problema.

Così come una preoccupazione di sviluppo software, abbiamo proposto ricorso fondato una finestra per aiutare i loro affari e risolvere i loro problemi. Questo progetto è stato completato in 5 mesi con un totale di 5 membri di cui solo 3 membri sono attivi attraverso il progetto. Questo progetto è stato realizzato utilizzando Microsoft Dot Net 2005 e MS Access come database.

La fase di sviluppo del progetto è diviso in quattro diversi fasi iterativo per il prodotto elaborato.

Iterazione1: Sviluppo del database

Iterazione2: Sviluppo del processo e le attrezzature

Iterazione3: Sviluppo delle caratteristiche dei materiali

Iterazione4: calcolo della produzione di processo

I risultati finali possono essere esportati o stampati o in Excel o Word o in Formato PDF. Il progetto viene testato manualmente dopo ogni iterazione. Dopo di sperimentazione della domanda La domanda viene finalmente consegnata per il cliente (AZFAB).

*To My God 'FATHER,' My Family and My Friends
For their Love, Care, Affection and Support*

I would like to acknowledge and extend my heartfelt gratitude to:

My professor Prof. Giuseppe Pozzi for his Advice and Guidance,

Mr.Laxmeesha, the project manager, for his Support and Help,

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*My friends, who encouraged, motivated and stood with me during
my difficult times,*

The Almighty, who gave me courage to overcome all my difficulties.

TABLE OF CONTENTS

<i>ABSTRACT</i>	<i>I</i>
<i>ACKNOWLEDGEMENT'S</i>	<i>III</i>
<i>TABLE OF CONTENTS</i>	<i>V</i>
<i>1. CHAPTER 1 - INTRODUCTION</i>	<i>01</i>
1.1 Objectives & Motivation	02
1.2 Thesis Structure	03
<i>2. CHAPTER 2 - BACKGROUND</i>	<i>04</i>
2.1 Aggregate, Fine Aggregate & Fine Aggregate Business	05
2.2 About AZFAB	06
2.3 About Dhithi Infoserve	09
2.4 Problem Definition	11
2.5 Our Approach	13
<i>3. CHAPTER 3 – ANALYSIS OF THE REQUIREMENTS</i>	<i>15</i>
3.1 General Requirements	16
3.2 Software Requirements	18
3.3 Hardware Requirements	20
<i>4. CHAPTER 4 –DESIGN, DEVELOPMENT & TESTING</i>	<i>21</i>
4.1 Design Phase	22
4.1.1 System Design – Basic Model	22
4.1.2 Detailed Design	23
4.1.3 Prototype Development	27
4.2 Development Phase	27
4.2.1 Iteration 1: Development of Database	28
4.2.2 Iteration 2: Development of Process & Equipment	31
4.2.3 Iteration 3: Development of Material Characteristics	33
4.2.4 Iteration 4: Calculation of Process Output	35
4.2.5 Export Result	36
4.3 Testing Phase	37
<i>5. CHAPTER 5 – CONCLUSION</i>	<i>38</i>
5.1 Review & Future Work	39
<i>APPENDIX</i>	<i>40</i>
1. Appendix A	40
2. Appendix B	63
<i>BIBLIOGRAPHY</i>	<i>76</i>

INTRODUCTION

Automation is a household name now a day's. Automation plays a vital role in reducing physical work thus decreases the work load and increases the efficiency. In this section I would like to discuss what is this topic about? Why is the topic relevant? What are the main features of the approach? Is there any particular requirement/constraint to be fulfilled? Finally the thesis structure.

1.1 Objectives and Motivation:

In this thesis I would like to introduce the context of the aggregate business and the process of 'Automating an aggregate business'. You may think what is the relevance between computer science and aggregate business? Needless to say 'automation' is everywhere. So this thesis is very relevant to computer science, further I have explained the various stages and steps of automating the processes of an aggregate business through this thesis

AZFAB is an American company which is doing aggregate business for a long time. Since the manual operation is more complex in an aggregate business, they asked us to develop an automated solution for their problem.

As a software development concern, we proposed a Window's based application to help their business and solve their problem. This project was finished in 5 months with a total of 5 members in which only 3 members were active through the project.

The main goal of the project was to develop a windows based application:

- With various processes for the clients including separate equipment & process pages with inbuilt levels for each equipments
- To generate Washers for equipments based on their capacity
- With tables and forms that automatically calculate various processes for the clients
- To generate the whole results of the process in an excel sheet

We used *Spiral Model* as life cycle development for this project because of its Iterative nature of this model and *SCRUM Programming* as development methodology because of its pair programming strategy. As a requirement or constraint, we were asked to use Microsoft Dot NET 2005 and MS Access as the Database. The processes of this application can also be managed as a 'Workflow Management System' (WFMS). I have explained briefly in the later stages of this document why the use of WFMS is discarded.

1.2 Thesis Structure:

This document has all details needed to understand the activities involved in automating an aggregate business. As an overview, I have given a brief introduction of each chapters and what you can find in these chapters.

We enter the thesis document with *chapter 1 – Introduction*, which we are currently in. Introduction provides a brief idea about the in-depth subject which is covered in this thesis.

Chapter 2 – Background: Provides details about aggregate business, about AZFAB, about Dhithi Infoserve (p) Ltd, the problem definition & our approach in solving the problem

Chapter 3 – Analysis of the Requirements: Provides detail about the software requirements, the hardware requirements and the general requirements needed to build this application. I have clearly mentioned why the particular tools were used and why some other similar tools were not used. I have also mentioned clearly why the use of ‘WFMS’ is discarded in this thesis. A basic model of the application to be developed based on the analysis of the requirements is also provided in this chapter.

Chapter 4 – Design, Development & Testing: In this chapter I have explained the various processes of the development phase of the project. I have also explained the various Iterations which lead to the particular useful check points. Testing phase is also explained here.

I conclude my thesis with *chapter 5 – Conclusion*; here you can find the important results and the deliverables to the clients. I have also mentioned the ‘limitation of this application and about future work of this project.

The *appendix* is provided with details, screenshot of the project which I consider will be useful for readers who wish to have more information and practical examples. Finally I end my thesis document with *bibliography*. I have clearly mentioned all the useful books, authors and web links which I referred to complete this thesis.

BACKGROUND

2.1 Aggregate, Fine Aggregate & Fine Aggregate Business

I would like to start my work by explaining about what is 'Aggregate', 'fine aggregate' and 'aggregate businesses'. Since automating an aggregate business is the main theme of this thesis, it would be nice to get an insight about these things before going in to detail about the problem definition and the solution.

Aggregate:

A mixture of sand and stone and other major components for making concrete are called as 'Aggregate'. The aggregates normally used for concrete are natural deposits of sand and gravel. Aggregate can also be rock, stone, crushed stone or slag, water-worn gravel, crushed lava rock or marble chips. At times, artificial aggregates, such as blast-furnace slag or specially burned clay, are used. Aggregates improve the formation and flow of cement paste and improve the concrete's structural performance.

There are two types of aggregates.

- 1) Fine Aggregate
- 2) Coarse Aggregate

Fine Aggregate:

'Fine aggregate' is defined as material that will pass a No. 4 sieve and will, for the most part, be retained on a No. 200 sieve. For increased workability and for economy as reflected by use of less cement, the fine aggregate should have a rounded shape. The purpose of the fine aggregate is to fill the voids in the coarse aggregate and to act as a workability agent.

Coarse Aggregate:

'Coarse aggregate' is a material that will pass the 3-inch screen and will be retained on the No. 4 sieve. Like fine aggregate, for increased workability and economy as reflected by the use of less cement, the coarse aggregate should have a rounded shape. Even though the definition seems to limit the size of coarse aggregate, other considerations must be accounted.

Fine Aggregate Business:

An ‘Aggregate business’ is a collective term used for any business that deals with any type of aggregate products and materials. It not only deals with sand and stones but also deals with concretes, steel, iron bars, etc. If the materials and products used by an aggregate business are only fine aggregates then we call that aggregate business as ‘fine aggregate businesses.

In this thesis we only consider only fine aggregate since the client AZFAB is specialized in dealing with fine aggregate business.

2.2 About Arizona Fine Aggregate Business (AZFAB)

Arizona Fine Aggregate Business has over 60 years of combined industry experience in the design and manufacture of fine aggregate wash plant equipment.



AZFAB also offer water reclamation systems that meet the ever-increasing environmental demands placed on plants in the aggregate industry. AZFAB has a proven process to separate, attrition and wash fracture sands that meets or exceeds API standards

2.2.1AZFAB Product Portfolio

Dewatering Screens:

The AZFAB dewatering screen can produce product with an average moisture content of 12 to 14 percent. Traditional methods often produce material at twice that level. Some AZFAB installations have even achieved a 7-percent moisture. AZFAB have screens ranging from 3 to 7 feet in width, with the 7-foot screen dewatering an average of 300 tons/hour. This capacity varies with the feed gradation.

- Low moisture content product
- Up to 300 tons per hour capacity
- Custom sizes to fit your plant
- Long lasting construction
- Replaceable Urethane panels
- Reinforced sub-deck



Fig: Dewatering Screen

Super Cutter:

The AZFAB Super Cutter Hydrocyclone is the answer to many serious material problems. The Hydrocyclone uses centrifugal force alone to separate material by size and density. AZFAB Supper Cutters are designed for a long service life. It comes in multiple models with capacities ranging from 550 to 2000 gallons per minute of water and solids.

- Abrasion Resistant
- Removable lid for easy access
- No moving parts
- Vacuum Assisted
- Proven reliability
- Sizes built to fit your plant's needs



Fig: Super cutter Hydrocyclone

Thickener:

AZFAB High Rate Thickeners are designed to recycle 90 percent of wash plant water. The system can reduce and in conjunction with other equipment completely eliminate the need for settling ponds. With a typical throughput of 2000 to 18,000 gallons per minute our Thickeners give you usable, clarified water almost immediately. The system can either be a bolt together or weld together design. All units come equipped with low drag rakes, hydraulic drives and PLC control.

- Reclaims 90 percent of your water
- Will reduce or eliminate settling ponds
- Fast re-cycle times
- Lower operating costs
- Various sizes to meet your plant needs



Fig: High Rate Thickener

Durability Cell:

The AZFAB Vertical Durability Cell is the most powerful product of its kind on the market. It provides the scrubbing power necessary to liberate clays through attrition. Moisture is retained when clays are allowed to remain in finished product, causing stockpiles to degrade which will eventually dislodge themselves and lower sand equivalent and durability index tests. The AZFAB Durability Cell frees deleterious residual clay and turns your sand into dollars.

- Brings sand into specification
- Lined with ½ 40 durometer natural rubber
- Bottom feed design
- Single and twin shaft designs available
- Planetary gear drive



Fig: Vertical durability cell

Filter Press:

The AZFAB Belt Filter Press sets new standards for efficiency and dependability and is designed specifically for the aggregate industry. Design features reduce frictional drag, resulting in a longer life for the filter cloth. The AZFAB Belt Filter Press has hydraulically controlled tension and steering as well as lengthened wedge and gravity zones.

- Hydraulic control of tension and steering
- Reduced Frictional Drag
- Lengthened wedge
- Lengthened gravity zones



Fig: Belt filter press

2.3 About Dhithi Infoserve

Dhithi Infoserve (P) Ltd. is an enterprise company run by a group of dynamic professionals with substantial years of experience in developing and implementing IT solutions. Much of the company's work centres round innovative technology. As an independent organization, Dhithi supports clients all around the globe.



Services:

Software Development:

Dhithi has worked on projects that follow the complete SDLC and also on projects that required specific deliverables such as System Requirements Specifications, Design Document, Coding Standards, Test Plans and User & System Manuals. Our projects extend from Low-end technologies such as 3GLs, etc., to High-end technologies such as EAI, Data Warehousing, ERP, Client/Server, Application Development, RDBMS, .NET, etc. We have also migrated Systems from a low end to a high-end technology.

Application Maintenance:

Dhithi has also undertaken maintenance of software for its clients. These include software developed in-house as well as those developed by other software vendors. We have also set up teams, onsite and offsite, to support these applications.

Joint Development:

Dhithi has partnered with IT companies in India, US and Australia in developing solutions for their clients.

Expertise:

Healthcare:

- Generating Shift roster for hospitals using a variety of parameters such as expertise of nurses, shift timings and patient census
- Data collection and reporting solutions for clinics, pharmacies & physicians
- prescription management, includes controlled drugs

Educational Services:

Dhithi's flagship product, Srishti, caters to the needs of the academic department of educational institutions and assists in areas such as:

- Student admission and registration
- Time table generation
- Attendance
- Marks
- Grade calculation
- Student and teacher evaluation
- Research and Publications
- Prizes and Scholarships

Order Processing

The knowledge in this area covers activities such as

- Identifying vendors
- Creation of Purchase requisition
- Workflow based approval system
- Issue of Purchase Order
- Invoice and payments

Material Management

Material Management solutions for order processing as well as post sales service have been developed covering areas such as

- Inventory Management
- Bill of Material based Work Order generation

Technologies Used:

<i>Languages</i>	<i>Databases</i>	<i>Application Servers</i>	<i>BI & ETL</i>	<i>Others</i>
ASP.NET, VB.NET, C#, ASP, Visual Basic, XML, VBA, Oracle Portal, Crystal Report, Java, Php	SQL Server, Ms-Access, Oracle, MySQL	IIS, Apache, Tomcat, Oc4j	Ardent Datastage, Business Objects	MS Visio, MS SharePoint Services, ActiveSync

Table: Technologies Used in Dhithi Infoserve

2.4 Problem Definition

Well we saw about Aggregate Business, about AZFAB and about Dhithi Infoserve, but there should be some problem with AZFAB that Dhithi Infoserve can provide solution.

As you can see from the section 2.2, AZFAB is a company dealing with heavy machines required for an aggregate business. Each construction work is different from the other. For example consider the process of making a Concrete, the materials and the percentage of mixtures (water, cement, sand, and stones) required for creating concrete or any other construction part is different. It also depends on the type of materials used and also the quality of the raw materials. So a person giving inputs to the machines should be very careful and he should know the accurate measurement of raw materials that should be fed in to the machines to make a good concrete. Also the operator should know which raw materials go in to which machines.

In some processes, raw materials needed to be washed before fed in to the main concentrate. So after washing the raw material in the ‘Washer’ (Ref. section 2.2), AZFAB had problems in finding the correct proportion of raw materials needed to be added along with this washed material in order to feed in to the machines.

So the ‘main problem’ faced by AZFAB is the difficulty in finding the right combination of inputs for their equipments.

Another problem is that sometimes proportion of the output needed to be given as input to another process running on another machine. But calculating that portion is time consuming need more human work load. An erroneous calculation may lead to indifferent final product with may lack in quality and will affect the durability and reliability of the construction work.

One more problem is there might be different processes running at the same time but in different equipments. Sometimes few processes might involve integration of different equipments or proportion of the materials in an equipment need to be fed as input to other equipment. So AZFAB had problem in monitoring which process involves which equipments.

Another problem is sizing the materials and finding its exact characteristics. In Aggregate business this is an important activity. Because in fine aggregate business the aggregates should pass through the no. 4 sieve (Ref., section 2.1) again here too they faced correct calculation problems. Important issue in this is finding out which material passes through which sieve. So depending on the sizes of the sieve, the proportion of the raw material will also change. Yet another difficulty is calculating the final output values of each process depending on the materials entering in to different sieve sizes.

The problems of AZFAB can be summarized as:

1. Finding the right combination of equipments.
2. Keeping track of processes and equipments
3. Finding correct material sizes and its characteristics
4. To check the correct quantity of water and other materials needed for a process
5. To check whether the material will pass through the particular sieve or not
6. Calculating the final process output depending on the following factors:
 - a. Material size
 - b. Material characteristics
 - c. Sieve size
 - d. With washer & without washer

Considering all the above said difficulties, AZFAB approached Dhithi Infoserve to come up with an application which will help them in reducing manual work and improve the efficiency of their company.

2.5 Our Approach

As a software development concern we analyzed the various possibilities and solutions based on the problem definition provided by AZFAB. After thorough analysis of the problem we proposed a ‘window’s based application’ to help AZFAB to solve their problems.

We did not try to find solution for all the problems separately, but rather we tried to inter-relate the problems, so that the solutions can also be inter-related.

The proposed solution contains five forms or pages.

- A. The first form (Home Page) contains ‘names of processes. New processes can be added and finished processes can be deleted here
- B. The second form contains details about material characterizes. This form helps to calculate the material size. Equipment page also contains
- C. The third (Equipment form) contains details about all the equipments which we are using for the specific process.
- D. The other two forms deals with calculations of Process output.

Our approach is based on:

- 1) Identification of Process
- 2) Calculation of material size
- 3) Identification of Equipments
- 4) Calculation of process Output
- 5) Export / Print output

The process starts with the user. Based on the user requirements we first we choose or create the process depending on its characteristics (Process Identification), upon choosing the process we analyze the material characteristics and will calculate the material size. Based on the material characteristics and material size we choose the required equipments for that process (Equipment Identification). After identifying the process and its equipments, we start calculating the user requirements based on various factors. Finally we print or export the process output. This is explained using a simple diagram.

In order to explain our approach clearly, let's consider:

- a. 'n' processes with different characteristics
- b. Any materials with different characteristics & size
- c. Different AZFAB equipments / machines

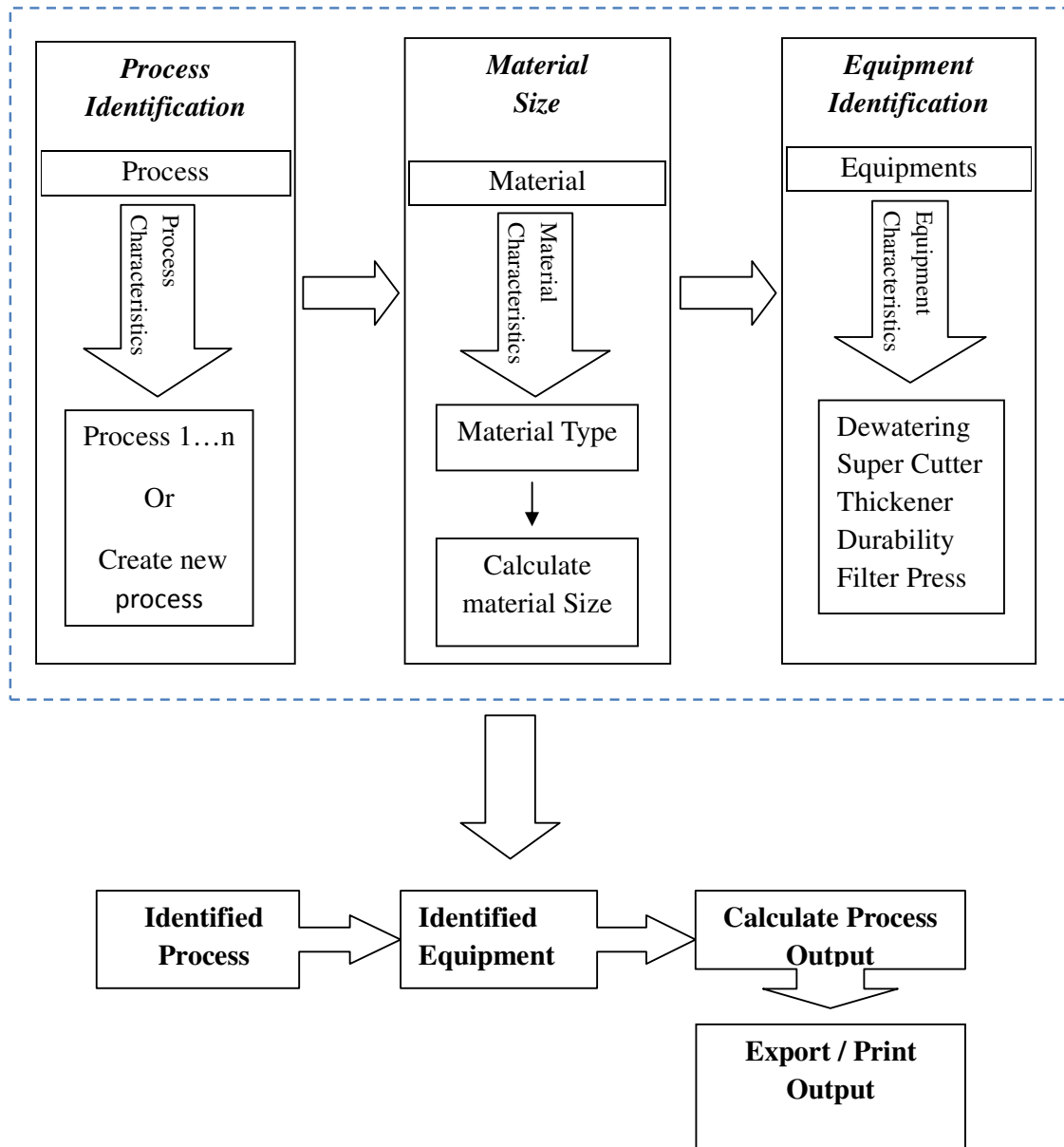


Fig: AZFAB Application Process outline

The above diagram is just the outline of AZFAB application. More detailed diagram and explanation can be found in chapter 4 – Development. This application provides a solution to most of the problems faced by AZFAB.

ANALYSIS OF REQUIREMENTS

Analysis Phase is the foremost phase of any development activity. Analysis should come early in any project, and the most important part of that analysis is the gathering of requirements. Analysis phase is carried out to find out how to develop software required for the end user, what are the resources we have? How to effectively use these resources to develop good software. We categorize the requirements under the following three topics:

- 1) General Requirements
- 2) Software Requirements
- 3) Hardware Requirements

3.1 General Requirements

This project was estimated to be finished in 6 months. The project team was composed of 5 members with only 3 members active through the project.

This application was designed using Object Oriented Architecture because Object Oriented concept gives more flexibility and reusability options in the coding part of the program. The different Object Oriented principles like Classes, encapsulation, data wrapping, polymorphism and inheritance make object oriented concept more programmer friendly

Spiral Model:

We were asked to use Spiral Model as life cycle development for this project because of its Iterative nature of this model.

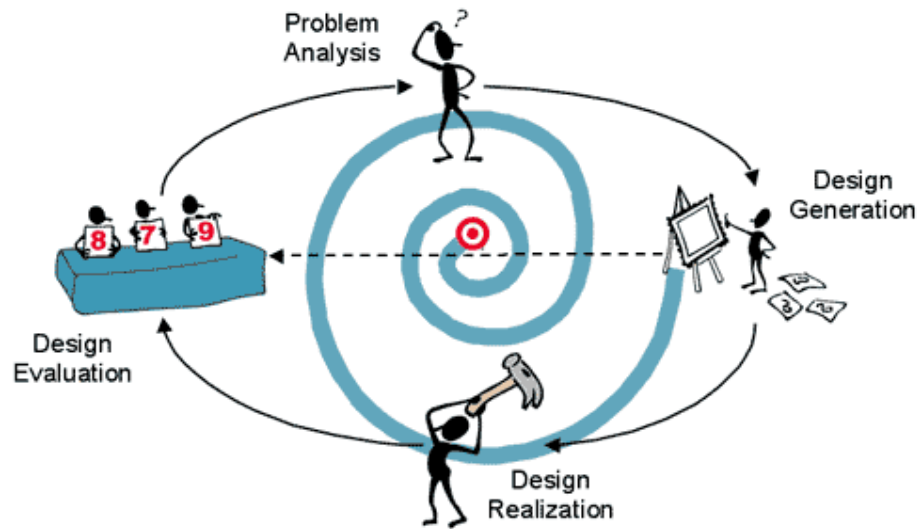


Fig: Spiral Model

SCRUM Programming:

We followed SCRUM Programming as development methodology because of its pair programming strategy. SCRUM is an agile process to manage and control development work. It is an iterative, incremental process for developing any product or managing any work. It produces a potentially shippable set of functionality at the end of all iterations.

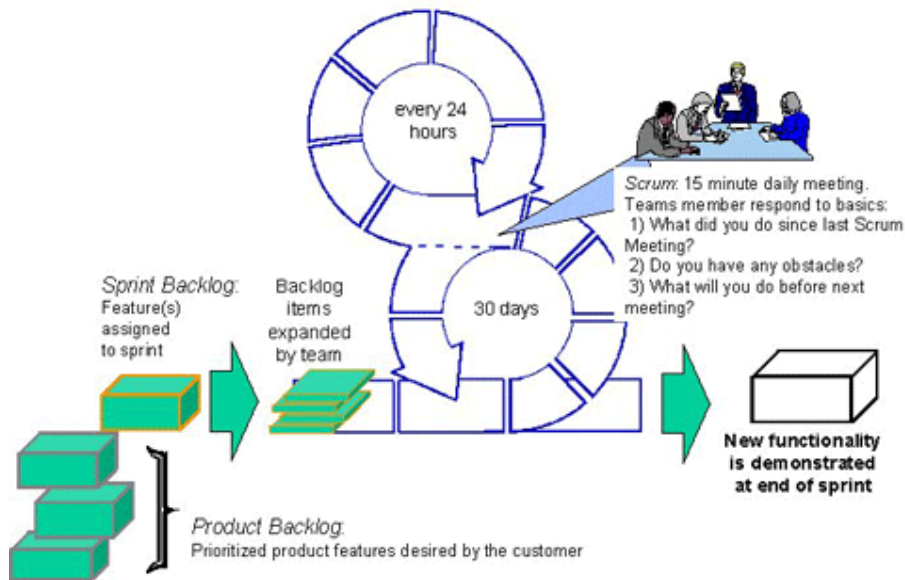


Fig: SCRUM Programming

Why WFMS is discarded?

The AZFAB application can also be designed as a workflow Management system. But as a general requirement it is mentioned to design a windows software application rather designing a workflow structure. So in order to satisfy the general requirement of the client we discarded the use of WFMS and designed the solution as software application.

3.2 Software requirements

We used Microsoft .NET, we used .NET 2005 and MS Access as the Database for developing this application.

Operating system

Both Windows 2000 Server and Windows XP were used as the main operating system for building the application. Both of these operating systems make excellent platforms for application hosting, and they function well.

.NET Framework SDK

Dot NET has a complete Software Development Kit (SDK) - more commonly referred to as .NET Framework SDK – that provides classes, interfaces and language compilers necessary to program for .NET.

Integrated Development Environment (IDE) & Development Tools

The new Visual Studio.NET is a powerful and flexible IDE that makes developing .NET applications a breeze. Some of the features of VS.NET that make you more productive are:

- Drag and Drop design
- IntelliSense features
- Syntax highlighting and auto-syntax checking
- Excellent debugging tools
- Integration with version control software such as Visual Source Safe (VSS)
- Easy project management

When we install Visual Studio.NET, .NET Framework is automatically installed on the machine.

Visual Studio.NET Editions

Visual Studio.NET comes in different editions. We can select edition appropriate for the kind of development we are doing. Following editions of VS.NET are available:

- Professional
- Enterprise Developer
- Enterprise Architect

Visual Studio .NET Professional edition offers a development tool for creating various types of applications mentioned previously. Developers can use Professional edition to build Inter - NET and develop applications quickly and create solutions that span any device and integrate with any platform.

Visual Studio .NET Enterprise Developer (VSED) edition contains all the features of Professional edition plus has additional capabilities for enterprise development. The features include things such as a collaborative team development, Third party tool integration for building XML Web services and built-in project templates with architectural guidelines and spanning comprehensive project life-cycle.

Visual Studio .NET Enterprise Architect (VSEA) edition contains all the features of Visual Studio .NET Enterprise Developer edition and additionally includes capabilities for designing, specifying, and communicating application architecture and functionality. The additional features include Visual designer for XML Web services, Unified Modeling Language (UML) support and enterprise templates for development guidelines and policies.

Database – MS Access

Due to cost constraint and the amount of data available we were asked to use MS-Access as the back end or database of this AZFAB application. Ms-Access is a powerful database for small and medium scale projects. Another reason for using this database is both the .NET and Access are Microsoft products and combining these two applications won't cause any compatibility issues. Since AZFAB is a windows application spending more time and money on other database was not accepted.

Microsoft Office

Ms-Word 2003 and Ms-Excel 2003 were the two Microsoft office tools used for this project. All the documentation work was done using Ms- Word. Ms – Excel is also a main tool used to export the final output result of the AZFAB application. It is also used for cross checking whether all the requirements were satisfied or not. We developed an Excel sheet with all the application requirements which needed to be addressed. So after completing each time line or requirement the excel sheet is used to enter the related information's and details.

3.3 Hardware requirement

Hardware is also a prime requirement in developing any application. The hardware we use should go hand in hand with the software requirements. So we should choose our hardware in such a way that our hardware and software requirements are compatible with each other. The below table clearly shows the hardware requirements for this project:

<i>Processor</i>	Pentium 4 processor
<i>Hard Disk</i>	72 GB SAS (15K rpm) raid 1 / 5 (Minimum)
<i>RAM Memory</i>	8 GB (with possible expansion to 16 GB)
<i>Server</i>	HP ProLiant ML110 G5 Storage Server
<i>Printer</i>	HP Officejet 4500 All-in-One Printer Print SCAN Fax

Table: Hardware Requirement

DESIGN, DEVELOPMENT & TESTING

Development of application is the main part of any software project. The development phase of this project is divided in to two different phases for the deliverable product.

- Design Phase
- Software Development Phase

4.1 Design Phase:

In design phase the requirements found out in the analysis phase are converted in to designs that can be used in the development of the application. In fact the real development tasks starts from design phase. The AZFAB Design phase is divided in to two parts

- System Design
- Detailed Design

4.1.1 System Design – Basic AZFAB Model

Based on the analysis of the requirements and considering the various constraints that this project had, we proposed a basic model which could be used as a reference model for developing a far better model in the prototype development phase. This model is very simple. Based on our analysis we found the following as the important activities that needed to be developed for the AZFAB application:

- Database server,
 - Database development and connection with the application
- Development of the AZFAB application with different
 - Process pages,
 - Material Characteristics page
 - Equipment page
 - Material size Calculation Page
- Export / Print Output
 - Ms – Excel
 - Ms- Word
 - PDF
 - HTML

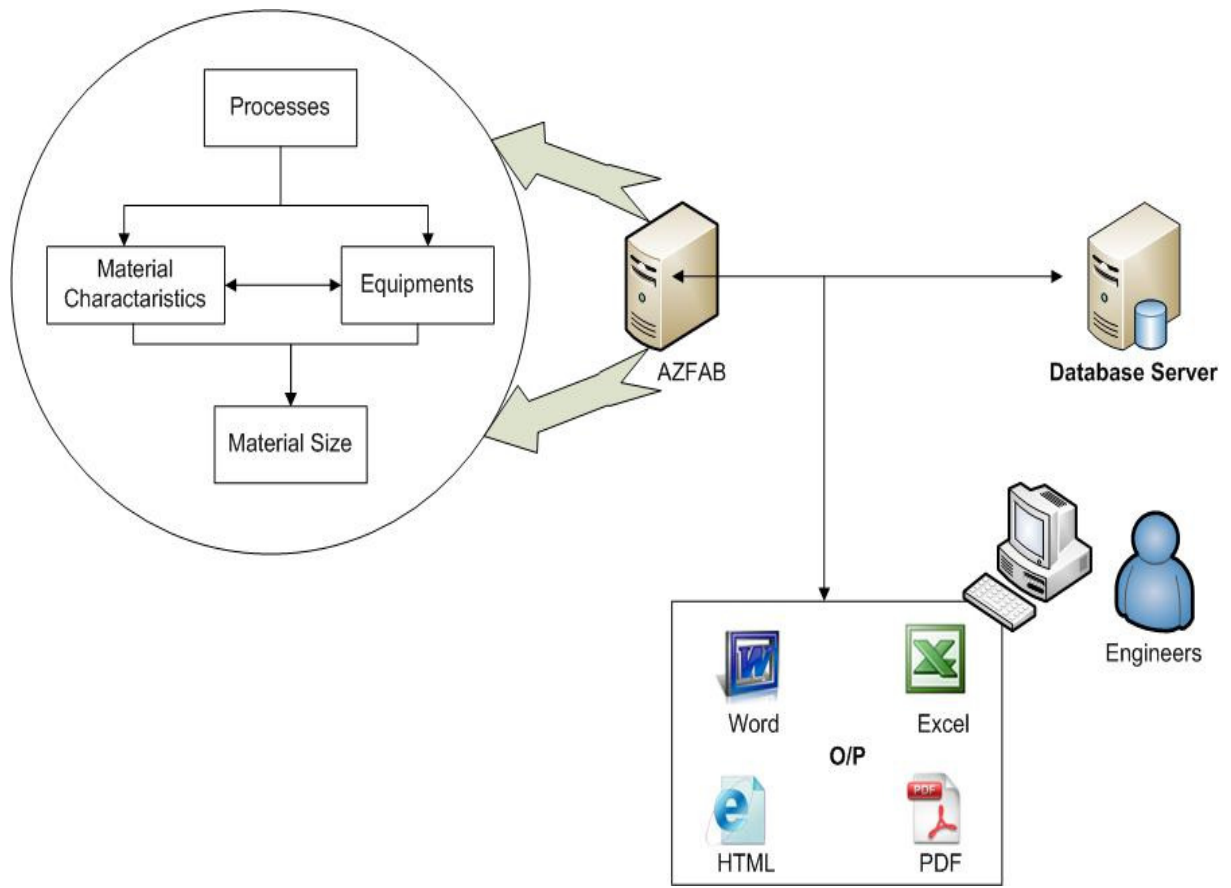


Fig: AZFAB basic model based on the requirement Analysis

4.1.2 Detailed Design

Once the system design is designed, we started working on designing the detailed design which will be the back bone to develop the original software. So based on the basic model we developed the prototype of AZFAB Application. The following are the main components of the prototype design.

- The application begins with the home / Main page
- Home page consists of the following main menus
 - Process menu
 - Equipments menu
 - Help Menu
 - Exit menu
- The following are the short cut menus in the home page
 - Process List
 - Save Process
 - Delete Process

The following diagram shows all these in detail

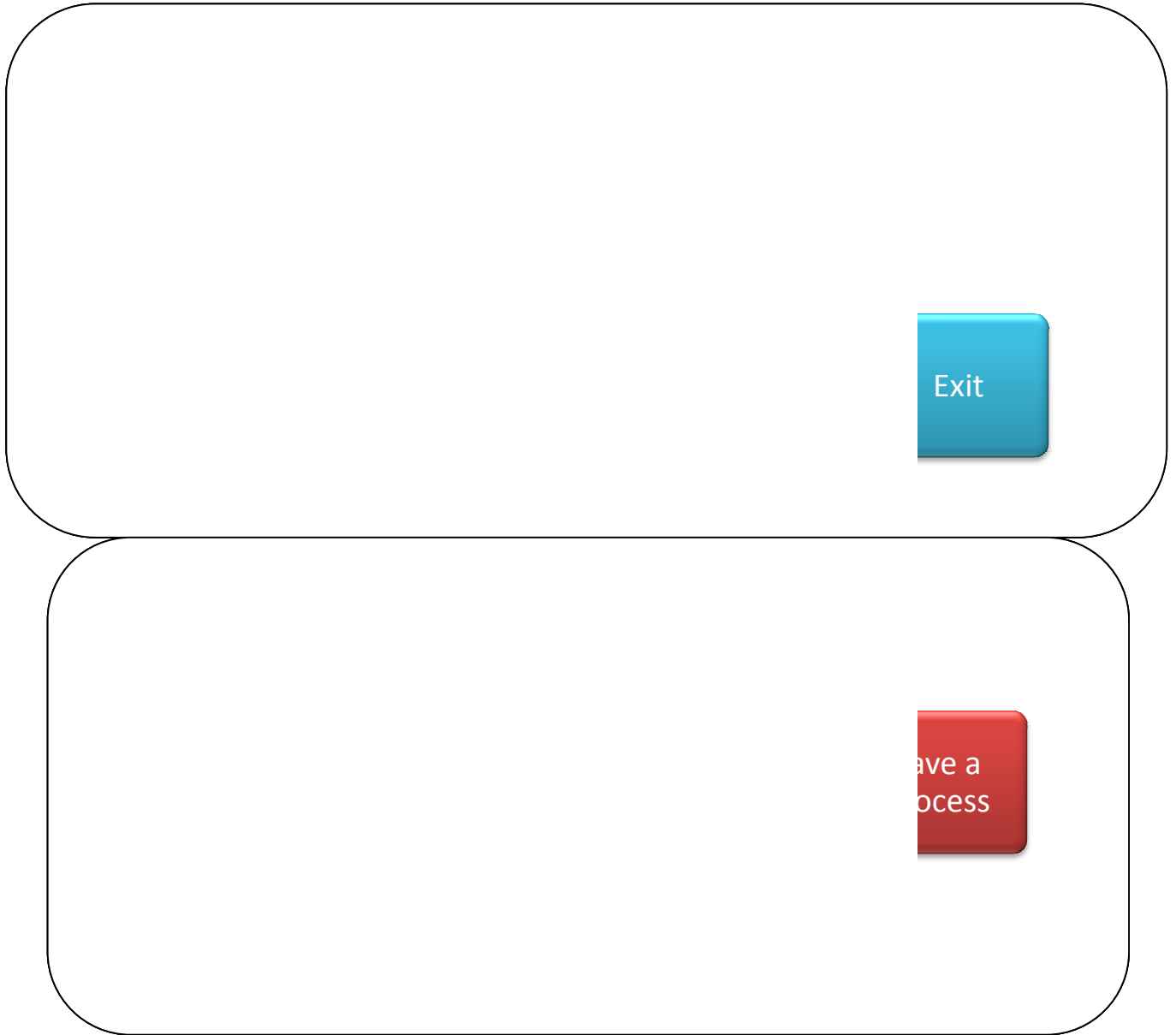


Fig: AZFAB Design Model

The below diagram shows the Process Page of the AZFAB Application

AZFAB Process page design

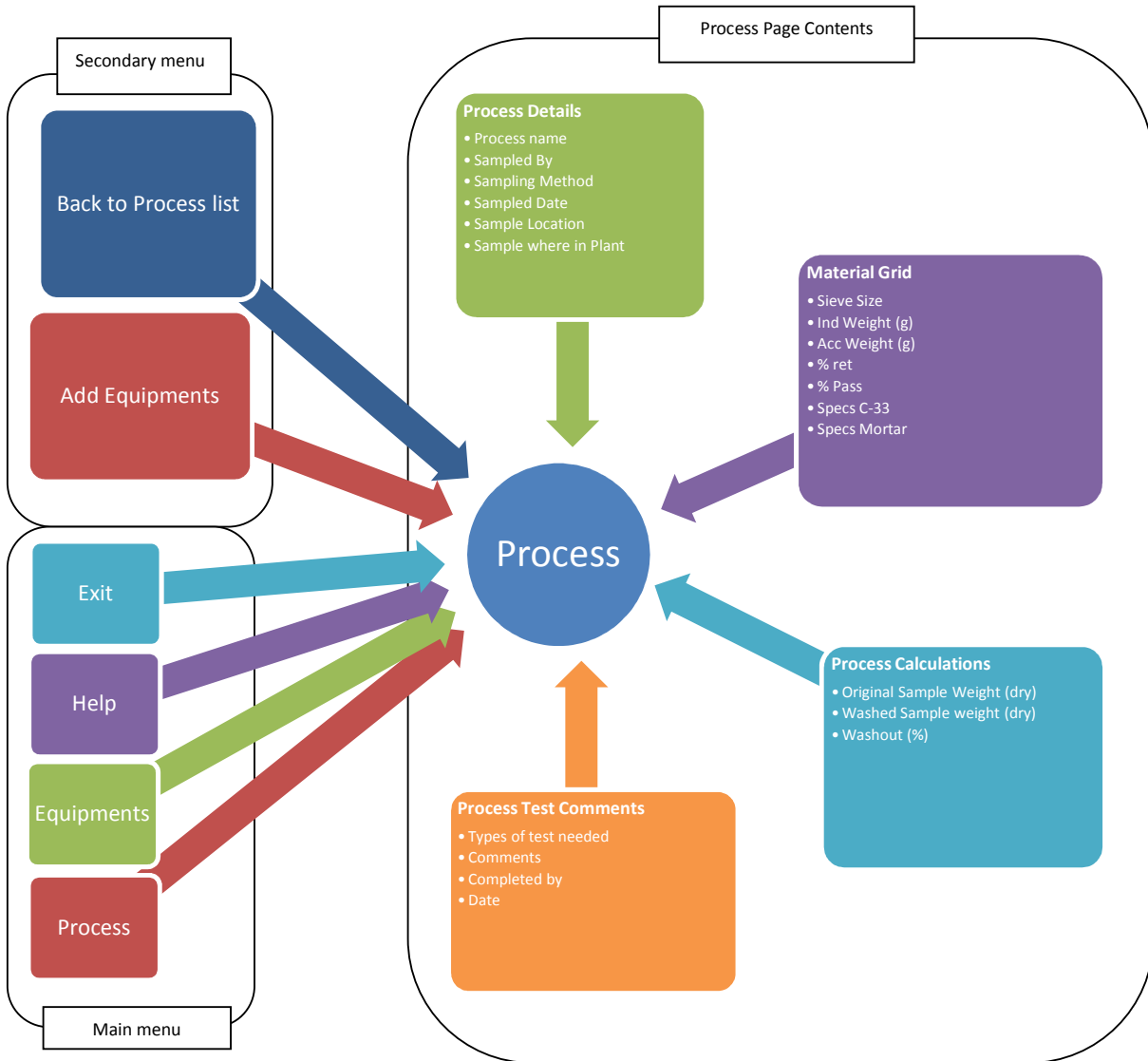


Fig: AZFAB Process page design

The following diagram shows the design of the equipments page

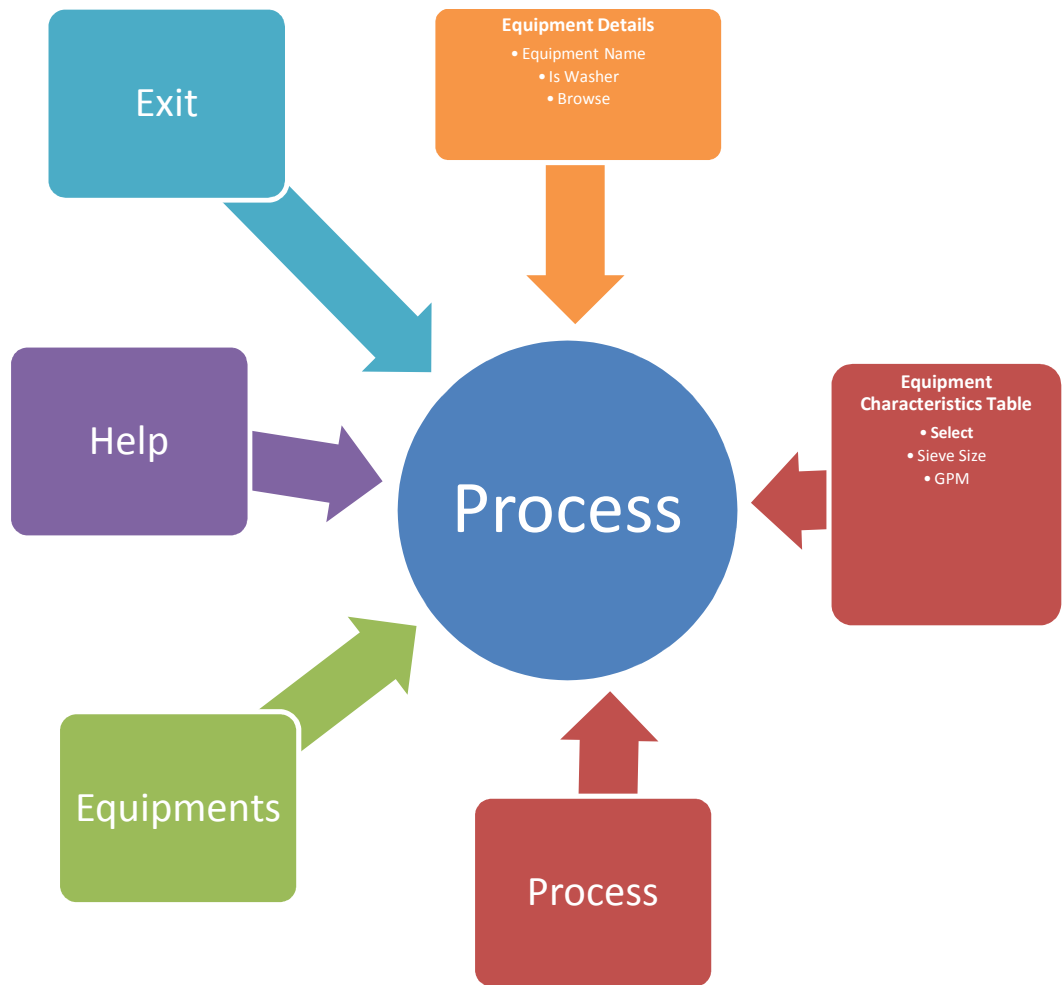


Fig: AZFAB Equipment page design

4.1.3 Prototype Development

Based on the detailed design, we started developing the prototype of the AZFAB application. This prototype is the first deliverable to the client. So we gave at most importance in developing this prototype. We developed this database prototype using VB Dot net. This prototype is exactly same as the final application but just a model but all its functionalities are not implemented. Just to show to the AZFAB Company how the application would like, we gave them the prototype. Based on the comments received from the AZFAB Company, we made slight changes to the prototype. This prototype design is completed in one month time with 3 members in that only two members were active all the time. After the approval of the prototype we began our software coding activities to this prototype.

4.2 Development Phase

Once the prototype is designed, we proceed to develop the application. This development is carried out using visual basic dot net 2005 as the backhand language and Microsoft Access as its database. The main idea of this phase is to organize this phases in an Iterative way using a cycle. This project has four Iteration phases for the deliverable product. Those are:

- *Iteration 1:* Development of Database
- *Iteration 2:* Development of Process and Equipments
- *Iteration 3:* Development of material Characteristics
- *Iteration 4:* Calculation of Process Output

In Iteration 1 we develop the database for the entire project. Here we design the various tables required for this application and also the various dependencies of the various fields of the tables. After the completion of this phase we go on with the second Iteration i.e. the development of Process and Equipment.

In Iteration 2 we developed the processes and equipments needed for this application. After Quality Analysis and testing we sent it to our clients for their suggestion and approval. After their approval we started to concentrate on Iteration 3 i.e. Development of material Characteristics

In Iteration 3 we develop the characteristics of each material for all the processes and equipment type for the various equipments. This is an important stage because the whole application and the process depend on this phase and any error in this phase will affect the whole processes.

Another important activity we did in this Iteration is the Integration of the Database with all the pages and forms of the application i.e. with processes and with the equipments.

In Iteration 4 we calculate the material sizes of the whole processes that can be given as input to the other processes or machines.

4.2.1 Iteration 1: Development of Database

Development of database kick starts the real development activity of the AZFAB application. This phase also starts the iterative nature of the activities. The database is designed using Ms-Access and is connected with the database server and the application using OLEDB connection.

The Database is created using the following seven different tables, each of them are composed of several lines of queries.

- ***AT_Process*** – This table contains information, name of all the processes of the AZFAB Company. This table is used to store all the old process and the new processes the user creates. User can create, delete, update and modify new processes using this table
- ***AT_ProcessSpecs*** – This table stores all the details about a particular process, its characteristics and its specifications. User can add, delete new specification and characteristics of their new process but they can't modify or delete the already present data's but they can modify and delete the information what they create using this table.
- ***AT_Process Equipment*** – This table has the information about all the equipments used by a particular process. An user can create, delete, update or alter information about a particular equipment of a process using this table
- ***AM_Equipment*** – This table contains information about the various equipments of AZFAB Company. It also specifies whether the equipment is a washer or not.
- ***AM_Equip_Properties*** – This table contains all the information about various equipments. A user can create, delete, update, and modify information's in this table.
- ***AM_Specs*** – This table contains all the details about the different equipment characteristics and specifications.
- ***AT_FinalOutput*** – This table contain all the information about the final output. This table is basically the result of all the combined activities, calculations performed by the whole application.

Relationship of AZFAB Tables:

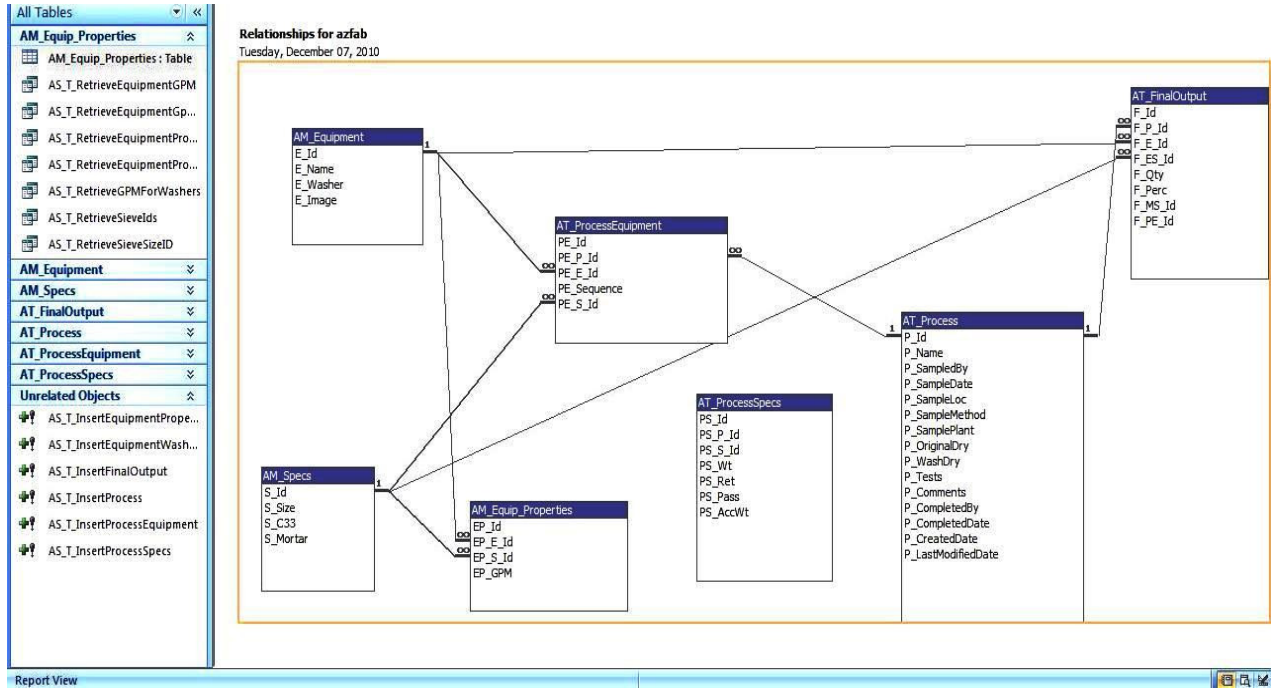


Fig: AZFAB Database Table's relationship

The above figure clearly specifies the relationship and dependencies of each table. It also specifies the foreign key constraints and other relationships of the table.

Connecting database with the application is another important part of database design. This connection can be done using different connection manager. In this project we used OLEDB technique to connect the different tables of the database with the database server and the software application.

Even though there are more powerful databases available in the market, we used Ms-Access as the database because comparing other database it is cheaper and it is relatively easier to write the queries. More over this application is relatively a small project which does not need big database to build the tables and the queries. We are not using any stored procedure in this database.

The iterative nature of this process helped us to make changes very easily. Even in the later stages when we integrated the database with the application we did minor changes to the database before proceeding with the integration activities.

Automation of Process in an Aggregate Business

E_Id	E_Name	E_Washer	E_Image
124	Wet Screen		Long binary data
125	Classifying Tank		Long binary data
126	Fine Material Washer	<input checked="" type="checkbox"/>	Long binary data
127	Super Cutter		Long binary data
128	Dewatering Screen		Long binary data
129	Washer1		
130	washer2		
*	(New)		

Fig: AZFAB Database Table AM_Equipment

S_Id	S_Size	S_C33	S_Mortar
1	1 1/2		
2	1 1/4		
3	1 1/8		
4	1		
5	3/4		
6	1/2		
8	3/8		
9	1/4		
10	#4	95-100	100
11	#8	80-100	95-100
12	#10		
13	#16	50-85	70-100
14	#30	25-60	40-75
15	#40		
16	#50	5-30	20-40
17	#100	0-10	10-25
18	#140		
19	#200	0-3.0	0-10
20	Pan		
*	(New)		

Fig: AZFAB Database Table AM_Specs

The above figures show the fields of the table AM_Equipment and AM_Specs. More examples and queries of this database is provided in Appendix A

4.2.2 Iteration 2: Development of Process & Equipment

Once the database is developed, we move on to the coding part to develop the required pages for the AZFAB application. Here in this iteration we develop the process and equipment pages of the AZFAB application. These two pages are the main and basic pages required for this application. Based on the details which are collected from these two pages the system calculates the final output. Based on the detailed design model we develop out process pages with all the details specified. The following figure shows the screen shot of the process page.

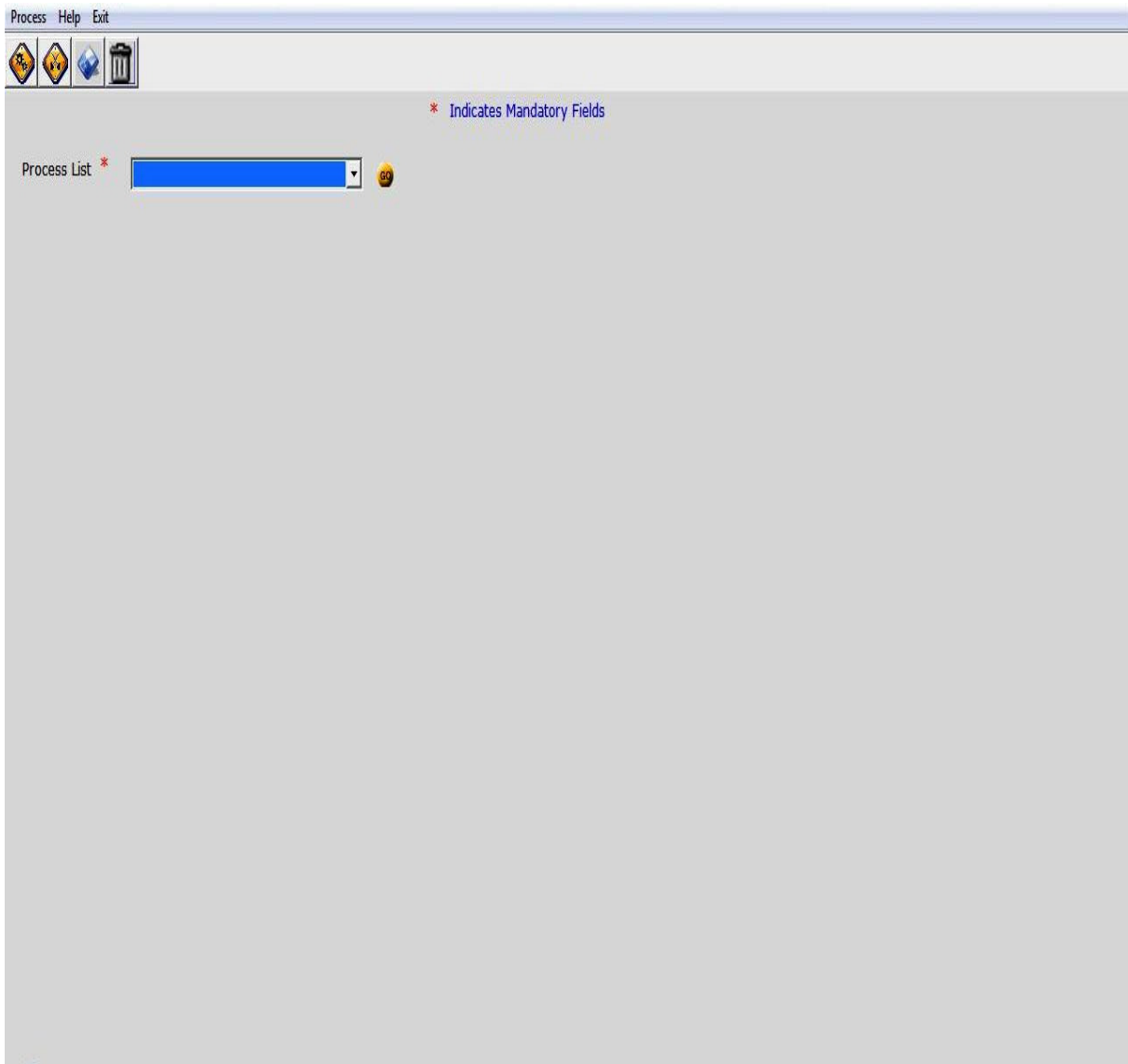


Fig: AZFAB Process page

Automation of Process in an Aggregate Business

The Process page consists of 'Process list' which contains different process names. User can either choose a process from the list or can create new process. Once the process is created then we move on to create the equipment page.

The equipment page consists of a drop down list of different equipments. User can select any number of equipments from the list. Even users can add new equipments and its characteristics here. If the selected equipment is washer, there is a separate provision to choose the selected equipment as washer.

* Indicates Mandatory Field

Equipment Name *

Is washer?

Characteristic		
Select	Sieve Size	GPM
<input type="checkbox"/>	1 1/2	
<input checked="" type="checkbox"/>	1 1/4	
<input type="checkbox"/>	1 1/8	
<input type="checkbox"/>	1	
<input type="checkbox"/>	3/4	
<input checked="" type="checkbox"/>	1/2	
<input type="checkbox"/>	3/8	
<input type="checkbox"/>	1/4	
<input type="checkbox"/>	#4	
<input type="checkbox"/>	#8	
<input checked="" type="checkbox"/>	#10	
<input type="checkbox"/>	#16	
<input checked="" type="checkbox"/>	#30	
<input type="checkbox"/>	#40	
<input type="checkbox"/>	#50	
<input type="checkbox"/>	#100	
<input type="checkbox"/>	#140	
<input type="checkbox"/>	#200	
<input type="checkbox"/>	Pan	

Fig: AZFAB Equipment page

4.2.3 Iteration 3: Development of Material Characteristics

This iteration of the development phase is one of the difficult phases of the project since it involves more calculation to find out the exact material characteristics. Calculation of material characteristics need details from the customers like what process they want, with which equipment(s) and what sieve sizes has to be used based on the calculated material characteristics, the system will determine what are the tests need to be performed for the particular process.

The screenshot shows a software window titled "Arizona Fine Aggregate Business-Material Characteristics". The window has a menu bar with "Process", "Help", and "Exit". Below the menu bar is a toolbar with four icons. The main area contains a form with the following fields:

- Process ***: A text input field containing "Process".
- Sampled By :**: A text input field.
- Sample Date:**: A date dropdown menu showing "6/30/2008".
- Sample Location:**: A text input field.
- Sampling Method:**: A text input field.
- Sampled where in plant:**: A text input field.

A legend indicates that an asterisk (*) denotes mandatory fields. Below the form is a table titled "Material Grid":

Sieve Size	Ind Wgt(g)	Acc Wgt(g)	%Ret	%Pass	Specs C-33	Specs Mortar
1 1/2	0	0	0	0		
1 1/4	0	0	0	0		
1 1/8	0	0	0	0		
1	0	0	0	0		
3/4	0	0	0	0		
1/2	0	0	0	0		
3/8	0	0	0	0		
1/4	0	0	0	0		

Below the table are three input fields:

- Original Sample Weight(dry):** 0
- Washed Sample Weight(dry):** 0
- Washout(%):**

At the bottom of the form are several more fields and buttons:

- Type of Tests Needed:** A text input field.
- Comments:** A text input field.
- Completed By:** A text input field.
- Date:** A date dropdown menu showing "6/30/2008".
- Back To Process List** and **Add Equipments** buttons.

Fig: AZFAB Material Characteristics page

Add Equipments for the Process:

Now we have developed the Process, its material characteristics and the equipments and its characteristics pages. So the next step is to select the equipments needed for the particular process. A process should have at least one equipment and can have a maximum of 'n' equipments. Even same equipment can be used twice but with different sieve sizes. Adding equipments to the particular process is the intermediate step.

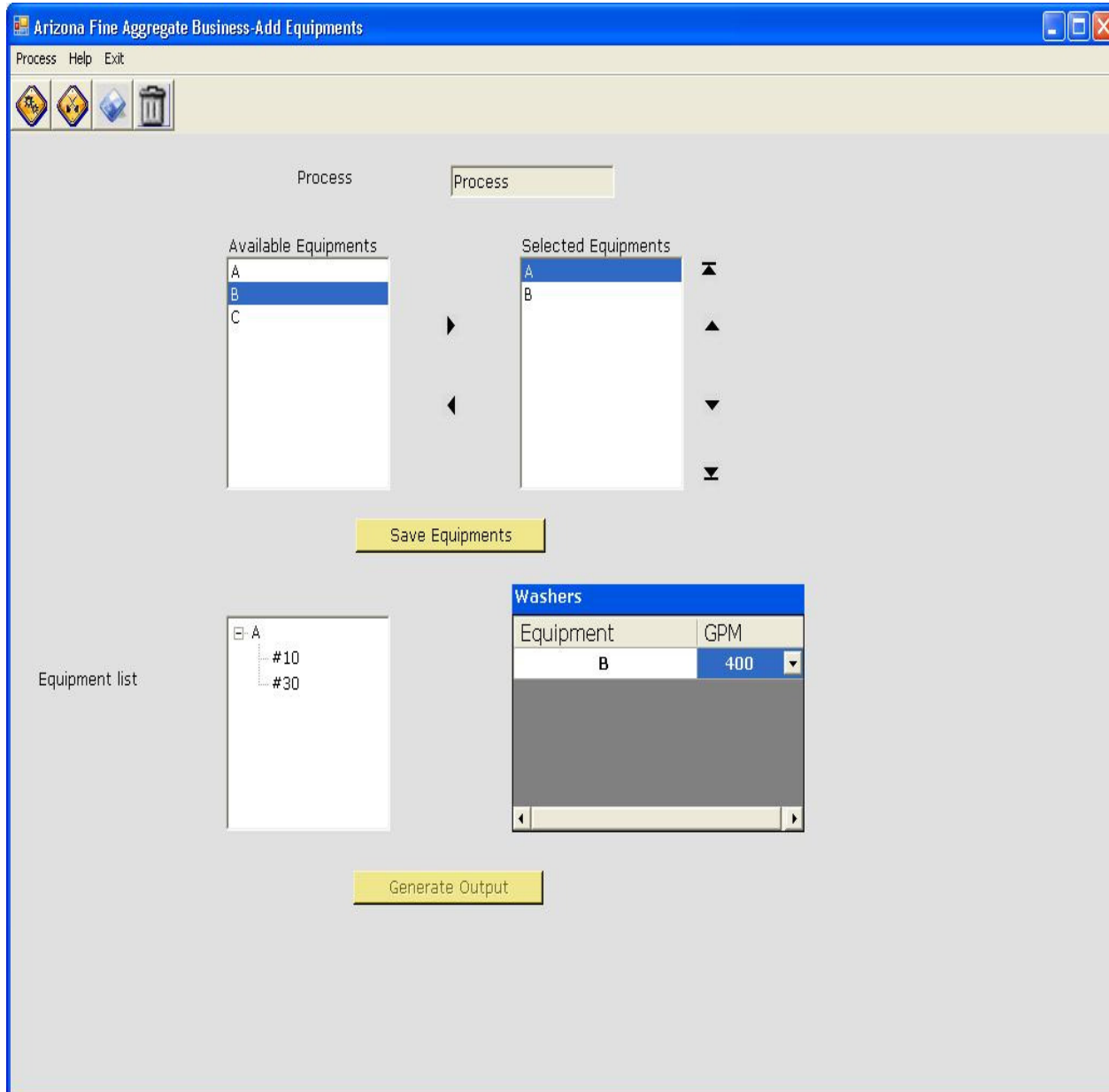


Fig: AZFAB Add Equipment page

4.2.4 Iteration 4: Calculate Process Output:

Calculating process output is the final iteration in the development phase with this we complete a cycle. At the end of this iteration we get the values of the given process which should be feed in the real system in order to get the desired output. Calculating the process output is a tough task since it is calculation intensive and it should collect information from all the previous pages namely the Process page, the material Characteristics page and the Equipment page. But since we have already calculated the material characteristics, material sizes and we know the type of equipments for the particular process we can calculate the final process output without much difficulty.

F_MS_Id	F_Qty
12	70.9
13	319.3
14	437.1
15	195.4
16	141
17	171.2
18	44.6
19	21.9
20	30.7
12	70.9
13	319.3
14	437.1
15	195.4
16	141
17	171.2
18	44.6
19	21.9
20	30.7
12	70.9
13	319.3
14	437.1
15	195.4
16	141
17	171.2
18	44.6
19	21.9
20	30.7
12	70.9

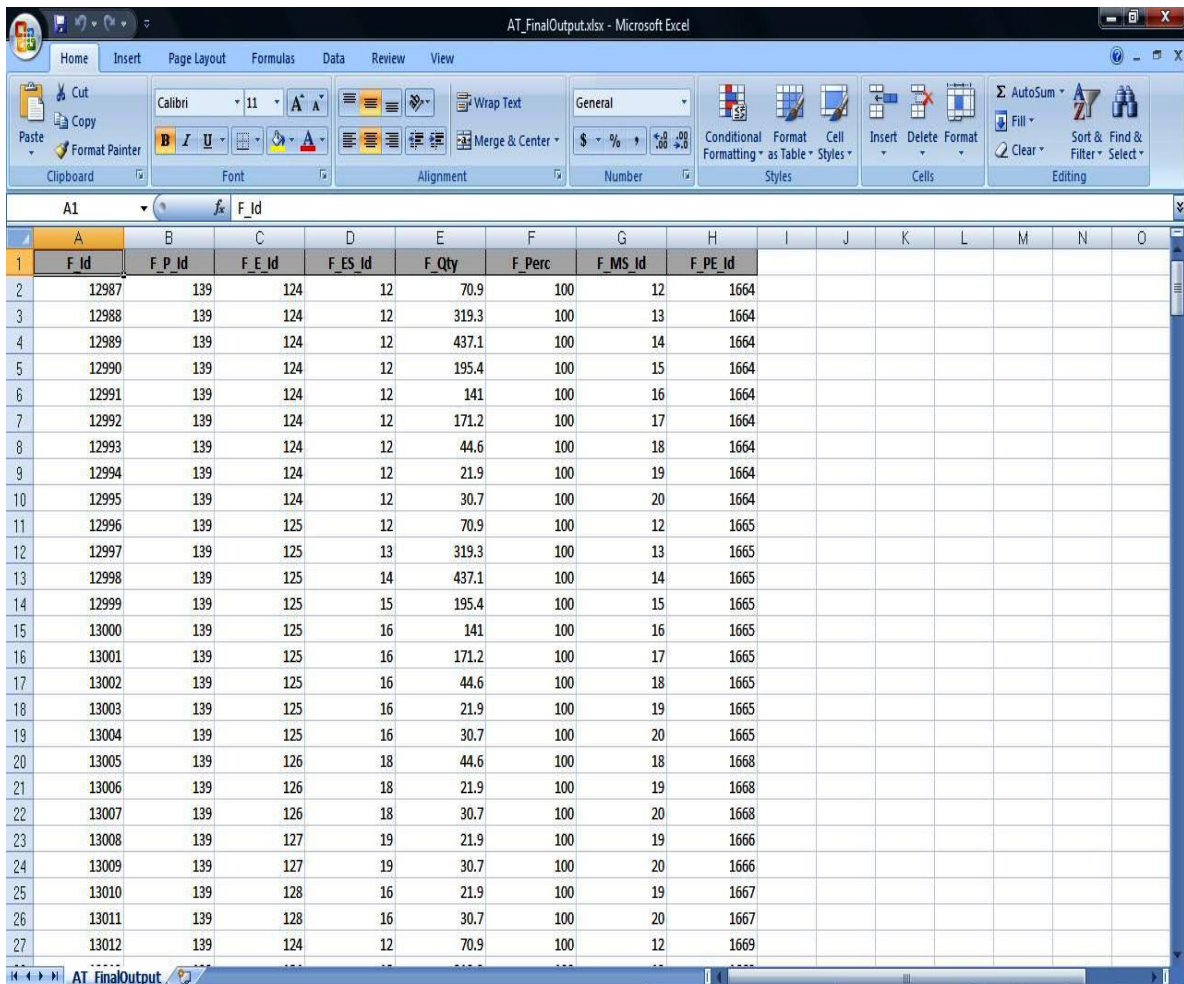
Fig: AZFAB sample Process output

4.2 Export Result:

Now we are at the final phase of the project. Once we calculate the process output, we need to export the output in any one of the following ways.

- As Excel
- As Word
- As PDF
- As HTML

I used Ms-Excel as the standard Process output exporter. The output file contains details about final output percentage, final output quantity, number of materials used, number of tests performed and many more details. The following diagram shows the sample result exported in an Excel sheet.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	F_Id	F_P_Id	F_E_Id	F_ES_Id	F_Qty	F_Perc	F_MS_Id	F_PE_Id							
2	12987	139	124	12	70.9	100	12	1664							
3	12988	139	124	12	319.3	100	13	1664							
4	12989	139	124	12	437.1	100	14	1664							
5	12990	139	124	12	195.4	100	15	1664							
6	12991	139	124	12	141	100	16	1664							
7	12992	139	124	12	171.2	100	17	1664							
8	12993	139	124	12	44.6	100	18	1664							
9	12994	139	124	12	21.9	100	19	1664							
10	12995	139	124	12	30.7	100	20	1664							
11	12996	139	125	12	70.9	100	12	1665							
12	12997	139	125	13	319.3	100	13	1665							
13	12998	139	125	14	437.1	100	14	1665							
14	12999	139	125	15	195.4	100	15	1665							
15	13000	139	125	16	141	100	16	1665							
16	13001	139	125	16	171.2	100	17	1665							
17	13002	139	125	16	44.6	100	18	1665							
18	13003	139	125	16	21.9	100	19	1665							
19	13004	139	125	16	30.7	100	20	1665							
20	13005	139	126	18	44.6	100	18	1668							
21	13006	139	126	18	21.9	100	19	1668							
22	13007	139	126	18	30.7	100	20	1668							
23	13008	139	127	19	21.9	100	19	1666							
24	13009	139	127	19	30.7	100	20	1666							
25	13010	139	128	16	21.9	100	19	1667							
26	13011	139	128	16	30.7	100	20	1667							
27	13012	139	124	12	70.9	100	12	1669							

Fig: AZFAB Final Output exported in an excel sheet

4.2 Testing Phase

Software Testing helps to identify bugs and hence leads to product improvement. This project is subjected to intermediate testing after each phase by the Quality Analysis team. But the final full testing is carried on using the testing phase. They performed manual testing in order to find bugs and to check whether all the requirements of the clients are satisfied by the developed application. After approval of the testing team that the developed application is free from bugs and it is satisfying all the requirements as specified by the clients, the application is sent to the Client for verification requirement and end-user testing.

CONCLUSION

The developed application was successfully delivered to the AZFAB Company in June 2010. They were fully satisfied with the application which we developed for them. As a conclusion to this thesis work, I would like to review few points about this application and the future plans about this AZFAB application.

5.1 Review & Future Work:

- The AZFAB application should not be understood as a fully automated application. It is just a windows application which reduces the physical calculating work of the machine and the end user.
- The final output given by the AZFAB application may result in significant changes if the equipments used in the process are changed or even the sieve size of the same equipment is changed.
- The material characteristics and the material sizes should be calculated before proceeding to calculate the final process output, if the user changes the equipment. However, after their introduction, it is appropriate to evaluate the new terms of work to examine the practical consequences of new measures.
- Since AZFAB application is developed for a US based company called AZFAB, after its delivery to the clients we only provide after sale support and maintenance to the application. We don't have any idea to improve this AZFAB application.

APPENDIX A

Database Tables:

AM_Equip_Properties			
EP_Id	EP_E_Id	EP_S_Id	EP_GPM
414	125	12	
415	125	13	
416	125	14	
417	125	15	
418	125	16	
419	126	18	500
420	127	19	
421	128	16	
436	124	12	
437	129	9	
438	130	8	

Insert values:

```
INSERT INTO AM_Equip_Properties ( EP_E_Id, EP_S_Id, EP_GPM )
```

```
VALUES (EP_E_Id, EP_S_Id, EP_GPM);
```

```
INSERT INTO AM_Equipment ( E_Name, E_Washer )
```

```
VALUES ([@ENAME], [@Washer]);
```


AM_Equipment			
E_Id	E_Name	E_Washer	E_Image
124	Wet Screen	No	
125	Classifying Tank	No	
126	Fine Material Washer	Yes	
127	Super Cutter	No	
128	Dewatering Screen	No	
129	Washer1	No	
130	washer2	No	

```
SELECT [AM_Specs].[S_Size], [AM_Equip_Properties].[EP_GPM]FROM AM_Specs LEFT  
JOIN AM_Equip_Properties ON [AM_Specs].[S_Id]=[AM_Equip_Properties].[EP_S_Id]WHERE  
[AM_Equip_Properties].[EP_E_Id]=[ @Equipmentid];
```

```
SELECT DISTINCT AM_Specs.S_Id, AM_Specs.S_SizeFROM AM_Specs INNER JOIN  
(AM_Equipment INNER JOIN AM_Equip_Properties ON  
AM_Equipment.E_Id=AM_Equip_Properties.EP_E_Id) ON  
AM_Specs.S_Id=AM_Equip_Properties.EP_S_Id
```

```
WHERE EP_E_Id=[ @Eid];SELECT [AM_Specs].[S_Id], [AM_Specs].[S_Size],  
[AM_Equip_Properties].[EP_GPM]FROM AM_Specs INNER JOIN (AM_Equipment INNER  
JOIN AM_Equip_Properties ON [AM_Equipment].[E_Id]=[AM_Equip_Properties].[EP_E_Id])  
ON [AM_Specs].[S_Id]=[AM_Equip_Properties].[EP_S_Id]
```

```
WHERE EP_E_Id=[ @Eid] And E_Washer=Yes;
```

AS_T_RetrieveEquipmentGPM		
S_Size	Expr1001	S_Id
1 1/2		1
1 1/4		2
1 1/8		3
1		4
3/4		5
1/2		6
3/8		8
1/4		9
#4		10
#8		11
#10		12
#16		13
#30		14
#40		15
#50		16
#100		17
#140		18
#200		19
Pan		20

```
SELECT [E_Name]

FROM AM_Equipment INNER JOIN AT_ProcessEquipment ON
AM_Equipment.E_Id=AT_ProcessEquipment.PE_E_Id

WHERE AT_ProcessEquipment.PE_P_Id=[@PE_P_Id]

ORDER BY [AT_ProcessEquipment].[PE_Sequence];
```

AM_Specs			
S_Id	S_Size	S_C33	S_Mortar
1	1 1/2		
2	1 1/4		
3	1 1/8		
4	1		
5	3/4		
6	1/2		
8	3/8		
9	1/4		
10	#4	95-100	100
11	#8	80-100	95-100
12	#10		
13	#16	50-85	70-100
14	#30	25-60	40-75
15	#40		
16	#50	5-30	20-40
17	#100	0-10	10-25
18	#140		
19	#200	0-3.0	0-10
20	Pan		

```
SELECT [S_Id]
```

```
FROM AM_Specs
```

```
WHERE S_Size=[@Size];
```

```
SELECT [AM_Specs].[S_Id]
```

```
FROM AM_Specs
```

```
WHERE S_Id>=[@NewS_Id] AND S_Id<[@PrevSIId];
```

Automation of Process in an Aggregate Business

AT_FinalOutput							
F_Id	F_P_Id	F_E_Id	F_ES_Id	F_Qty	F_Perc	F_MS_Id	F_PE_Id
12987	139	124	12	70.9	100	12	1664
12988	139	124	12	319.3	100	13	1664
12989	139	124	12	437.1	100	14	1664
12990	139	124	12	195.4	100	15	1664
12991	139	124	12	141	100	16	1664
12992	139	124	12	171.2	100	17	1664
12993	139	124	12	44.6	100	18	1664
12994	139	124	12	21.9	100	19	1664
12995	139	124	12	30.7	100	20	1664
12996	139	125	12	70.9	100	12	1665
12997	139	125	13	319.3	100	13	1665
12998	139	125	14	437.1	100	14	1665
12999	139	125	15	195.4	100	15	1665
13000	139	125	16	141	100	16	1665
13001	139	125	16	171.2	100	17	1665
13002	139	125	16	44.6	100	18	1665
13003	139	125	16	21.9	100	19	1665
13004	139	125	16	30.7	100	20	1665

Automation of Process in an Aggregate Business

AT_FinalOutput							
F_Id	F_P_Id	F_E_Id	F_ES_Id	F_Qty	F_Perc	F_MS_Id	F_PE_Id
13005	139	126	18	44.6	100	18	1668
13006	139	126	18	21.9	100	19	1668
13007	139	126	18	30.7	100	20	1668
13008	139	127	19	21.9	100	19	1666
13009	139	127	19	30.7	100	20	1666
13010	139	128	16	21.9	100	19	1667
13011	139	128	16	30.7	100	20	1667
13012	139	124	12	70.9	100	12	1669
13013	139	124	12	319.3	100	13	1669
13014	139	124	12	437.1	100	14	1669
13015	139	124	12	195.4	100	15	1669
13016	139	124	12	141	100	16	1669
13017	139	124	12	171.2	100	17	1669
13018	139	124	12	44.6	100	18	1669
13019	139	124	12	21.9	100	19	1669
13020	139	124	12	30.7	100	20	1669
13021	139	125	12	70.9	100	12	1670
13022	139	125	13	319.3	100	13	1670

Automation of Process in an Aggregate Business

AT_FinalOutput							
F_Id	F_P_Id	F_E_Id	F_ES_Id	F_Qty	F_Perc	F_MS_Id	F_PE_Id
13023	139	125	14	437.1	100	14	1670
13024	139	125	15	195.4	100	15	1670
13025	139	125	16	141	100	16	1670
13026	139	125	16	171.2	100	17	1670
13027	139	125	16	44.6	100	18	1670
13028	139	125	16	21.9	100	19	1670
13029	139	125	16	30.7	100	20	1670
13030	139	126	18	44.6	100	18	1673
13031	139	126	18	21.9	100	19	1673
13032	139	126	18	30.7	100	20	1673
13033	139	127	19	21.9	100	19	1671
13034	139	127	19	30.7	100	20	1671
13035	139	128	16	21.9	100	19	1672
13036	139	128	16	30.7	100	20	1672
13037	139	124	12	70.9	100	12	1674
13038	139	124	12	319.3	100	13	1674
13039	139	124	12	437.1	100	14	1674
13040	139	124	12	195.4	100	15	1674

Automation of Process in an Aggregate Business

AT_FinalOutput							
F_Id	F_P_Id	F_E_Id	F_ES_Id	F_Qty	F_Perc	F_MS_Id	F_PE_Id
13041	139	124	12	141	100	16	1674
13042	139	124	12	171.2	100	17	1674
13043	139	124	12	44.6	100	18	1674
13044	139	124	12	21.9	100	19	1674
13045	139	124	12	30.7	100	20	1674
13046	139	125	12	70.9	100	12	1675
13047	139	125	13	319.3	100	13	1675
13048	139	125	14	437.1	100	14	1675
13049	139	125	15	195.4	100	15	1675
13050	139	125	16	141	100	16	1675
13051	139	125	16	171.2	100	17	1675
13052	139	125	16	44.6	100	18	1675
13053	139	125	16	21.9	100	19	1675
13054	139	125	16	30.7	100	20	1675
13055	139	126	18	44.6	100	18	1678
13056	139	126	18	21.9	100	19	1678
13057	139	126	18	30.7	100	20	1678
13058	139	127	19	21.9	100	19	1676

Automation of Process in an Aggregate Business

AT_FinalOutput							
F_Id	F_P_Id	F_E_Id	F_ES_Id	F_Qty	F_Perc	F_MS_Id	F_PE_Id
13059	139	127	19	30.7	100	20	1676
13060	139	128	16	21.9	100	19	1677
13061	139	128	16	30.7	100	20	1677
13062	139	124	12	70.9	100	12	1679
13063	139	124	12	319.3	100	13	1679
13064	139	124	12	437.1	100	14	1679
13065	139	124	12	195.4	100	15	1679
13066	139	124	12	141	100	16	1679
13067	139	124	12	171.2	100	17	1679
13068	139	124	12	44.6	100	18	1679
13069	139	124	12	21.9	100	19	1679
13070	139	124	12	30.7	100	20	1679
13071	139	125	12	70.9	100	12	1680
13072	139	125	13	319.3	100	13	1680
13073	139	125	14	437.1	100	14	1680
13074	139	125	15	195.4	100	15	1680
13075	139	125	16	141	100	16	1680
13076	139	125	16	171.2	100	17	1680

Automation of Process in an Aggregate Business

AT_FinalOutput							
F_Id	F_P_Id	F_E_Id	F_ES_Id	F_Qty	F_Perc	F_MS_Id	F_PE_Id
13077	139	125	16	44.6	100	18	1680
13078	139	125	16	21.9	100	19	1680
13079	139	125	16	30.7	100	20	1680
13080	139	126	18	44.6	100	18	1683
13081	139	126	18	21.9	100	19	1683
13082	139	126	18	30.7	100	20	1683
13083	139	127	19	21.9	100	19	1681
13084	139	127	19	30.7	100	20	1681
13085	139	128	16	21.9	100	19	1682
13086	139	128	16	30.7	100	20	1682
13087	139	124	12	70.9	100	12	1688
13088	139	124	12	319.3	100	13	1688
13089	139	124	12	437.1	100	14	1688
13090	139	124	12	195.4	100	15	1688
13091	139	124	12	141	100	16	1688
13092	139	124	12	171.2	100	17	1688
13093	139	124	12	44.6	100	18	1688
13094	139	124	12	21.9	100	19	1688

Automation of Process in an Aggregate Business

AT_FinalOutput							
F_Id	F_P_Id	F_E_Id	F_ES_Id	F_Qty	F_Perc	F_MS_Id	F_PE_Id
13095	139	124	12	30.7	100	20	1688
13096	139	125	12	70.9	100	12	1689
13097	139	125	13	319.3	100	13	1689
13098	139	125	14	437.1	100	14	1689
13099	139	125	15	195.4	100	15	1689
13100	139	125	16	141	100	16	1689
13101	139	125	16	171.2	100	17	1689
13102	139	125	16	44.6	100	18	1689
13103	139	125	16	21.9	100	19	1689
13104	139	125	16	30.7	100	20	1689
13105	139	126	18	44.6	100	18	1692
13106	139	126	18	21.9	100	19	1692
13107	139	126	18	30.7	100	20	1692
13108	139	127	19	21.9	100	19	1690
13109	139	127	19	30.7	100	20	1690
13110	139	128	16	21.9	100	19	1691
13111	139	128	16	30.7	100	20	1691
13112	139	124	12	70.9	100	12	1693

Automation of Process in an Aggregate Business

AT_FinalOutput							
F_Id	F_P_Id	F_E_Id	F_ES_Id	F_Qty	F_Perc	F_MS_Id	F_PE_Id
13113	139	124	12	319.3	100	13	1693
13114	139	124	12	437.1	100	14	1693
13115	139	124	12	195.4	100	15	1693
13116	139	124	12	141	100	16	1693
13117	139	124	12	171.2	100	17	1693
13118	139	124	12	44.6	100	18	1693
13119	139	124	12	21.9	100	19	1693
13120	139	124	12	30.7	100	20	1693
13121	139	125	12	70.9	100	12	1694
13122	139	125	13	319.3	100	13	1694
13123	139	125	14	437.1	100	14	1694
13124	139	125	15	195.4	100	15	1694
13125	139	125	16	141	100	16	1694
13126	139	125	16	171.2	100	17	1694
13127	139	125	16	44.6	100	18	1694
13128	139	125	16	21.9	100	19	1694
13129	139	125	16	30.7	100	20	1694
13130	139	126	18	44.6	100	18	1696

Automation of Process in an Aggregate Business

AT_FinalOutput							
F_Id	F_P_Id	F_E_Id	F_ES_Id	F_Qty	F_Perc	F_MS_Id	F_PE_Id
13131	139	126	18	21.9	100	19	1696
13132	139	126	18	30.7	100	20	1696
13133	139	127	19	21.9	100	19	1695
13134	139	127	19	30.7	100	20	1695
13135	139	124	12	70.9	100	12	1697
13136	139	124	12	319.3	100	13	1697
13137	139	124	12	437.1	100	14	1697
13138	139	124	12	195.4	100	15	1697
13139	139	124	12	141	100	16	1697
13140	139	124	12	171.2	100	17	1697
13141	139	124	12	44.6	100	18	1697
13142	139	124	12	21.9	100	19	1697
13143	139	124	12	30.7	100	20	1697
13144	139	125	12	70.9	100	12	1698
13145	139	125	13	319.3	100	13	1698
13146	139	125	14	437.1	100	14	1698
13147	139	125	15	195.4	100	15	1698
13148	139	125	16	141	100	16	1698

Automation of Process in an Aggregate Business

AT_FinalOutput							
F_Id	F_P_Id	F_E_Id	F_ES_Id	F_Qty	F_Perc	F_MS_Id	F_PE_Id
13149	139	125	16	171.2	100	17	1698
13150	139	125	16	44.6	100	18	1698
13151	139	125	16	21.9	100	19	1698
13152	139	125	16	30.7	100	20	1698
13153	139	126	18	44.6	100	18	1700
13154	139	126	18	21.9	100	19	1700
13155	139	126	18	30.7	100	20	1700
13156	139	127	19	21.9	100	19	1699
13157	139	127	19	30.7	100	20	1699
13158	139	124	12	70.9	100	12	1701
13159	139	124	12	319.3	100	13	1701
13160	139	124	12	437.1	100	14	1701
13161	139	124	12	195.4	100	15	1701
13162	139	124	12	141	100	16	1701
13163	139	124	12	171.2	100	17	1701
13164	139	124	12	44.6	100	18	1701
13165	139	124	12	21.9	100	19	1701
13166	139	124	12	30.7	100	20	1701

Automation of Process in an Aggregate Business

AT_FinalOutput							
F_Id	F_P_Id	F_E_Id	F_ES_Id	F_Qty	F_Perc	F_MS_Id	F_PE_Id
13167	139	125	12	70.9	100	12	1702
13168	139	125	13	319.3	100	13	1702
13169	139	125	14	437.1	100	14	1702
13170	139	125	15	195.4	100	15	1702
13171	139	125	16	141	100	16	1702
13172	139	125	16	171.2	100	17	1702
13173	139	125	16	44.6	100	18	1702
13174	139	125	16	21.9	100	19	1702
13175	139	125	16	30.7	100	20	1702
13176	139	126	18	44.6	100	18	1706
13177	139	126	18	21.9	100	19	1706
13178	139	126	18	30.7	100	20	1706
13179	139	126	18	44.6	100	18	1707
13180	139	126	18	21.9	100	19	1707
13181	139	126	18	30.7	100	20	1707
13182	139	127	19	21.9	100	19	1703
13183	139	127	19	30.7	100	20	1703
13184	139	128	16	21.9	100	19	1704

Automation of Process in an Aggregate Business

AT_FinalOutput							
F_Id	F_P_Id	F_E_Id	F_ES_Id	F_Qty	F_Perc	F_MS_Id	F_PE_Id
13185	139	128	16	30.7	100	20	1704
13186	139	128	16	21.9	100	19	1705
13187	139	128	16	30.7	100	20	1705
13188	139	124	12	70.9	100	12	1708
13189	139	124	12	319.3	100	13	1708
13190	139	124	12	437.1	100	14	1708
13191	139	124	12	195.4	100	15	1708
13192	139	124	12	141	100	16	1708
13193	139	124	12	171.2	100	17	1708
13194	139	124	12	44.6	100	18	1708
13195	139	124	12	21.9	100	19	1708
13196	139	124	12	30.7	100	20	1708
13197	139	125	12	70.9	100	12	1709
13198	139	125	13	319.3	100	13	1709
13199	139	125	14	437.1	100	14	1709
13200	139	125	15	195.4	100	15	1709
13201	139	125	16	141	100	16	1709
13202	139	125	16	171.2	100	17	1709

Automation of Process in an Aggregate Business

AT_FinalOutput							
F_Id	F_P_Id	F_E_Id	F_ES_Id	F_Qty	F_Perc	F_MS_Id	F_PE_Id
13203	139	125	16	44.6	100	18	1709
13204	139	125	16	21.9	100	19	1709
13205	139	125	16	30.7	100	20	1709
13206	139	126	18	44.6	100	18	1712
13207	139	126	18	21.9	100	19	1712
13208	139	126	18	30.7	100	20	1712
13209	139	127	19	21.9	100	19	1710
13210	139	127	19	30.7	100	20	1710
13211	139	128	16	21.9	100	19	1711
13212	139	128	16	30.7	100	20	1711
13213	139	125	12	70.9	100	12	1713
13214	139	125	13	319.3	100	13	1713
13215	139	125	14	437.1	100	14	1713
13216	139	125	15	195.4	100	15	1713
13217	139	125	16	141	100	16	1713
13218	139	125	16	171.2	100	17	1713
13219	139	125	16	44.6	100	18	1713
13220	139	125	16	21.9	100	19	1713

Automation of Process in an Aggregate Business

AT_FinalOutput							
F_Id	F_P_Id	F_E_Id	F_ES_Id	F_Qty	F_Perc	F_MS_Id	F_PE_Id
13221	139	125	16	30.7	100	20	1713
13222	139	126	18	44.6	100	18	1724
13223	139	126	18	21.9	100	19	1724
13224	139	126	18	30.7	100	20	1724
13225	139	127	19	21.9	100	19	1714
13226	139	127	19	30.7	100	20	1714
13227	139	128	16	21.9	100	19	1715
13228	139	128	16	30.7	100	20	1715
13229	139	124	12	21.9	100	19	1716
13230	139	124	12	30.7	100	20	1716
13231	139	125	12	70.9	100	12	1717
13232	139	125	13	319.3	100	13	1717
13233	139	125	14	437.1	100	14	1717
13234	139	125	15	195.4	100	15	1717
13235	139	125	16	141	100	16	1717
13236	139	125	16	171.2	100	17	1717
13237	139	125	16	44.6	100	18	1717
13238	139	125	16	21.9	100	19	1717

Automation of Process in an Aggregate Business

AT_FinalOutput							
F_Id	F_P_Id	F_E_Id	F_ES_Id	F_Qty	F_Perc	F_MS_Id	F_PE_Id
13239	139	125	16	30.7	100	20	1717
13240	139	127	19	21.9	100	19	1718
13241	139	127	19	30.7	100	20	1718
13242	139	127	19	21.9	100	19	1719
13243	139	127	19	30.7	100	20	1719
13244	139	125	12	70.9	100	12	1720
13245	139	125	13	319.3	100	13	1720
13246	139	125	14	437.1	100	14	1720
13247	139	125	15	195.4	100	15	1720
13248	139	125	16	141	100	16	1720
13249	139	125	16	171.2	100	17	1720
13250	139	125	16	44.6	100	18	1720
13251	139	125	16	21.9	100	19	1720
13252	139	125	16	30.7	100	20	1720
13253	139	126	18	44.6	100	18	1725
13254	139	126	18	21.9	100	19	1725
13255	139	126	18	30.7	100	20	1725
13256	139	127	19	21.9	100	19	1721

Automation of Process in an Aggregate Business

AT_FinalOutput							
F_Id	F_P_Id	F_E_Id	F_ES_Id	F_Qty	F_Perc	F_MS_Id	F_PE_Id
13257	139	127	19	30.7	100	20	1721
13258	139	128	16	21.9	100	19	1722
13259	139	128	16	30.7	100	20	1722
13260	139	125	12	70.9	100	12	1723
13261	139	125	13	319.3	100	13	1723
13262	139	125	14	437.1	100	14	1723
13263	139	125	15	195.4	100	15	1723
13264	139	125	16	141	100	16	1723
13265	139	125	16	171.2	100	17	1723
13266	139	125	16	44.6	100	18	1723
13267	139	125	16	21.9	100	19	1723
13268	139	125	16	30.7	100	20	1723
13269	139	125	12	70.9	100	12	1726
13270	139	125	13	319.3	100	13	1726
13271	139	125	14	437.1	100	14	1726
13272	139	125	15	195.4	100	15	1726
13273	139	125	16	141	100	16	1726
13274	139	125	16	171.2	100	17	1726

Automation of Process in an Aggregate Business

AT_FinalOutput							
F_Id	F_P_Id	F_E_Id	F_ES_Id	F_Qty	F_Perc	F_MS_Id	F_PE_Id
13275	139	125	16	44.6	100	18	1726
13276	139	125	16	21.9	100	19	1726
13277	139	125	16	30.7	100	20	1726
13278	139	126	18	44.6	100	18	1729
13279	139	126	18	21.9	100	19	1729
13280	139	126	18	30.7	100	20	1729
13281	139	127	19	21.9	100	19	1727
13282	139	127	19	30.7	100	20	1727
13283	139	128	16	21.9	100	19	1728
13284	139	128	16	30.7	100	20	1728
13285	139	124	12	70.9	100	12	1730
13286	139	124	12	319.3	100	13	1730
13287	139	124	12	437.1	100	14	1730
13288	139	124	12	195.4	100	15	1730
13289	139	124	12	141	100	16	1730
13290	139	124	12	171.2	100	17	1730
13291	139	124	12	44.6	100	18	1730
13292	139	124	12	21.9	100	19	1730

Automation of Process in an Aggregate Business

AT_FinalOutput							
F_Id	F_P_Id	F_E_Id	F_ES_Id	F_Qty	F_Perc	F_MS_Id	F_PE_Id
13293	139	124	12	30.7	100	20	1730
13294	139	125	12	70.9	100	12	1731
13295	139	125	13	319.3	100	13	1731
13296	139	125	14	437.1	100	14	1731
13297	139	125	15	195.4	100	15	1731
13298	139	125	16	141	100	16	1731
13299	139	125	16	171.2	100	17	1731
13300	139	125	16	44.6	100	18	1731
13301	139	125	16	21.9	100	19	1731
13302	139	125	16	30.7	100	20	1731
13303	139	126	18	44.6	100	18	1734
13304	139	126	18	21.9	100	19	1734
13305	139	126	18	30.7	100	20	1734
13306	139	127	19	21.9	100	19	1732
13307	139	127	19	30.7	100	20	1732
13308	139	128	16	21.9	100	19	1733
13309	139	128	16	30.7	100	20	1733

APPENDIX B

Screenshot of the software codes:

```
1 #region Import
2 using System;
3 using System.Drawing;
4 using System.Collections;
5 using System.ComponentModel;
6 using System.Windows.Forms;
7 using System.Data;
8 using System.Data.OleDb;
9 using Softgroup.NetResize;
10 using System.Globalization;
11 #endregion
12 namespace AZFAB
13 {
14     /// <summary>
15     /// Summary description for MaterialCharacteristics.
16     /// </summary>
17     ///
18
19     public class MaterialCharacteristics : System.Windows.Forms.Form
20     {
21
22         #region Declaration
23         //10th july
24         public int processIDValue;
25         private DataSet dSet = new DataSet();
26
27         private static double ExceIndWgt = 0;
28         private static double ExcelAccWidget = 0;
29         public static double washedsample = 0;
30
31         private Softgroup.NetResize.NetResize MaterialCharacteristicsNetResize;
32         bool check = false;
33
34         // private Jalindi.RapidLayout .RapidLayoutPanel materialresize;
35
36     }
37 }
```

C# source file nb char: 80883 Ln:1 Col:1 Sel:0 UNIX ANSI INS

Codes of Home Page:

```
using Softgroup.NetResize;
```

```
namespace AZFAB
```

```
{
```

```
    public class Form1 : System.Windows.Forms.Form
```

```
    {
```

```
        private Softgroup.NetResize.NetResize Form1NetResize;
```

```
        #region Declarations
```

```
        Equipments frmEQUIPMENTS = new Equipments();
```

```
        Process frmPROCESS = new Process();
```

```
        AddEquipments frmAddEquipments = new AddEquipments();
```

```
        MaterialCharacteristics frmMaterialCharacteristics = new MaterialCharacteristics();
```

```
        private System.Windows.Forms.MainMenu mainMenu1;
```

```
        private System.Windows.Forms.MenuItem menuItem1;
```

```
        private System.Windows.Forms.MenuItem menuProcesslist;
```

```
        private System.Windows.Forms.MenuItem menuEquipment;
```

```
        private System.Windows.Forms.MenuItem Exit;
```

```
        private System.Windows.Forms.ImageList imgListToolbar;
```

```
        private System.Windows.Forms.ToolBar toolBar1;
```

```
        private System.Windows.Forms.ToolBarButton toolBarButton1;
```

```
        private System.Windows.Forms.ToolBarButton toolBarButton2;
```

```
        private System.Windows.Forms.ToolBarButton toolBarButton3;
```

```
        private System.Windows.Forms.ToolBarButton toolBarButton4;
```



```
public System.Windows.Forms.PictureBox pictureBox1;

public System.Windows.Forms.Label lblERRORMESSAGE;

private System.Windows.Forms.Label label3;

private System.Windows.Forms.Label label2;

private System.Windows.Forms.Label label1;

public System.Windows.Forms.TextBox txtPROCESSNAME;

private System.Windows.Forms.Label lblPROCESSLIST;

public System.Windows.Forms.ComboBox cmbPROCESSLIST;

public string processListValue;

#endregion

private MenuItem menuHelp;

private MenuItem menuAbout;

private System.ComponentModel.IContainer components;

public Form1()
{
    InitializeComponent();
}

protected override void Dispose(bool disposing)
{
    if (disposing)
    {
        if (components != null)
        {
            components.Dispose();
        }
    }
}
```

```
    }  
  
    }  
  
    base.Dispose(disposing);  
  
    }  
  
#region Windows Form Designer generated code  
  
    /// <summary>  
    /// Required method for Designer support - do not modify  
    /// the contents of this method with the code editor.  
    /// </summary>  
  
    private void InitializeComponent()  
    {  
  
        this.components = new System.ComponentModel.Container();  
  
        System.ComponentModel.ComponentResourceManager resources = new  
System.ComponentModel.ComponentResourceManager(typeof(Form1));  
  
        this.imgListToolBar = new System.Windows.Forms.ImageList(this.components);  
  
        this.mainMenu1 = new System.Windows.Forms.MainMenu(this.components);  
  
        this.menuItem1 = new System.Windows.Forms.MenuItem();  
  
        this.menuProcesslist = new System.Windows.Forms.MenuItem();  
  
        this.menuEquipment = new System.Windows.Forms.MenuItem();  
  
        this.menuHelp = new System.Windows.Forms.MenuItem();  
  
        this.menuAbout = new System.Windows.Forms.MenuItem();  
  
        this.Exit = new System.Windows.Forms.MenuItem();
```

```
this.toolBar1 = new System.Windows.Forms.ToolBar();

this.toolBarButton1 = new System.Windows.Forms.ToolBarButton();

this.toolBarButton2 = new System.Windows.Forms.ToolBarButton();

this.toolBarButton3 = new System.Windows.Forms.ToolBarButton();

this.toolBarButton4 = new System.Windows.Forms.ToolBarButton();

this.lblERRORMESSAGE = new System.Windows.Forms.Label();

this.label3 = new System.Windows.Forms.Label();

this.label2 = new System.Windows.Forms.Label();

this.label1 = new System.Windows.Forms.Label();

this.txtPROCESSNAME = new System.Windows.Forms.TextBox();

this.lblPROCESSLIST = new System.Windows.Forms.Label();

this.cmbPROCESSLIST = new System.Windows.Forms.ComboBox();

this.pictureBox1 = new System.Windows.Forms.PictureBox();

((System.ComponentModel.ISupportInitialize)(this.pictureBox1)).BeginInit();

this.SuspendLayout();

//

// imgListToolbar

//

this.imgListToolbar.ImageStream =

((System.Windows.Forms.ImageListStreamer)(resources.GetObject("imgListToolbar.ImageStream"

)));

this.imgListToolbar.TransparentColor = System.Drawing.Color.Transparent;

this.imgListToolbar.Images.SetKeyName(0, "");

this.imgListToolbar.Images.SetKeyName(1, "");
```

```
this.imgListToolbar.Images.SetKeyName(2, "");

this.imgListToolbar.Images.SetKeyName(3, "");

//

// mainMenu1

//

this.mainMenu1.MenuItems.AddRange(new System.Windows.Forms.MenuItem[] {

this.menuItem1,

this.menuHelp,

this.Exit});

//

// menuItem1

//

this.menuItem1.Index = 0;

this.menuItem1.MdiList = true;

this.menuItem1.MenuItems.AddRange(new System.Windows.Forms.MenuItem[] {

this.menuProcesslist,

this.menuEquipment});

this.menuItem1.RadioCheck = true;

this.menuItem1.Text = "&Process";

        this.menuEquipment.Index = 1;

this.menuEquipment.Shortcut = System.Windows.Forms.Shortcut.CtrlE;

this.menuEquipment.Text = "&Equipments";

this.menuEquipment.Click += new System.EventHandler(this.menuEquipment_Click);
```

```
this.menuHelp.Index = 1;

this.menuHelp.MenuItems.AddRange(new System.Windows.Forms.MenuItem[] {

this.menuAbout});

this.menuHelp.Text = "Help";

this.menuAbout.Index = 0;

this.menuAbout.Text = "About";

this.menuAbout.Click += new System.EventHandler(this.menuAbout_Click);

this.Exit.Index = 2;

this.Exit.Shortcut = System.Windows.Forms.Shortcut.CtrlX;

this.Exit.Text = "E&xit";

this.Exit.Click += new System.EventHandler(this.Exit_Click);

this.toolBar1.Buttons.AddRange(new System.Windows.Forms.ToolBarButton[] {

this.toolBarButton1,

this.toolBarButton2,

this.toolBarButton3,

this.toolBarButton4});

this.toolBar1.DropDownArrows = true;

this.toolBar1.ImageList = this.imgListToolbar;

this.toolBar1.Location = new System.Drawing.Point(0, 0);

this.toolBar1.Name = "toolBar1";

this.toolBar1.ShowToolTips = true;

this.toolBar1.Size = new System.Drawing.Size(1026, 42);

this.toolBar1.TabIndex = 0;
```

```
this.toolBar1.ButtonClick += new
System.Windows.Forms.ToolBarButtonClickEventHandler(this.toolBar1_ButtonClick);

    this.toolBarButton1.ImageIndex = 0;

this.toolBarButton1.Name = "toolBarButton1";

this.toolBarButton1.ToolTipText = "Process";

this.toolBarButton2.ImageIndex = 1;

this.toolBarButton2.Name = "toolBarButton2";

this.toolBarButton2.ToolTipText = "Equipments";

    this.toolBarButton3.ImageIndex = 2;

this.toolBarButton3.Name = "toolBarButton3";

this.toolBarButton3.ToolTipText = "Save";

this.toolBarButton4.ImageIndex = 3;

this.toolBarButton4.Name = "toolBarButton4";

this.toolBarButton4.ToolTipText = "Delete";

    this.lblERRORMESSAGE.BackColor =
System.Drawing.Color.FromArgb(((int)(((byte)(224)))), ((int)(((byte)(224)))),
((int)(((byte)(224)))));

    this.lblERRORMESSAGE.Font = new System.Drawing.Font("Verdana", 9.75F,
System.Drawing.FontStyle.Regular, System.Drawing.GraphicsUnit.Point, ((byte)(0)));

this.lblERRORMESSAGE.ForeColor = System.Drawing.Color.Red;

this.lblERRORMESSAGE.Location = new System.Drawing.Point(155, 128);

this.lblERRORMESSAGE.Name = "lblERRORMESSAGE";

this.lblERRORMESSAGE.Size = new System.Drawing.Size(223, 10);

this.lblERRORMESSAGE.TabIndex = 18;
```

```
this.label3.Font = new System.Drawing.Font("Verdana", 9.75F,  
System.Drawing.FontStyle.Regular, System.Drawing.GraphicsUnit.Point, ((byte)0));
```

```
this.label3.ForeColor = System.Drawing.Color.Blue;
```

```
this.label3.Location = new System.Drawing.Point(503, 47);
```

```
this.label3.Name = "label3";
```

```
this.label3.Size = new System.Drawing.Size(200, 24);
```

```
this.label3.TabIndex = 17;
```

```
this.label3.Text = "Indicates Mandatory Fields";
```

```
        this.label2.Font = new System.Drawing.Font("Verdana", 12F,  
System.Drawing.FontStyle.Regular, System.Drawing.GraphicsUnit.Point, ((byte)0));
```

```
this.label2.ForeColor = System.Drawing.Color.Red;
```

```
this.label2.Location = new System.Drawing.Point(479, 47);
```

```
this.label2.Name = "label2";
```

```
this.label2.Size = new System.Drawing.Size(16, 16);
```

```
this.label2.TabIndex = 16;
```

```
this.label2.Text = "*";
```

```
this.label2.TextAlign = System.Drawing.ContentAlignment.TopRight;
```

```
        this.label1.Font = new System.Drawing.Font("Verdana", 12F,  
System.Drawing.FontStyle.Regular, System.Drawing.GraphicsUnit.Point, ((byte)0));
```

```
this.label1.ForeColor = System.Drawing.Color.Red;
```

```
this.label1.Location = new System.Drawing.Point(103, 85);
```

```
this.label1.Name = "label1";
```

```
this.label1.Size = new System.Drawing.Size(18, 14);
```

```
this.label1.TabIndex = 15;
```

```
this.label1.Text = "*";

this.label1.TextAlign = System.Drawing.ContentAlignment.TopRight;

        this.txtPROCESSNAME.Font = new System.Drawing.Font("Verdana", 9.75F,
System.Drawing.FontStyle.Regular, System.Drawing.GraphicsUnit.Point, ((byte)0));

this.txtPROCESSNAME.Location = new System.Drawing.Point(143, 89);

this.txtPROCESSNAME.MaxLength = 50;

this.txtPROCESSNAME.Name = "txtPROCESSNAME";

this.txtPROCESSNAME.Size = new System.Drawing.Size(264, 23);

this.txtPROCESSNAME.TabIndex = 14;

this.txtPROCESSNAME.Visible = false;

this.txtPROCESSNAME.TextChanged += new
System.EventHandler(this.txtPROCESSNAME_TextChanged);

this.lblPROCESSLIST.Font = new System.Drawing.Font("Verdana", 9.75F,
System.Drawing.FontStyle.Regular, System.Drawing.GraphicsUnit.Point, ((byte)0));

this.lblPROCESSLIST.Location = new System.Drawing.Point(7, 85);

this.lblPROCESSLIST.Name = "lblPROCESSLIST";

this.lblPROCESSLIST.Size = new System.Drawing.Size(104, 24);

this.lblPROCESSLIST.TabIndex = 13;

this.lblPROCESSLIST.Text = "Process List";

this.lblPROCESSLIST.TextAlign = System.Drawing.ContentAlignment.MiddleCenter;

        this.cmbPROCESSLIST.DropDownStyle =
System.Windows.Forms.ComboBoxStyle.DropDownList;

this.cmbPROCESSLIST.Font = new System.Drawing.Font("Verdana", 9.75F,
System.Drawing.FontStyle.Regular, System.Drawing.GraphicsUnit.Point, ((byte)0));

this.cmbPROCESSLIST.Location = new System.Drawing.Point(143, 88);
```



```
this.cmbPROCESSLIST.Name = "cmbPROCESSLIST";

this.cmbPROCESSLIST.Size = new System.Drawing.Size(264, 24);

this.cmbPROCESSLIST.TabIndex = 12;

this.cmbPROCESSLIST.SelectedIndexChanged += new
System.EventHandler(this.cmbPROCESSLIST_SelectedIndexChanged);

        this.pictureBox1.BackgroundImage =
((System.Drawing.Image)(resources.GetObject("pictureBox1.BackgroundImage")));

this.pictureBox1.Location = new System.Drawing.Point(422, 91);

this.pictureBox1.Name = "pictureBox1";

this.pictureBox1.Size = new System.Drawing.Size(20, 18);

this.pictureBox1.TabIndex = 19;

this.pictureBox1.TabStop = false;

this.pictureBox1.Click += new System.EventHandler(this.pictureBox1_Click);

this.AutoScroll = true;

this.BackColor = System.Drawing.Color.FromArgb(((int)(((byte)(224)))),
((int)(((byte)(224)))), ((int)(((byte)(224)))));

this.ClientSize = new System.Drawing.Size(1026, 702);

this.Controls.Add(this.pictureBox1);

this.Controls.Add(this.lblERRORMESSAGE);

this.Controls.Add(this.label3);

this.Controls.Add(this.label2);

this.Controls.Add(this.label1);

this.Controls.Add(this.txtPROCESSNAME);

this.Controls.Add(this.lblPROCESSLIST);
```

```
{
    return false;
}
}
return true;
}
#endregion
private void txtPROCESSNAME_TextChanged(object sender, EventArgs e)
{
}
private void menuAbout_Click(object sender, EventArgs e)
{
    MessageBox.Show("AZFAB Version 1.0, developed by Dhithi Infoserve Pvt. Ltd ");
}
}
}
```

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