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| System Overview |
| FEDORA AUTOMATION is an Automated Feedmill Control System using Siemens PLC powered by Ignition. The Siemens PLC is a powerful integrated software solution for automation .Ignition is a software platform for creating human machine interface (HMI), supervisory control and data acquisition (SCADA), manufacturing execution system (MES), and industrial internet of things applications. The Ignition gateway is the key for the PLC’s and database to communicate bidirectinally for it has built in PLC and database drivers. The FEDORA AUTOMATION is accompanied by a third party contractor METROLOGYX INDUSTRIAL AUTOMATION. |
| Significance of the study |
| The proposed System will provide great benefit to the following :  FEEDMILL CREW   * The System will provide efficient and lessen time process of for receiving of raw materials. * The System helps achieve maximum uptime and productivity. * The System is integrated with a barcode scanner for the receiving end of raw materials. * Monitoring of stock quantity for each raw materials. * The system provides a planner to signal the warehouse crew of what production for today is. * Provides Inventory Management system and Mobile Application Quality Assurance Checklist. |

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| Methodology of the Study |
| **Requirement & Analysis**  **Design**  **Coding**  **Testing**  **Implementation**  **Maintenance**  Requirement and Analysis: Researchers conduct meetings, interview with the Proponent, collect important templates and gather all possible requirements for the  System.  Design: The requirement specifications from first phase are studied in this phase and the  System design is prepared. This system design helps in specifying system  Requirements and helps in defining the overall system architecture.  Coding: The actual source code is finally written in this phase. Implementing all charts, logic  and information that were specified in the prior phases.  Testing: During this stage, tester must discover and report within the system that need to  be resolved and bugs must be eliminated .  Implementation: During this phase primary users will use the system for parallel run, if  Bugs and error occur, user must report the error for system improvement.  Maintenance: During this phase, System is finally deployed and there are some issues  Which come up in the client environment. To fix those issues, patches are released. Also to  Enhance the system, some better versions are released. Maintenance is done to deliver  these changes in the customer environment .  Planning  In this phase we conduct different kinds of ways on how to gather information and  Data. Here are some of the following:  Data Gathering:  Researchers gather data thru sample excel templates of their old process and  Meeting, meetings and interview. Also researchers, gathered data thru plant  Visitation and interviews with the proponents.  Research:  Researchers gathered data in the internet related to the study and use it as one of  The basis in the system. At the same time developers use this phase in order to seek  Programming techniques, codes and guidelines.  Sources:  Language: Phyton,Ignition built in script functions, C# ,ASP.NET  Database: Mysql ,MS SQL SERVER  Developer Tool: Designer Launcher,Ignition,Bunifu Framework , Nugget Packages  Third Party : CEBU METROLOGYX  Observation:  Researcher’s team conduct meetings, interview even plant visitation, to observe the  Process of the proponent as well as their concerns. As time goes on researchers  manage to create a systemize process to standardize the process of the proponents  Interview:  Researchers interviewed different proponent user like Order Taker, warehouse specialist  To identify their concern and the functionality of the system. |

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| Review of Related Literature |
| This chapter presents the related literature and studies after the thorough and in-depth  Search done by the researchers. This will phase will also provide the definition of terms for  Better comprehension of the study.  Related Literature  The Feedmill automation incorporates ingredient and formula destination checks to ensure ingredients and formulas are not cross contaminated while grinding and transferring occurs. Standard batching features are included, such as the multi-tasking capability that allows the system to batch while editing or checking formulas, formula production/inventory, ingredients, ingredient inventory/usage and other main menu functions. The system automates bin feeders, scales, mixing and discharge from the mixer. Finished feed bin levels are also monitored by the system in order to automatically control the finished feed elevator and distributor.    Sterling Systems & Controls, Inc. custom designs and manufactures the highest quality automation control systems for virtually any process or a complete facility. Sterling Systems & Controls has designed and provided equipment and software for a customized Automated Feedmill Control System using an Allen-Bradley PLC and desktop PC’s running Sterling Systems’ customized Windows-based Automation Software. Sterling’s forty plus (40+) years of Feedmill process and automation experience ensures quality and efficiency in both hardware and software.  link: https://www.sterlingcontrols.com  Related Studies  The Genius 5.0 Feedmill control systems are high quality, automated systems for Plant Control and Monitoring of all Mill operations including intake, grinding, rolling, weighing, blending, pelleting and out load.  The Genius 5.0 Feedmill control systems have been developed over the years to include features that modern Mill operators and managers need, including automated reporting, downtime summaries, and online accessibility.  link: https://www.gordynpalmer.com.au  Definition of Terms   1. HMI – HUMAN Machine Interface is user interface or dashboard that connects a person to a machine, system, or a device. 2. SCADA – Supervisory Control and Data Acquisition, refers to an industrial computer system that monitors and controls a process. 3. SAP CRYSTAL REPORT - is a system that is designed and developed to work in tandem with databases, and to provide users with data to allow for thorough and detailed analysis and interpretation. 4. MICROSOFT .NET FRAMEWORK - is a Windows-only version of .NET for building any type of app that runs on Windows. |

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| Flow Chart : User Access | Procedures |
|  | 1. The user will login into the Fedora system. 2. Fedora admin can control users on their access modules. 3. SQL stored Procedures Validate Fedora user rights access level. 4. Fedora system will open depends on the user access level. 5. User access level will be filter the corresponding Menus, and master list references according on access level. |
| Flow Chart : Uploading PO | **Procedures** |
|  | 1. The Oracle user will export the feedmill daily PO summary report. 2. Fedora user will import the exported PO Summary report at excel format. 3. The uploaded data at Fedora will be sync at QA module that can access on their mobile devices to check the raw materials by searching the PO. 4. The checklist provided the details QA staff has an a privileges for mark a item as Good or Reject and Void. |

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| Flow Chart : Macro  Receiving Raw Materials | Procedures   1. The QA Staff will check the PO Summary of and evaluated the quality of all the raw materials before receiving. 2. The FM Crew shall check all the raw materials to be receive and get the list of barcode for each raw material, all the receiving materials are already validated by the QA staff. 3. The Crew shall scan the barcode based for each raw material delivered and input the actual count in Fedora before receiving 4. Input the remaining details , actual count of the following raw materials ,based on primary count of QA staff, micro/macro receiver is in need to count manually again and input the actual count in the system. 5. The Material that will already receive we will be tracked all the transactions at the Tracking module. And all those material in not already fulfill the delivered count system notified users show a message regarding on the following items. |
| QUALITY ASSURANCE  RECEIVING FEEDMILL CREW  RECEIVING FEEDMILL CREW  RECEIVING FEEDMILL CREW  FEDORA |  |
| Flow Chart :  Micro Receiving | **Procedures** |
|  | 1. The QA Staff will check the PO Summary of and evaluated the quality of all the raw materials before receiving. 2. The FM Crew shall check all the raw materials to be receive and get the list of barcode for each raw material, all the receiving materials are already validated by the QA staff. 3. The Crew shall scan the barcode based for each raw material delivered and input the actual count in Fedora before receiving 4. Input the remaining details , actual count of the following raw materials ,based on primary count of QA staff, micro/macro receiver is in need to count manually again and input the actual count in the system. 5. The Material that will already receive we will be tracked all the transactions at the Tracking module. And all those material in not already fulfill the delivered count system notified users show a message regarding on the following items.   QUALITY ASSURANCE  RECEIVING FEEDMILL CREW  RECEIVING FEEDMILL CREW  RECEIVING FEEDMILL CREW  FEDORA |

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| Flow Chart : Daily  Production Plan | Procedures   1. From the Touch Panel, the planner will upload the production schedule. 2. Specify the quantity in bags to be produce; this will update the formulation table based on the quantity in bags. |
| QUALITY ASSURANCE |  |
| Flow Chart :  Micro Repacking | **Procedures**  1. The micro staff will set an repacking schedule based on Feed code raw materials needed.   1. Repacking of raw materials – the staff will search the raw materials , subject of repacking and actual weight that will be allow will be show at the group box 2. Validation – the allowable weight of repacking is connected on repacking schedule module if the quantity schedule is not meet the actual the system validation will be return into repacking starting entry 3. Printing – Printing of the barcode ones the item already meet the standard repacking schedule, Fedora will printing the primary barcode and additional details about the printed barcode , item code, quantity/weight , expiration date 4. The barcode will attached in the zip lock |
|  | (Warehouse Micro)  . |
| Flow Chart : Micro  Preparation | **Procedures**     1. They shall check the list for production in Preparation module on dropdown list 2. Fedora will get the preparation data on the repacking raw materials 3. The crew shall prepare all the required raw materials which is set by Production Planner 4. Scan the barcode for each required raw materials for validation of the prepared formula. 5. Fedora will validate the actual weight of the item based on the raw material. 6. After required raw materials is met, the crew shall now print all requirements, and will generate a 1 unique barcode |
| QUALITY ASSURANCE |  |
| Flow Chart :  Mixing Micro (Base Mix) | **Procedures**     1. From the Touch Panel, select the Production schedule for today that is subject for mixing. 2. Scan all the raw materials is required for validation of the mixing subject feed code 3. If the following item is not part of the feed code for mixing the base mix will return into preparation area. 4. After successful validation we will dump all the raw materials (base mix) to the mixer machine 5. Repack the base mix according to specified formulation 6. Click proceed, the system will proceed and print the barcode details and proceed into production area. |
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| Flow Chart : Macro  Preparation | **Procedures**     * They shall check the list for production in Preparation module on dropdown list * The crew shall prepare all the required raw materials which is set by Production Planner * Scan the barcode for each required raw materials for validation of the prepared formula. * Fedora will validate the actual weight of the item based on the raw material. * After required raw materials is met, the crew shall now print all requirements, and will generate a 1 unique barcode |
| QUALITY ASSURANCE |  |
| Flow Chart :  Production | **Procedures** |
|  | (Warehouse Micro)  .     1. From the Touch Panel, select the Production for today. The production for today is set by the Production Planner and Approved by Feedmill Manager 2. Receive the printed copy and actual raw materials coming from micro/macro (base mix) 3. Scan the base mix barcode for validation and all the raw materials included in the based mix will be show at Fedora Output. 4. If the base mix ready for production is missing in production area, the production staff is also update the base mix as missing and the base mix staff will notify the update of production staff. 5. If the base mix registered at for production entry, Raw materials Micro (base mix) and Macro will dump to the dumping pit, mashing and going to pelleting. |
| Flow Chart : Finished Goods | **Procedures** |
| FG | 1. From the Touch Panel, select production schedule for today that ready for bagging 2. Finish Goods Module also have a monitoring in the daily production and the count for finish goods already done in bagging 3. After Bagging the system will print the barcode of each finish goods |
| Flow Chart :  NOne | **Procedures** |
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| System Flow |
| **Admin Data Management**    Flowchart Guidelines        (Production Planner)  PRODUCTION PLANNER   1. The crew will select the feed type for production in the dropdown list. 2. Input the number of bags that will be produced 3. The Production of Today has an Option Posted and Unposted. 4. Posted – that will be visible at Preparation Table. 5. Unposted – Production entry already on planner module. 6. Approval – Production Planner already posted the following production ,the preparation will able to see the production table but cannot proceed for production because the procedure is in need an approval coming for Feedmill Manager |

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| System Features |
| FEDORATION INCLUDES THE FOLLOWING MODULES   1. RECEIVING OF RAW MATERIALS 2. PREPARATION OF RAW MATERIALS 3. PLANNER   RECEIVING OF RAW MATERIALS  This system provides historical logging of delivery of raw materials and also automatically updating stock quantity for inventory. The process in this module is scanning the barcode for each raw material that is to be delivered. The system has a barcode number configured and registered in the database for each raw material to be delivered. Historical logs are exportable to excel file whenever needed. Below are the details to be stored in the system’s database.   1. Item Code 2. Item Description 3. Category 4. Quantity 5. Supplier 6. Expiration Date 7. Delivery Date   PREPARATION OF RAW MATERIALS  This system provides the warehouse crew of what production for today they are going to prepare. The production for today is set by the Planner. When the Planner updates, the warehouse crew shall now select from the dropdown list the feed codes that are going to prepare. Required raw materials for a feed type are displayed in a formula table for the warehouse crew to validate. After validation, the warehouse crew can now print the update formula table. Below are the details needed:   1. FEED CODE 2. FEED TYPE 3. ITEM CODE 4. ITEM DESCRIPTION 5. CATEGORY 6. QUANTITY   PLANNER  This system provides production for today and viewing of stocks in the inventory table. Receive orders from farms are needed to input in this module before setting up the production for today.  Fedora has 6 Modules  This system provides the following modules and the following procedures will be start at the master list of the items, Quality Assurance checking of the items provide an inventory monitoring and tracking.   1. Master list of Items 2. QA Checklist 3. Receiving of Raw Materials 4. Preparation of Raw Materials 5. Mixing of Raw Materials 6. Finish Goods   Fedora Dashboard has 10 Main Menus  The Main Menus sub modules are collection of the 6 module   1. Item Master list 2. Macro Inventory 3. Micro Inventory 4. Micro Preparation 5. Micro Mixing 6. Item Tracking 7. Formula 8. User Management 9. Repacking 10. Import Feed mill Summary Report   Fedora Notification will show up at status Bar  This system provides an efficient monitoring of items.   * Production For Today * Raw Materials Status for Reorder Level * System Updates details of latest updates based on problem, bug, and additional features and corresponding solutions.  |  | | --- | | System Requirement & Architecture | | TABLES IN DATABASE        System Requirements   |  |  |  | | --- | --- | --- | | **Browser** | | | | Browser | Version | Remarks | | **Google Chrome** | Version 75.0.3770.100 | If this is not the browser version. There will be error in viewing the system. | | **Mozilla Firefox** | Version 67.0.4 | | **Machine or Equipment** | | | | DEVICE | DESKTOP / LAPTOP  BARCODE SCANNER  WEIGHING SCALE |  | | IGNITION SOFTWARE | 8.0.3 | LICENSE SOFTWARE | | MY SQL WORKBENCH  MICROSOFT SQL SERVER | 8.0  18.4 |  | | **Others** | | | |  | Internet Connection, Network Connection, Load  Microsoft .Net Framework, SAP Crystal Report(Client) |  |   Scope and Limitation  The System aims to develop a system that automates the process of production, logs deliveries of raw materials that also monitors stock quantity from the inventory  Scope   * System provides efficient and productive for delivery of raw materials. * System provide automation for the process of feed mill * System is design to run on capability both 86xbit/64x bit computer.   Limitation   * System cannot be access without RDF LAN / WLAN Connection. |  |  | | --- | | Project Schedule | | System Timeline and Review   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **System Cycle Phased** | **Start Date** | **Target Date** | **No. Of Days** | **Date Finished** | | Project Initiate |  | - | - | - | | Planning | - | - | - | - | | System Analysis and Requirement | - | - | - |  | | System Design |  |  |  |  | | Development |  |  |  |  | | Integration and Testing |  |  |  |  | | Implementation |  | - |  |  | | Operation and Maintenance |  |  |  |  | | System Documentation |  |  |  |  | |  | | |

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| Document Approval |
| This document has been approved as the official system design for the Fedora System.   |  |  |  | | --- | --- | --- | | **Prepared by:** | **Signature:** | **Date:** | | **Gerard Singian** |  |  |  |  |  |  | | --- | --- | --- | | **Accepted by:** | **Signature:** | **Date:** | | **Erwin Dela Cruz** |  |  |  |  |  |  | | --- | --- | --- | | **Approved by:** | **Signature:** | **Date:** | | **Cenon Tubil Jr.** |  |  | |  |  |  | |