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Raw Material Weighing Application Through Visual-Based RS-232 Cable Port

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Abstract: Officers who record incoming weighing data using a manual weighing machine experience difficulties when interacting with the weighing device. It is difficult to press the buttons, the storage memory cannot be more than three digits, and the display is difficult for officials to understand which can hinder the performance of recording the scales. Lack of capacity to store scale data on machine, so it can only store a maximum of 3 data scales. Inflexible on-machine data storage system. That is, the data scales that have been stored cannot be moved apart from within the machine itself. The large size of the machine is enough to take up space. So it is necessary to design a signal connection path from the scales to the computer via cable. With a computerized weighing application through the RS-232 communication port, where data input can be done using a visual-based weighing application. This data is then processed and produces an accurate report according to the data recorded by the scales. The testing process is carried out by entering data on the scales 19 times along with the check-in and check-out process for each incoming truck of raw materials for transportation. The testing process is carried out so that the application can run properly.

Keywords: Raw material weighing, Application Through Visual-Based, RS-232 Cable Port

INTRODUCTION

Scales are used as a tool to indirectly determine the mass of an object (Muslimin & Lestari, 2021). Manual type scales are being replaced with digital scales which have a higher level of accuracy. Application of scales is a method used to eliminate errors in inputting gross weight and facilitate product tracking (Setiawan et al., 2018). The most well known serial communication standard is RS-232 which is used to transmit data remotely and it is easier to run single core cables required in applications (Dawoud & Dawoud, 2020). RS-232 serial communication is a communication system on computers and microcontrollers (Amelia et al., 2017).

In the production process that begins with the process of withdrawing raw materials, when goods come in, the raw materials must be weighed first before being brought to the warehouse for storage. After being weighed, it must be weighed again to get a net raw material. When the weighing process is carried out, the transport stops on a long plate at the bottom of which there is a device to send a signal to a simple weighing machine. The machine then translates the signal into a number, namely the weight of the freight. Data storage on this machine is very small and not portable. So that in storing the results of weighing raw materials, the logistics department must record them manually into the card for each scale which is then used as a presentation report to the manager every month. When the report was triggered, there were several recording errors made by the logistics department. This can affect the accuracy of data, weighing and when presenting reports by the logistics department.

Lack of capacity to store scale data on machine, so it can only store a maximum of 3 data scales. Inflexible on-machine data storage system. That is, the data scales that have been stored cannot be moved apart from within the machine itself. The large size of the machine is enough to take up space. So it is necessary to design a signal connection path from the scales to the computer via cable. With a computerized weighing application through the RS-232 communication port, where data input can be done using a visual-based weighing application. This data is then processed and produces an accurate report according to the data recorded by the scales.

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LITERATURE REVIEW

Logistics is the flow of goods or services from source to destination. Logistics is also the process of planning, implementing and controlling the efficient and effective flow of goods or services and related information from the point of origin to the point of use to meet customer requirements. The main logistics activities are procurement, storage, inventory, transportation, warehousing, packaging, security, and handling of goods and services in the form of raw materials, intermediate goods, and finished goods. The logistics function is a continuous process and is interrelated with one another and supports one another (Manado et al., 2016).

Scales are a measuring tool used to measure the weight of an object. Scales, in English "scale" is a measuring tool to determine the weight or mass of an object. A scale that uses a spring system carries out the process of measuring weight by measuring the length of the spring with a range that has been prepared due to the given load Scales are a measuring tool used to measure the weight of an object. Scales, in English "scale" is a measuring tool to determine the weight or mass of an object. A scale that uses a spring system carries out the process of measuring weight by measuring the length of the spring with a range that has been prepared due to the given load (Hulu, 2018).

The current weighing system is still done manually and is considered inefficient because it takes quite a long time to do it repeatedly. To overcome this, an electronic weighing device was designed using the Arduino Uno microcontroller as a controller and a load cell as a sensor (Anwari, 2017). The accuracy of weighing data greatly affects how much raw material is needed to produce a product. Recording weighing data in real time can reduce operator recording errors in entering gross and net values (Setiawan et al., 2018). Digital scales work by using an electronic system, which is a system that uses computer media as a device used to retrieve weighing data from the physical changes in the loadcell installed under the scales via RS-232 port communication between the computer and the digital indicator device as a connecting medium with the scales bridge. RS-232 is a serial communication standard defined as an interface between data terminal equipment (DTE) and data communications equipment atau DCE) using serial binary data exchange (Julham & Adam, 2018).

METHOD

Analysis of data requirements in designing this weighing system such as data on truck weight, driver identity, container number containing raw materials (if any), truck license plate, truck entry hours, truck exit hours, and total weight before and after loading and unloading. The functional analysis is: Login process for logistics officers, Management of weighing data by logistics officers such as saving, changing, and deleting, Seeing the results of the weighing data by the logistics officer. The process of checking in the scales by the logistics officer to record the initial weight of incoming raw materials. The check-out process of weighing data by logistics officers to record the final weight after unloading of raw materials from the truck to the storage warehouse.

Before starting the weighing application design process, information collection (analysis) is carried out regarding the weighing data. This information includes the arrival date of the raw material truck, check-in time, check-out time, container number, BK plate, driver's name, material, initial weight, final weight and difference in weight (net). This information is an entity table structure in the database.

Use case diagram model is modeling the interaction between the user and the system in a diagram. A UC Diagram states the visualization of the interactions that occur between users (actors) and the system (Kurniawan, 2018). Model Use Case Diagram describes the interaction between user and software. In simple terms, the Use Case Diagram illustrates user access to the login page, main menu, the weighing data input section, changing weighing data, deleting, and managing in the form of a list. The Use Case Diagram model that will be designed in this weighing application can be seen in Fig. 1 following :

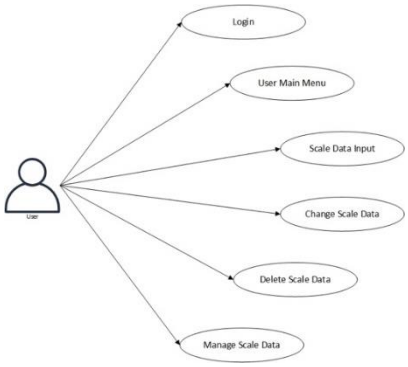

Fig.1 Use Case Diagrams

After the user enters the login password correctly, the main form will appear. This form is the main work page as a weighing application. Property sections contain such as TextBox monitor scales, ID, Container number, Vehicle license plate (BK), Name, Material, Hours in, Hours out, Initial weight, Final weight,

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Difference, current date and time label, Check-in button, Check-out button, Clear button, Change button, Save button, Register button, and Delete button.

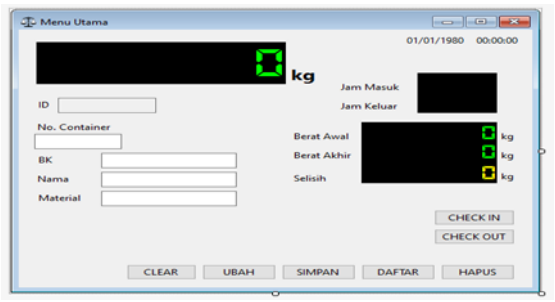

Fig.2 Scale Application Main Form

When the user wants to call data for truck scales that have been made previously to be updated, the user presses the "REGISTER" button to see a list of records for the raw material truck scales that have been made before. The table from the List Form will read the records that have been stored in the MS database. Access which is then displayed in tabular form from the List Form. Users can also search for previous weighing data based on name, ID, material, date, vehicle number, container number in the search box located above the list of weighing data table. The List Form contains properties such as Search Label, Search TextBox, List ListView, “SELECT” button, and “CANCEL” button.

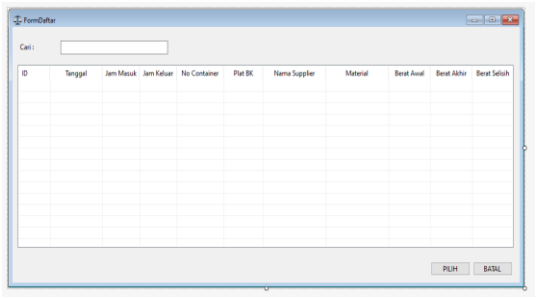

Fig.3 Register Form

One of the module functions in Visual Basic is that it can connect programs to other programs through coding arrangements. Therefore, two modules are needed to make this weighing application run perfectly. These connection modules include the MS-Access Database connection module and the connection module to weighing devices via the RS-232 cable port.

This connection module consists of coding compiled in Visual Basic. After creating the connection module, the new attribute will appear in the Project. This connection module also serves as a link through Class Diagrams to connect entities in the database to the attributes of the scales data. The module structure can be seen in Figure 5 the following:

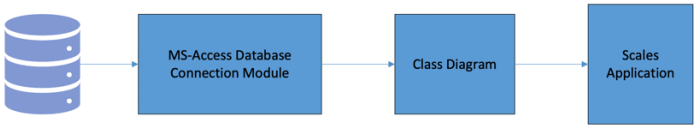

Fig.4 MS-Access Database Connection Module Structure

The scale connection module is via a series of RS-232 cables consists of a series of coding that can translate and read the incoming input signals from the scales into a weighing scale. The signal coming from a series of RS-232 cables is then forwarded through an RS-232 USB converter cable so that it can be connected to a computer and weighing application program. The results in the form of weight scale values that have been converted through this module will be displayed in the Scales Monitor TextBox on the Main Menu Form.

The scheme for this series of modules can be seen in Fig. 5 the following :

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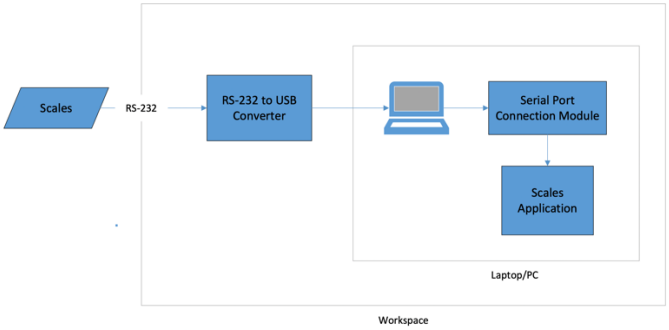
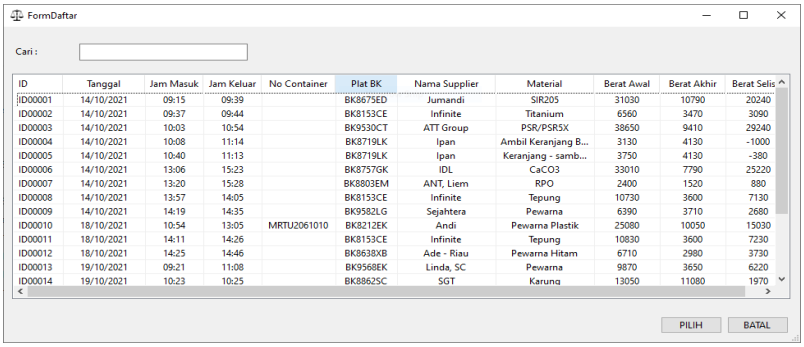


Fig.5 Weighing Connection Module Structure

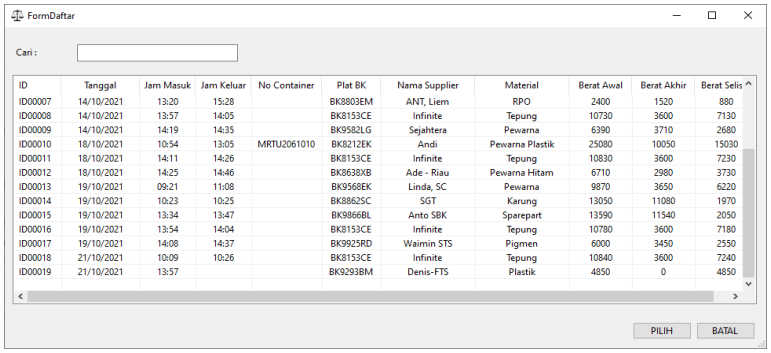
RESULT

After the process of designing the weighing application design using the waterfall model, then the testing process is carried out on the application of raw material weighing at PT. Garuda Mas Mighty. The testing process is carried out by entering data on the scales 19 times along with the check-in and check-out process for each incoming truck of raw materials for transportation. The testing process is carried out so that the application can run properly. The results of the testing process in the form of truck scale data can be seen in the following list Form:



ID	Tanggal	Jam Masuk	Jam Keluar	No Container	Plat BK	Nama Supplier	Material	Berat Awal	Berat Akhir	Berat Selis
ID00001	14/10/2021	09:15	09:39		BK8675ED	Jumandi	SIR20S	31030	10790	20240
ID00002	14/10/2021	09:37	09:44		BK8153CE	Infinite	Titanium	6560	3470	3090
ID00003	14/10/2021	10:03	10:54		BK9530CT	ATT Group	PSR/PSR5X	38650	9410	29240
ID00004	14/10/2021	10:08	11:14		BK8719LK	Ipan	Ambil Keranjang B...	3130	4130	-1000
ID00005	14/10/2021	10:40	11:13		BK8719LK	Ipan	Keranjang - samb...	3750	4130	-380
ID00006	14/10/2021	13:06	15:23		BK8757GK	IDL	CaCO3	33010	7790	25220
ID00007	14/10/2021	13:20	15:28		BK8803EM	ANT, Liem	RPO	2400	1520	880
ID00008	14/10/2021	13:57	14:05		BK8153CE	Infinite	Tepung	10730	3600	7130
ID00009	14/10/2021	14:19	14:35		BK9582LG	Sejahtera	Pewarna	6390	3710	2680
ID00010	18/10/2021	10:54	13:05	MRTU2061010	BK8212EK	Andi	Pewarna Plastik	25080	10050	15030
ID00011	18/10/2021	14:11	14:26		BK8153CE	Infinite	Tepung	10830	3600	7230
ID00012	18/10/2021	14:25	14:46		BK8638XB	Ade - Riau	Pewarna Hitam	6710	2980	3730
ID00013	19/10/2021	09:21	11:08		BK9568EK	Linda, SC	Pewarna	9870	3650	6220
ID00014	19/10/2021	10:23	10:25		BK8862SC	SGT	Karung	13050	11080	1970

Fig.6 Display Scales Application Testing Results 1



ID	Tanggal	Jam Masuk	Jam Keluar	No Container	Plat BK	Nama Supplier	Material	Berat Awal	Berat Akhir	Berat Selis
ID00007	14/10/2021	13:20	15:28		BK8803EM	ANT, Liem	RPO	2400	1520	880
ID00008	14/10/2021	13:57	14:05		BK8153CE	Infinite	Tepung	10730	3600	7130
ID00009	14/10/2021	14:19	14:35		BK9582LG	Sejahtera	Pewarna	6390	3710	2680
ID00010	18/10/2021	10:54	13:05	MRTU2061010	BK8212EK	Andi	Pewarna Plastik	25080	10050	15030
ID00011	18/10/2021	14:11	14:26		BK8153CE	Infinite	Tepung	10830	3600	7230
ID00012	18/10/2021	14:25	14:46		BK8638XB	Ade - Riau	Pewarna Hitam	6710	2980	3730
ID00013	19/10/2021	09:21	11:08		BK9568EK	Linda, SC	Pewarna	9870	3650	6220
ID00014	19/10/2021	10:23	10:25		BK8862SC	SGT	Karung	13050	11080	1970
ID00015	19/10/2021	13:34	13:47		BK9866BL	Anto SBK	Sparepart	13590	11540	2050
ID00016	19/10/2021	13:54	14:04		BK8153CE	Infinite	Tepung	10780	3600	7180
ID00017	19/10/2021	14:08	14:37		BK9925RD	Waimin STS	Pigmen	6000	3450	2550
ID00018	21/10/2021	10:09	10:26		BK8153CE	Infinite	Tepung	10840	3600	7240
ID00019	21/10/2021	13:57			BK9293BM	Denis-FTS	Plastik	4850	0	4850

Fig.7 Display Scales Application Testing Results 2

DISCUSSIONS

The logistics system uses a type of large scale that can weigh trucks weighing up to 50 tons. Logistics officers who record incoming weighing data using old weighing machines experience difficulties when interacting with these weighing devices. It is difficult to press buttons, the storage memory cannot contain more than three data, and menus that are difficult for new logistics officers to understand can hinder the performance of recording incoming and outgoing truck scales.

Based on the problems that occur, the author provides a solution to solving the problem by designing a Visual Basic-based raw material weighing application that can simplify the process of incoming and outgoing transport truck scales. With a comfortable and attractive interface, it makes it easy for logistics officers to understand every button and menu in the process of weighing incoming raw materials. It is hoped that the application of raw material scales will become the newest weighing application and facilitate the logistics to record data on truck scales before and after loading and unloading.

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CONCLUSION

Based on the results of the tests that have been carried out, the authors draw several conclusions, the are: The scales application is designed using Microsoft Visual Studio 2019, connected with an RS-232 communication serial cable to obtain data on the weight of truck scales that check-in or check-out, then the scale data records are stored in the Microsoft Office Access 2016 database connected to the application balance. The process of recording weighing data becomes easier and faster by using this weighing application.

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