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Metrological Testing

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Abstract: ***The Project aim is to save the information into the database and reduce the chances of error and data lost. The Civil department of our collage has done Compression testing for the firms and organization used for that the maintaining the record and calculation for their test they used Excel sheet. We identified this and decided to make the Software that can maintain the record into the database, do all the calculation related to the test. This will reduce the human error and maintain record into database. We will do the provision that to take the data backup regularly so the data loss in prevented.***

I. INTRODUCTION

Presently our collage Civil Engineering department done some testing on the construction jobs of some construction firms and organization in their laboratory. The test results storage and calculation purpose they used the Microsoft Excel sheet. Traditional way the results are stored in the sheets one after another and also do the calculations in it.
This is the time-consuming process and generation of results sheet manually So, there is chance of data lost when there is the issue with PC, some other causes, security of data and might result in error.

A. Exiting System

- No software present at all.
- Time consuming.
- Manual creation of report.

B. Objectives

The objective of the systems: -

- It reduced the Operational time.
- To reduce paperwork as generate Pdf report.
- Increase accuracy and reliability.
- Increase operational efficiency.
- Data security.

This software packages can be readily used by non – programming personal avoiding human handled chance of error.

C. Scope Of Project

This project has a large scope as it has the following features which help in making it easy to use, understand and modify it

- Ease of Procedure.
- No Need to do Paper Work as Pdf copy of report is generated.
- To save the environment by using paper free work.
- To increase the accuracy and efficiency of the placement procedure.
- Management of Data.

Main Points are: -

- Simplified Management of customer Profiles.
- Pdf of report with QR code.
- Selection Results.
- Real-time Information through system

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II. METHODOLOGY

A. Approach

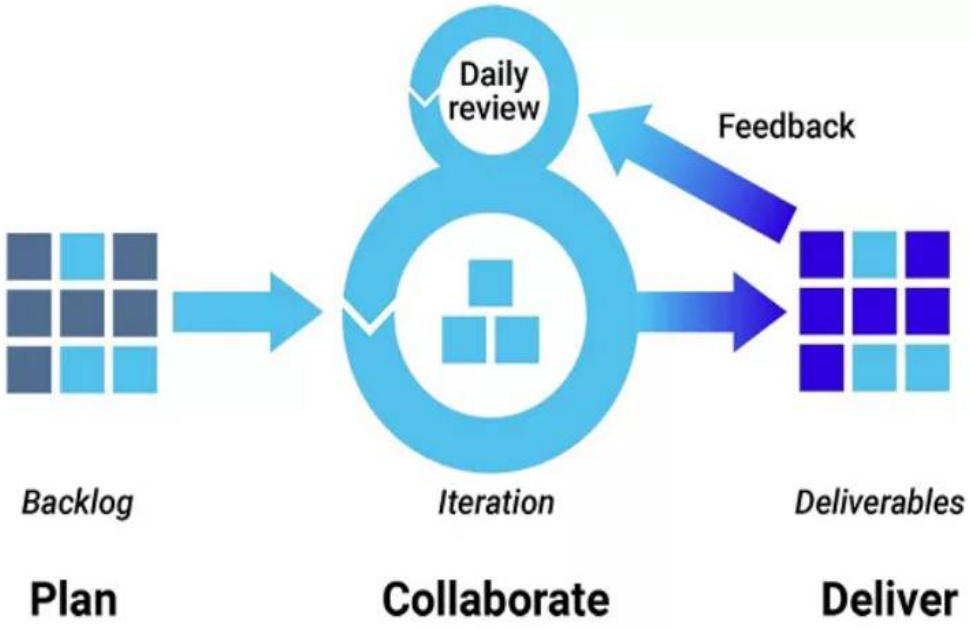
Successful software projects are managed well. To manage a project efficiently, the manager or development team must choose the software development methodology that will work best for the project at hand. All methodologies have different strengths and weaknesses and exist for different reasons. Here's an overview of the most commonly used software development methodologies and why different methodologies exist. They are

- Agile development methodology.
- Waterfall development methodology.
- Rapid application development.
- DevOps development methodology.

In our project we proposed the Agile methodology. The description for this is as follows:

1) Agile development methodology

Teams use the agile development methodology to minimize risk (such as bugs, cost overruns, and changing requirements) when adding new functionality. In all agile methods, teams develop the software in iterations that contain mini-increments of the new functionality. There are many different forms of the agile development method, including scrum, crystal, extreme programming (XP), and feature-driven development (FDD).



Advantage

- The primary benefit of agile software development is that it allows software to be released in iterations.
- Iterative releases improve efficiency by allowing teams to find and fix defects and align expectation early on.
- They also allow users to realize software benefits earlier, with frequent incremental improvements.

Disadvantages:

- Agile development methods rely on real-time communication, so new users often lack the documentation they need to get up to speed.
- They require a huge time commitment from users and are labor intensive because developers must fully complete each feature within each iteration for user approval.

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2) Technology

C# Language

The Ecma standard lists these design goals for C#:

- The language is intended to be a simple, modern, general-purpose, object-oriented programming language.
- The language, and implementations thereof, should provide support for software engineering principles such as strong type checking, array bounds checking, detection of attempts to use uninitialized variables, and automatic garbage collection. Software robustness, durability, and programmer productivity are important.
- The language is intended for use in developing software components suitable for deployment in distributed environments.
- Portability is very important for source code and programmers, especially those already familiar with C and C++.
- Support for internationalization is very important.
- C# is intended to be suitable for writing applications for both hosted and embedded systems, ranging from the very large that use sophisticated operating systems, down to the very small having dedicated functions.
- Although C# applications are intended to be economical with regard to memory and processing power requirements, the language was not intended to compete directly on performance and size with C or assembly language.

B. Design and Development

Our proposed system has four menu option they are –

- New File
- Open File
- Settings
- Backup

1) New File

In this menu we have all the data entry parameters which required for the report generation. There are 4 buttons are present in this section they are as follow

- SAVE: - It is used to Save all the data.
- RESET: - It is used to Reset the parameters.
- DELETE: - It is used to Delete the data if we don't want it.
- PRINT: - It proposed for print the Reports.

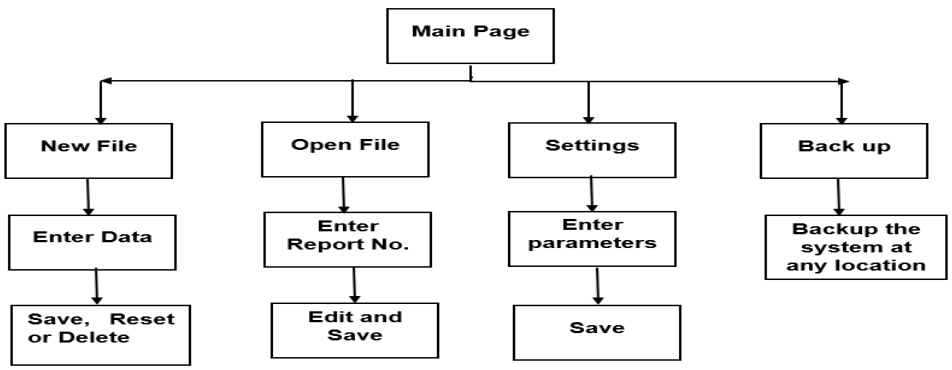
2) Open File: This menu option used when we want to edit some data of particular record. In this menu option all button as in New File are present.

3) Settings: In this menu option we have some changeable parameters which are Notes, Terms and Conditions, Designation and their name etc.

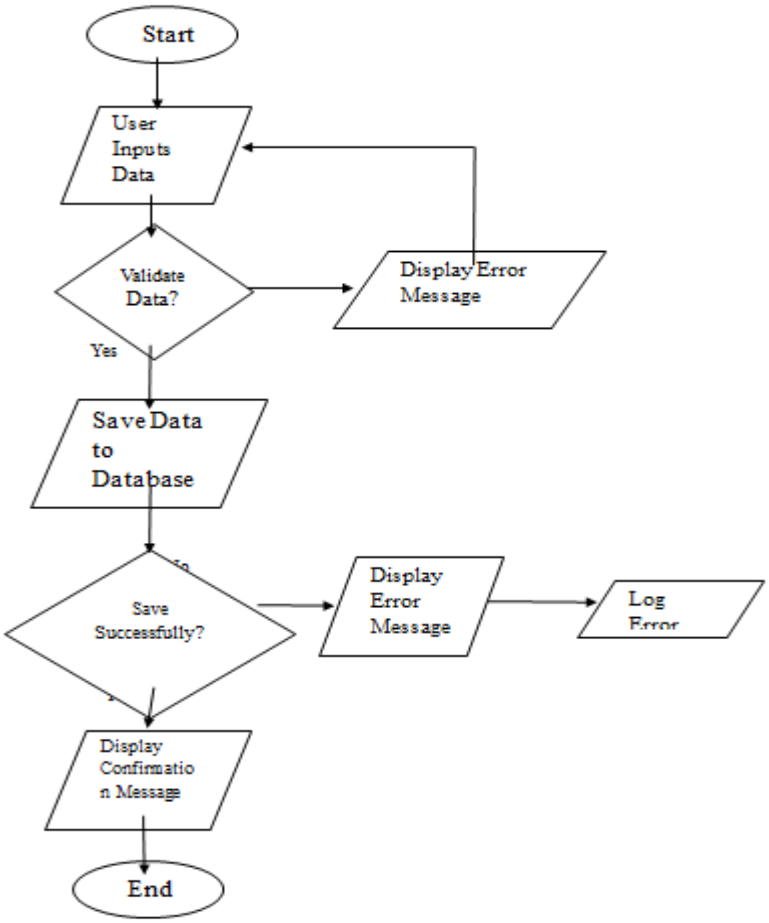
4) Back-up: This menu option is used for the Backup the Data.

III. MODELING AND ANALYSIS

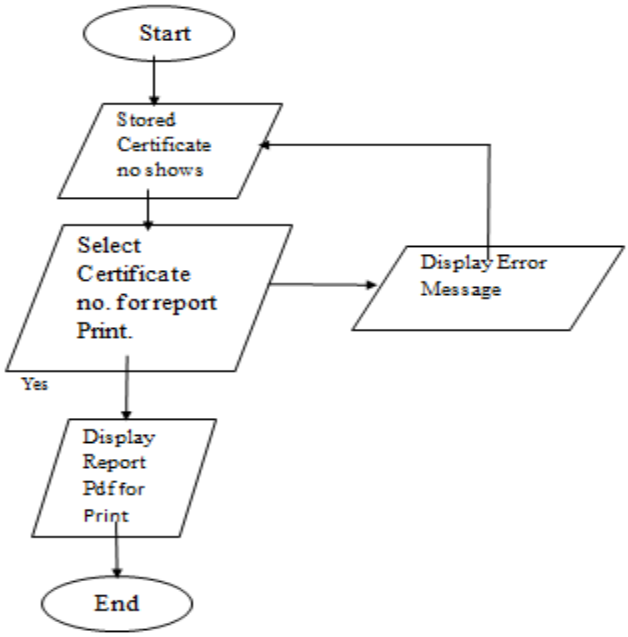
A. System Block Diagrams



The flow chart for the Save the Data is as follows

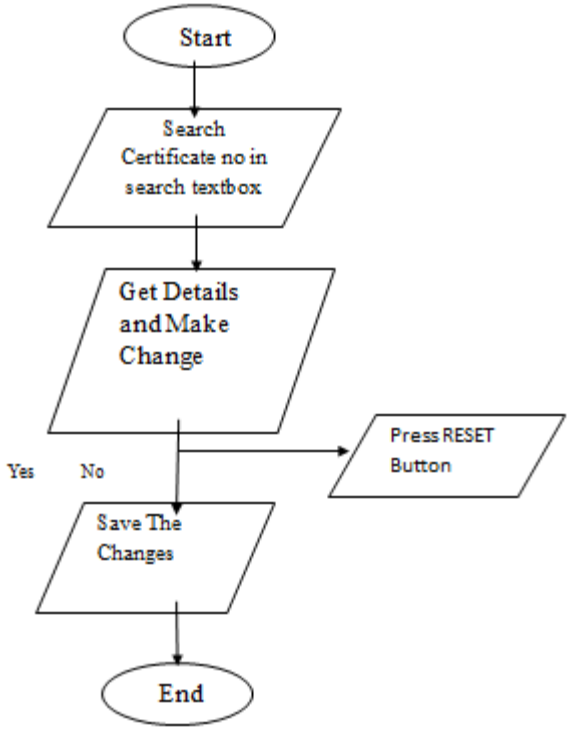


The flow chart for the Print report is as follows



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The flow chart for the Edit is as follows



IV. RESULT AND DISCUSSION

A. Main Page



Image 1 :- Main Page

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The above image shows the design and overview of the Main Page of software. This page contains the The Menu bar, in which we can navigate in to the software through it.
The Menu bar contains menu which described in section 2.2 , they are

- New File
- Open File
- Settings
- Backup
- Print File

From all above menu we have first concentrate on the main part of the which is the New File.

B. New File

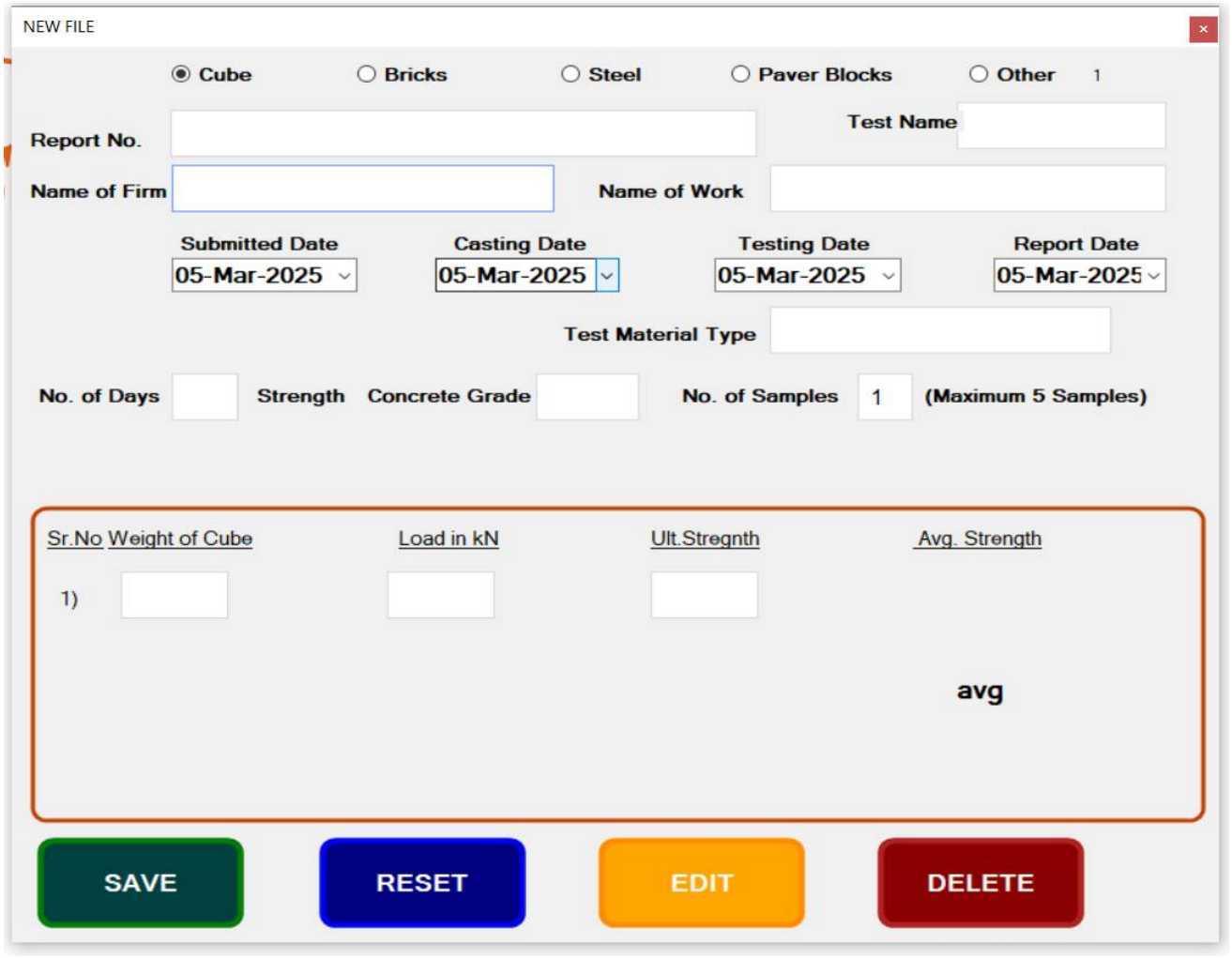


Image 2:- NEW FILE

In New File we have enter all Test Data.
There is selection buttons according to test material type which are

- Cube and Paver.
- Bricks.
- Steel
- Paver Blocks
- Other

According to the type of material, we have to select one of the above type.

The data entry fields are

1) Name of Firm – from which firm we have the work allotted.
2) Name of Work – For which company the firm doing work.
3) Report No. – The report number is allotted by the Lab.
4) Date – There are four dates Casting date, Submitted date, Testing date, Report date.
5) Testtype – According to test material type we have to enter which type of test material we have used like Cube, Bricks, Paver, Reinforcement Steel etc.
6) Test Material Type - In this field we have to enter the use of test material like footing, Slab etc.
7) No of day Strength – This information is given by the Firm.
8) Concrete Grade – This field is for which Grade material used.
9) No. of Samples - The number of sample submitted for testing. In this software we have limited to 5 samples for one report.
10) Reading Table - According to the no of Sample the data entry text boxes are changed.

- In the above image we have take 5 sample so there are 5 data entry text boxes.
- The Calculation are done automatically accordingly the data entered.

11) The three buttons are to Save, Reset, Delete are used to save, reset and delete the record.
12) Edit - By Pressing this button we see the Search Text box with Search button,Enter the Certificate Number and press search button.All Data related to that certificate will appear in respective text boxes. Change the Data which we want to change and Save.

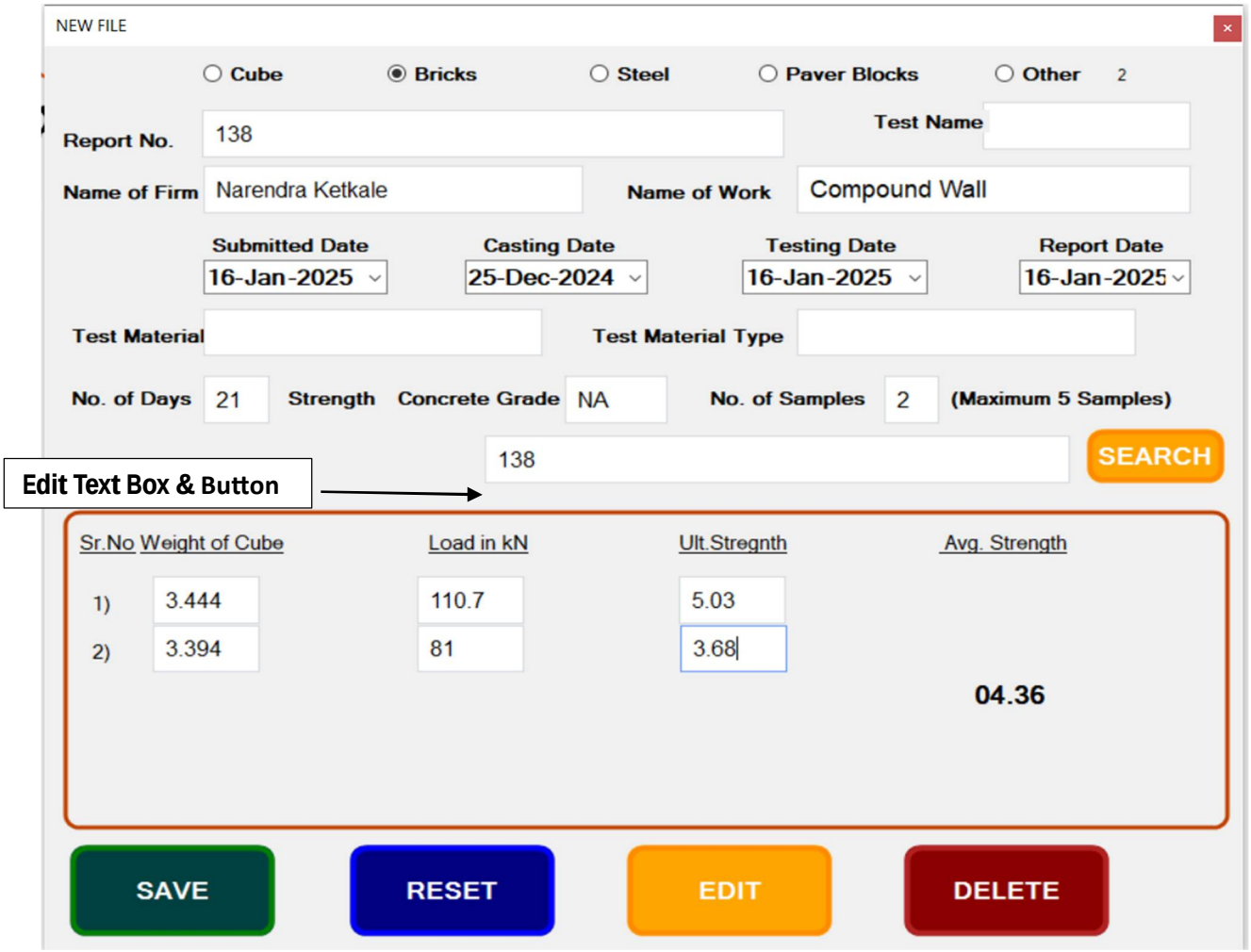


Image :- NEW FILE with Edit option

C. Print File

The Print button will navigate us to the report print page

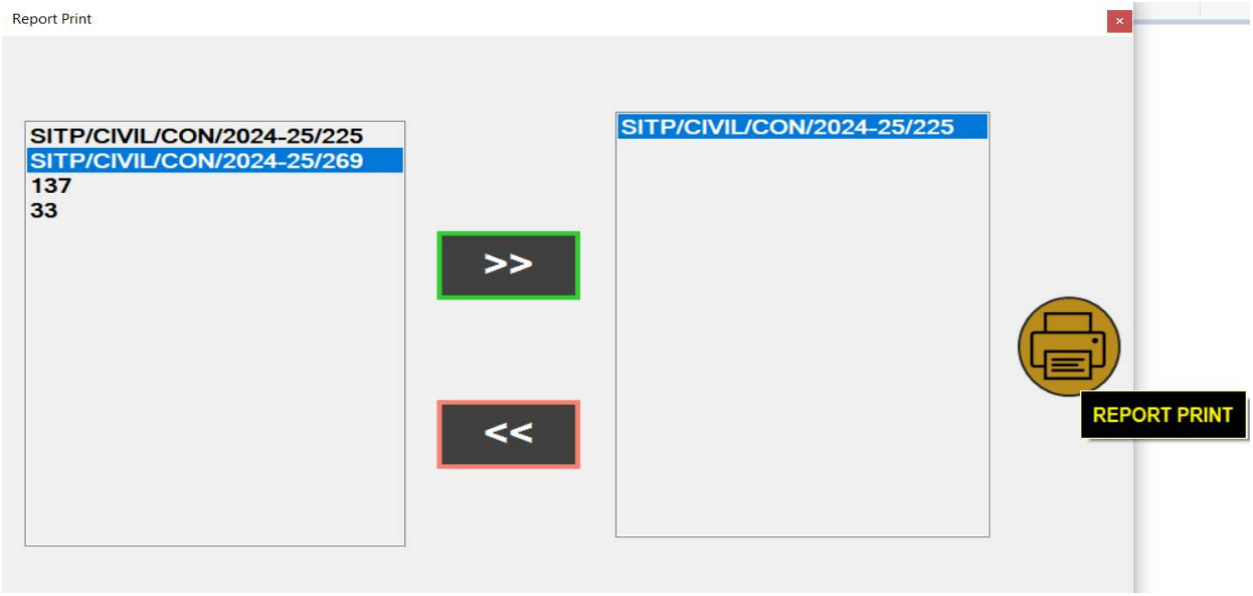


Image 3 – PRINT FORM

The above Image 4 Shows the Report Print Form, in which the the list of the saved report are shown.
There are two buttons which are ADD, REMOVE ,REPORT PRINT.

- ADD - It will add the report which we want to print into print report list
- REMOVE - It will remove the report which we selected to print into print report list
- REPORT PRINT – This button will shows the report in the pdf form, so we can save it or print it.

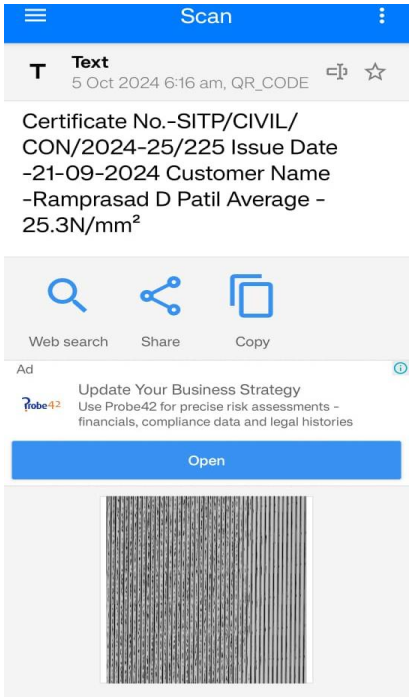


Image 4 – QR CODE SCAN

The above Image 5 and 6 shows the Report and QR code scan data.
The extra feature of QR code is added in the report.

D. Settings

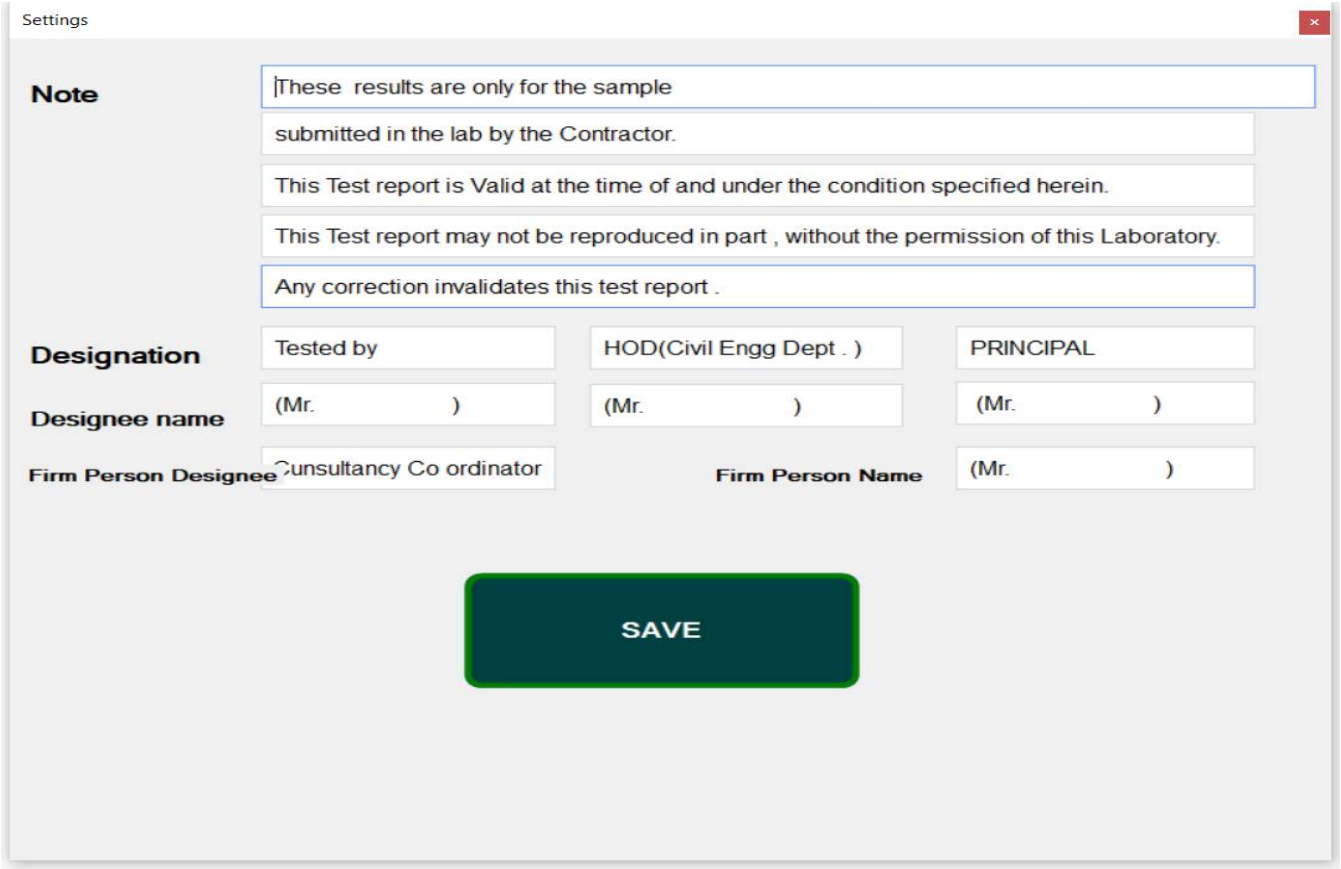


Image 5– SETTINGS FORM

The above Image 7 Shows the Settings Form, in which the the list of the saved report are shown.
In which we have saved some data which is editable as per the rule or condition of management changed

The fields are in setting page are,

- Notes
- Designation
- Name of Designee
- Firm Person Designee
- Firm Person Name

Notes

In the Notes we can mention the terms and condition for the report according to guideline of management.

A. Designation and Name

In this we can add Designation of Authorized person and their Names respectively for the report.

As in the above form we have the designations are

a) Tested By
b) HOD(Civil Department)
c) Principal

B. Firm Person Designation And Name

In this field we can add the Authorized firm person Designation and Name if he/she presents during the test perform as for proof on the report.

Or we can mention this on report for acknowledgment for our consideration as report has received by the Authorized person of firm for which testing has done.

C. Back Up

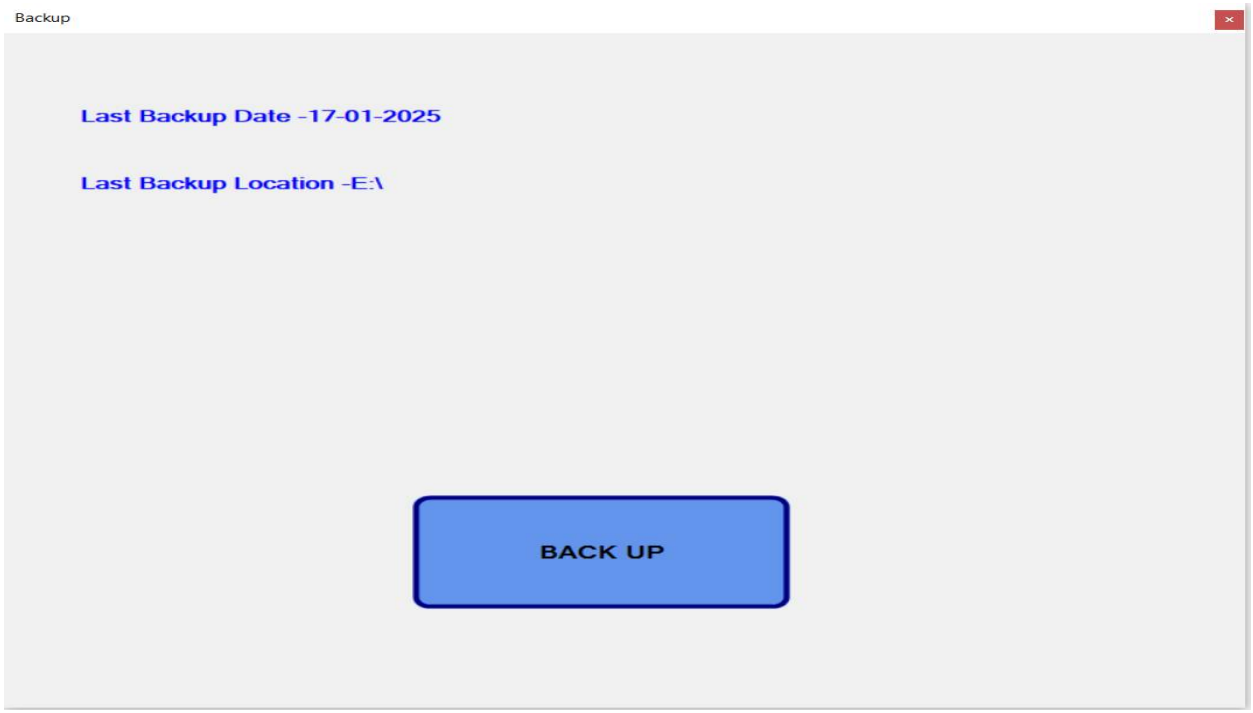


Image 9 – BACKUP FORM

The above Image 8 Shows the BACKUP Form, in which the the list of the saved report are shown.

The above Image shows Back up form.

- In this we can take the back up of all the data saved in Database by pressing the Back Up button.
- If the back up is taken earlier then the there is provision has made in the form that it shows

1.Last Back up Date.
2. Back up Location.

1) Last Back up Date.

The Date on which Back up was taken previously.

2) Back up Location.

The Location where the previous Back up Stored

As above image shows that the Last Back up Date which is 17-01-2025 and the Location was on E Drive.

D. Microsoft SQL Server

Data base used in the software is Microsoft SQL Server, which is secure and reliable. We make three tables which are following with their description.

1) TestBasics

The data related to New File form is stored in the this table.

Column used in this table are as follows –

- testId(Primary key - int) – It unique Id for each test.
- testFirm(nvarchar(250)) – It used to store the Firm name for which work done.
- testWork(nvarchar(250)) – It is used to store the test on which work is done.
- testContractor(nvarchar(250)) – It used to store the Contractor name.
- testType(int) – It used to store test type.
- testMaterial(nvarchar(100)) – It used to store the test Material.
- testCertNo(nvarchar(250)) – It used to store the Certificate number.
- testMtype(nvarchar(100)) – It used to store the test Material type.
- testSubmitdt, testCastingdt, testTestingdt, testReportdt(smalldatetime)-It used to store the submitted, Testing , Casting and Report Date.
- testDays(int) - It used to store the number of days strength.
- testGrade(nvarchar(50)) – It used to store material grade.
- testNoSampl(int) – It used to store the number of sample submitted for test.
- Also there are columns for store test results according to there test Type.

2) TestSettings

The data related to Settings form is stored in the this table, which may change periodically.

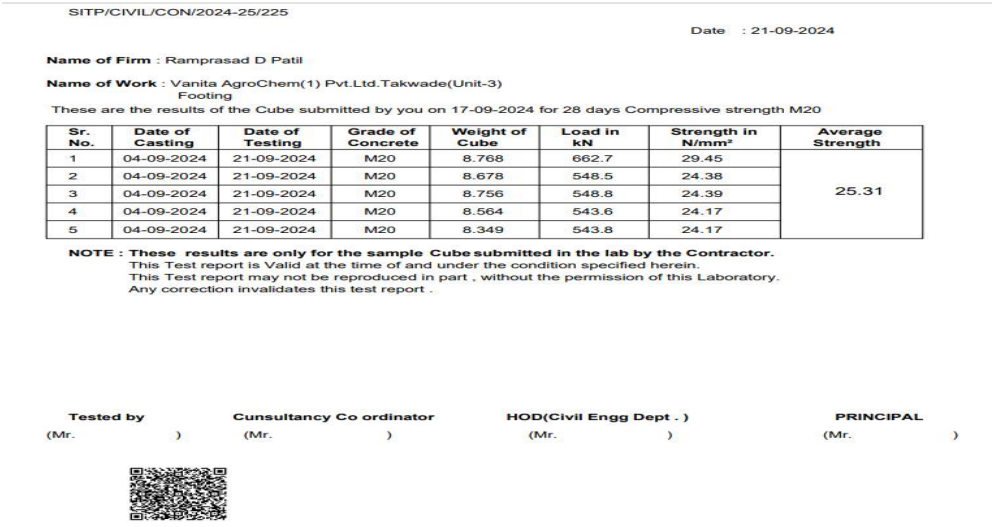
Column used in this table are as follows –

- testNote1, testNote11, testNote2,testNote3,testNote4 (nvarchar (500))-
  It is used to store the Note or Disclaimer.
- testDes1, testDes2, testDes3, testDesNam1, testDesNam2, testDesNam3(nvarchar(50)) – It used to store Designation and Designee Name.
- testConPerson, testConPersonName(nvarchar(50))- It used to store the Contractor Person Designation and Name.

3) DBBACKUP

This table save the back up data.

- bkpId(int) – It used to store the backup Id.
- bkpDate(smalldatetime)- It used to store backup Date.
- bkpPath(nvarchar(MAX)) – It used to store backup Path where back up is stored.



SITP/CIVIL/CON/2024-25/225

Date : 21-09-2024

Name of Firm : Ramprasad D Patil

Name of Work : Vanita AgroChem(1) Pvt.Ltd.Takwade(Unit-3)
Footing

These are the results of the Cube submitted by you on 17-09-2024 for 28 days Compressive strength M20

Sr. No.	Date of Casting	Date of Testing	Grade of Concrete	Weight of Cube	Load in kN	Strength in N/mm²	Average Strength
1	04-09-2024	21-09-2024	M20	8.768	662.7	29.45	25.31
2	04-09-2024	21-09-2024	M20	8.678	548.5	24.38	
3	04-09-2024	21-09-2024	M20	8.756	548.8	24.39	
4	04-09-2024	21-09-2024	M20	8.564	543.6	24.17	
5	04-09-2024	21-09-2024	M20	8.349	543.8	24.17	

NOTE : These results are only for the sample Cube submitted in the lab by the Contractor.
This Test report is Valid at the time of and under the condition specified herein.
This Test report may not be reproduced in part , without the permission of this Laboratory.
Any correction invalidates this test report .

Tested by (Mr.)
Cunsultancy Co ordinator (Mr.)
HOD(Civil Engg Dept .) (Mr.)
PRINCIPAL (Mr.)

Image 10 – After Printing Form

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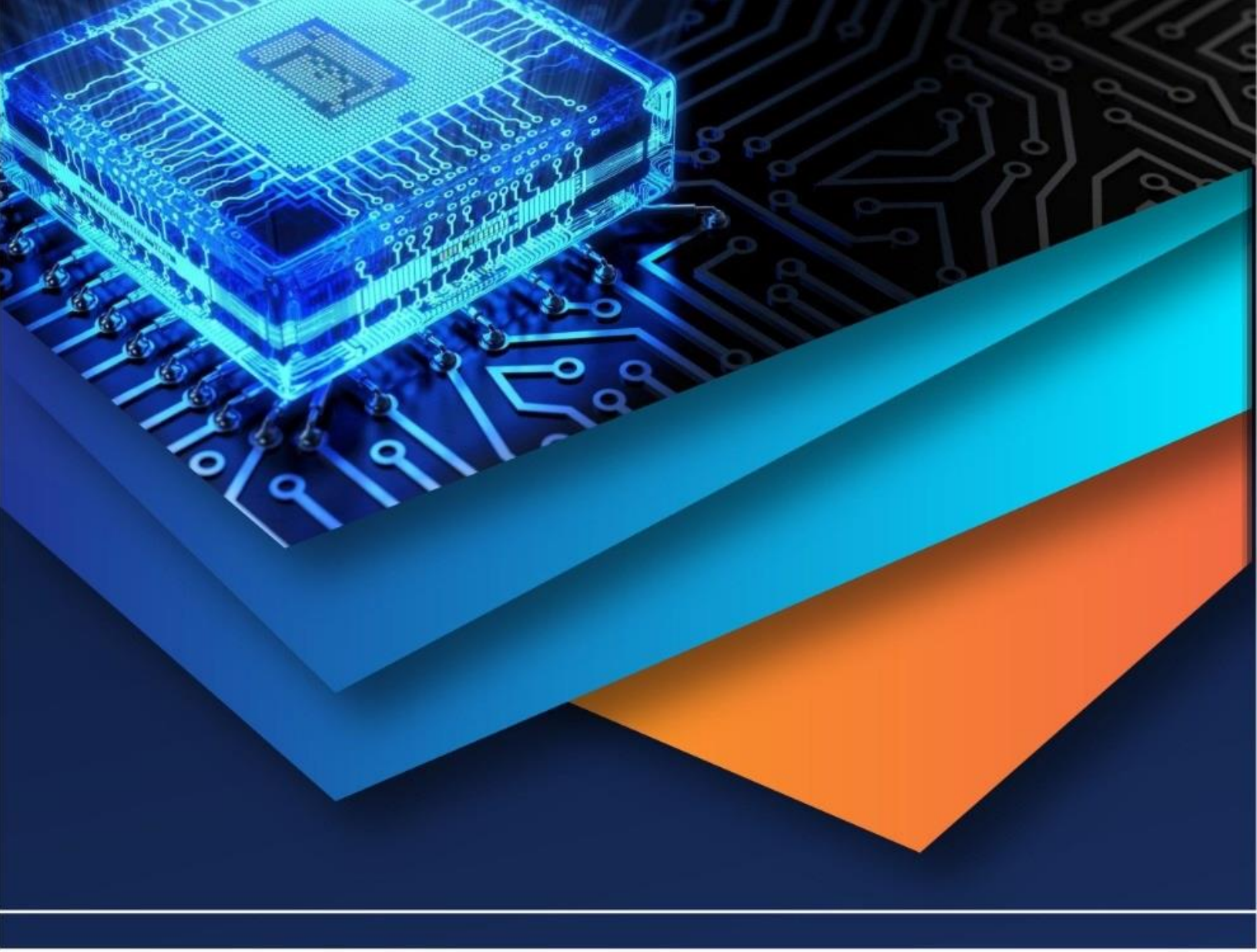
V. CONCLUSION

In conclusion, the software described provides an efficient solution for managing laboratory test data, especially for construction materials. It offers a seamless process for entering, editing, and storing test data, as well as generating and printing reports. The integration of backup functionality and customizable settings ensures that the system can adapt to evolving laboratory needs. The use of Microsoft SQL Server, Visual Studio 2019, and other tools like Guna UI and PdfSharp ensures that the software is both robust and user-friendly.

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