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Blending of Aggregates in Road Construction by Using STAB Software

Introduction

In road construction, the blending of aggregates is a crucial process that ensures the structural integrity and performance of the road. Aggregates provide strength, durability, and stability to the road structure. The process of blending involves mixing different sizes and types of aggregates to achieve a desired gradation that meets specific requirements for road construction. This document covers the methods of aggregate blending and the application of STAB software for optimized proportioning.

Methods of Aggregate Blending

There are several methods used for blending aggregates in road construction. These methods vary in complexity and accuracy, depending on the project requirements and available resources.

1. Trial and Error Method

The trial-and-error method is the simplest and most traditional approach to blending aggregates. It involves manually mixing different aggregates and testing the mixture to achieve the desired gradation. This method is often time-consuming and may require multiple iterations to achieve the optimal blend.

2. Graphical Method

The graphical method involves plotting the gradation curves of individual aggregates on a graph. By superimposing these curves, a designer can visually determine the proportions needed to achieve a target gradation. This method provides a more systematic approach compared to trial and error, but it still relies on manual calculations and judgment.

3. Mathematical Method

The mathematical method uses equations to calculate the proportions of different aggregates required to meet the target gradation. This method is more accurate than the graphical method and allows for quick adjustments and optimization. The equations typically involve solving for the unknown proportions using linear algebra or other mathematical techniques.

4. Optimized Proportioning

Optimized proportioning is a more advanced method that involves the use of software tools to determine the ideal blend of aggregates. This method accounts for various factors such as

material availability, cost, and performance criteria. STAB (Simple Tool for Aggregate Blending) is one such software used to achieve optimized proportioning.

Using STAB Software for Aggregate Blending

Introduction to STAB Software

STAB (Simple Tool for Aggregate Blending) is a software tool designed to assist engineers in optimizing the blend of aggregates for road construction. It simplifies the process of calculating the ideal mix of aggregates to achieve the desired gradation, taking into account factors such as material properties, cost, and availability.

Input Data Required for STAB

To use STAB software effectively, certain input data are required, including:

1. Gradation curves of the individual aggregates
2. Target gradation specifications
3. Material costs
4. Availability of materials

Step-by-Step Procedure

The following steps outline the procedure for using STAB software for aggregate blending:

1. Input the gradation data for each aggregate into the software.
2. Define the target gradation based on project specifications.
3. Enter the cost and availability of each aggregate.
4. Run the optimization tool to determine the ideal proportions of each aggregate.
5. Review the results and adjust the inputs as necessary.

Example Calculation with Tables

To illustrate the use of STAB software, consider an example where three different aggregates are blended to meet a target gradation. The following table provides the gradation data for each aggregate:

Using the STAB software, the ideal proportions of each aggregate can be determined to achieve the target gradation. The software will calculate the optimal mix based on the input data and provide a detailed report of the results.

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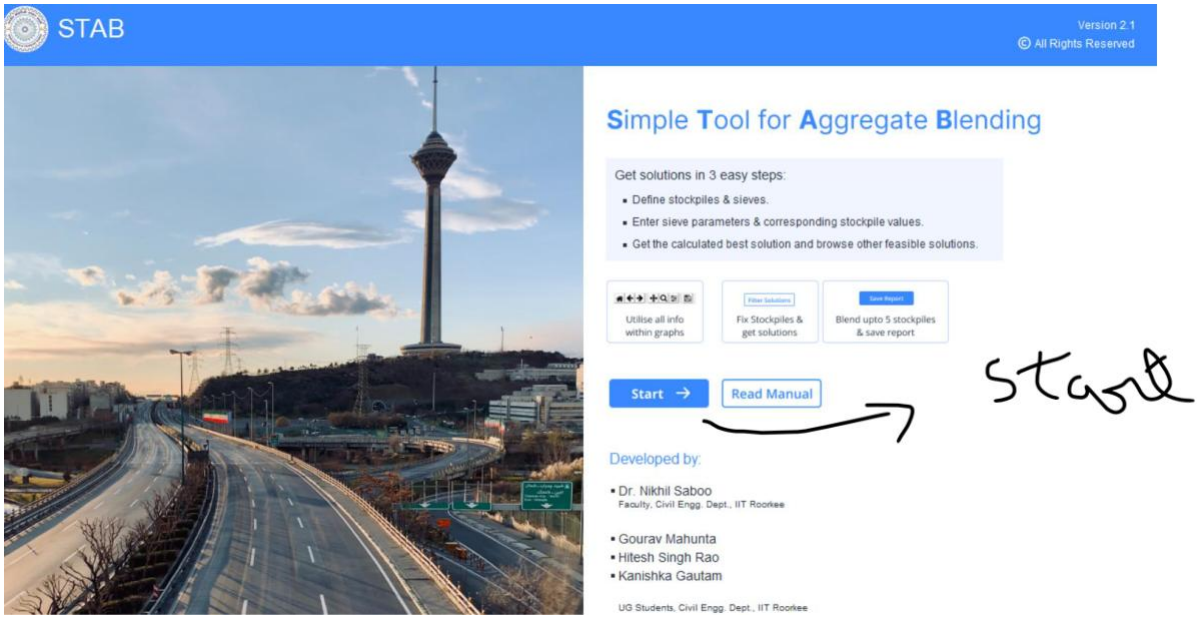

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Put values in both column

	Size(mm)	Lower Bound	Upper Bound	Stockpile 1	Stockpile 2
Sieve1	26.5	100	100	100	100
Sieve2	19	90	100	100	100
Sieve3	13.2	59	79	60	80
Sieve4	9.5	52	72	55	65
Sieve5	4.75	35	55	52	32
Sieve6	2.36	28	44	48	25
Sieve7	1.18	20	34	38	18
Sieve8	0.6	15	27	20	15
Sieve9	0.3	10	20	10	10
Sieve10	0.15	5	13	4	2
Sieve11	0.075	2	8	0	0

After this we will get solutions in desirable errors, so for above case we decided 2% error case and we will get 41 possible solutions. From that solutions we can choose best solution for which error should be minimize. And that solution is: 53 percent of stock pile 1

47 percent of stock pile 2

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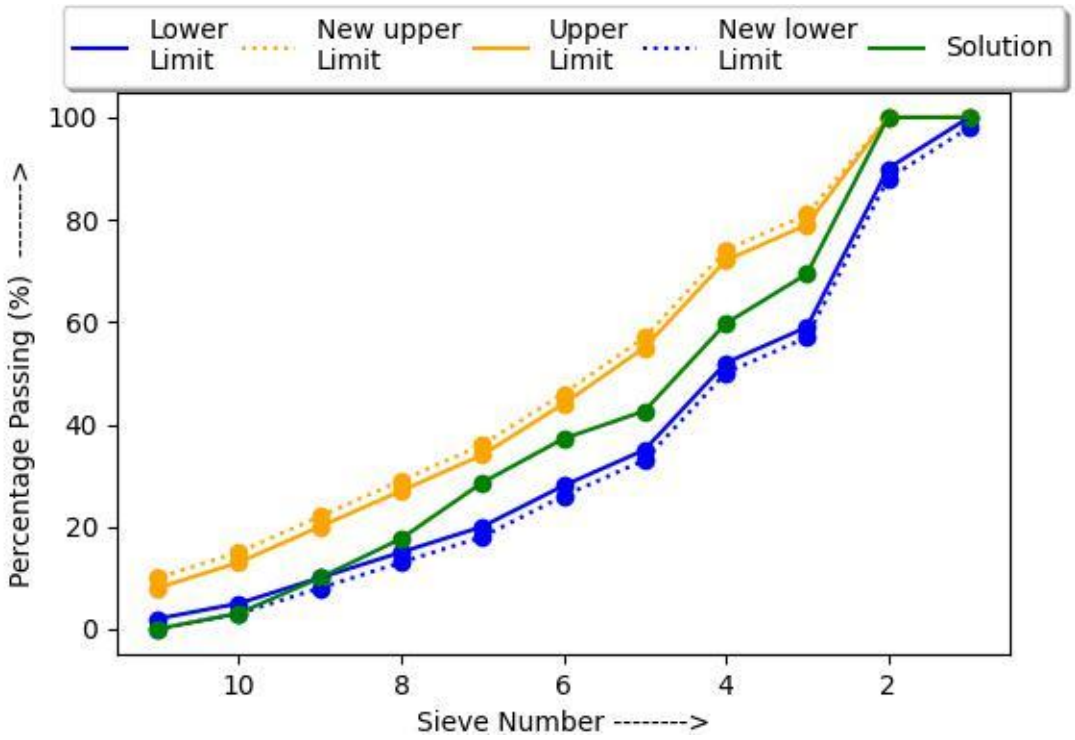

Conclusion

Accurate blending of aggregates is essential for the quality and durability of road construction projects. The use of methods such as trial and error, graphical, and mathematical approaches can be effective, but the use of specialized software like STAB offers significant advantages in terms of accuracy and efficiency. By optimizing the blend of aggregates, engineers can ensure that the road meets performance requirements while minimizing costs and material waste.