TATA STEEL PPT

REBAR

OPTIMISATION

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What is optimisation?

Optimisation refers to finding the most feasible and optimal solutions on the basis of certain conditions or constrains.

Rebar Optimisation

Rebar optimisation involves optimising the rebar rods and getting the best cutting patterns in order to fullfill demands, cost effeciency ,minimise wastage and performance standards.

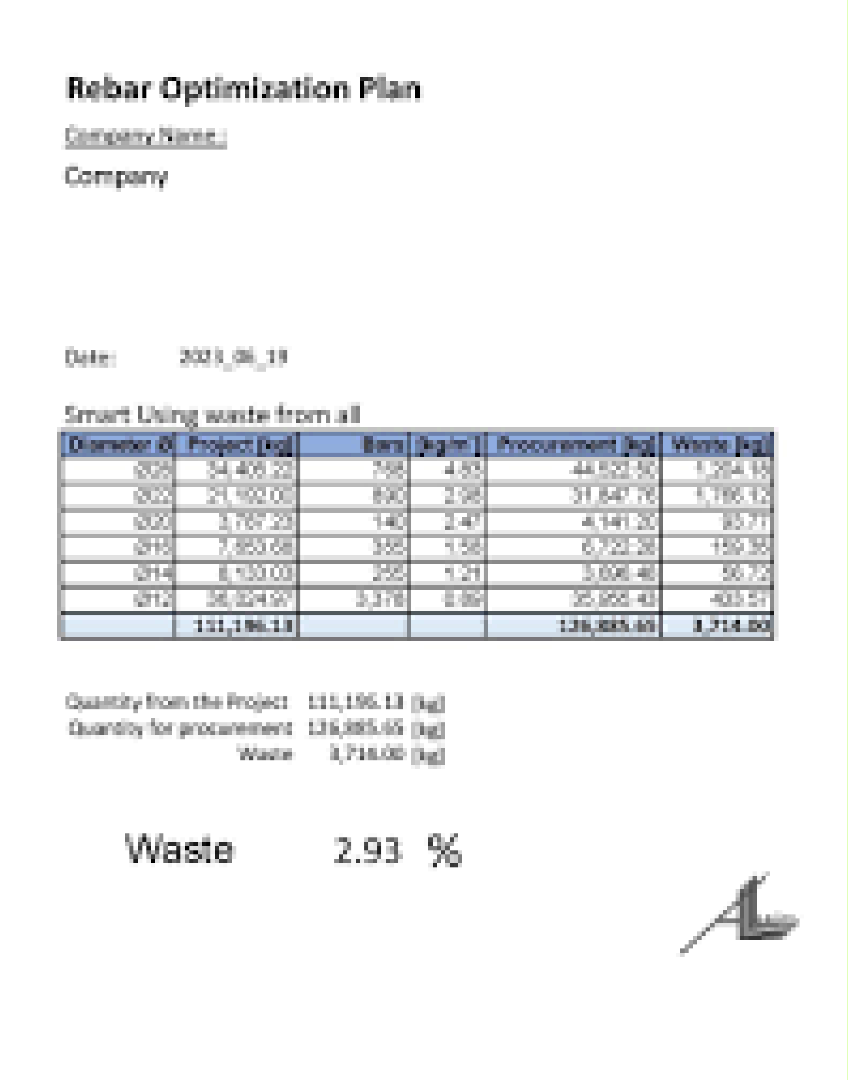
The various methods of Rebar Optimisation includes-

a.Knapsack /Linear Programming Technique

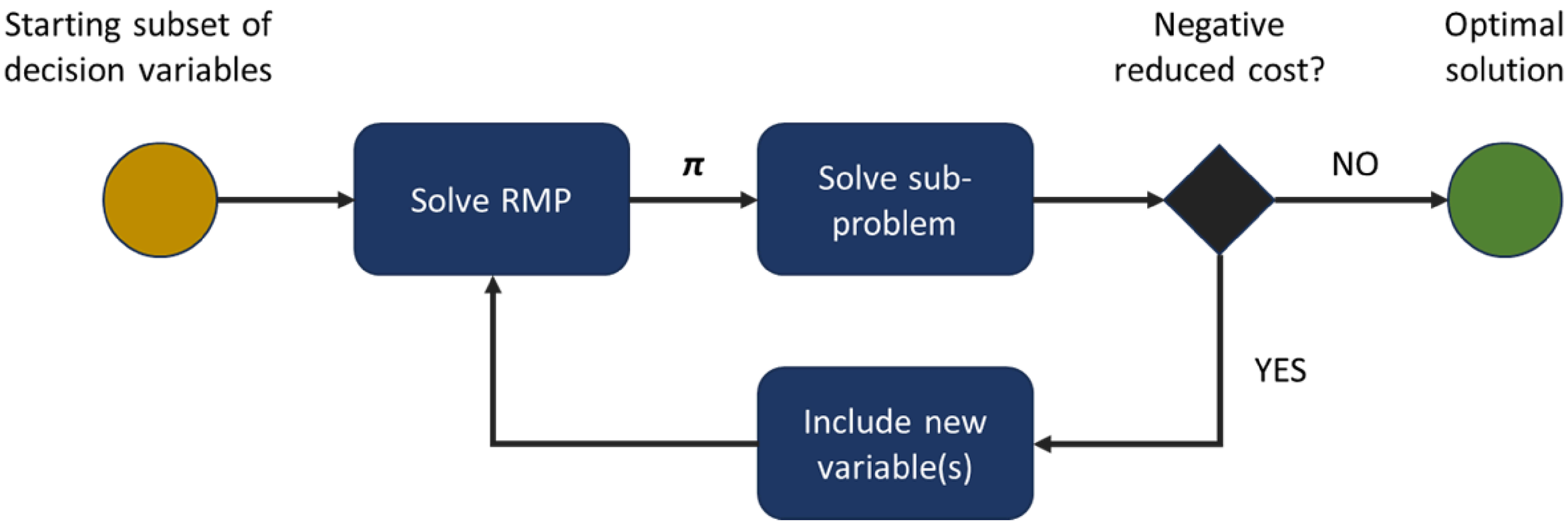
b.Genetic Algorithm

c.Greedy Methods

d.Column Generation Techniques



COLUMN GENERATION TECHNIQUE AND KNAPSACK APPROACH



Knapsack Technique of Optimisation

- The knapsack technique for rebar optimization involves selecting the combination of rebar sizes and lengths that maximize structural performance or cost efficiency within the constraints of available resources, similar to maximizing the value of items in a knapsack without exceeding its weight limit.

- Linear programming in rebar optimization entails formulating the problem as a set of linear equations and inequalities, where the objective is to minimize the total cost or material usage of rebar while satisfying structural and design constrains.

Genetic Algorithm in Rebar Optimisation-

1.Population Initialization:

- Begin with a randomly generated population of potential rebar layouts, where each layout is encoded as a chromosome.

2.Fitness Function:

Evaluate each rebar length on the basis of Fitness Function.

3.Selection:

Select the best performing rebar layouts on the basis of fitness scores using the tournament selection,rank selection etc.

4.Crossover-

Combine pairs of parent chromosomes to produce offsprings to generate new rebar combinations.

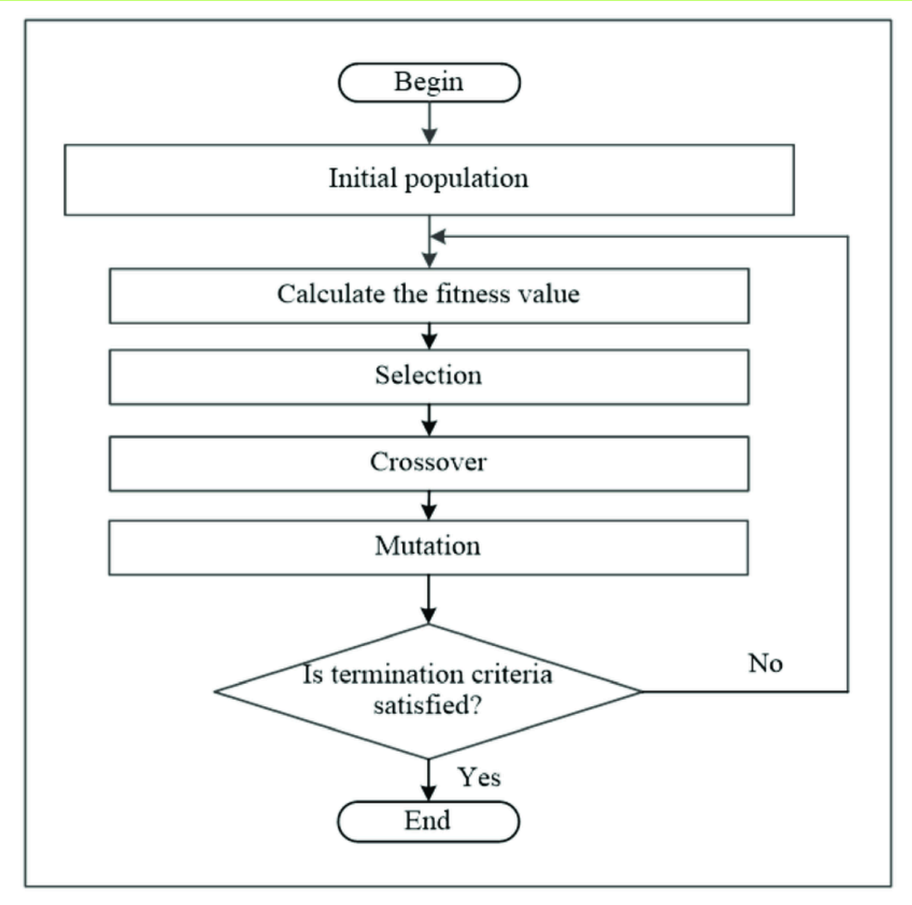
5.Mutations-

Apply random changes to the individual genes in the offspring chromosomes to explore more cutting patterns.

6.Iteration and Termination-

Repeat the same process of selection,crossover and mutation processes over multiple iterations that will iteratively improve the populstion overall fitness function to give an optimal cutting pattern. Finally when the convergence or threshold condition is met the iteration will stop giving the optimal distribution result accordingly.

Architechtural Flow Diagram-



Steps used in Rebar Optimisation-

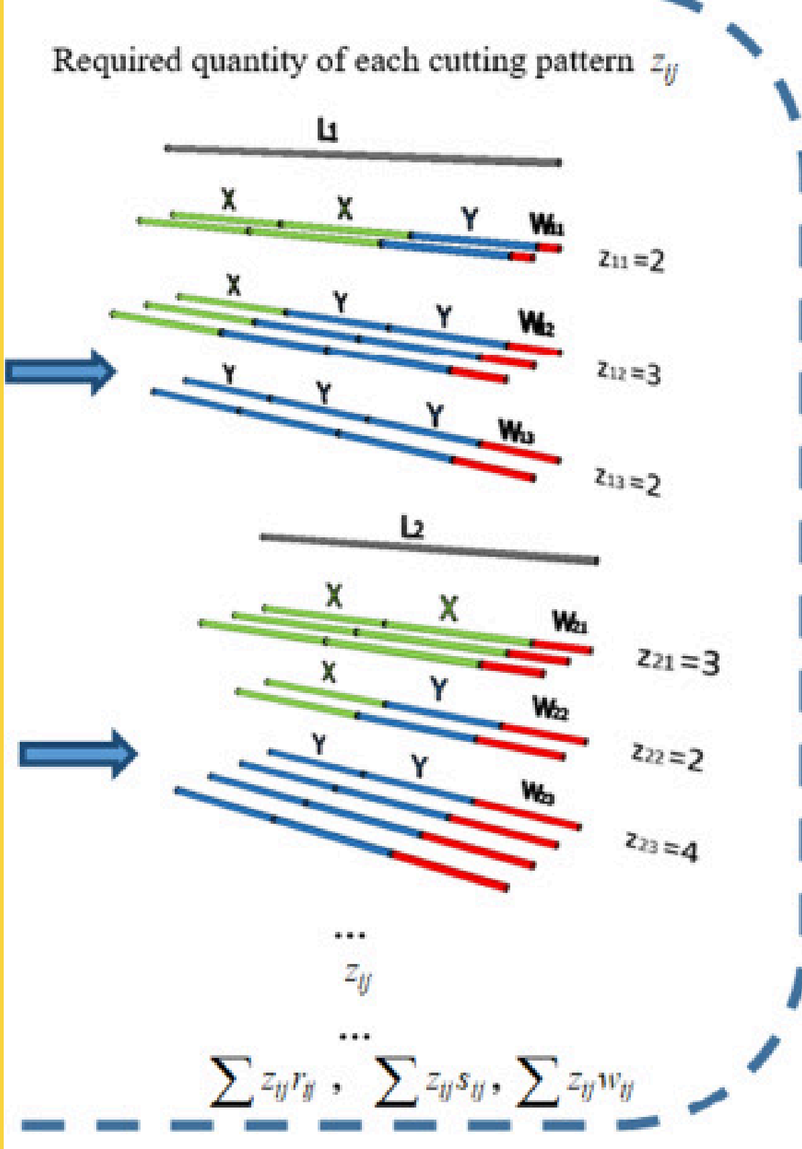
1.Used Greedy Approach to distribute the demands of arbitary lengths -(Assigns the highest demand to highest width)

2.Used Knapsack and Linear Programming technique to calculate matrix and sol.x respectively iteratively row by row to generate and update new cutting patterns.

3.Further incorporated the Genetic Algorithm Approach to distribute the arbitary demands respectively .

Results Findings-

On having a comparitive study based on the two methods observed that Greedy approach could fullfill 90% of demands whearas Genetic Algorithm could fullfill 86.5% of demands.



THANK YOU!!