

TECHFEST 2021-22

PackMax

Introduction

Efficient movement of goods is critical to the conservation of both financial and environmental resources. Creating efficient packing plans for the trucking industry can help to reduce its carbon footprint, protect goods from damage, and save on shipping costs.

- The Indian logistics sector is worth US\$ 215 billion; only 10-15% is organized. ([Business World](#))
- Transportation accounts for about a quarter of global CO2 emissions. Smart Logistics can help reduce this number, reduce cost, and deliver more to customers. ([Financial Express](#))
- "Optimising truck use can reduce annual CO2 emissions by 185 million tonnes in 2050", and a cost savings of 85 lakh crore INR. ([Rocky Mountain Institute](#))

Problem Statement

Participants have to create a tool(an algorithm, a digital tool etc) which can generate and communicate optimal packing plans to help reduce costs and environmental impact.

This tool should take in a dispatch list, product-specific packing restrictions, and available resources to generate a vehicle loading plan which optimizes resource use (I.e. truck space, petrol usage, etc.) which can be communicated on-the-ground in a fast-moving warehouse-like environment.

Things to think about:

- Filling a truck all the way not only optimizes space but also reduces product damage by preventing vibration.
- Different trucks will have different loading capacities, shapes, and dimensions, as well as different fuel efficiencies.
- Employees on the loading docks often speak vernacular languages and have levels of technological literacy.
- Different products have different loading restrictions, some can be stacked (but only so high), some must sit in a particular direction (other are more flexible), certain products can only be transported in particular types of vehicles and/or areas of the truck bed.

Criteria

Input

- **Static** (See *datasets attached*.)
 - o Product Information – package dimensions, weight, etc. packing and stacking restrictions per product type

- o Vehicle Information – Bed dimensions, shape, etc. loading restrictions, fuel efficiency
- **Dynamic** (changes daily)

Every day, the products (and their quantities) as well as the available trucks (and their quantities) change. The system should be able to handle a wide variation in these numbers. For development, participants can create sample data sets by generating “random” dispatch lists and available truck lists. *It should be noted that some products (ex. Split A/C units) are two separate cartons but will always be shipped together.*

- **Datasets:**

https://docs.google.com/spreadsheets/d/18l8kU65fNIHraak8qG6og_yhiBJ7GeDPtDRr9ZOcEQM/edit#gid=43222426

Output:

- Vehicle Loading Plan which optimizes for:
 - o Truck usage and packing
 - o Reduction of fuel
 - o Protection of products
- Way to communicate Vehicle Loading Plan on the warehouse floor which
 - o Is language agnostic
- Outputs a “Green Score” (a metric to be suggested by participants) to help us track carbon footprint, sustainable packaging components (cartons, strapping, fillers, etc.), etc.

Open-ended Questions and areas of differentiation that we would like the participants to address are :

- How might this tool keep track as loading progress?
- Can this tool use image processing to detect loading errors?
- Can the plan be communicated without words?
- How do different vehicles respond to different loading amounts and configurations? How does fuel efficiency change?
- How can this system allow for (future) integration into other enterprise software/databases?

Note- These questions are open ended and it's not compulsory to include them in your report. But there will be bonus marks for the participants who will give them a try and arrive at a significant conclusion. Also you are free to think as an unconventional thinker and you can also work on a different question that you think is a problem area in the packaging industry.

Abstract Submission Format:

- Objectives
- Beneficiaries (For whom)
- Value of results (Usage)
- Research that you have done
- The idea and solution that you thought so far including your innovation
- Description of concepts, theories and/or approach involved in the proposed solution

Final Report Submission Format:

- Demo Application (which takes in input and returns the output)
- A PDF Report explaining:
 - High-level thoughts and approach
 - Logic of Vehicle Loading Plan algorithm
 - Communication approach
 - Rational behind suggested "Green Score"
 - Additional thoughts for future development in sustainable packing materials (i.e. reducing EPS and plastics, etc.)
 - Solutions to the Open-ended questions described above.

Judging Criteria:

Participants will present a working version of their tool and engage with a team of experts in explaining their solution and choices.

Sample dispatch lists and lists of available trucks will be provided to all participants a day before the presentation.

Judging will be based on:

- Explanation of optimization strategy and "Green Score" metric proposal
- Performance of optimization and "Green Score" as per above
- Performance in communicating a packing plan (particularly on its practicality in a warehouse environment).

Bonus Criteria:

- Additional thoughts for future development in sustainable packing materials (i.e. reducing EPS and plastics, etc.)

ELIGIBILITY

- Individuals or teams from the following categories are allowed:
 - Students/research scholars of authorized institutions (students have to show their valid College/School ID).
 - Participants who have passed out of college no more than 3 years ago.
- A team is allowed to have a maximum of 4 members.

- If the participating team feels that their idea requires more participants in their team, they can forward their request, with suitable reasons to packmax@techfest.org with the subject "Ideate (Team_ID): Team number increase request".

REGISTRATION AND SUBMISSION

The Participants have to register on the official Techfest Website and fill all the necessary details. www.techfest.org ->(Hover on) Competitions-> Ideates -> Packmax -> Explore More -> Register -> Fill all your details -> Now you must create/Join a team

PROJECT REPORT SUBMISSION

The project report should be mailed to with the subject 'Ideate: "Packmax" Project Report: Team_ID ' (for eg. Ideate: "Packmax" Project Report: PM-211234). The report must be submitted in PDF format and then only be mailed to packmax@techfest.org.

TIMELINE

Godrej Experts Session For guidance	30th October	There will be a webinar in which the experts will be explaining the problem statement. Recording has been uploaded on website
Last Date of Registration	8th December	Participants need to register before this date.
Deadline for Abstract Report Submission	8th December	Submission of First Draft Report
Declaration of Result	13th December(may change)	Declaration of shortlisted teams to work for final project reports
Deadline for Final Project Report Submission	2nd January	Submission of final project report with documentation of work along with a video prototype (if any) has to be submitted before this date.
Declaration of Result	7th January	Declaration of shortlisted teams for final presentation at Techfest, IIT Bombay on the basis of the final report and the supporting materials
Improvisation Stage	8th-16th January	Shortlisted participants are to improve their model and prepare a presentation for the final round.
Final Presentation Stage	17th-19th January	Final live presentation in front of Judges

SHORTLISTING

Top 15 teams will be selected and will get the chance to present their model/idea in the Final Round of Packmax, Techfest, IIT Bombay. Participants will get a slot for presenting their model/idea to the Judges based on which they will be evaluated. These teams will be selected by a panel of judges.

GENERAL RULES

- Every team has to register online on our website(techfest.org) for the competition. A Team ID will be allocated to the team on registration which shall be used for future references.
- A team can register at any point of time before 15th November 2020 and submit the final abstract and video (as mentioned in the structure).
- The decision of the organizers or judges shall be treated as final and binding on all. Techfest has all the rights to verify the identity and accuracy of the details provided by the participants.
- No responsibility will be held by Techfest, IIT Bombay for any late, lost or misdirected entries.
- The idea presented by the teams should be original (not protected by means of patent/copyright/technical publication by anyone else).
- Note that at any point of time the latest information will be that which is on the website. However, registered participants will be informed through mail about any changes on the website(techfest.org).
- All modes of official communication will be through the Techfest e-mail.

CERTIFICATE POLICY

Only those teams that are shortlisted for the finals and also give a final presentation about their work during Techfest 2021-22 would be awarded an e-Certificate of Participation. The top 5 entries from this event would be provided with a Certificate of Excellence.

PRIZES

The prize money will be awarded to top 3 winners via NEFT and will be processed within 30 working days after receiving the prize money from sponsors. Winners have to mail the following information (immediately after the announcement of results) to kunal@techfest.org

FORMAT OF MAIL :

Subject: "Packmax", Team_ID -Position - (example-"Packmax", PM211003 - 3rd Position)

Body of mail:

- Account Holder's Name
- Account Number
- Bank name and Branch name.
- IFSC Code
- Photograph of Bank Passbook as a proof