



**SUSTAINABLE
PACKAGING INNOVATION
FOR MEDICAL DEVICES:
STRATEGY, COMPLIANCE AND
IMPACT**

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MEET THE TEAM



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AGENDA

INTRODUCTION

Nefab at a Glance
Key Packaging Challenges in the Healthcare Industry

PORTFOLIO

Engineered Packaging Solutions to Overcome Key Challenges
Reference Cases and Success Stories

ENGINEERING, INNOVATION & TESTING

Engineering Excellence
Innovation Showcase
Testing and Validation

SUSTAINABILITY & COMPLIANCE

Sustainability
Life Cycle Assessment (LCA) Tool
Regulatory Landscape (EUDR, PPWR, etc.)



NEFAB OVERVIEW



- +4900** Employees
- 130** Locations in **38** countries
- 250** Engineers worldwide
- 6** ISTA test labs
- 2** Long term owners

How?

Who?

What?

Why?



Telecom



Healthcare



Datacom
& Cloud



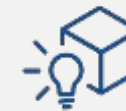
Semicon



LiB

CUSTOMERS

Leading industry segments



Packaging
Solutions



Logistics
Services



Digital
Services

OFFERINGS

WE SAVE RESOURCES
IN SUPPLY CHAINS FOR
A BETTER TOMORROW



10 m tons
saved



75% sales are
sustainable solutions

2024 sales: 10.3 BSEK

EMEA: 43 %

Americas: 35 %

APAC: 22 %

NEFAB'S OFFERINGS

CUSTOMIZED SOLUTIONS & SERVICES

PACKAGING SOLUTIONS

Engineered, multi-material, customized



Fiber



Plastics



Plywood



Wood



Other

LOGISTICS SERVICES

End-2-end optimization,
customized setups



- Contract Logistics
- Packing Services
- Pooling Services

DIGITAL SERVICES

Supply chain transparency
& accountability



- Returnable Packaging Management
- High Value Asset Management
- Installation Management

HEALTHCARE SEGMENT

LEADING HEALTHCARE EQUIPMENT PACKAGING COMPANY



DIAGNOSTIC EQUIPMENT

Such as imaging systems, lab analyzers, patient monitoring equipment, etc..

TREATMENT EQUIPMENT

Such as surgical robots, radiotherapy (linear accelerator) systems, infusion pumps, etc..

LIFE SUPPORT EQUIPMENT

Such as ventilators, anesthesia machines, AEDs, etc..

DURABLE MEDICAL EQUIPMENT

Such as wheelchairs, hospital beds, patient lifts, etc..



CHALLENGES IN HEALTHCARE PACKAGING



Protection

Ensures sterility, physical integrity, and safety of the device.



Cost

Balancing quality, compliance, and budget constraints.



Storage & Transportation

Must withstand temperature, humidity, vibration, and handling during transit.



Handling

Ease of use in clinical settings; intuitive opening and organization.



Last Mile Delivery & Installation

Mitigating risks from material shortages and global disruptions.



Regulatory Compliance

Compliance with ISO, FDA, EUDR, PPWR, and other global standards.



Sustainability

Reducing waste, using recyclable materials, and meeting ESG targets.

PROTECTION



**Custom-Engineered
Designs**



**Advanced
Multi-Material
Solutions**



**Rigorous Testing &
Validation**



COST



Reduced Material Usage & Waste



Minimized Losses & Damage Claims



Streamlined Logistics Costs



Benefits:

- Plastic-free, mono-material solutions replaced foam and is fully recyclable
- Reduced package size by **34%**, resulting in **25%** less landfill waste
- Achieved a **66%** increase in packing speed
- Improved space utilization allows for **50%** more products to be transported



23% reduction in annual CO₂ emissions.



46% reduction in total cost.

STORAGE & TRANSPORTATION



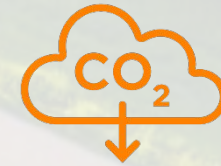
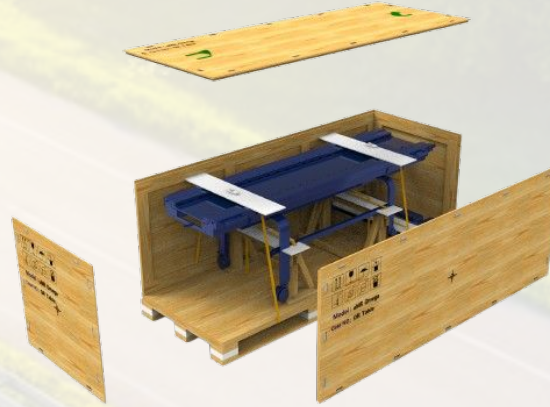
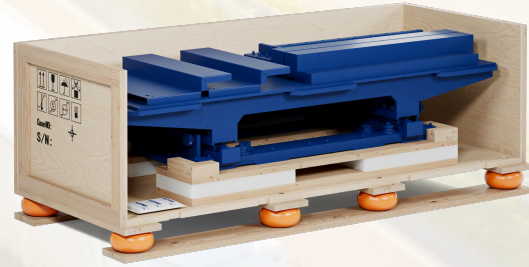
Durability & Protection



Space & Weight Efficiency



Supply Chain Optimization



27% reduction in annual CO₂ emissions.



31% annual cost savings.



HANDLING



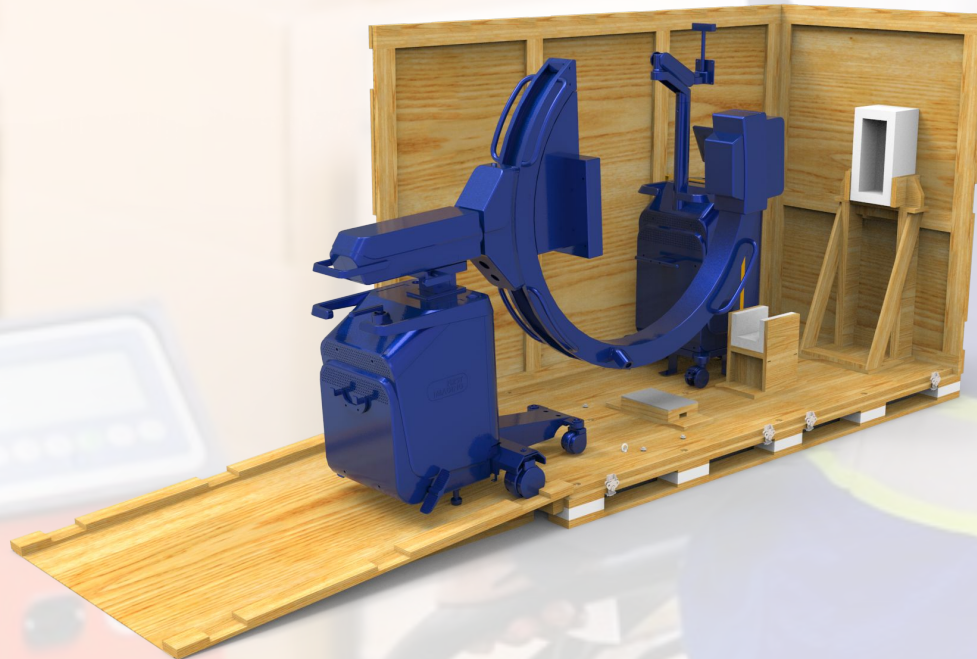
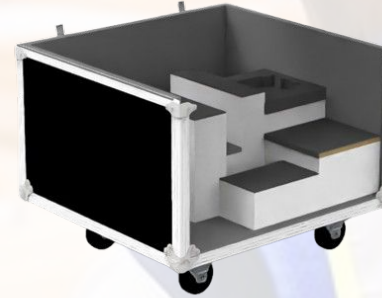
**Ergonomics &
Maneuverability**



**Workflow
Compatibility**

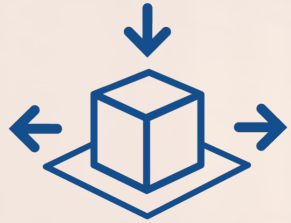


Safety & Efficiency



NEFAB
SAVING RESOURCES

LAST MILE DELIVERY & INSTALLATION



Realtime Tracking & Status Updates



Minimized Losses & Damage Claims



Streamlined Logistics Costs



Benefits:

- Maintained a flawless delivery record with **no missing or damaged parts** throughout the two-year program
- Reduced the number of handling units by **22%**, shortening loading time
- Cut installation time by **4 hours** through improved visibility and organization



Project earned Nefab the prestigious “Supplier Excellence Award” in 2020.



\$1M annual cost savings.

REGULATORY COMPLIANCE



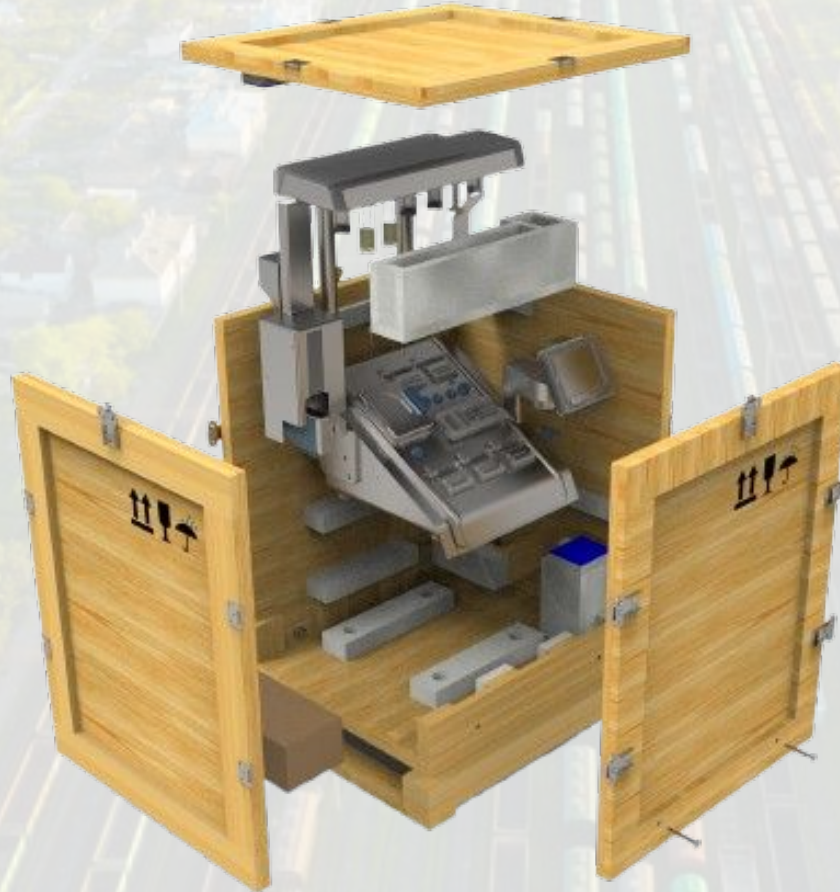
**Compliant Materials
for Reuse & Recycling**



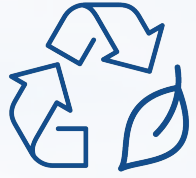
**Handling, Lifecycle
& Audit Readiness**



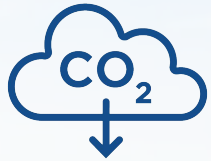
**Maintaining Product
Integrity**



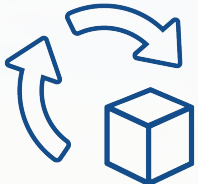
SUSTAINABILITY



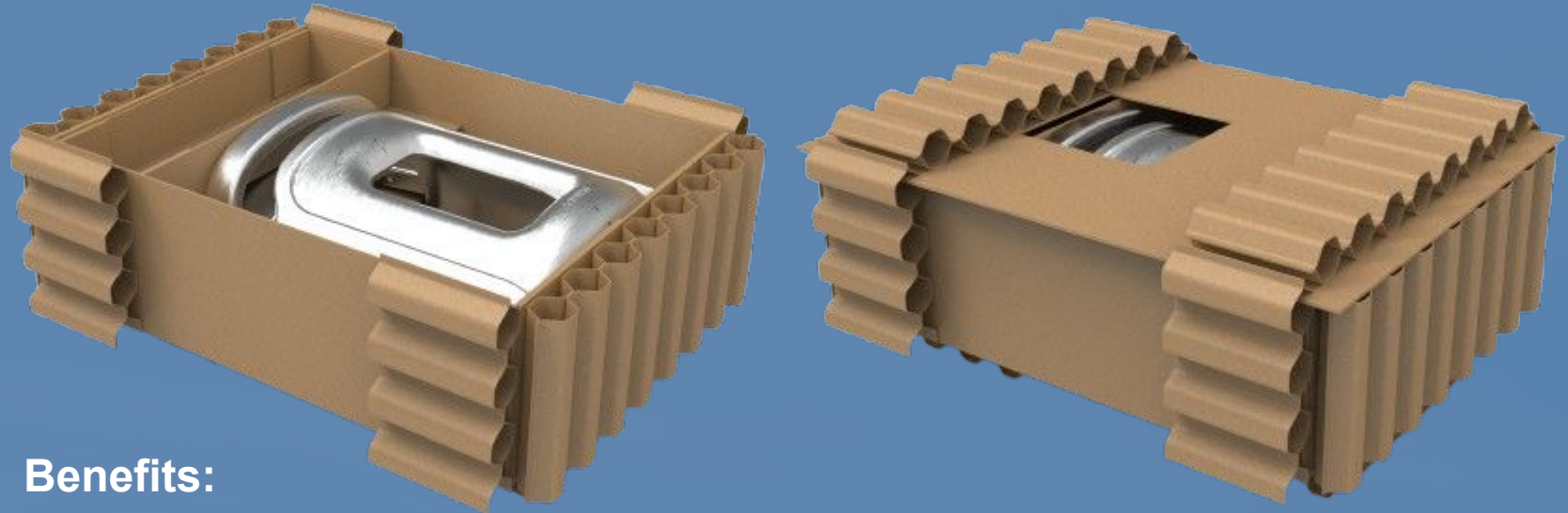
**Recycled &
Recyclable Materials**



**Optimized to Reduce
Carbon Footprint**



**Reusable
Closed-Loop
Solutions**



Benefits:

- Solution made of 100% recycled paper, and fully recyclable in the paper recycling stream
- Nestable cushioning reduced inbound transport and storage footprint 8x versus prior PE foam



33% reduction in
annual CO₂ emissions.



10% reduction in total
cost.

ENGINEERING

GLOBAL PRESENCE, LOCAL SUPPLY

+250

Engineers & designers

+30

Engineering teams & centers

+30

Material, testing & software specializations

+10

Test labs



INNOVATION SHOWCASE

EdgePak Straw



- Comparable strength to plywood with better stacking strength than a triple wall corrugated box
- Easy handling and nail-less assembly
- 100% paper recyclable

FiberFlute



- Made of 100% recycled paper & recyclable in the paper stream
- Outstanding cushioning performance
- Sustainable alternative to PE foam

Thermoformed Cushioning



- Provides superior cushioning using less materials than traditional foam
- Reduces space in shipping, storage and handling volume by up to 85%
- Lowers CO2 emissions and plastic waste over multiple cycles by consisting of recycled HDPE

TESTING AND VALIDATION

01

Advanced Test Center

- ISTA Certified Lab
- Advanced Test Equipment
- Advanced Data Collection
- Material Testing
- Development Lab



**Compression
Test**

02

Qualification Lab

- ISTA Certified Lab
- Equipment for ISTA & ASTM Test Standards



Vibration Test

03

Development Lab

- Equipment to evaluate & compare Nefab designed packaging
- Speed to market
- Optimize design

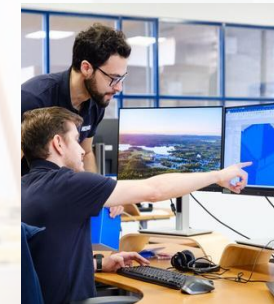


**Material
Testing (VCI)**

ISO



**ISO 9001
ISO 14001
ISO 17025
ISO 13485**



FEA

SUSTAINABILITY IN YOUR SUPPLY CHAIN

CHALLENGES

>20%

of total CO₂ linked to transportation

>90%

of products go in one-way solutions

>60%

of packaging doesn't get recycled properly

>50%

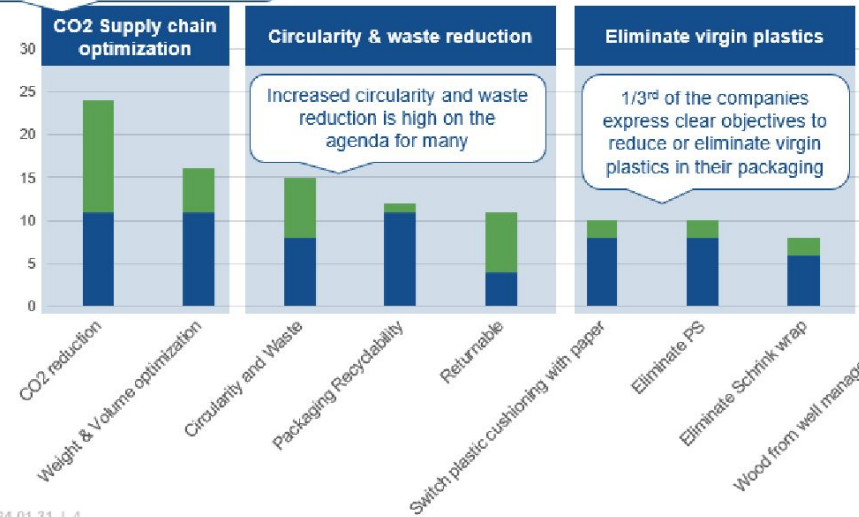
of waste in transport



TRENDS – SUSTAINABILITY

CUSTOMERS' SUSTAINABILITY GOALS

A clear majority has set goals related to CO₂ reductions by optimizing supply chains



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Opportunity to decarbonize your supply chain with smarter and sustainable packaging

GreenCalc™

The LCA tool to cut costs and reduce your carbon footprint.

NEFAB
SAVING RESOURCES

20% Financial savings

30% Environmental savings

Average savings based on 4 000 GreenCalc processes

- **Understand** your packaging and logistics impact
- **Identify and prioritize** initiatives to lower your environmental impact and total cost
- **Compare** your existing solution with the new Nefab solution
- **Track and report** your progress (scope 3 emissions)



THE GREENCALC PROCESS

Joint Data Collection

New Engineered Design

SUPPLY CHAIN SAVINGS REPORT

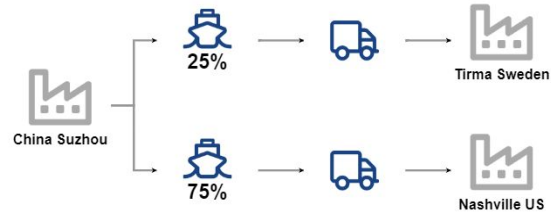
Case description - PERMOBIL

Nefab optimizes packaging to save total logistic cost and environmental impact.

In this flow 22 000 products are shipped on average 16 500 km by boat and 200 km by truck.

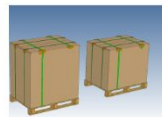
Input data for design:
- product weight: 16.4 kg
- Stacking requirement 1+1 stacking
- test standard: ISTA 3E

Based on the above we have following solution comparison:



Packaging solution

CURRENT
Current solution



Currently the Chassis box and Battery box has individual packaging solution.

MATERIAL USAGE:
25.6 kg Corrugated
23.8 kg Plywood
1.3 kg Steel galvanized, ExPak
0.6 kg PE, bag
Total of 51,3 kg

PROPOSED
New proposal



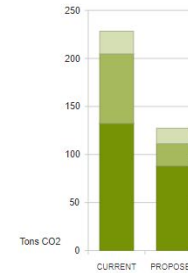
The new solution enable the integration of Chassis box and Battery box as one product, which can lower the packaging and logistic cost.

MATERIAL USAGE:
19.2 kg Corrugated
11.9 kg Plywood
0.7 kg Steel galvanized, ExPak
0.3 kg PE, bag
Total of 32,1 kg

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Annual savings

ENVIRONMENTAL



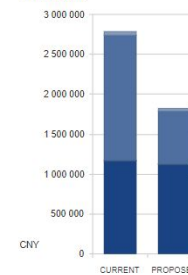
CO2 eq Savings
100 metric tons = 44%



Tons of CO2 equivalent is calculated using ISO14040 & 14044 guidelines, ecoinvent database and ReCiPe 2016 MIDPOINT Hierarchist methodology.

Powered by **SímaPro**

FINANCIAL



Total Savings
964 005 CNY = 35%

SAVINGS IMPACT
Per Product = 43.82 CNY
Per Package = 525.63 CNY



The Financial Savings graph illustrates total cost of logistics by implementing a new solution. Main components are: transport, handling, packaging, Others (warehousing, damages, waste management)

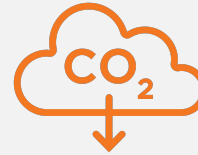
Environmental and Financial Savings

SUSTAINABILITY ASSESSMENT



PACKAGING SOLUTIONS

Scope includes wood-based, returnable, and multi-material packaging.



CARBON REDUCTION

Life-cycle assessment shows 15-20% average CO₂ savings.



COST SAVINGS

CTO approach delivers 8-10% average cost reduction through productivity gains.

Pre Assessment

Workshop at
Customer Site

Re-Engineering

Report

Sampling &
Testing

Implementation

PACKAGING AND PACKAGING WASTE REGULATION (PPWR)

Objective: The PPWR mandates reduced packaging and waste across the EU, pushing businesses to adopt circular principles and comply with regulatory standards.

Key Measures:

- **2028:** Design Guidelines for all packaging.
- **2030:** >70% recyclable to enter EU market.
- **2035:** Must be effectively collected, sorted and recovered (“**recycled at scale**”).
- **2038:** <80% **recyclable** packaging banned from EU market.

Extended Producer Responsibility (EPR): Producers are accountable for the full lifecycle of the packaging, including ensuring suppliers comply with recyclability and traceability requirements.

EU DEFORESTATION REGULATION (EUDR)

Objective: The EU Deforestation Regulation requires any product linked to certain commodities (including wood, paper, and rubber) to be proven to *deforestation-free* and *legally sourced* before entering or being sold in the EU.

Why it matters for medical device OEMs:

- **Packaging Exposure:** Many shipping crates, pallets, and paper-based materials used in MedTech logistics fall under EUDR.
- **Due diligence obligations:** Even if OEMs aren't the importer of record, *they're accountable* through their supply chain – traceability back to the forest or recycled source will be required **FROM OEM'S PACKAGING SUPPLIERS**.
- **Risk of disruption:** Non-compliant suppliers or packaging vendors could block exports into the EU market after Dec. 2025

The European Commission is likely to postpone the regulation by one year to 30 Dec 2026, with official publication anticipated in early Dec 2025 (≈98% probability per analysts).

NEFAB'S HEALTHCARE SEGMENT



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Detailed map available on Nefab.com

An aerial photograph of a train on tracks during a golden sunrise. The sun is low on the horizon, casting a warm glow over a landscape of green fields, trees, and a road. The train is moving away from the viewer along the tracks.

NEFAB

SAVING RESOURCES