History, Status & Perspectives of Natural Fibers Application in Ford Motor Company

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Research and Advanced Engineering

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FMC R&A Locations

R&A at Ford Motor Company

- 1994 FFA founded
- R&A FoE: 290 employees

- Appr. 1400 in Dearborn, Michigan
- Project co-ordination with all FMC brands

Road Transport – Significant Challenges towards Sustainable Mobility

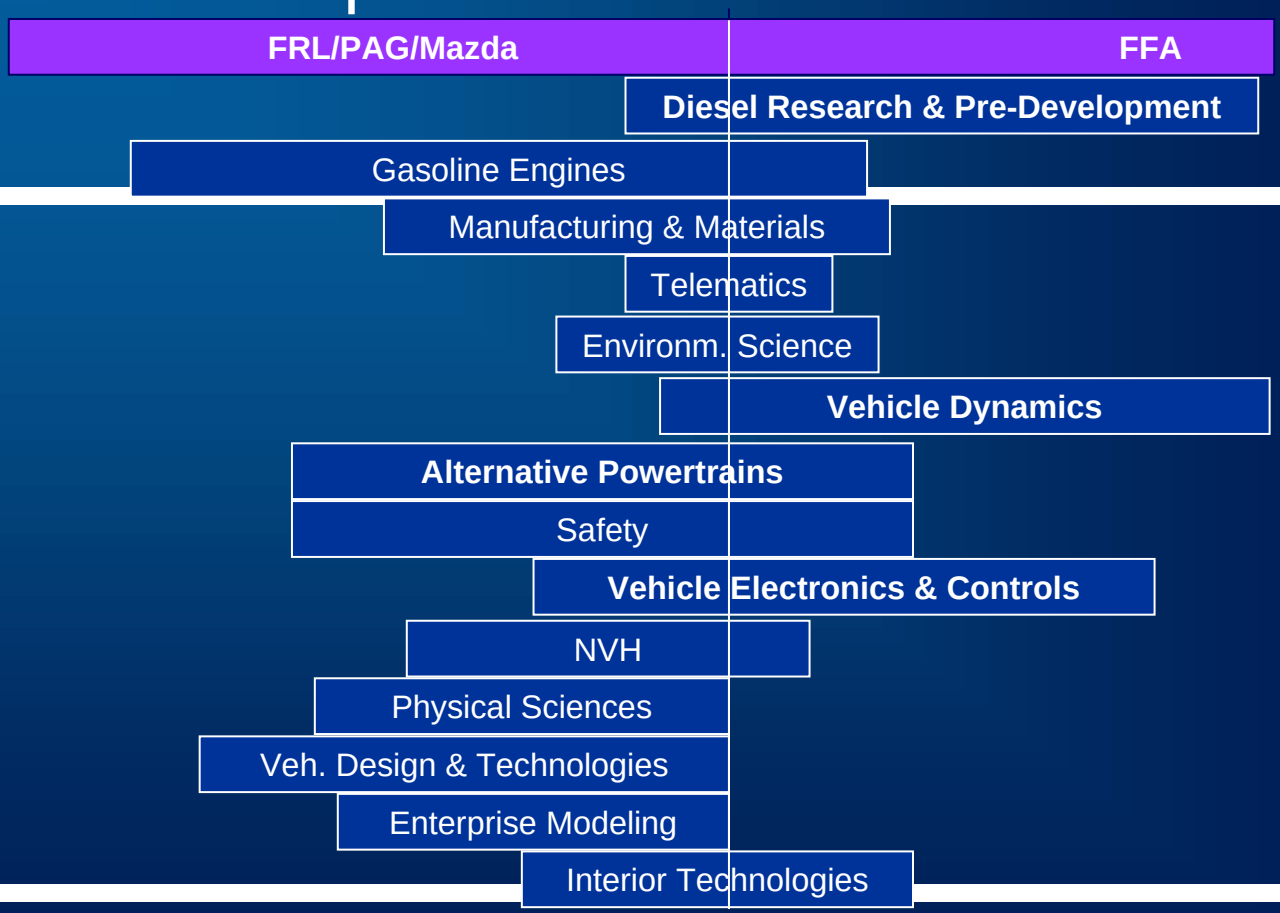
Emissions

Greenhouse gases

Limited fossil fuels

Safety

R&A Responsibilities



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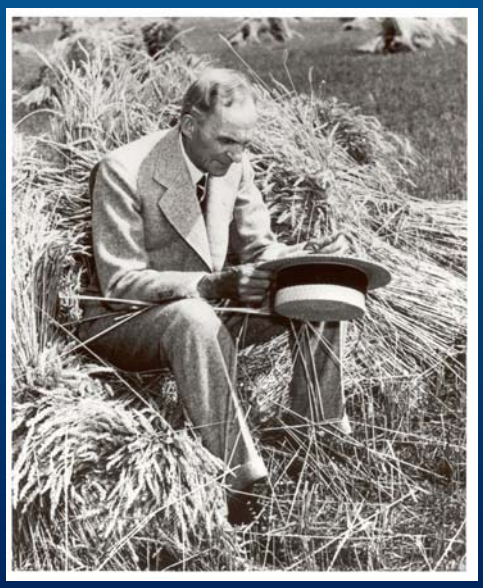
History – renewable materials

1915 (Model T):

- **wheat based glue;**
- **soybean wool (upholstery);**
- **soybean plastics (gear shift lever balls, door escutcheons & handles, instr. panel, clock, control knobs, window riser, ignition coil covers, etc.)**

Henry Ford spent $1.25 Million from 1932-1933 to research soy crops

History – renewable materials



1940: trunk lid out of soybean plastic

1941 - "Annual community festival of Dearborn": 1st handmade car – plastic body. Besides soybean plastics:

- wheat, hemp, flax, ramie & cork

Moving into a new century

Status

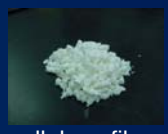
5 - 16,5 kg NF / veh. – 270 different components

Examples are:

- Package tray
- Interior trims (luggage, door, etc.)
- Headliner, sunvisor
- load floor, carpets
- insulation



wood

hemp fiber

cellulose fiber

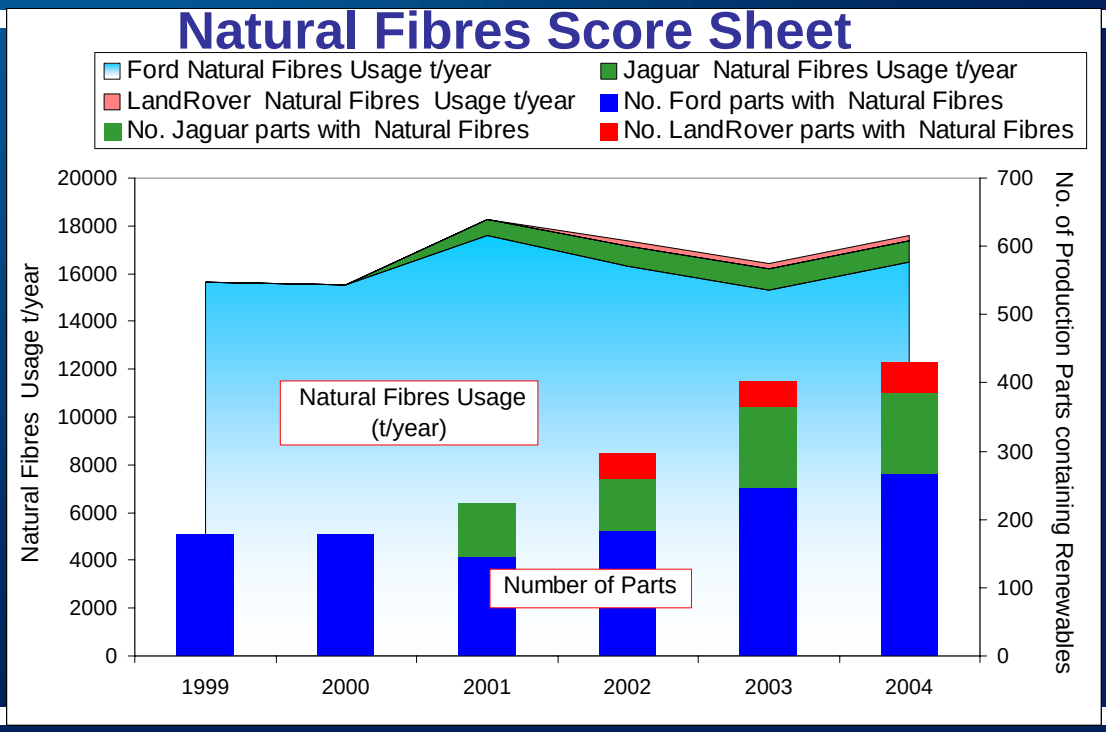
flax fiber

sisal fiber

kenaf fiber

jute fiber

Status



Status – requirements

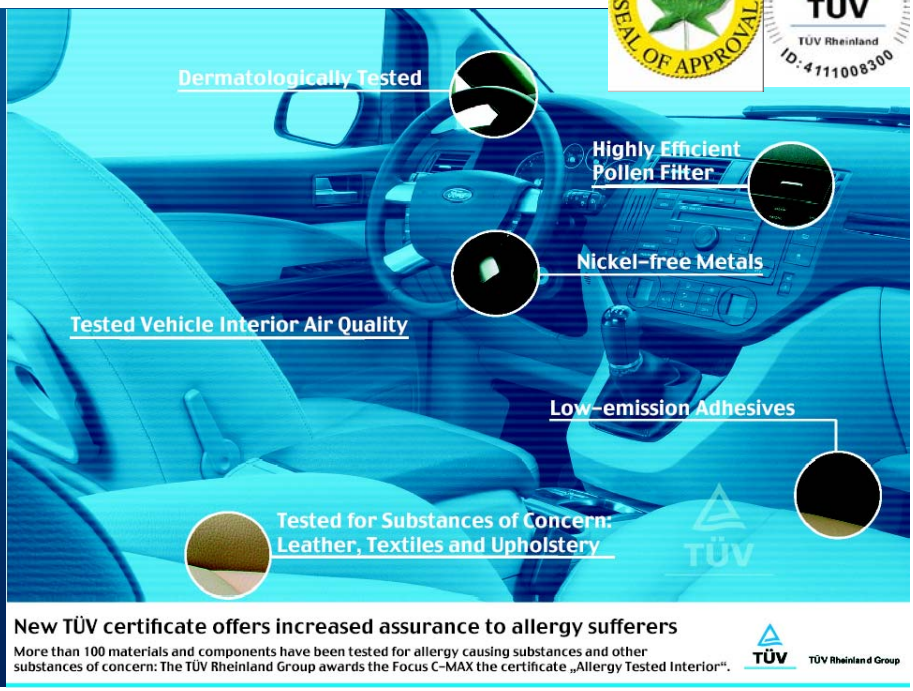
NF use requirements are to mind:

- **Lightweight (fuel economy)**
- **Supply (stable & sustainable growing – social & environmental)**
- **Clean compartment (smell & allergy)**
- **Technical specifications (no mono material thermoplastic subst.)**

Status - requirement

Ford Focus C-Max Allergy Tested

- **Industry 1st**
- **Dermatological tested surfaces**
- **Low-emissions from interior materials**
- **Effective pollen filter**



Ford‘s Vision

- **Turn into an exemplary corporate citizen**
- **Improved technologies to create vehicles more environmentally responsible**
- **Use of renewable materials: concrete action to reduce the company’s environmental footprint**

Model U – 2003 Ford Concept Vehicle

- **Reconfigurable interior and exterior**
- **Active safety**
- **Conversational speech**
- **Hydrogen ICE**
- **Green manufacturing and materials**

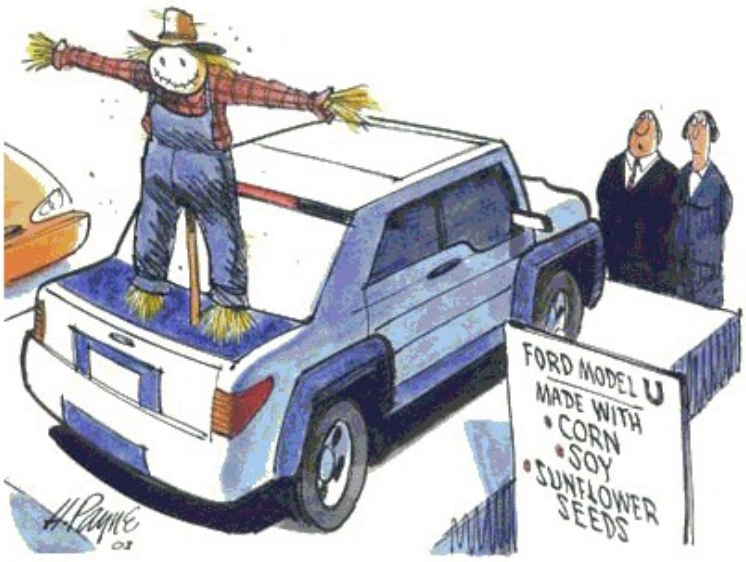
Model U – 2003 Ford Concept Vehicle

Model U -

'Green' materials:

- Corn based fabric
- Soy based foam
- Sunflower engine oil

Positive Press in Model U



"With all the crop-based materials, we added a scarecrow option to keep the crows away."

**Henry Payne,
Detroit Free Press**

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Ford Research Center Introduction

History of renewable materials in FMC

Status of NF application

Perspective

Summary

„Consumer will insist on doing business with companies they can trust, companies that do the right things environmentally and ethically, as well as economically. To fully meet the expectations of those consumers, companies are going to have to address the concerns of the society“

Bill Ford

Motivation

- LCA proved environmental superiority in most cases
  (IF weight is = or <)
- Technical improvements
  (safety, NVH, weight, etc.)
- Image
  (public interest red. net CO_2 release)
- Competitive cost
  (*"Get ready to pay more for plastic products"* Milwaukee Journal Sentinel / Sep. 19th,2005)

Perspective

Increase the amount of natural (bast) fibres in vehicles

→ Carline targets for renewable materials is under review at Ford

Barriers

- **Robustness of NF composites supply**
- **Availability of material data for crash simulation**
- **Inconclusive:**
  - Cost – dependent on agriculture incentives / subsidies?
  - Smell – varies due to impurities?
  - Moisture absorption?

Challenges & Opportunities

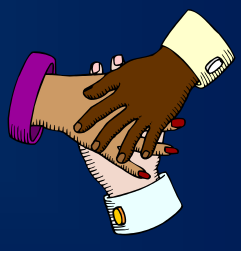
Crash simulation package

Injection molding: NF/Polymer granulate – supply capacity for automotive industry

In-cabin air quality / allergy compliance

Summary

- **Use of renewables since early 20th century**
- **Major interest for renewables / NF → reduction of environmental footprint of products**
- **DfE requirements to be minded (trade-offs to be solved case-by-case)**
- **Success can only be achieved by closer cooperation with different stakeholders**



Thank you for your attention!

Questions?

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