



Forming of complex aerostructures

13/04/2021

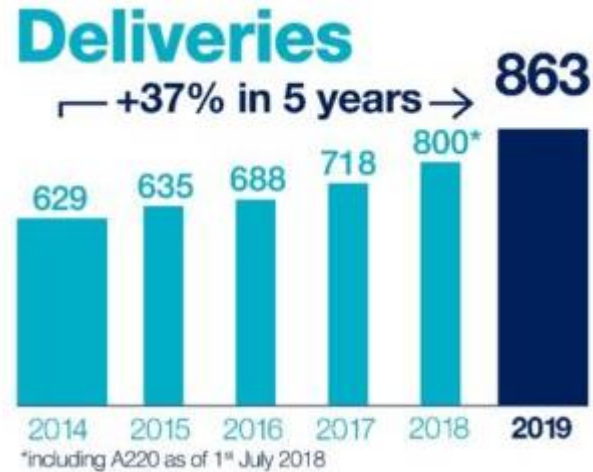
Claudia Jimenez Martin

Supervisors: Dr James Kratz (UoB) & Jon Wright (Airbus)

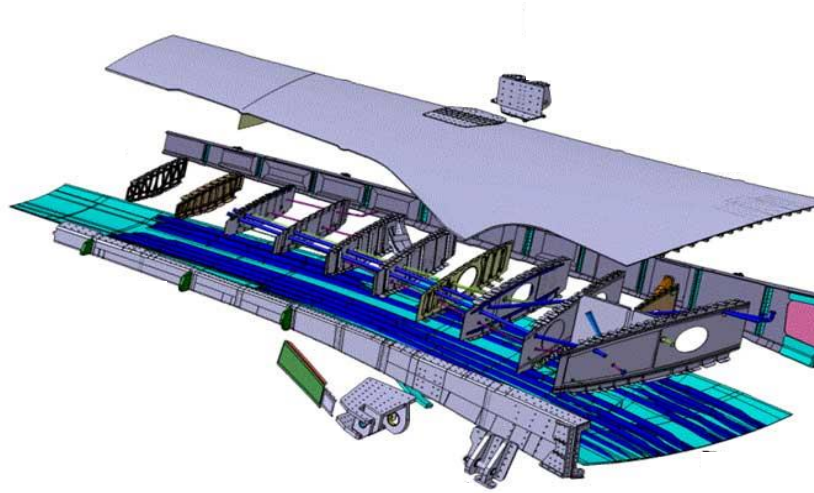
AIRBUS

The Problem Statement

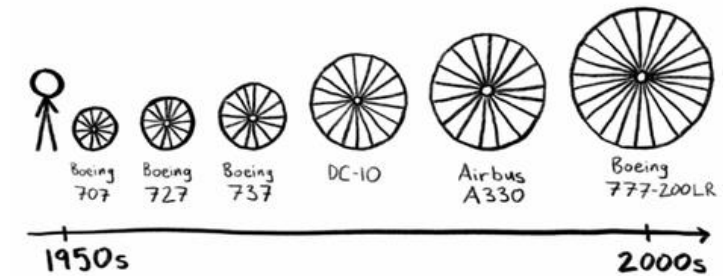
- Aircraft production rates are increasing



- Structures are more integrated



- Jet engines are larger



Complex shapes

The Preforming Bottleneck

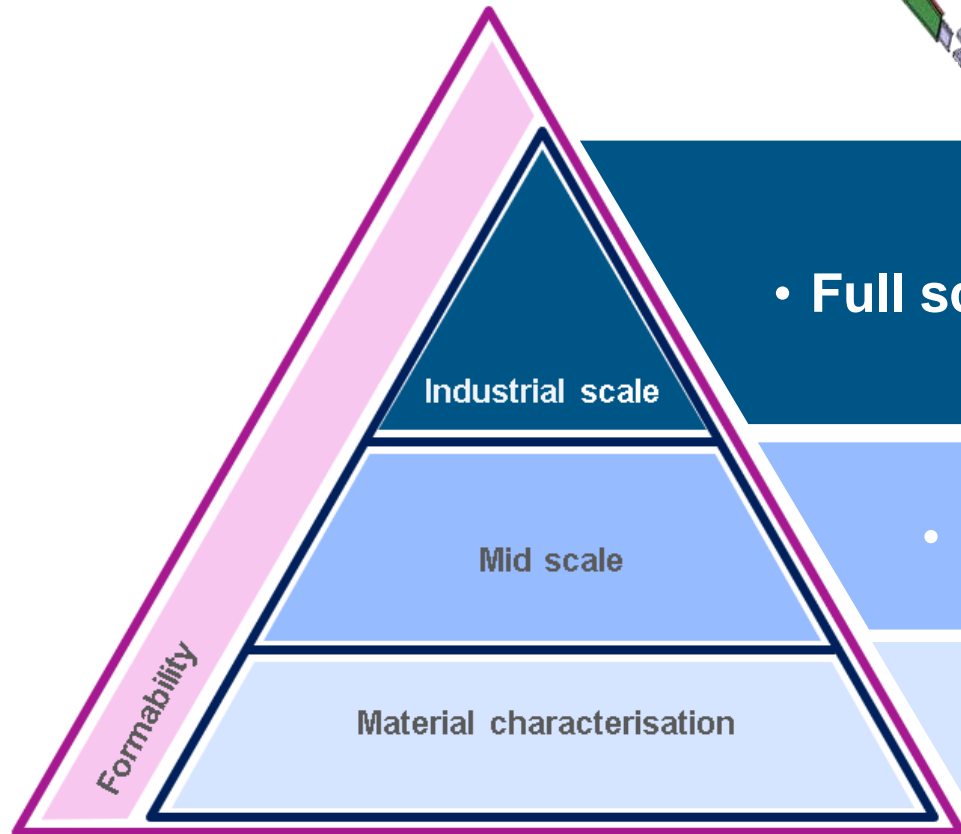
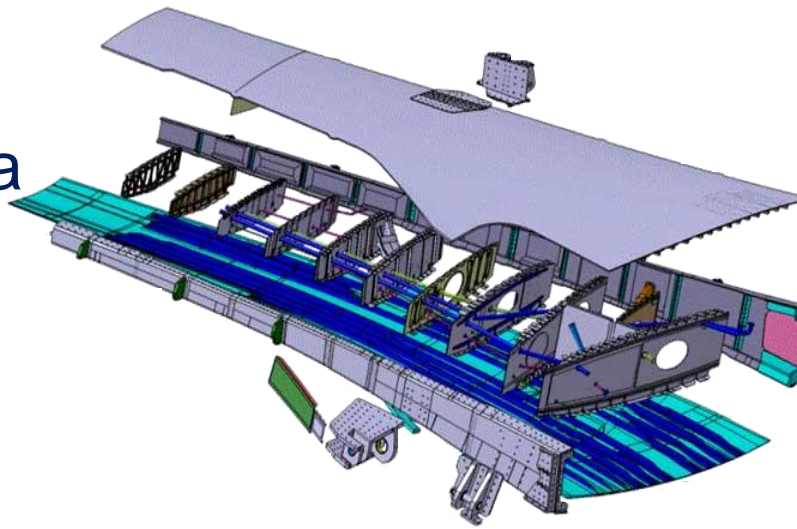


- **Dry fibre processes offer** promising deposition rates.

- Preforming is **complex, step-intensive** and often **manual**
- **Defects such as ply wrinkling can occur.**



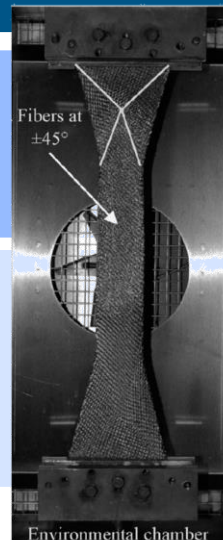
The Scale Dilemma



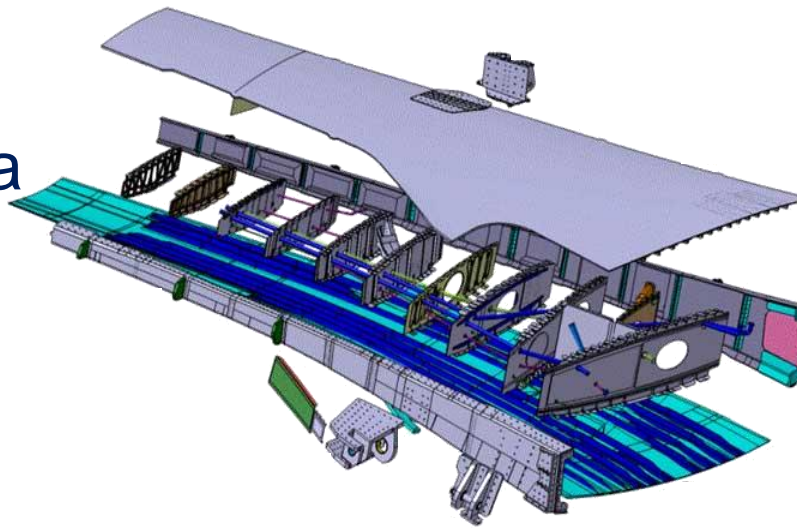
- Full scale component

- Component sections

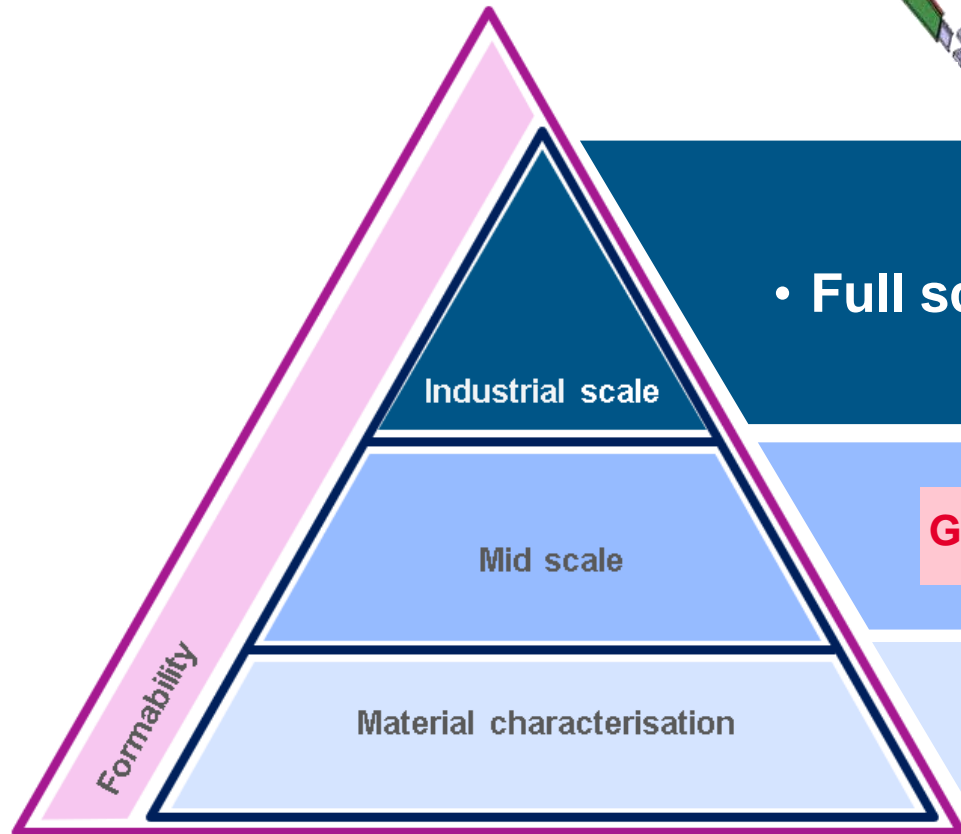
- Bias extension / picture frame



The Scale Dilemma

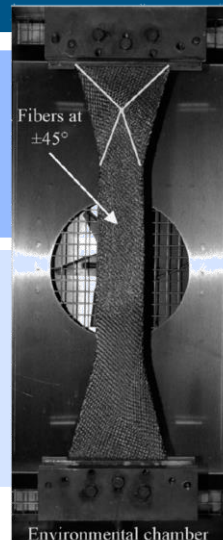


- Full scale component

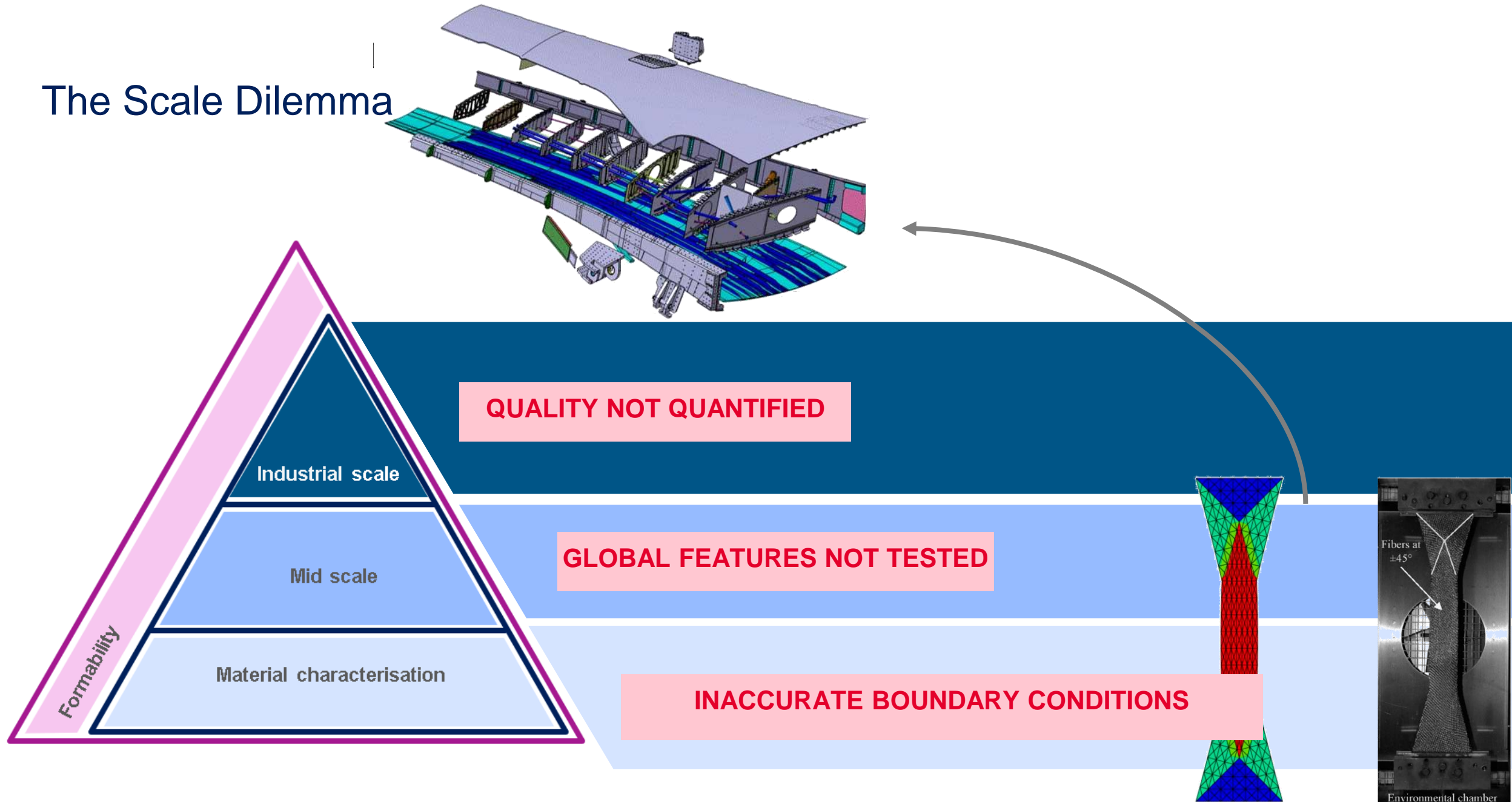


GLOBAL FEATURES NOT TESTED

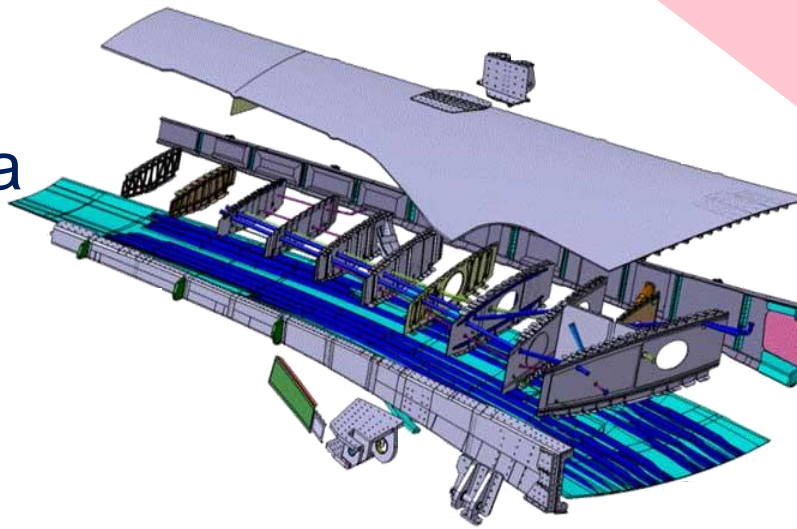
INACCURATE BOUNDARY CONDITIONS



The Scale Dilemma

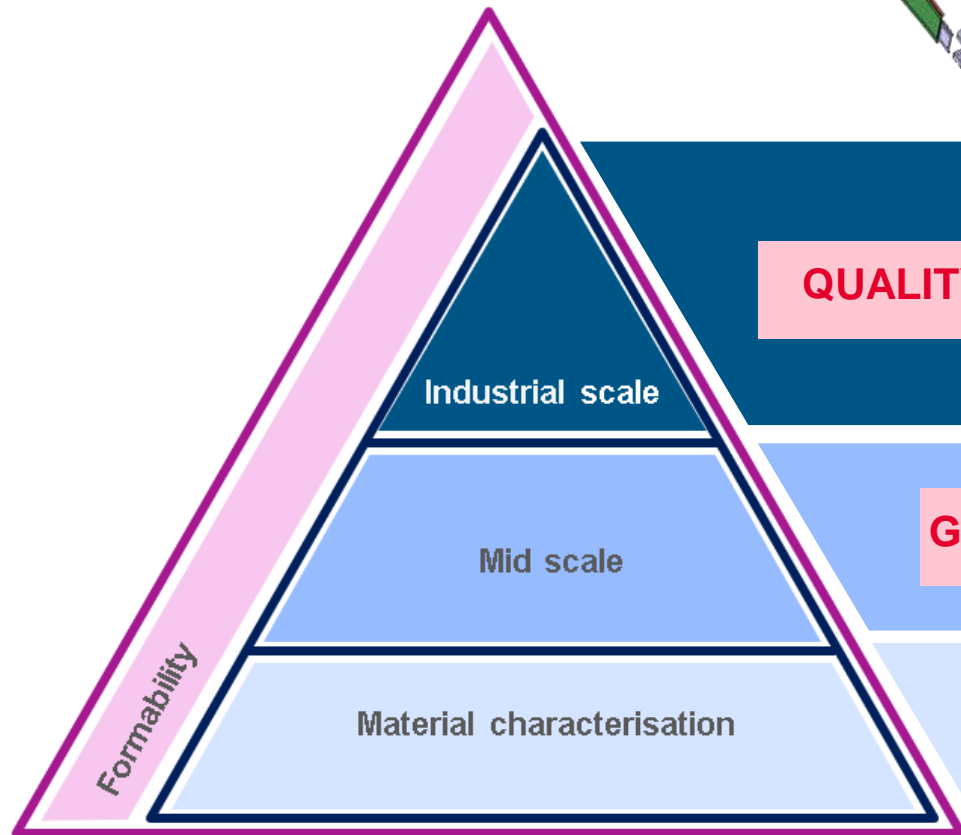


The Scale Dilemma



Targeted Outcome:

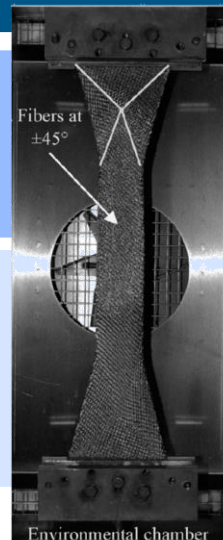
A DATA DRIVEN COMPARISON
ACROSS SCALES



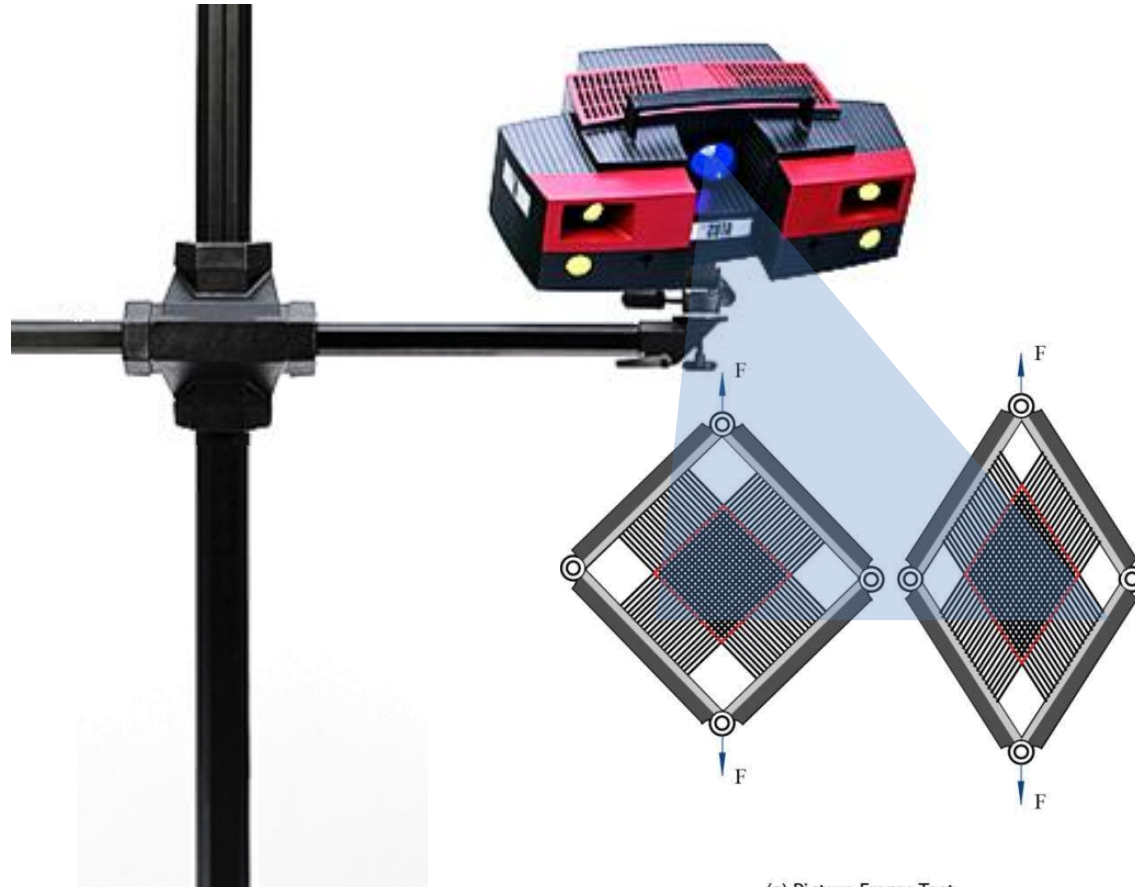
QUALITY NOT QUANTIFIED

GLOBAL FEATURES NOT TESTED

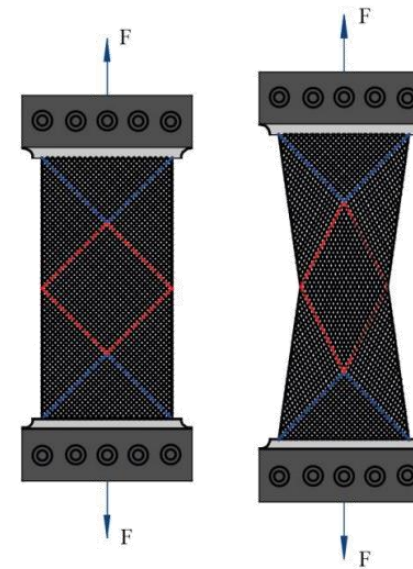
INACCURATE BOUNDARY CONDITIONS



The untapped potential of shop floor photos

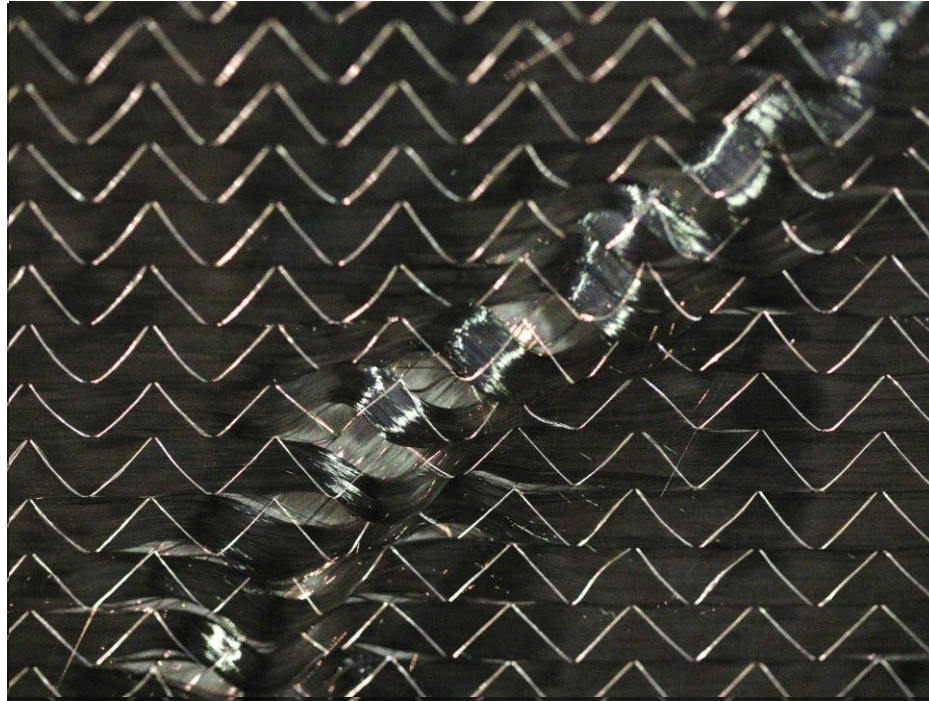


(a) Picture Frame Test

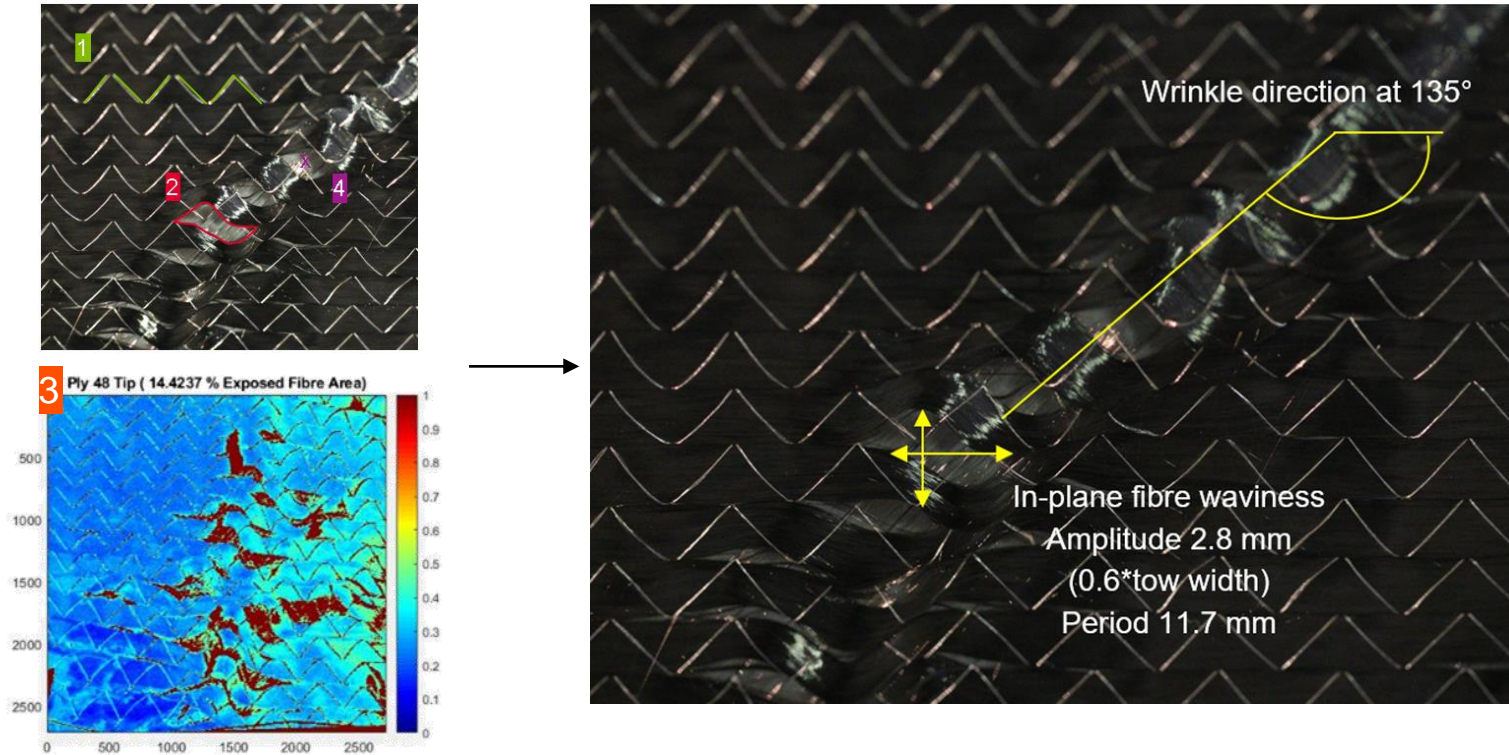


(b) Bias Extension Test

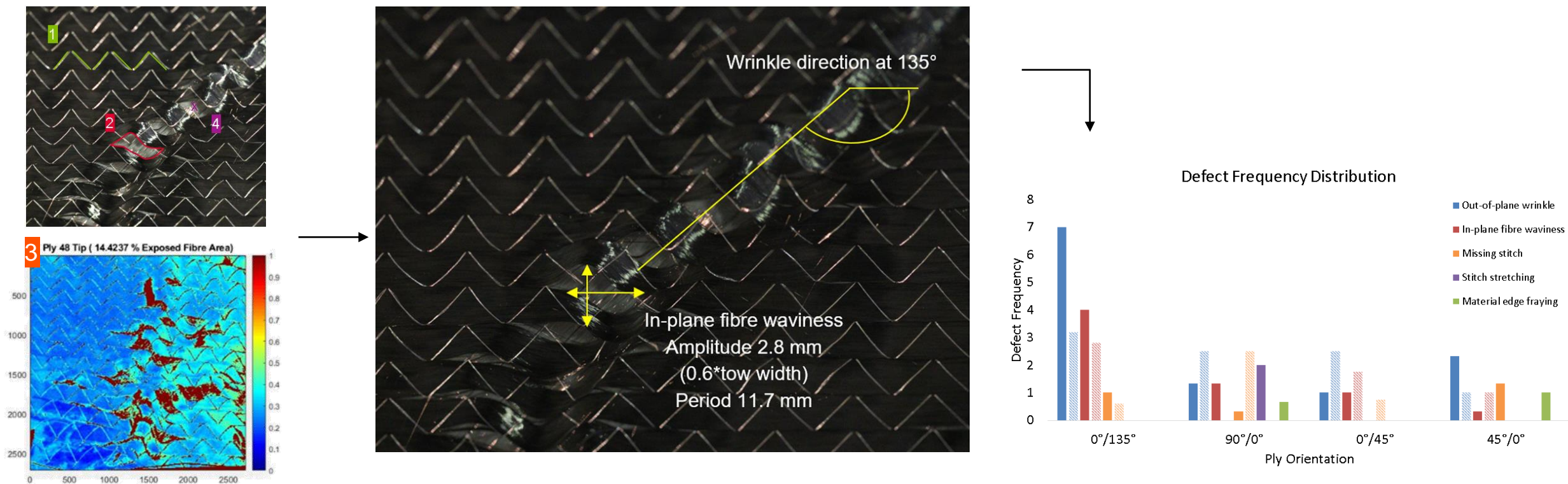
The untapped potential of shop floor photos



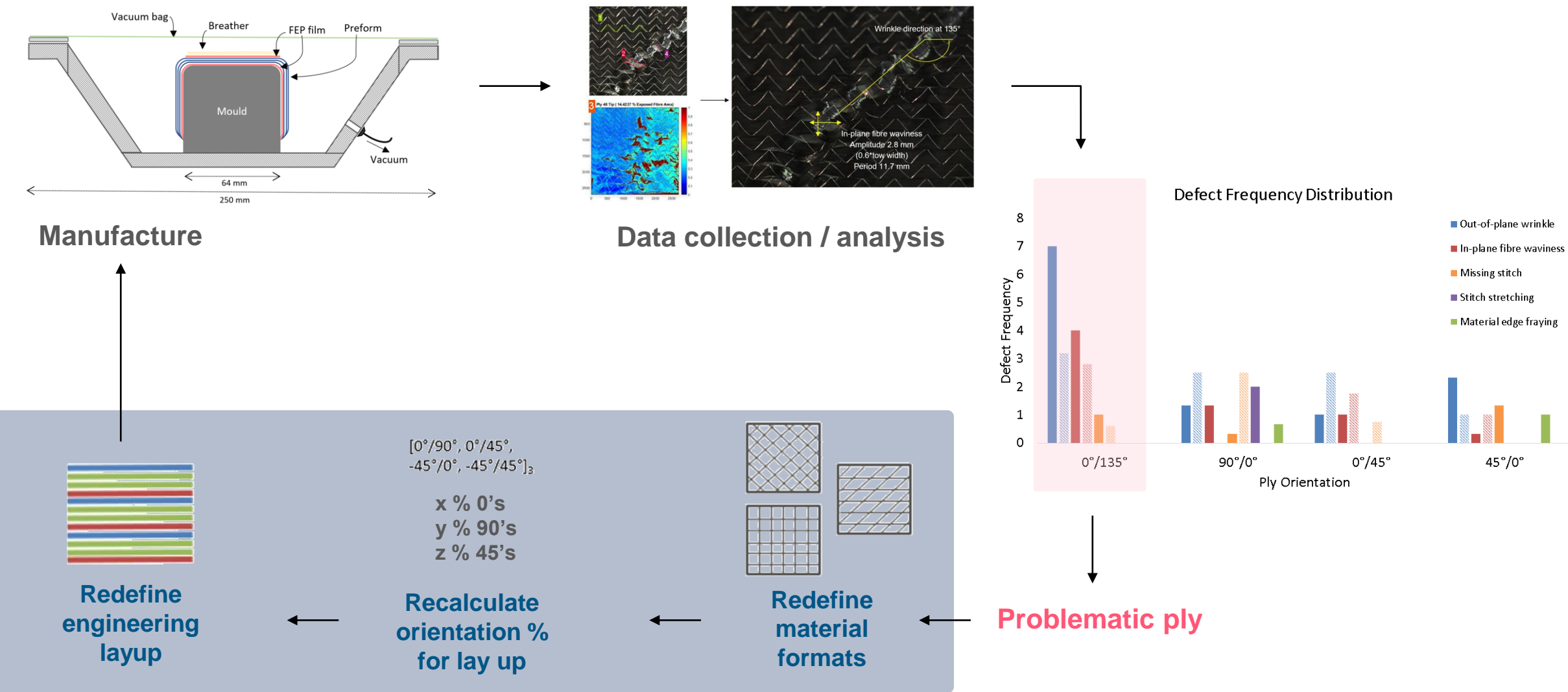
The untapped potential of shop floor photos



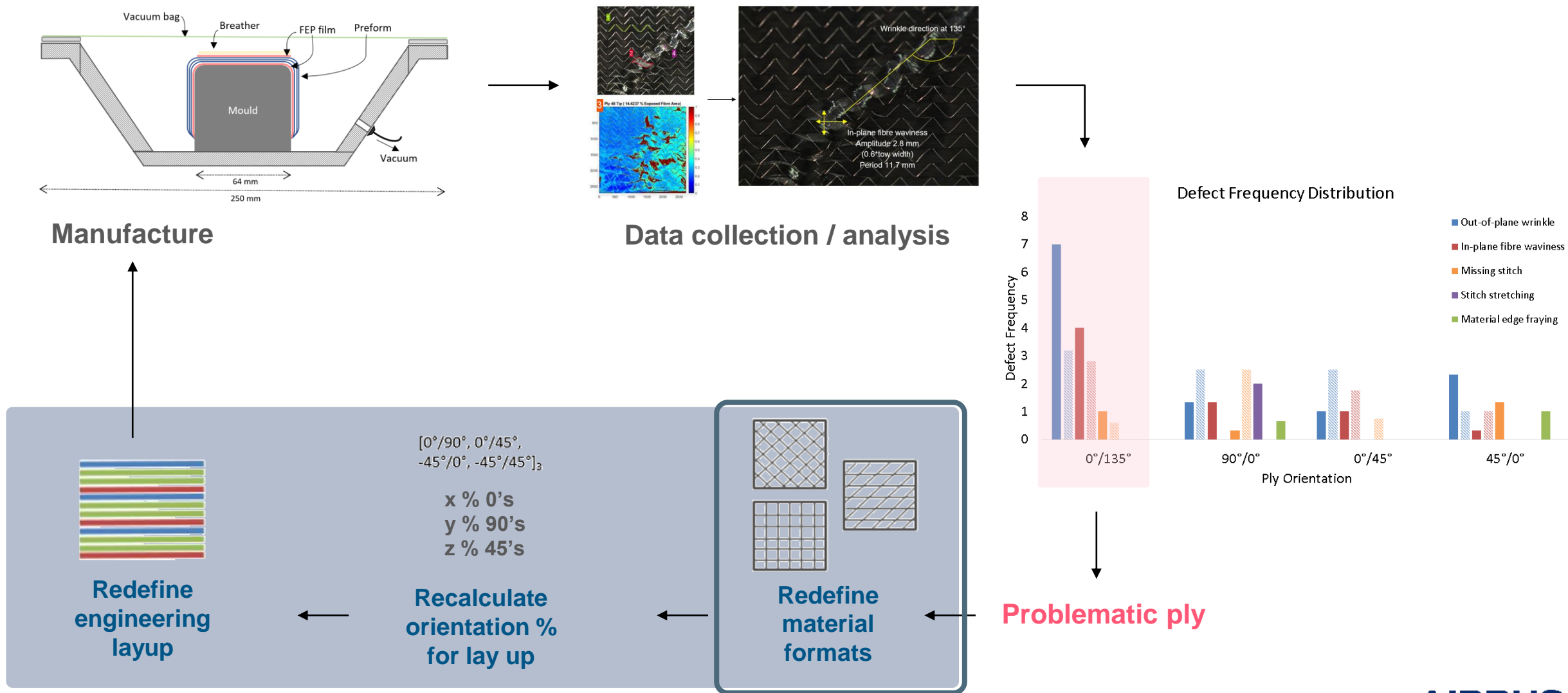
The untapped potential of shop floor photos



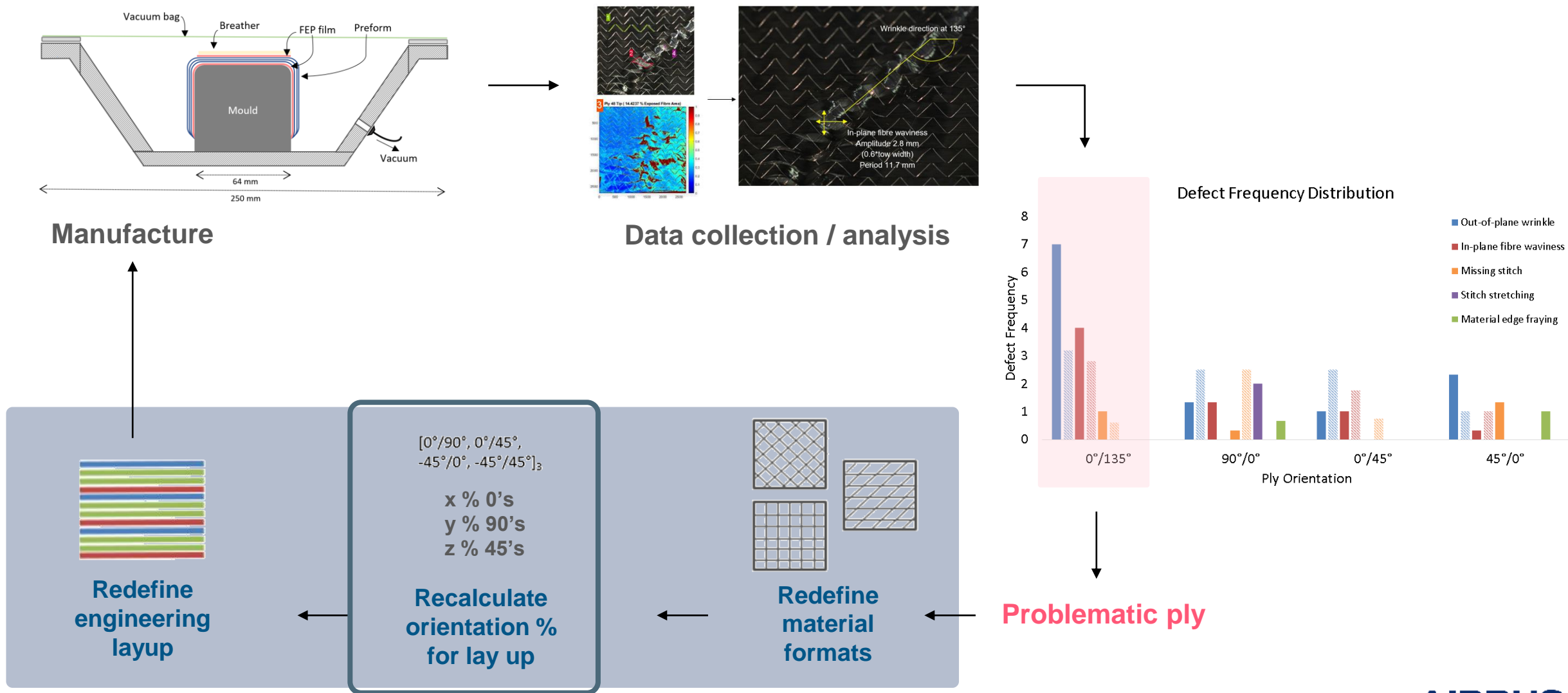
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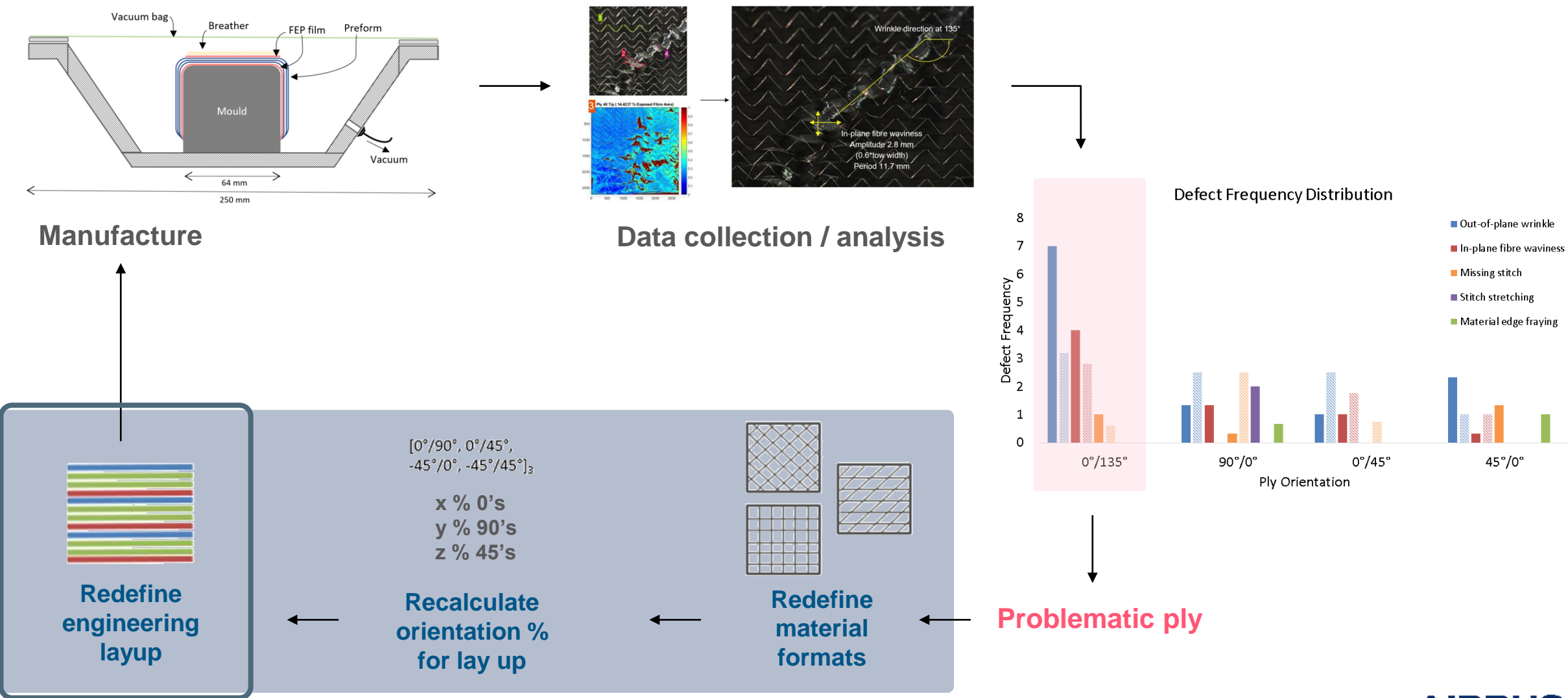
The untapped potential of shop floor photos



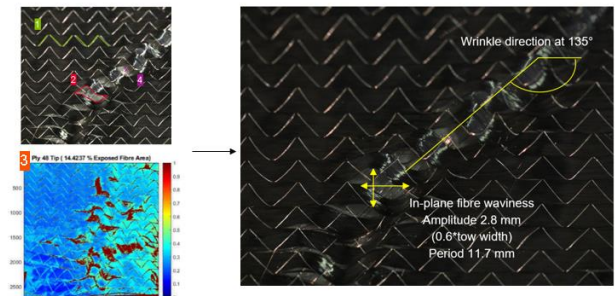
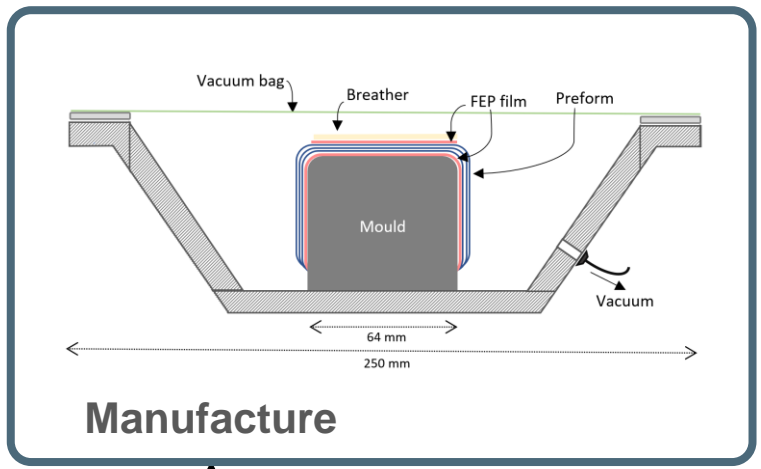
The untapped potential of shop floor photos



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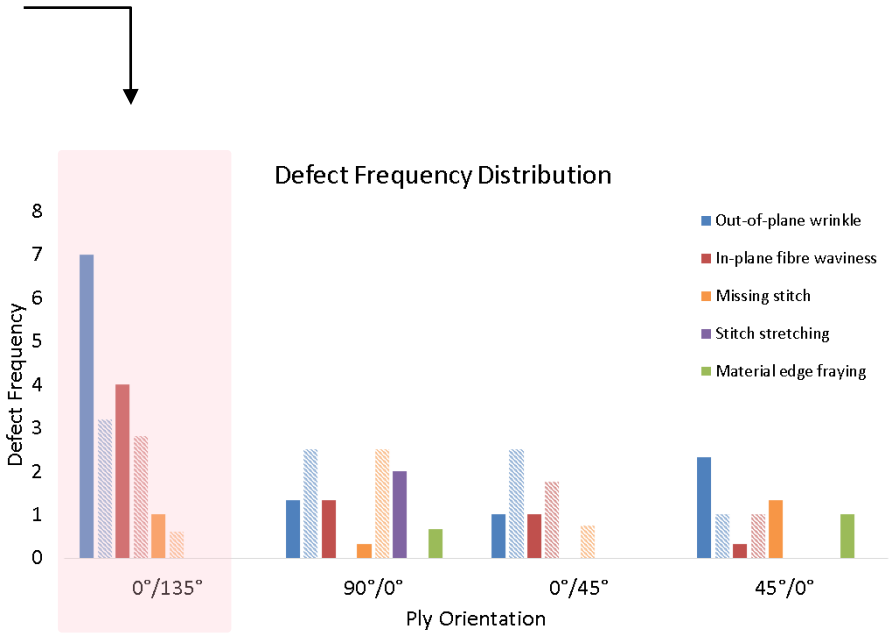
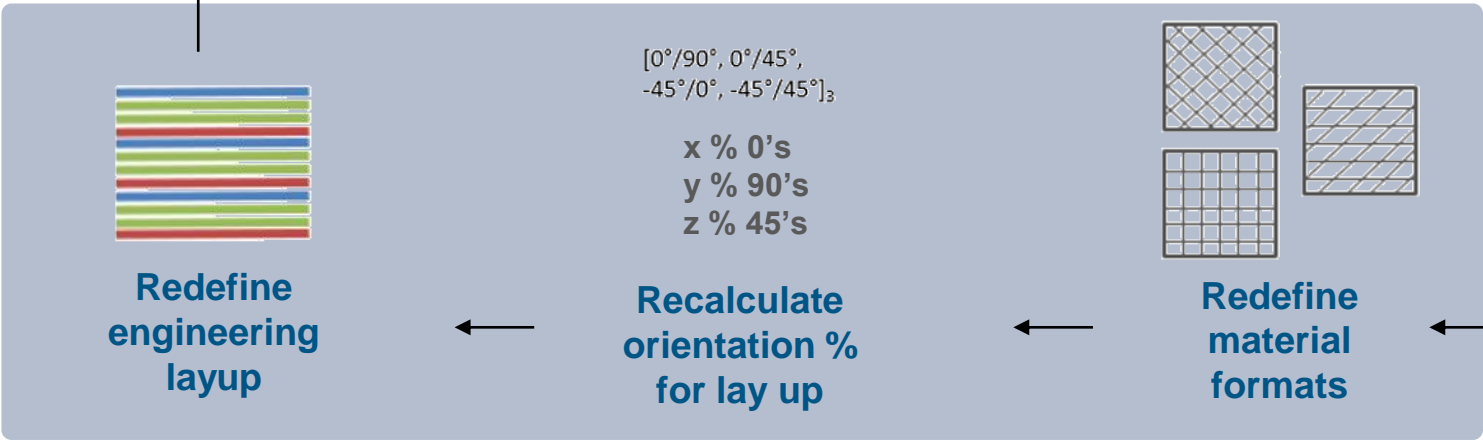


The untapped potential of shop floor photos



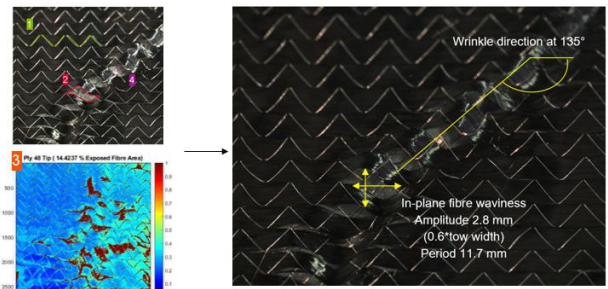
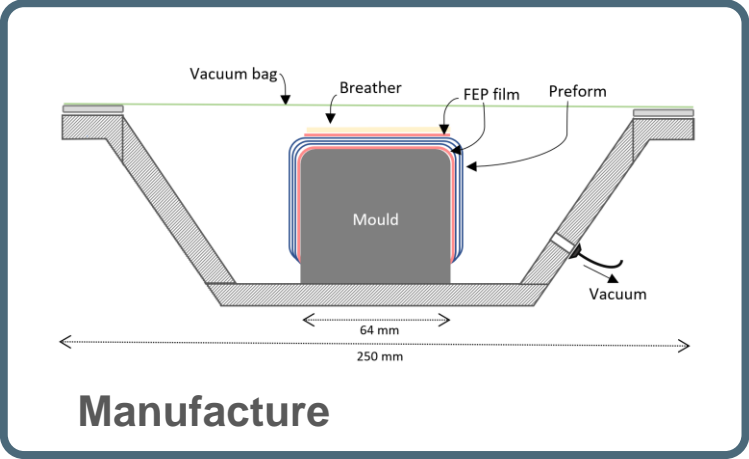
Data collection / analysis

Design for manufacture loop



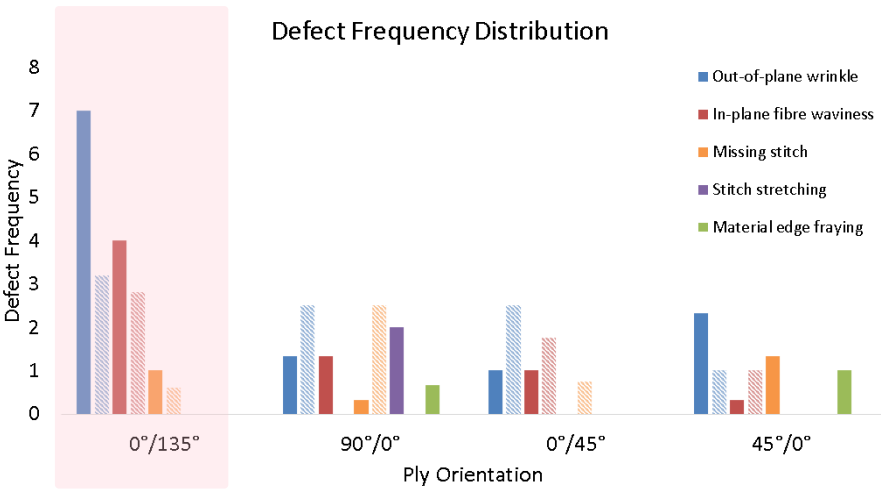
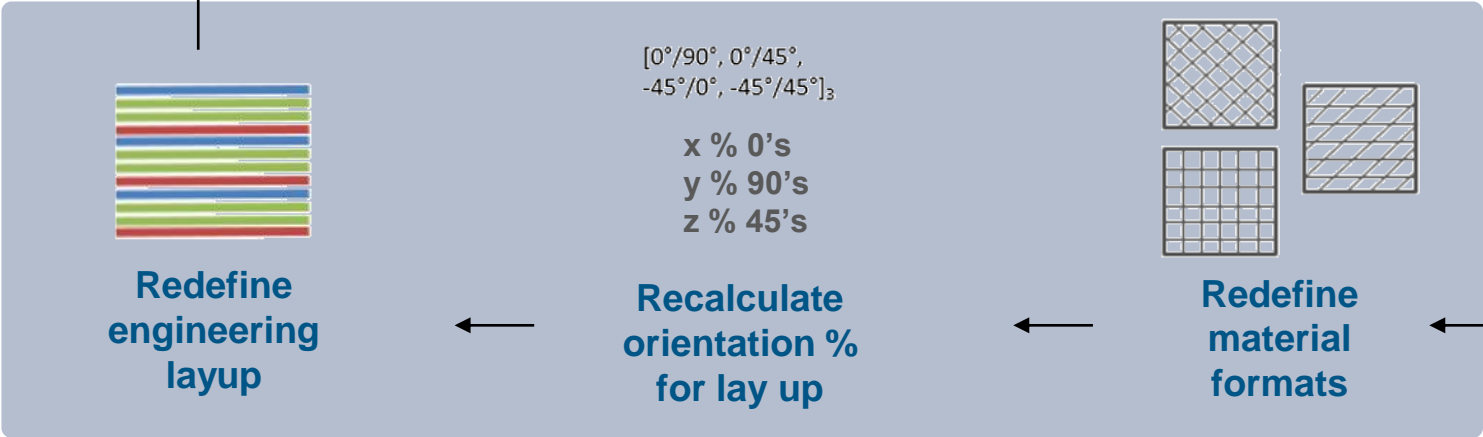
Problematic ply

The untapped potential of shop floor photos



Data collection / analysis

Design for manufacture loop



Problematic ply

Outcomes

- Value added insights
- Compatible across scales

Thank you