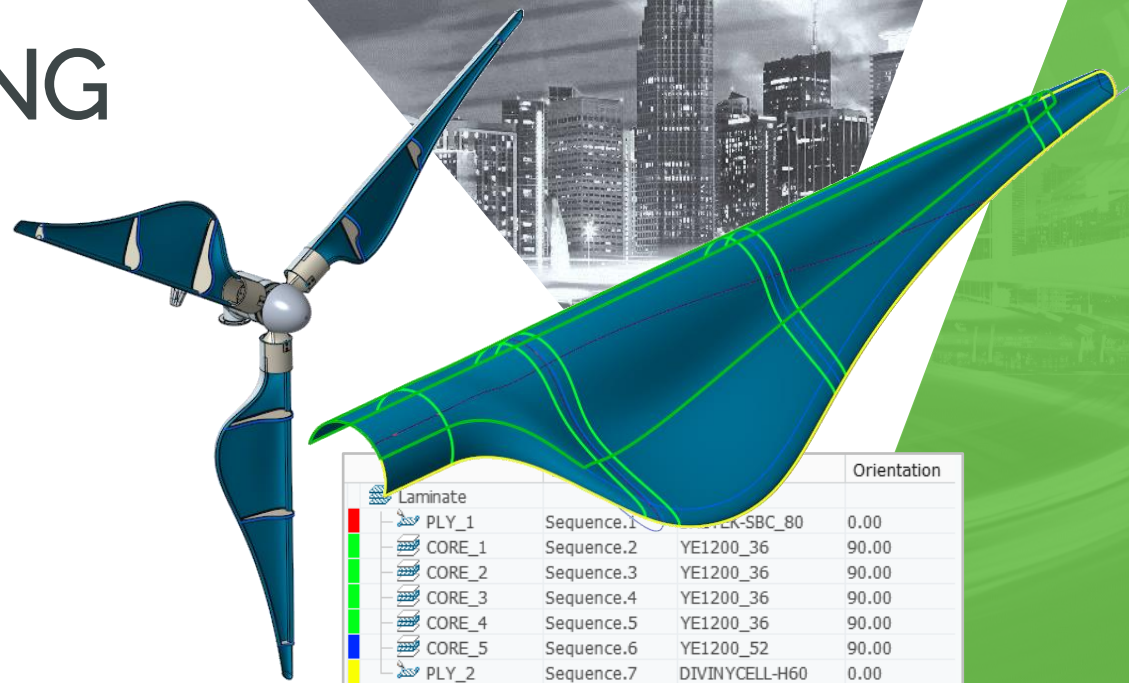




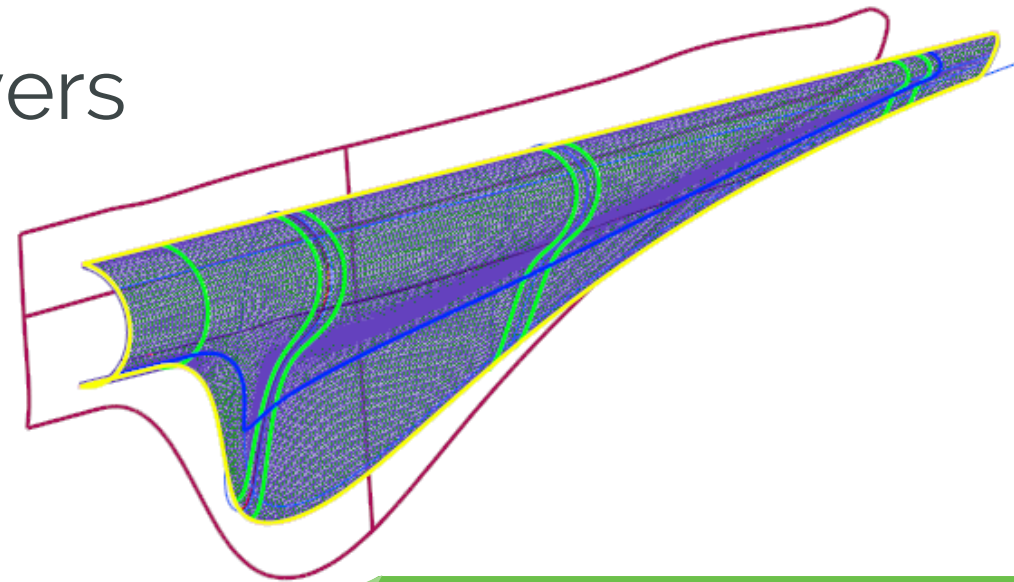
DIGITAL TRANSFORMS PHYSICAL

CREO COMPOSITE DESIGN AND MANUFACTURING



AGENDA

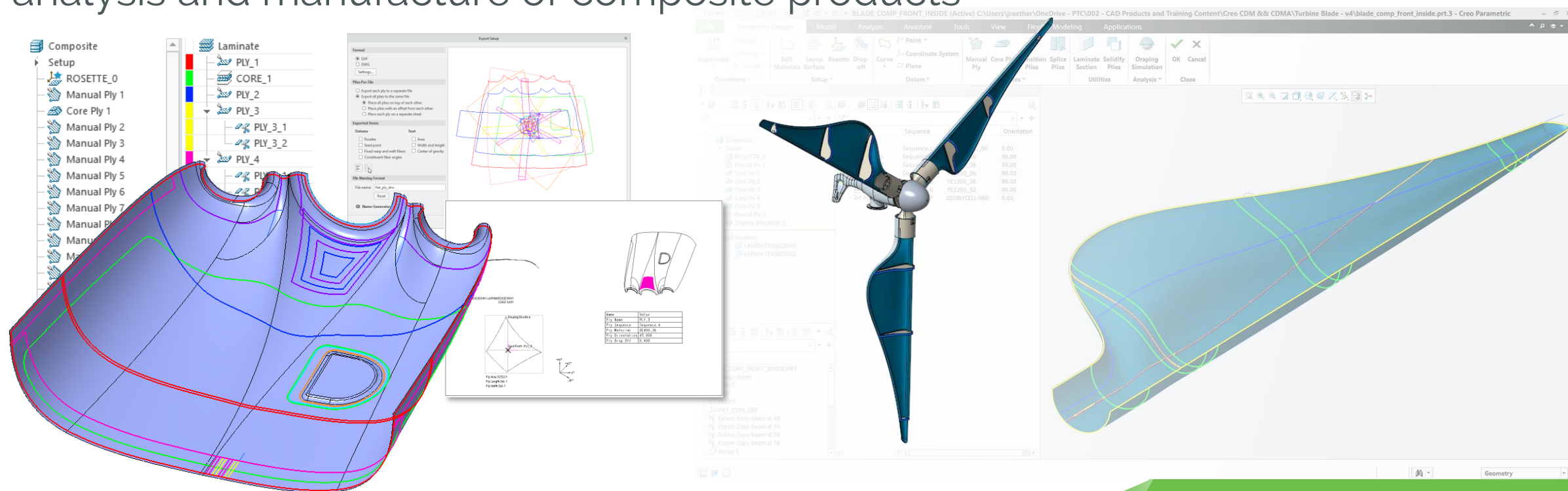
- Product Introduction
- Solution Capabilities
- Value Drivers



PRODUCT INTRODUCTION

What is Creo Composite Design and Manufacturing (CDM/CDMA)

- Creo Composite Design and Manufacturing is an add-on extension providing specialized functionality to speed and simplify the design, analysis and manufacture of composite products



CREO COMPOSITE DESIGN & MANUFACTURING

What is a Composite?

- Composites are a combinations of two or more distinct materials that are combined to create a new material that is ideally superior to its individual parts.

What are the benefits of composite design?



High Strength

- Anisotropic- strength changes depending on alignment of fibers
- High specific, tensile, shear, and compressive strength



Resistance

- Resistant to environmental and chemical corrosion
- Corrosion is dependent on both fiber and resin selected and can be tailored to specific use case needs



Light weight

- High strength-to-weight ratio, carbon fiber-reinforced materials are up to 70% lighter than steel
- Low weight reduces vehicle fuel consumption and user cost



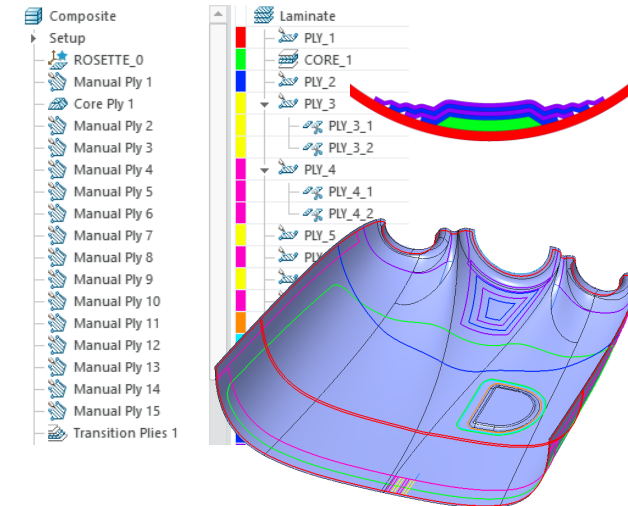
Durability

- High strength and resistance make them long lasting and require little maintenance
- Able to withstand applied loads, UV light, and temperature exposure

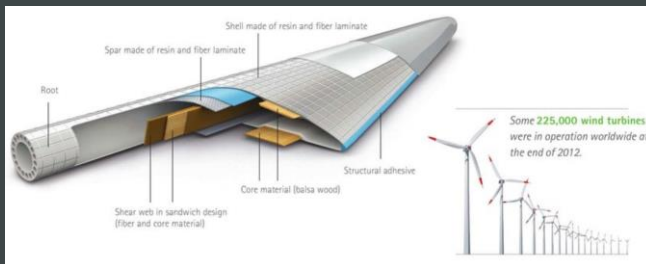
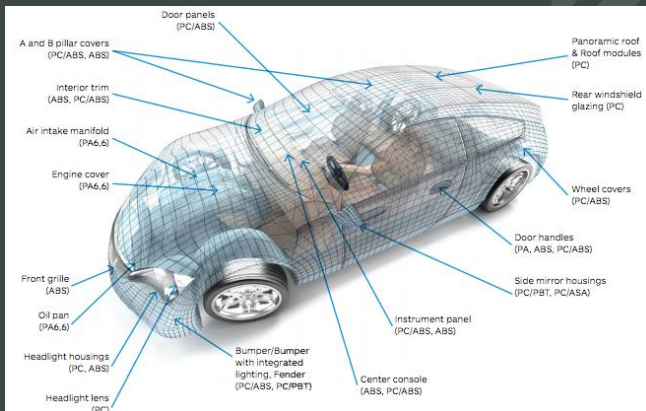


Flexibility

- Can be molded into complex shapes that cannot be easily accessed with traditional materials
- Strength and stiffness can be altered using specific fiber direction and density to create flexible products



WHAT ARE THE APPLICATIONS FOR COMPOSITE MATERIALS?



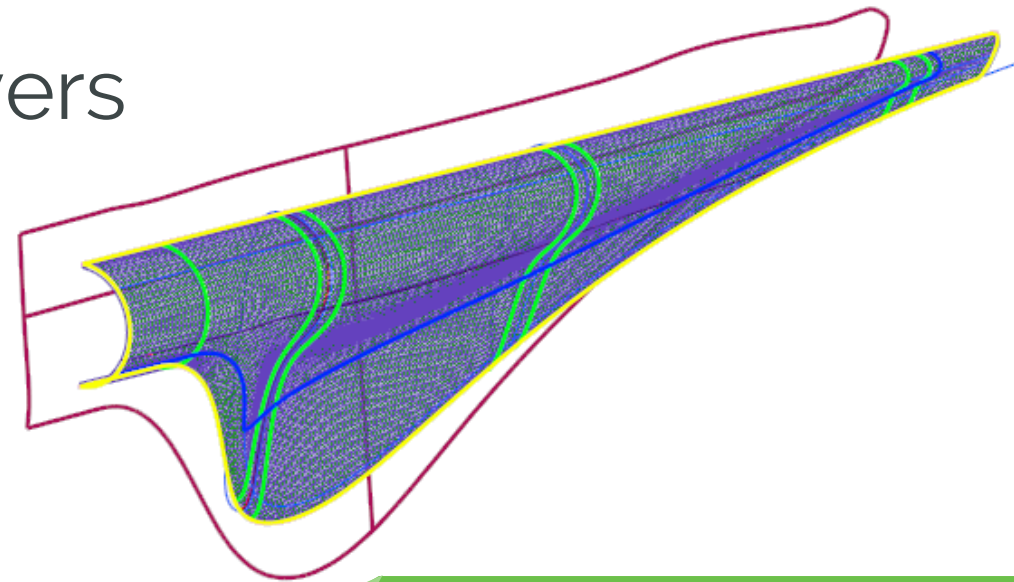
Composites are widely used in markets that require strength, weight reduction and enhanced resistance to improve performance and durability

- Aerospace
- Automotive
- Energy Production
- Boat Building and Marine
- Sports and Recreation
- Transportation
- And more,...

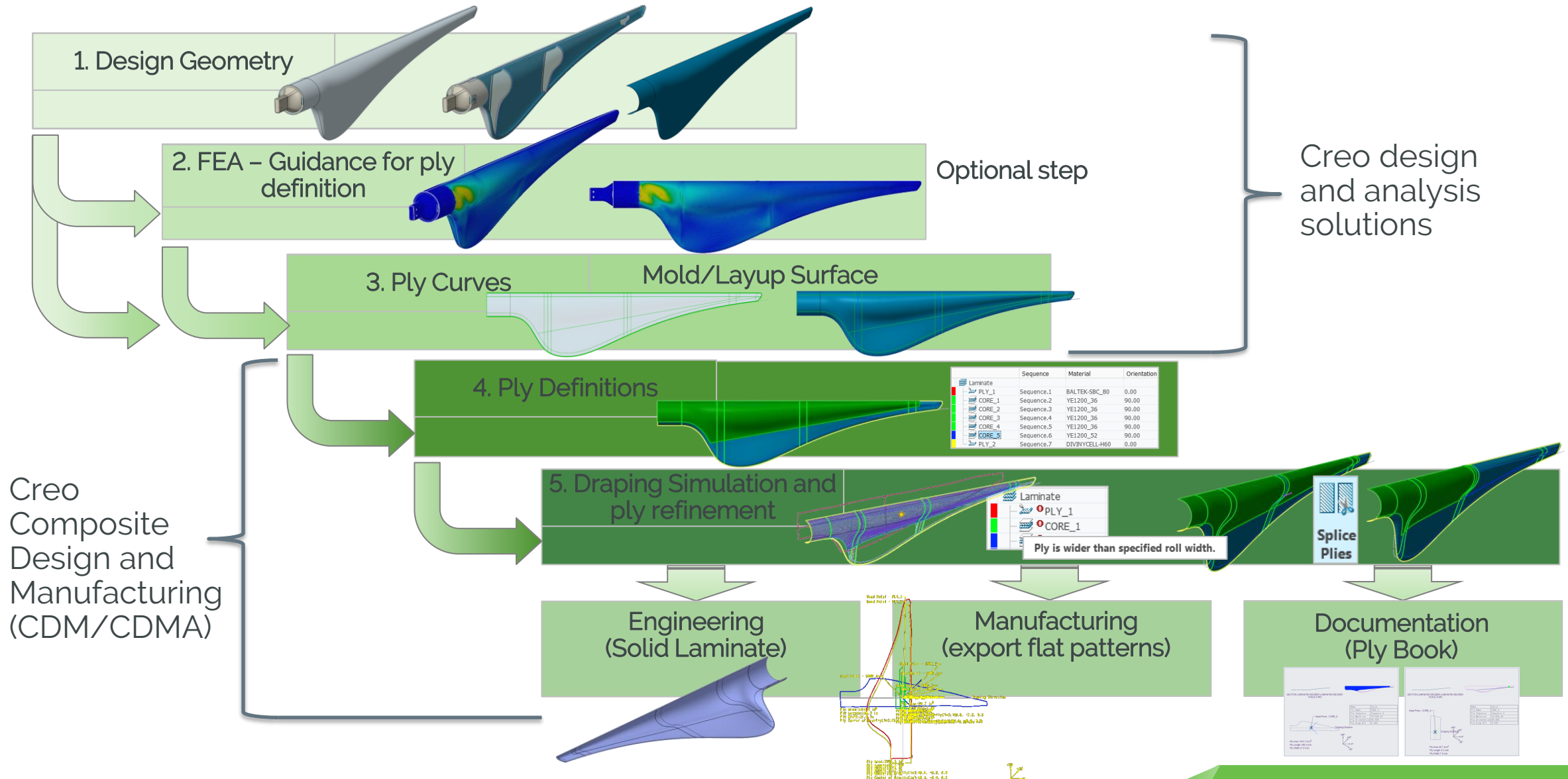
A 3D CAD model of a wind turbine, showing the three blades and the central hub. The blades are light blue and have a curved, aerodynamic shape. The hub is a darker blue. A thin green vertical line is positioned to the right of the turbine.

AGENDA

- Product Introduction
- Solution Capabilities
- Value Drivers



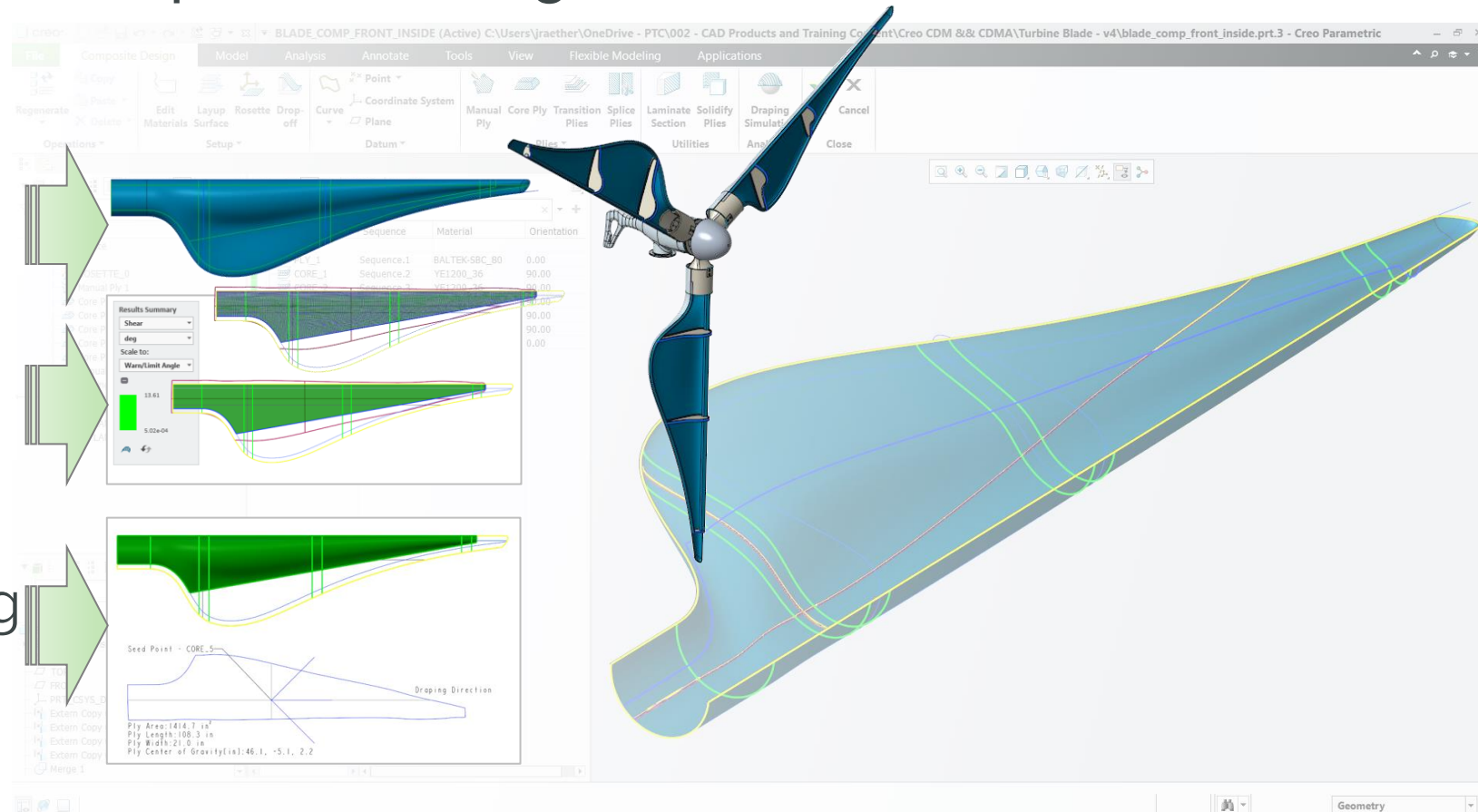
COMPOSITE DESIGN WORKFLOW



CREO COMPOSITE DESIGN AND MANUFACTURING

Creo Composite Design and Manufacturing provides the capabilities engineers require to simplify and speed the design and manufacture of composite products

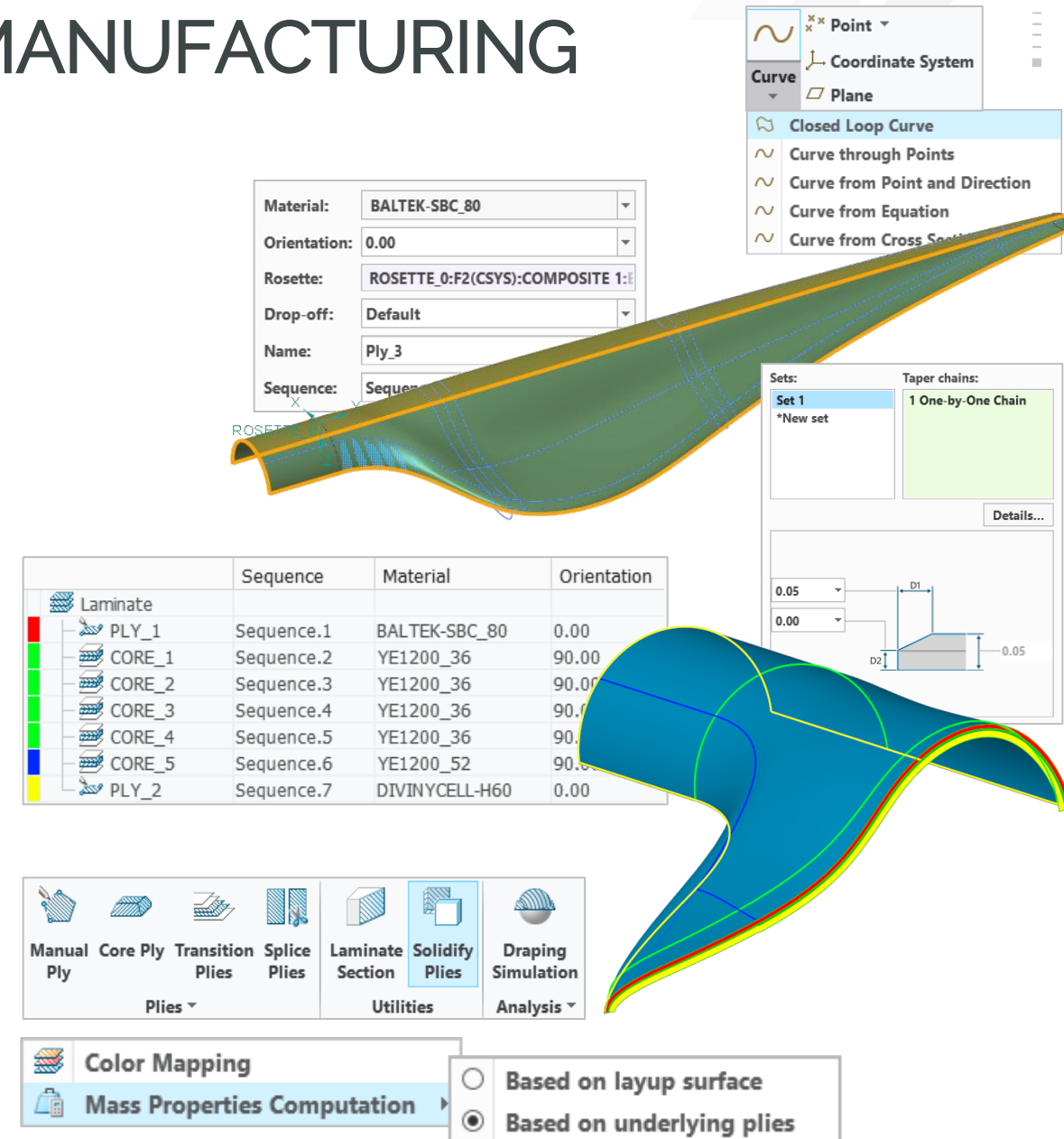
- Comprehensive design functionality
- Advanced composite simulation and analysis
- Fast preparation and creation of manufacturing deliverables



CREO COMPOSITE DESIGN AND MANUFACTURING

Comprehensive design functionality

- New curve chain/loop creation tool
- Ply definition and creation
 - Manual ply and Core ply w/taper
 - Ply transitions
 - Sectioning of plies w/scaling and colors
- Laminate manager
 - Laminate list and color coding
 - Customizable display, columns and editing
- Ply based Mass Properties
- Full laminate solid
 - With core and taper geometry
 - Solid and IML quilt



CREO COMPOSITE DESIGN AND MANUFACTURING

Advanced composite simulation and analysis

■ Integrated draping simulation

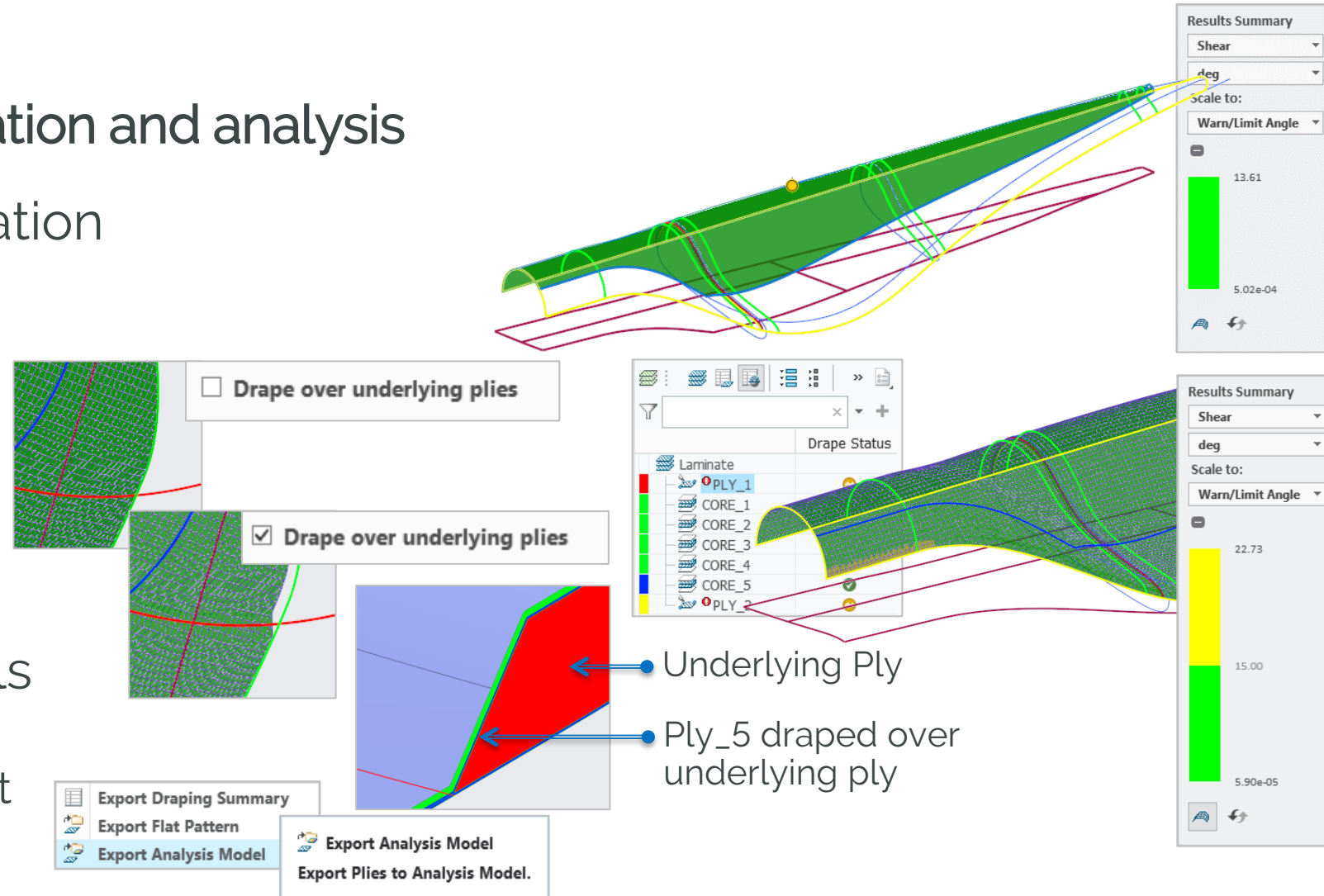
- Drape manager
- Fiber distortion
- Flat ply preview
- Over underlying plies

■ Integrated Creo Simulate

- Structural analysis

■ Interface to 3rd party tools

- *.nas file format
- Rich Export HDF5 file format



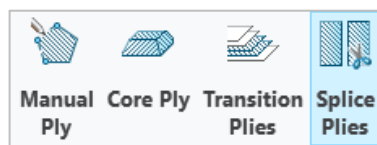
CREO COMPOSITE DESIGN AND MANUFACTURING

Fast preparation and creation of manufacturing deliverables

- Exceeding roll width alert
- Ply splicing & darning
 - Overlap & Stagger
- Flattening of plies
 - Export DXF/DWG
- Plybook creation
 - Automated template-based Ply Book creation

Laminate	Drape Status
PLY_1	✓
CORE_1	✓
CORE_2	✓
CORE_3	✓
CORE_4	✓

Ply is wider than specified roll width.



☒ Overlap 11.00

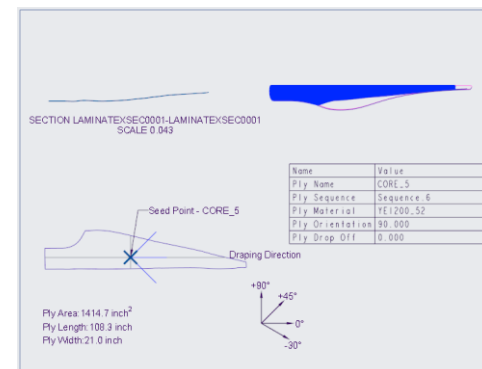
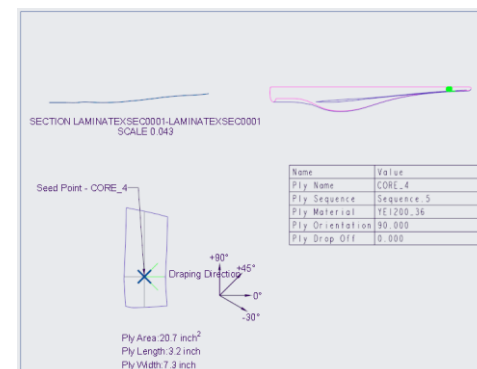
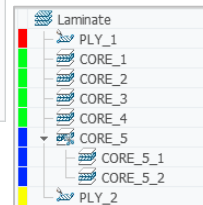
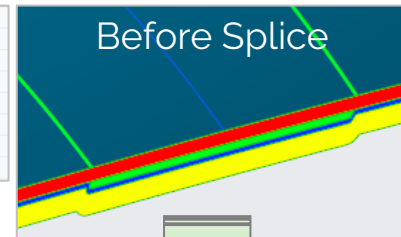
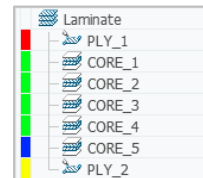
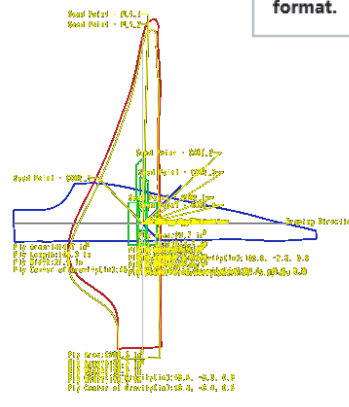
☐ Stagger 0.00

Flip Splicing Direction



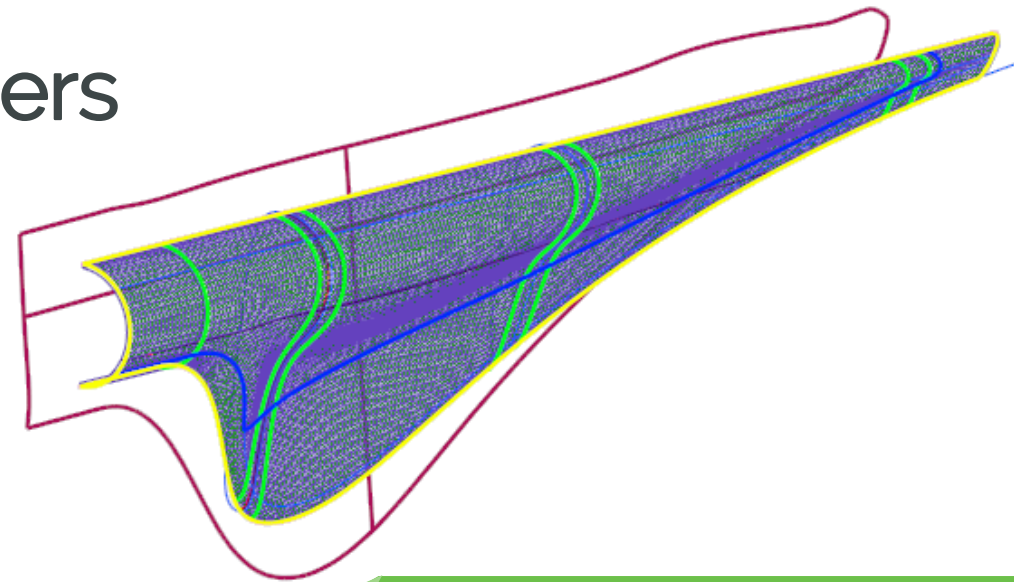
Export Flat Pattern

Set up export properties, preview the results, and output plies to another format.



AGENDA

- Product Introduction
- Solution Capabilities
- Value Drivers



CREO COMPOSITE DESIGN AND MANUFACTURING VALUE DRIVERS

■ Reduce Time-To-Market

- Integral software and capabilities simplify and speed the design and manufacture of composites

■ Design to Realize Price Premium

- Design and deliver innovative products that exceed quality and performance criteria

■ Reduce Product Development Costs

- Increase engineering efficiency and reduce lengthy design cycle times

■ Improve Product Quality and Innovation

- Deliver high strength, light weight, corrosion resistant products that deliver enhanced durability and performance



CREO COMPOSITE DESIGN AND MANUFACTURING SOLUTIONS OVERVIEW

Capability	Creo Composite Design and Manufacturing (CDM)	Creo Composite Design and Manufacturing Advanced (CDMA)
Comprehensive Design functionality		
Curve chain and loop creation tools	✓	✓
Ply definition and creation	✓	✓
Core definition and creation	✓	✓
Laminate section	✓	✓
Ply transition sectioning and scaling	✓	✓
Ply trim and extend	✓	✓
Zone based (ply) design		✓
Zone based (ply) merging		✓
Laminate manager	✓	✓
Full laminate solid	✓	✓
Solidified drop-off geometry	✓	✓
IML quilt create	✓	✓
Core Sample	✓	✓
Composite Simulation and Analysis		
Draping simulation	✓	✓
Drape manager	✓	✓
Fiber distortion	✓	✓
Flat ply preview	✓	✓
Over underlying plies	✓	✓
Integrated Creo Simulate	✓	✓
Structural simulation	✓	✓
Interface to 3 rd party tools	✓	✓
Export of .nas file format	✓	✓
Export of HDF5 file format (with draping results)	✓	✓
Preparation and Creation of Manufacturing Deliverables		
Reference laminate		✓
Exceeding roll width alert		✓
Ply splicing and darting w/overlap and stagger		✓
Laminate laser projection		✓
Flattening of plies (export DFX/DWG)	✓	✓
Automated plybook create (template-based)	✓	✓



DIGITAL TRANSFORMS PHYSICAL

THANK YOU

ptc.com

