



## Unlocking Efficiency with Model-Based Definition - MBD Implementation at Vestas

Dennys Gomes



Let's Connect on LinkedIn

6th November 2025

### PLM Road Map™ & PDT Europe 2025

*PLM's Integral Role in Digital Transformation From Strategy to Execution  
Elevating PLM to an Enterprise Business Solution,  
the PLM Professional's Road Map to Success*

CIMdata

5 & 6 November

-eurostep-

Wind. It means the world to us.™

Vestas

# The Global Leader in Sustainable Energy Solutions

# Vestas®

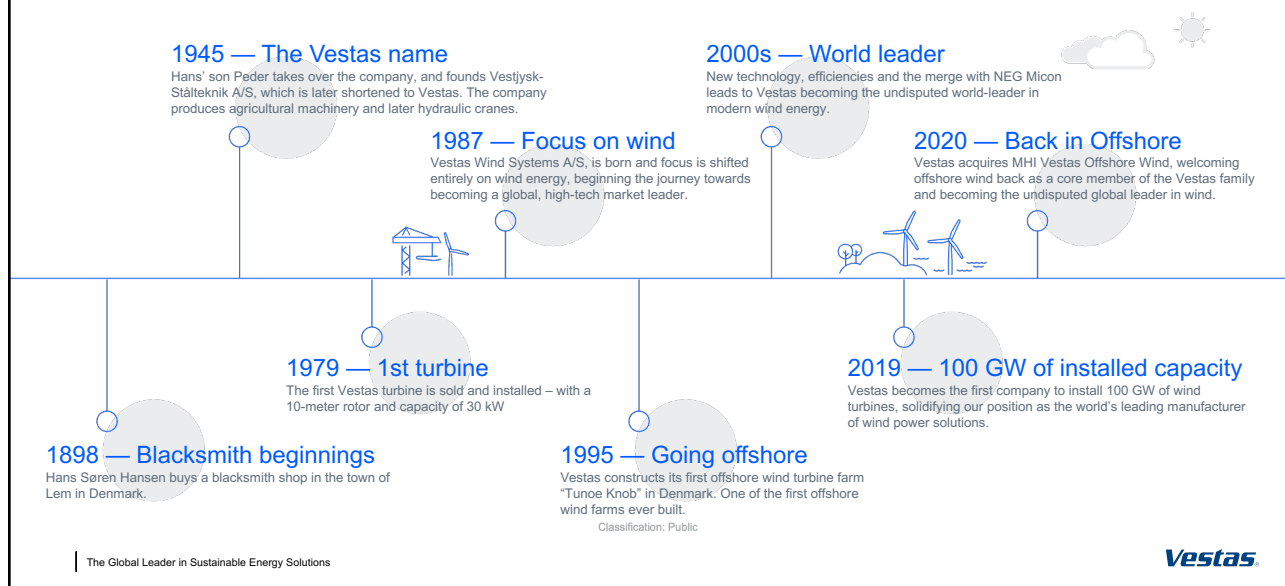


Wind. It means the world to us.™

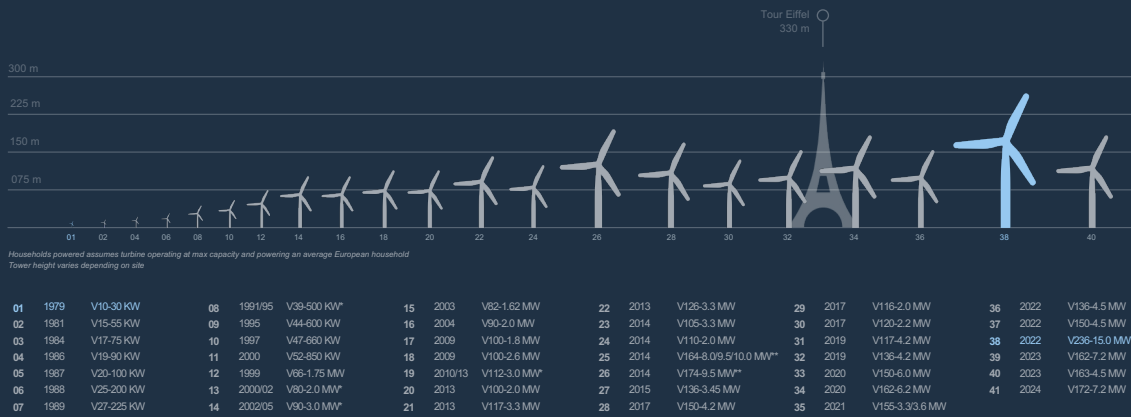
Vestas



## From a bold vision to the global leader in sustainable energy solutions



## Technology evolution from 30 KW to 15 MW



Households powered assumes turbine operating at max capacity and powering an average European household  
Tower height varies depending on site

5 |

Classification: Confidential



## The undisputed global leader in wind energy

**+35,000**  
employees

Every day, our employees help create a better world by designing, manufacturing, installing, developing, and servicing wind energy projects all over the world

**~59,800**  
turbines under service

Our service technicians keep the world spinning by servicing a global portfolio of 157 GW - the largest fleet in the world

**193 GW**  
installed wind turbine capacity

We have installed more wind turbine capacity than any other company in the world, with installations in 88 countries

**245m**  
tonnes CO<sub>2</sub>e avoided annually

Our total aggregated installed fleet annually help the World avoid emissions of 245 million tonnes CO<sub>2</sub>e

Classification: Public

The Global Leader in Sustainable Energy Solutions



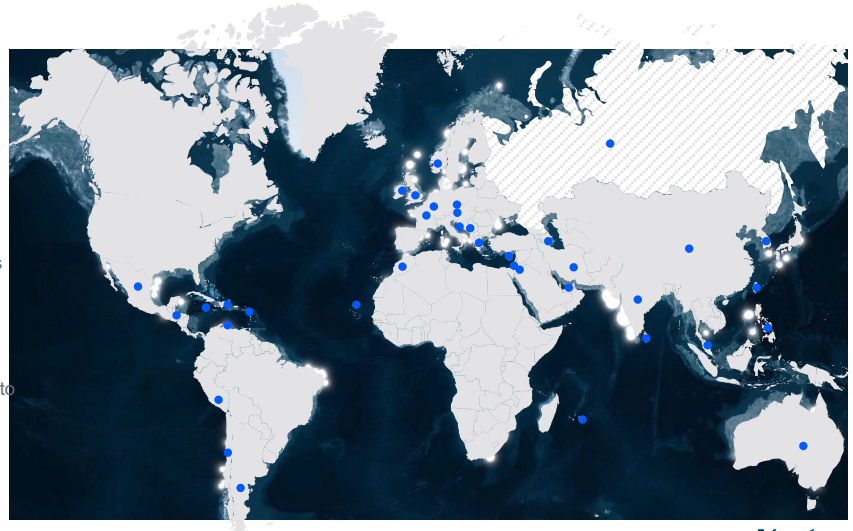
## Vestas is the global wind energy pioneer

Vestas has **succeeded** in bringing renewable energy to 39 markets

Over the past 40 years, Vestas has continuously pioneered new technologies, challenged conventions and developed emerging solutions, thus planting the seeds of the modern wind industry.

From wind energy insight to wind park development, construction and operation, Vestas has the knowledge and capabilities to help any organisation or company successfully invest in wind energy.

● Markets Vestas has pioneered



7 | The Global Leader in Sustainable Energy Solutions

Vestas

## Our core portfolio of sustainable energy solutions

### Onshore

Vestas is the market leader with more than 40 years of experience in Onshore wind.

### Offshore

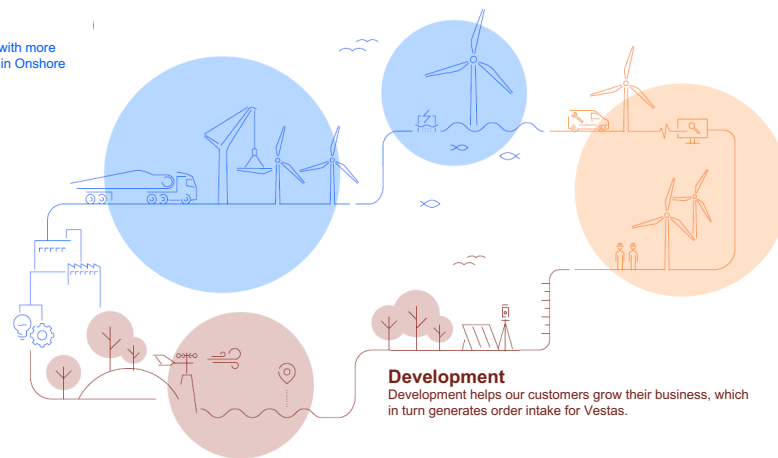
Vestas is becoming a leading player in Offshore wind with almost 30 years of experience.

### Service

Vestas is the global leader in Service within wind power with around 16,000 employees across 67 countries.

### Development

Development helps our customers grow their business, which in turn generates order intake for Vestas.



Classification: Public

| The Global Leader in Sustainable Energy Solutions

Vestas

## Wind turbine platforms for every segment

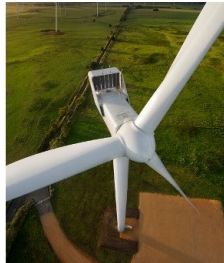
### Onshore



#### 2MW Platform

58+ GW  
Installed since 2000

**Turbines**  
V110-2.0 MW®  
V120-2.2 MW®



#### 4MW Platform

81+ GW  
Installed since 2010

**Turbines**  
V117-3.45 MW® V136-4.2 MW™  
V126-3.45 MW® V150-4.2 MW™  
V117-4.2 MW™ V136-4.5 MW™  
V136-3.45 MW® V150-4.5 MW™  
V163-4.5 MW™



#### EnVentus™ Platform

11+ GW  
Installed capacity

**Turbines**  
V150-6.0 MW™  
V162-6.2 MW™  
V162-7.2 MW™  
V172-7.2 MW™

### Offshore



#### V236-15.0 MW™

~8.5 GW  
Firm order intake

**Turbines**  
V236-15.0 MW™

The Global Leader in Sustainable Energy Solutions

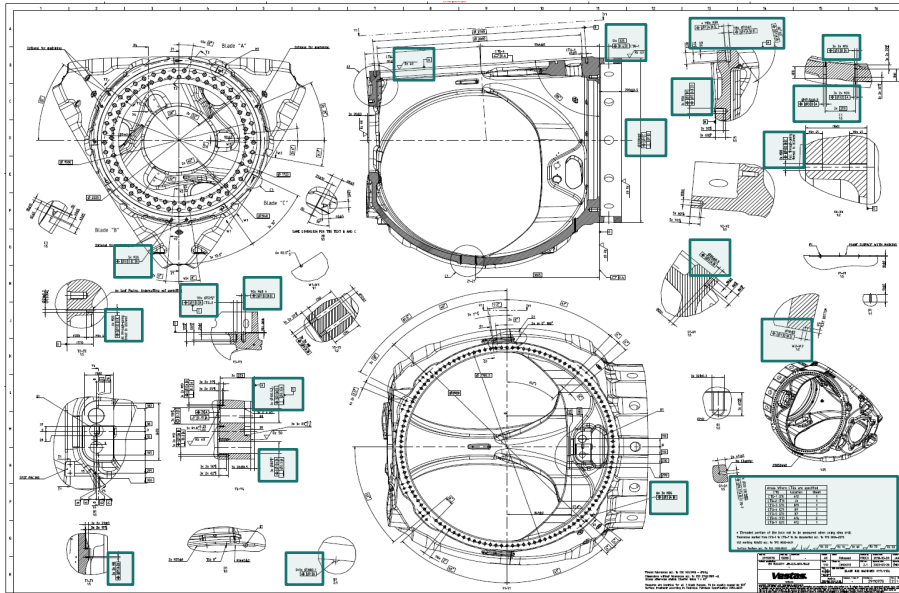
Data as of 31 March 2025

**Vestas**

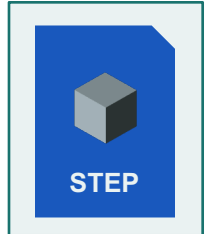
# MBD Journey... WHY?

Classification: Public

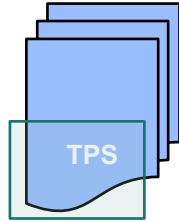
**Vestas**



+



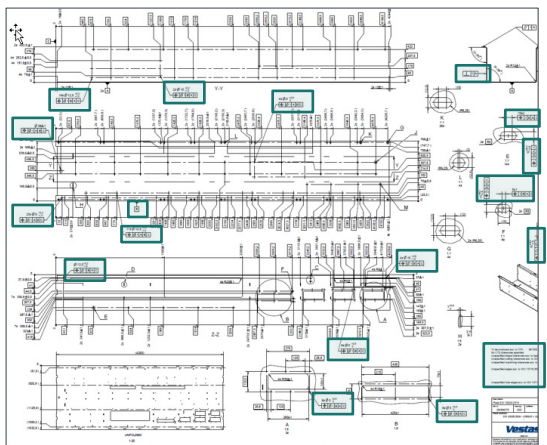
+



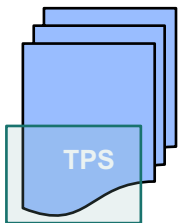
13 November 2025

11 | TPS – Technical Purchase Specification

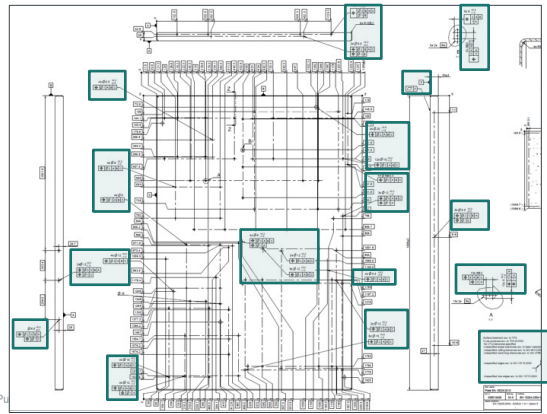
Vestas



+



+



Classification: PU

12 |

Vestas

# WASTE

## ...and an opportunity

### Embodying our values

**Simplicity.**

We strive to simplify our work and our solutions to the benefit of our customers.



Excellence =

Excellence = **Efficiency** + Effectiveness

Working in a way that does not  
waste resource e.g.



Purchase  
cost



People / Talent



Knowledge and  
know-how

**Excellence = Efficiency + Effectiveness**

Achieving the results that we  
want e.g.



Quality



Product /  
Solution Function



Time to Market



Lifecycle Cost

# Our Approach...

Classification: Public

**Vestas**

ASME

ASME Y14.41-2019  
(Revision of ASME Y14.41-2012)

# Digital Product Definition Data Practices

Engineering Product Definition and Related Documentation Practices



MIL-STD

NOT MEASUREMENT SENSITIVE  
MIL-STD-1900A  
17 February 2013  
SUPERSEDED BY  
MIL-STD-19000  
05 November 2009

DEPARTMENT OF DEFENSE  
STANDARD PRACTICE  
TECHNICAL DATA PACKAGES

This standard is approved for use by all Departments and Agencies of the Department of Defense.

### 1. SCOPE

1.1 This standard provides requirements for the deliverable data products associated with a technical data package (TDP) and its related TDP data management products. A TDP contains elements, as described by a level and type, and may have associated metadata and supplementary technical data. TDP contains a subset of product data and product data is a subset of technical data. These relationships are shown in the hierarchical breakdowns of data in Figure 1.

Comments, suggestions, or questions on this document should be addressed to: Commander, US Army AMRDEC, ATTN: SJAR-QES-E, Picatinny Arsenal, New Jersey 07866-5000 or email to [esg@army.mil](mailto:esg@army.mil); [esg@doe.dau.mil](mailto:esg@doe.dau.mil); [esg@doe.dau.mil](mailto:esg@doe.dau.mil). Since contact information can change, you may want to verify the currency of this address information using the ASSIST online database at <https://assist.dau.mil>.

AMSC 9341

AREA S155

DISTRIBUTION STATEMENT A - Approved for public release; distribution is unlimited.

Classification: Public

ISO

INTERNATIONAL STANDARD  
ISO 16792

First edition  
2009-12-15

Technical product documentation —  
Digital product definition data practices

Documentation technique de produits — Données de définition d'un produit

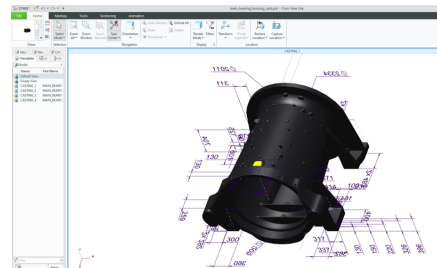
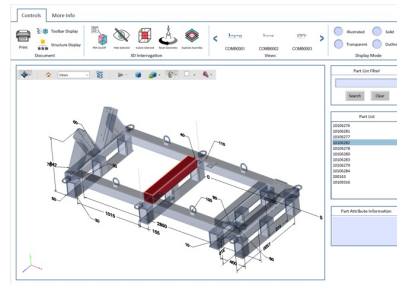
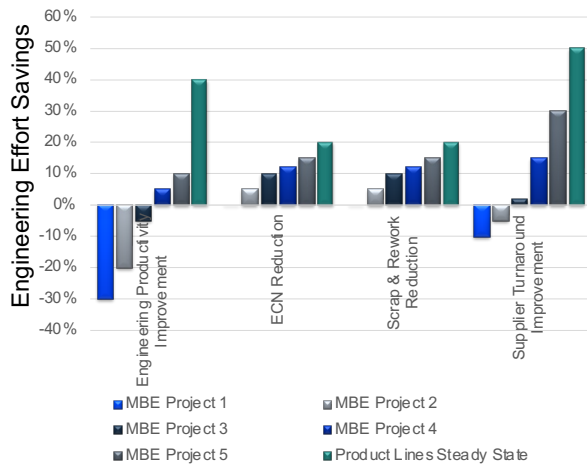


Reference number  
ISO 16792:2009(E)  
© ISO 2009

13 November 2025

## Project study and proof of concepts

### MBE Benefits & KPI's



Classification: Public

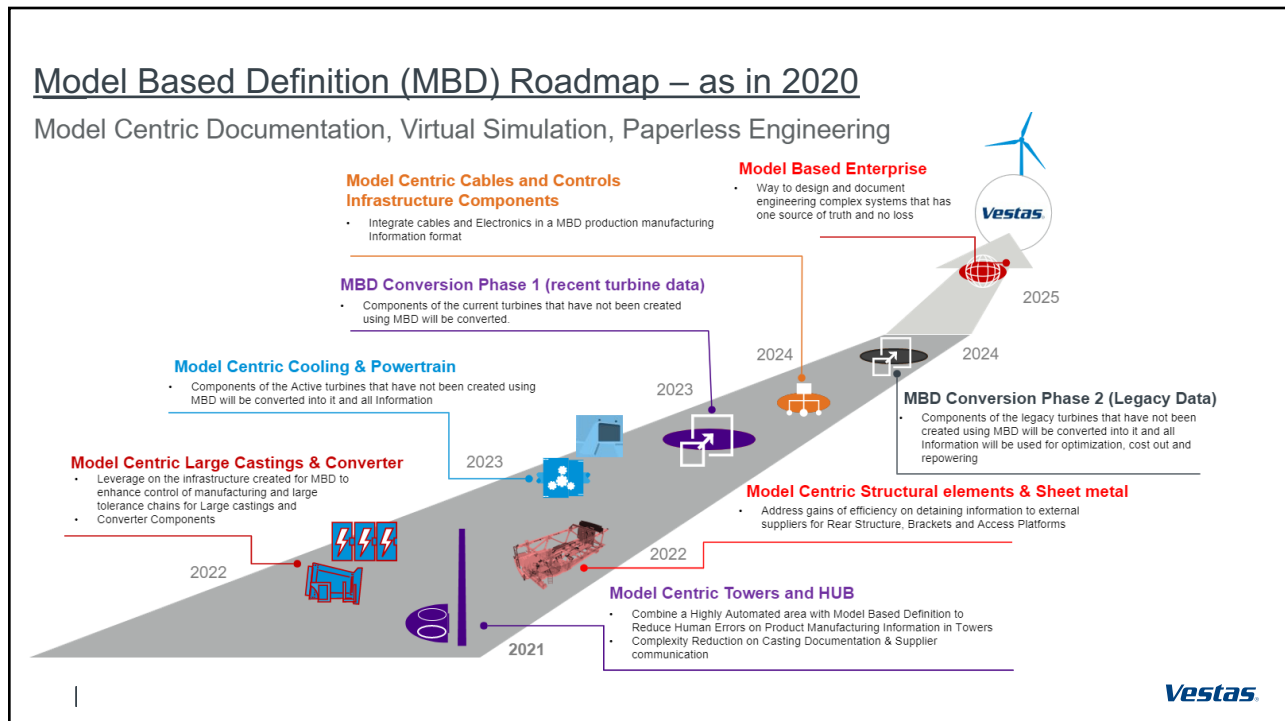
13 November 2025

		Level 0	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
		<b>Dwg-Centric</b>	<b>Model Centric</b>		<b>Model Based Definition</b>		<b>Model Based Enterprise</b>	
<b>Design Data (CAD)</b>	Geometry	Geo. from dwg., no assoc.	All geometry from model					
	Dimensions & Tolerances	Dim. & tol. from drawing	Most dimensions & tolerances from model		All dimensions & tolerances from model			
	Notes, non-geom data	Notes on drawing			Notes in model	Notes in database	Notes in PLM system database	
	BOM	Manual in ERP, no link to CAD	Managed in PLM, linked to CAD					
<b>Technical Data Package (TDP)</b>		Ad-hoc, manual creation & delivery			Structured, manual creation and manual delivery		Automated creation by PLM	Automated delivery by PLM
<b>Change and Configuration Management Data</b>		Drawing-based			Model-based			
<b>External and Internal Manufacturing Data Exchange</b>		Drawing-based	Geometry from model, using neutral formats. Annotations from drawing		All information from model, different databases may exist		All managed in PLM, full associativity	
<b>Quality Requirements, Planning, and Inspection Code Generation</b>		Remastered 3D model	Neutral models	Copies of native models		Native models from PLM	Native models from PLM, parallel process	
<b>Enterprise Collaboration and Data Exchange</b>		Drawings-based, sent to supplier	Drawings & models, sent to supplier		Models & deriv., automat. sent	Models & deriv., automat. shared	Models & derivatives, shared through external PLM access	

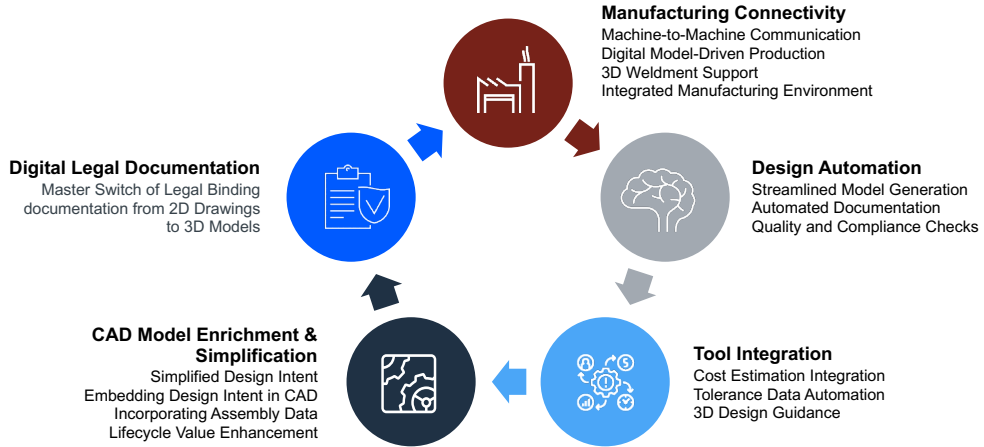
Classification: Public

Vestas in 2020

21 | Source: NSC MBE Maturity Index Issue C



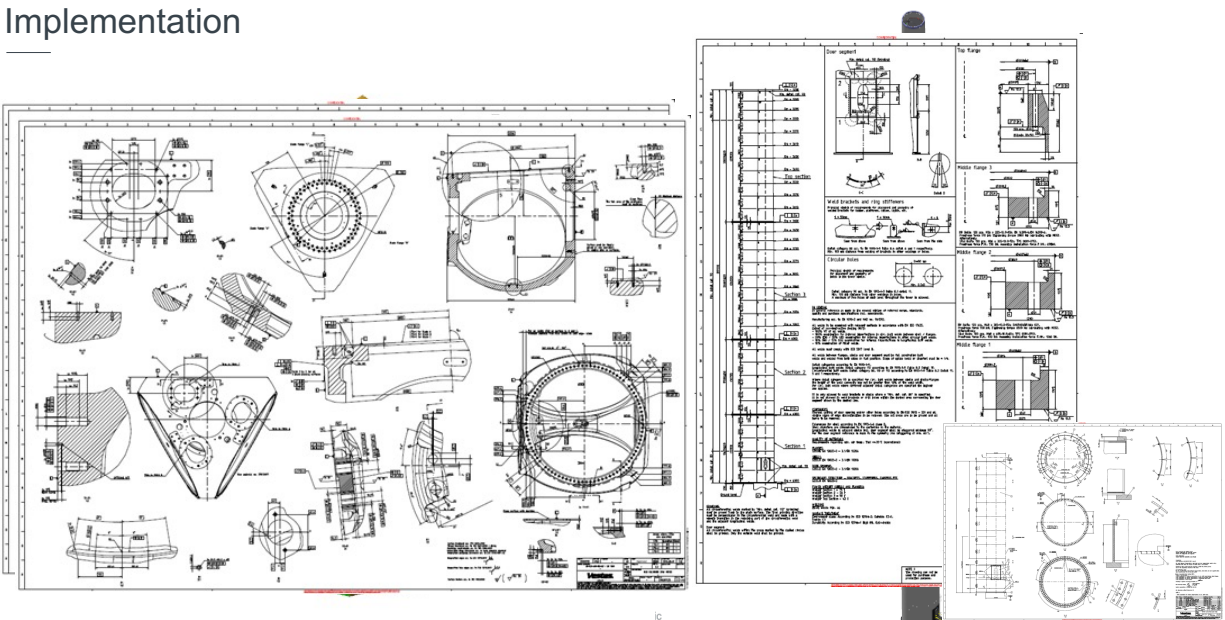
# Capability Development



**MBD is an enabler across the value chain and supplier collaboration**

Classification: Public

# Implementation



# Development Challenges and Lessons

## IT System Architecture

Data Creation and Authoring

PDM & PLM

ERP and Data Distribution and Value Chain propagation and usage



creo®



windchill®



Classification: Public



Vestas

# Development Challenges and Lessons

## Light Format Viewer Comparison

	ZIP container	PVZ & STEP provided through Windchill	PDF/A-3 with embedded PVZ & STEP	3D-PDF	Web Platform, providing PVZ & STEP
Viewing 3D + PMI	PVZ	PVZ	PVZ	PRC, STEP	WebGL
Processing 3D + PMI	STEP	STEP	STEP	PRC, STEP	STEP
Viewing of BOM	XLS	XLS	XLS	XLS + List in PDF	XLS + List in HTML
Viewing of List of Characteristics	XLS	XLS	XLS	XLS + List in PDF	XLS + List in HTML
Traceability of the Package	no	yes	yes	yes	No files, but content provided
Integrity of the Package	no	yes	yes	no	No files, but content provided
Commenting & upstream Communications	no	no	no	no	yes

Classification: Public

13 November 2025

## Development Challenges and Lessons

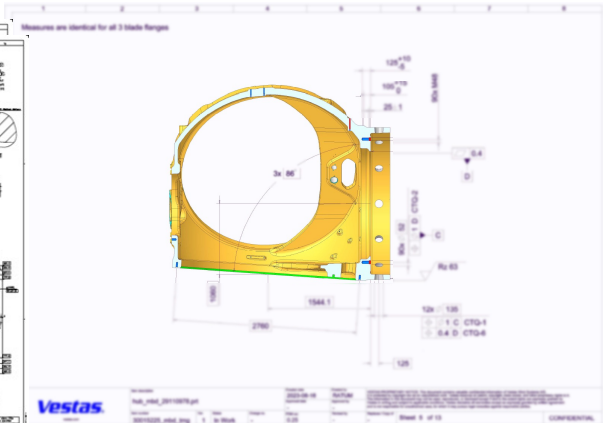
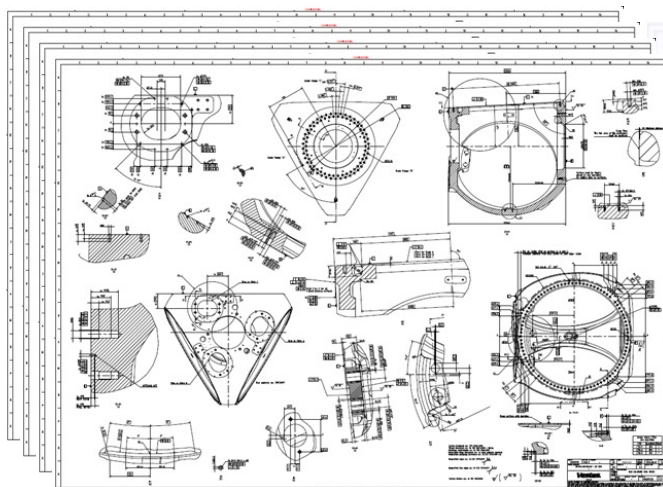
### Supplier Involvement

Component Type	Suppliers
HUB	05
Tower	14
Sheet metal	16
Sheet metal & Weldments	42
Composite	03



Vestas

### Simplification and Automation



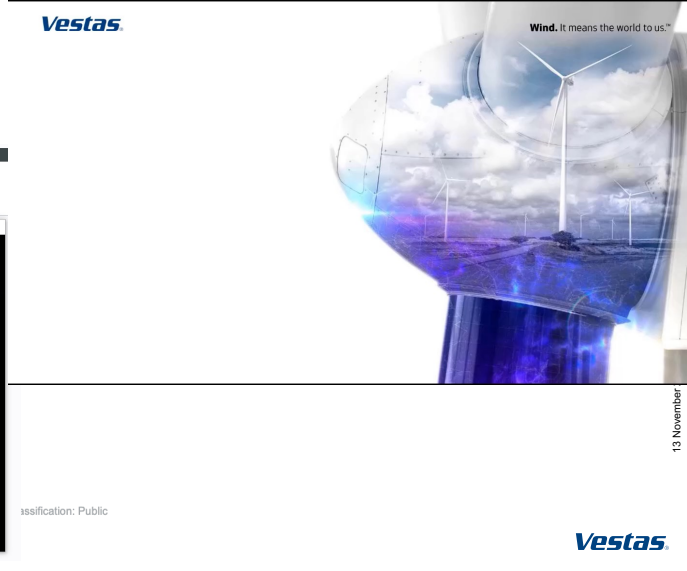
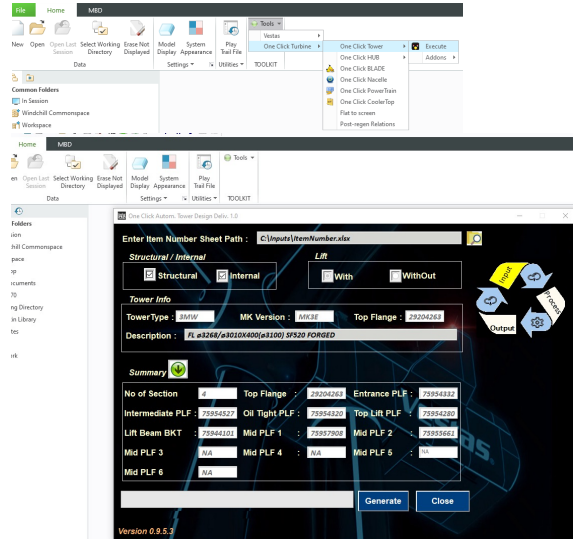
Classification: Public

13 November 2025

Vestas

# Simplification and Automation

## Enabling Automation

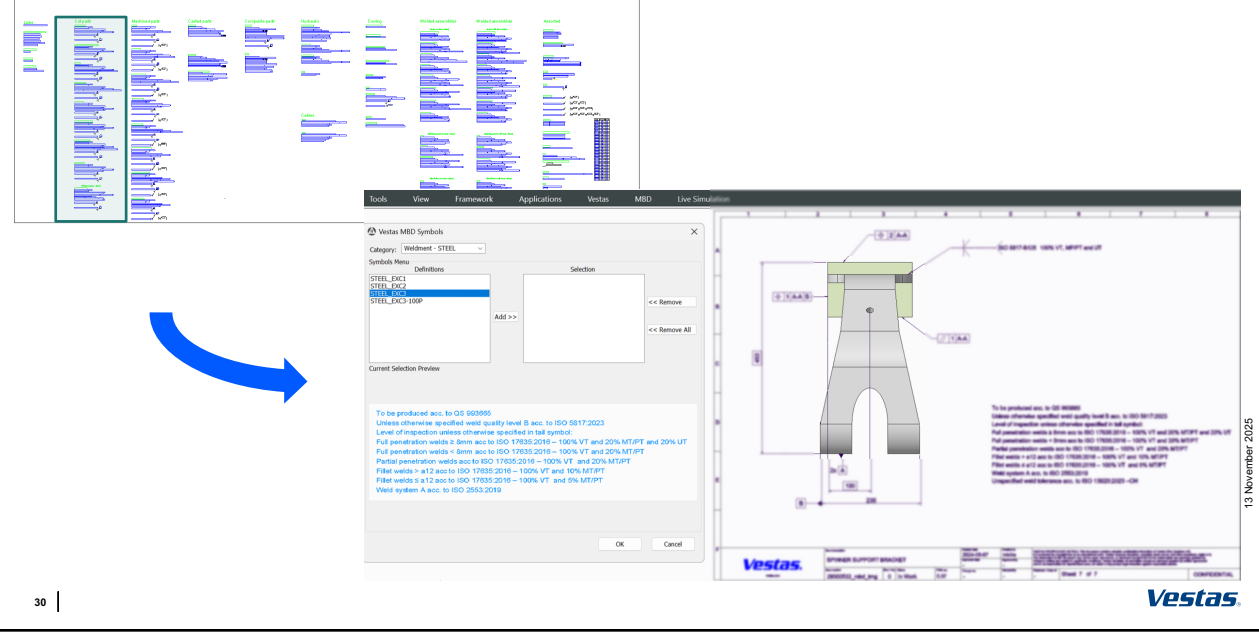


13 November

Classification: Public

Vestas

# Simplification and Automation - Engineering note database



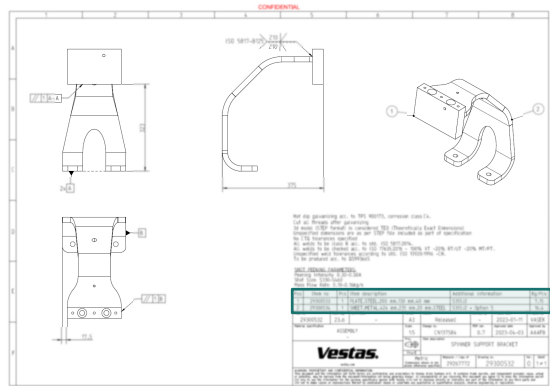
13 November 2025

30

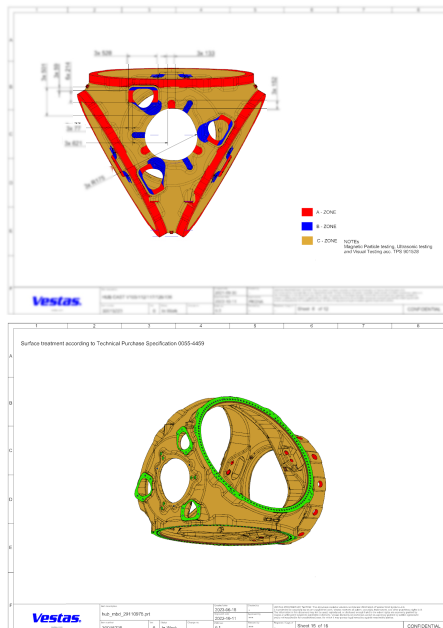
Vestas

# Development Challenges and Lessons

## BOM Information in the 3D model

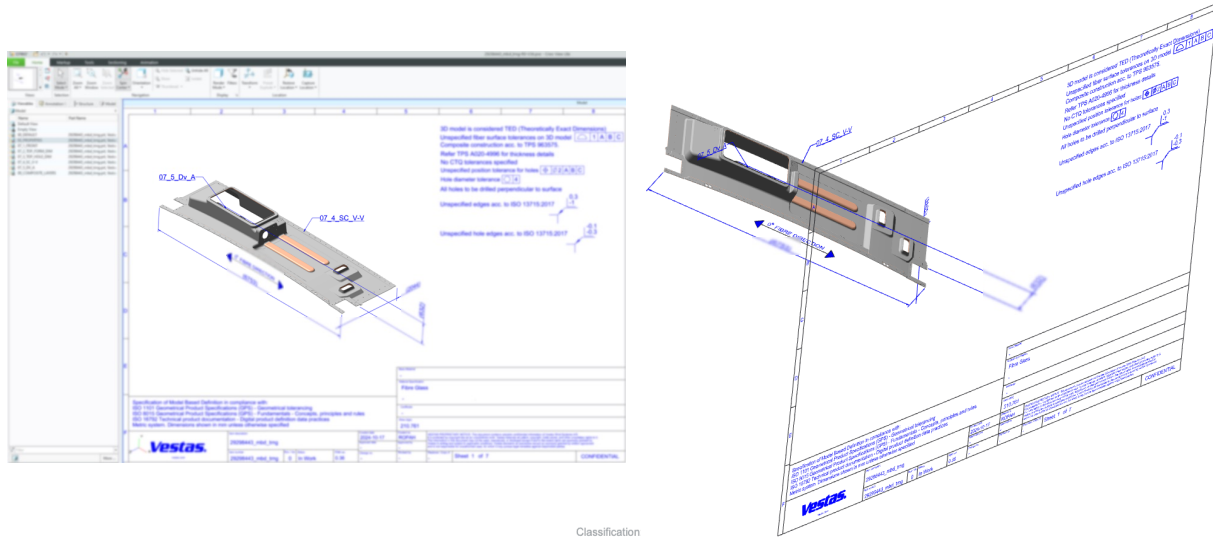


## Simplification and Automation - Colors



13 November 2025

## Framing the 3D Models



33 |

Classification

13 November 2025

Vestas

## Final result

creo® view  
Express

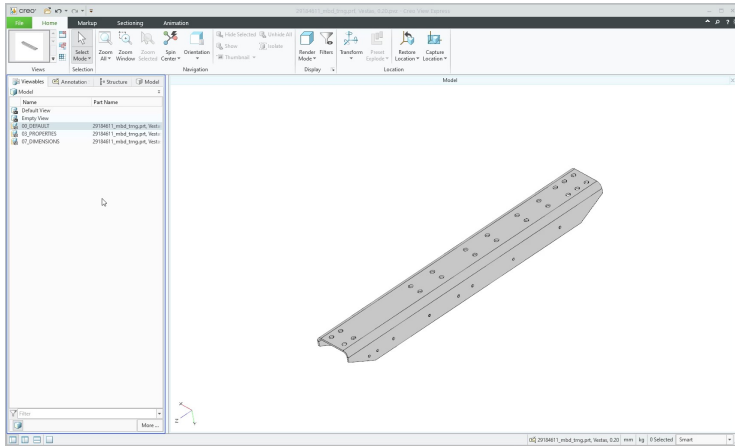


Classification: Public

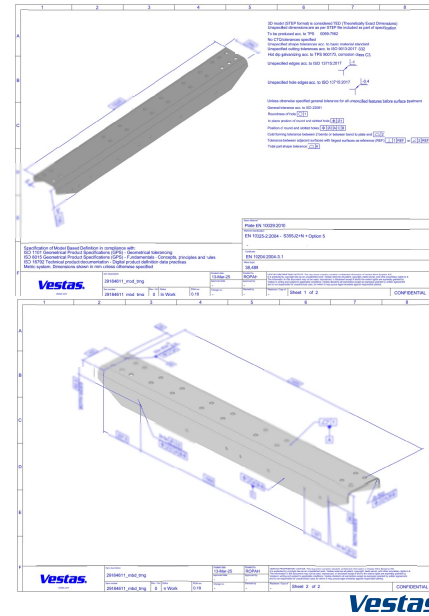
|

Vestas

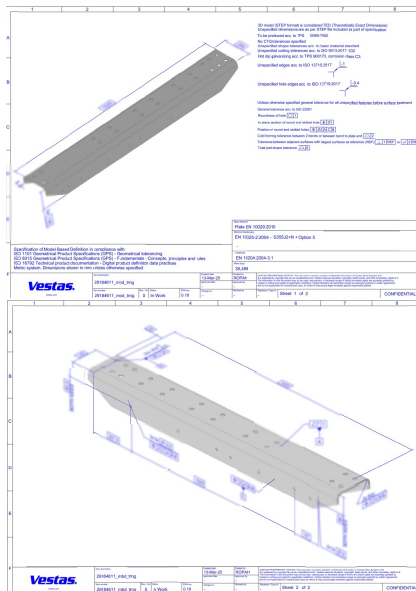
# Final result



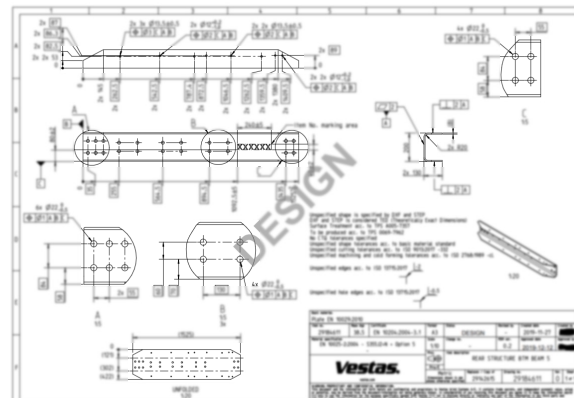
Classification: Public



# Final result



18 Dimensions/Measurements



53 Dimensions/Measurements

Classification: Public

Vestas

## Cost out of designing and measurement

	Internal Cost Out Design and Review	External Cost Out Measurement
Towers Automation	40%	0%
Hub	40%	20%
Sheet Metal	40%	75%
Welded	75%	20%
<b>Total (1.000.000€/Year)</b>	<b>50%</b>	<b>50%</b>

**Annotated 3d model**  
Easy understanding and reviewing

**Machine readable**  
Notes, dimensions and tolerances tied to a features or surfaces

**Full measurable part geometry**  
Less dimensions required

**One master product definition with all information**  
Easy to "Check in" in Windchill

**Reduce time to market**  
Simpler compared to 2D

**Automation potential**  
One click tower automation

**Possibility to use color**



## USE MBD CAPABILITY MATURITY LEVELS AS BASIS FOR AN MBD ROADMAP AND FRAMEWORK (SCHEMA)

		Level 0	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
		Dwg-Centric	Model Centric	Model Based Definition	Model Based Enterprise			
<b>Design Data (CAD)</b>	Geometry	Geo. from dwg., no assoc.	All geometry from model					
	Dimensions & Tolerances	Dim. & tol. from drawing	Most dimensions & tolerances from model	All dimensions & tolerances from model				
	Notes, non-geom data	Notes on drawing		Notes in model	Notes in database	Notes in PLM system database		
	BOM	Manual in ERP, no link to CAD	Managed in PLM, linked to CAD					
<b>Technical Data Package (TDP)</b>		Ad-hoc, manual creation & delivery		Structured, manual creation and manual delivery	Automated creation by PLM	Automated delivery by PLM		
<b>Change and Configuration Management Data</b>		Drawing-based		Model-based				
<b>External and Internal Manufacturing Data Exchange</b>		Drawing-based	Geometry from model, using neutral formats. Annotations from drawing	All information from model, different databases may exist	All managed in PLM, full associativity			
<b>Quality Requirements, Planning, and Inspection Code Generation</b>		Remastered 3D model	Neutral models	Copies of native models	Native models from PLM	Native models from PLM, parallel process		
<b>Enterprise Collaboration and Data Exchange</b>		Drawings-based, sent to supplier	Drawings & models, sent to supplier	Models & deriv., automat. sent	Models & deriv., automat. shared	Models & derivatives, shared through external PLM access		

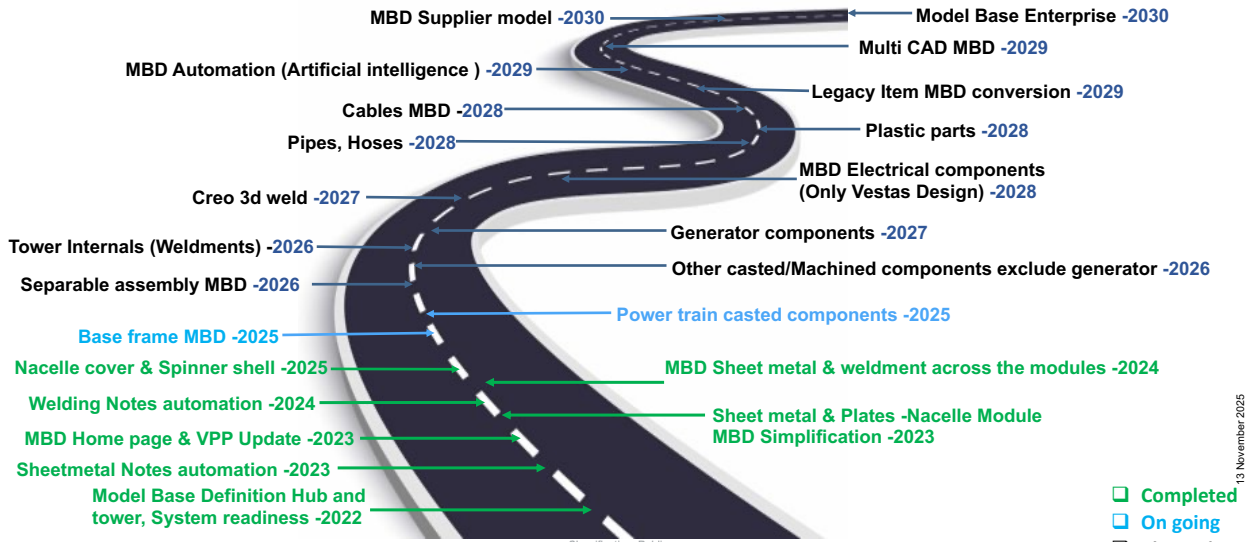
Classification: Public

Vestas in 2020

Vestas in August 2025

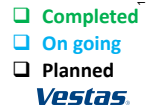
Goal for 2030 **Vestas**

# ROADMAP



13 November 2025

Classification: Public



## Key Takeaways



**Simplicity** || We are reducing complexity, keep and increasing quality and enhancing context communication

**Keep an eye on your Suppliers** || They are key to succeed during the whole process

**Play as a team** || The whole value chain need to work together to deploy the paradigm change that MBD Brings

**Handle Change Management with care** || Constant communication and effective training of the designer's and suppliers helps a smooth deployment

# Q&A

Copyright Notice  
The documents are created by Vestas Wind Systems A/S and contain copyrighted material, trademarks, and other proprietary information. All rights reserved. No part of the documents may be reproduced or copied in any form or by any means - such as graphic, electronic, or mechanical, including photocopying, taping, or information storage and retrieval systems without the prior written permission of Vestas Wind Systems A/S. The use of these documents by you, or anyone else authorized by you, is prohibited unless specifically permitted by Vestas Wind Systems A/S. You may not alter or remove any trademark, copyright or other notice from the documents. The documents are provided "as is" and Vestas Wind Systems A/S shall not have any responsibility or liability whatsoever for the results of use of the documents by you.