Prima Power

DIMECC

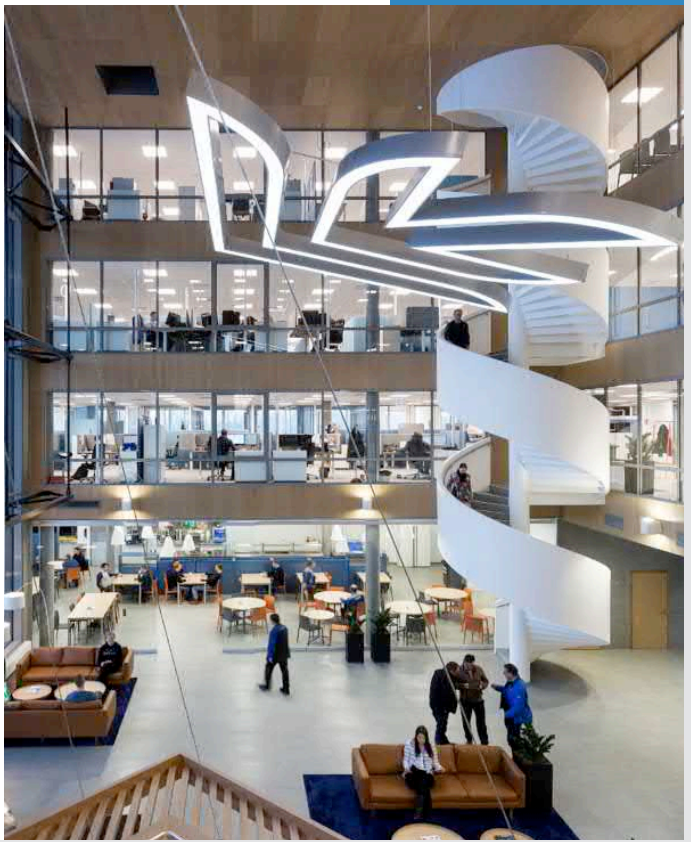
TECHNOLOGIES AND SOLUTIONS FOR

INDUSTRY 4.0

InDEx project:
Prima Power preliminary results

Valeria Boldosova
10.11.2020

PRIMA POWER:
WHO WE ARE &
WHAT DO WE DO?



Prima Power

Prima Power: Brief introduction

Prima Power

Prima Power is a global **leader in laser and sheet metal machinery.**
Our product range covers every step of metalworking: **punching, laser processing, bending, systems, automation and software.**

Prima Power: Brief introduction

Prima Power

LASER AND SHEET METAL MACHINERY

THE LASER

2D and 3D laser machines for cutting, welding and drilling

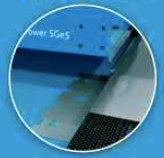
THE PUNCH

Servo-electric turret punch presses

THE SHEAR

Integrated systems punch+shear

THE COMBI



Integrated systems punch+laser

THE PRESS

Servo-electric and hydraulic press brakes

THE BEND

Servo-electric panel benders and bending centers

THE SYSTEM

FMC & FMS to automate your production flow

THE SOFTWARE

Smart solutions to connect your machines and maximize productivity

PRODUCT PORTFOLIO

Prima Electro

ELECTRONICS AND LASER TECHNOLOGIES

DOTS

Embedded Electronics - Dedicated -off-the-shelf

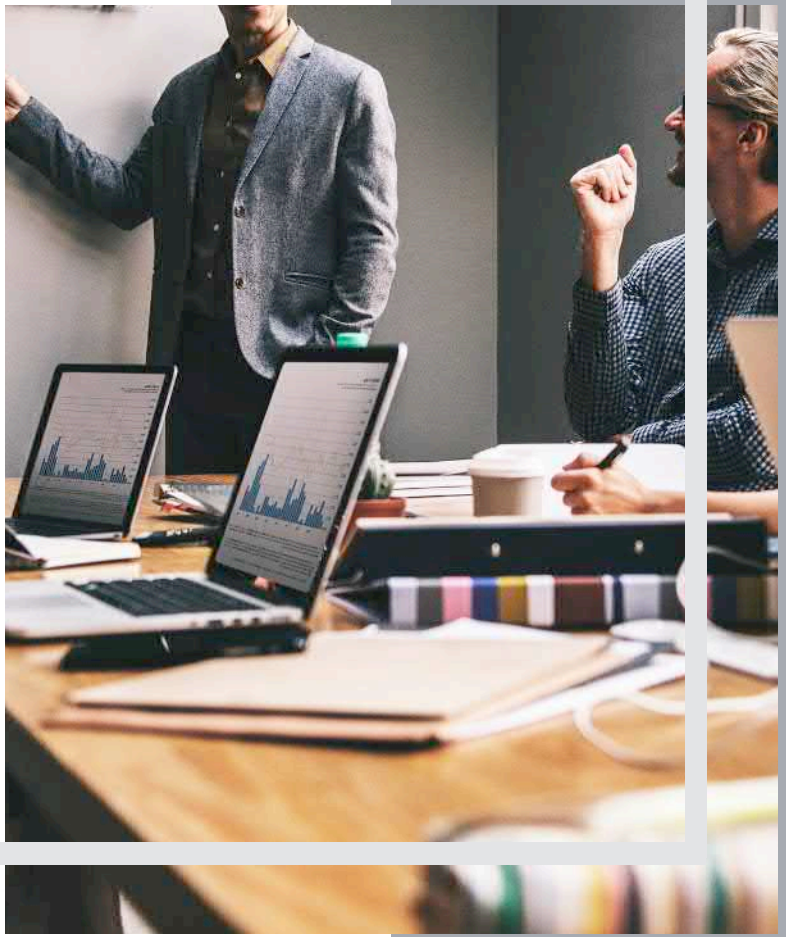
CONVERGENT

Fiber and CO_2 Laser sources

OSAI

Motion Control and CNC's

PROJECT GOALS & COLLABORATION WITH PROJECT PARTNERS



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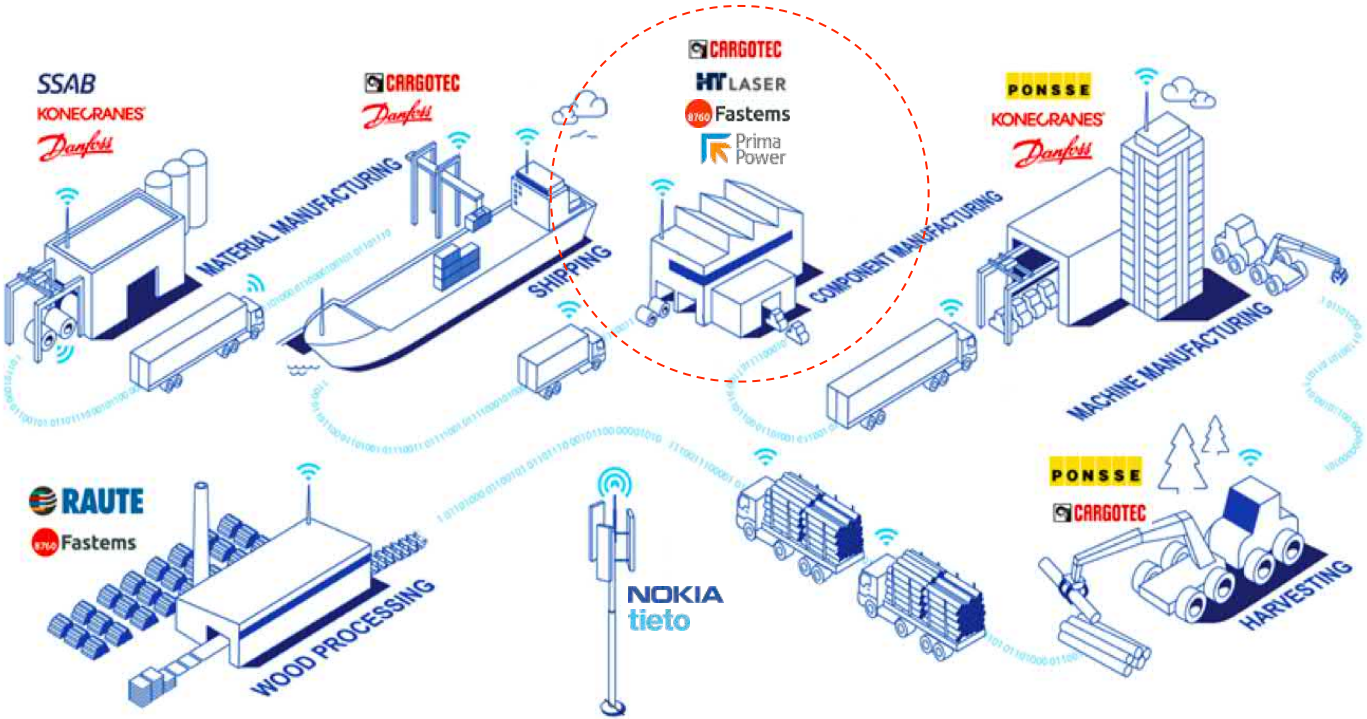
Intelligent Industrial Ecosystem:
Prima Power leading the ‘AI-assisted order-delivery’ experiment



Industrial Data Excellence project: Prima Power collaboration and joint activities

SOFTWARE PROVIDER

Jubic

Practical implementation of Cloud Manufacturing platform

Technical architecture, back end and user management

MANUFACTURING COMPANIES

Prima Power

Collecting industrial requirements and specifications for AI-assisted order-delivery process

Developing Cloud Manufacturing platform: digital order placement, digital price calculator etc.

elekmerk

Pilot customer: providing sheet metal processing environment for testing Cloud Manufacturing platform

Collecting feedback from factory and office workers on the Cloud Manufacturing platform

UNIVERSITIES

Vaasan yliopisto

Jyväskylän yliopisto

Legal contracts, IPR, data ownership (UVA)

Cybersecurity, risk management (JYU)

PRELIMINARY PROJECT RESULT:
CLOUD MANUFACTURING PLATFORM

Prima Power

InDEx experiment: Digital AI-assisted order-delivery process

1 Online quotation tool & ordering portal

- Webshop for end customers
- Part's feature recognition (online quote calculator)

2 Programming (CAM)

- Automatic order processing
- AI-assisted CAM

3 Manufacturing

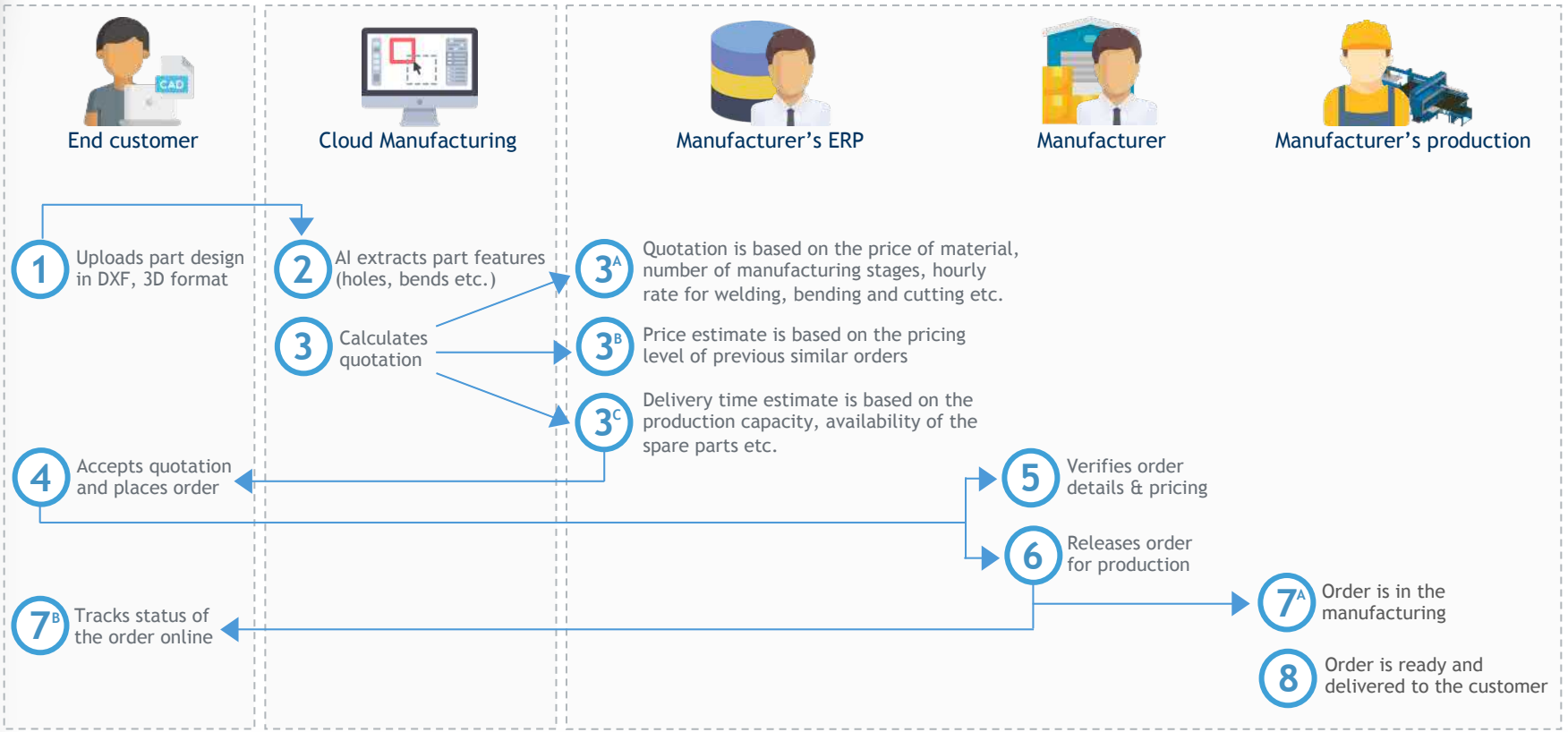
- Production line optimization
- Order tracking

Cloud Manufacturing platform: Factory of the future

Industry 4.0 SaaS product for manufacturers to be used with own customers

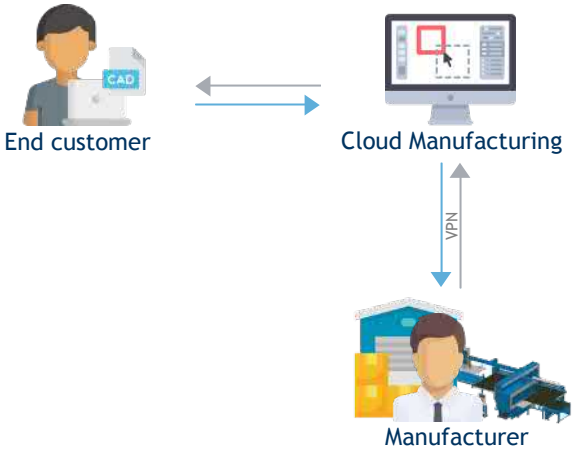
- Easy online order placement
- Flexible file upload options (2D DXF, 3D)
- Fast and accurate quotation calculator
- Automated part pre-processing with AI
- Connectivity to factory software
- Automated order flow through ERP connection
- Online order tracking

Cloud Manufacturing platform: Digital workflow & data sharing in manufacturing ecosystem

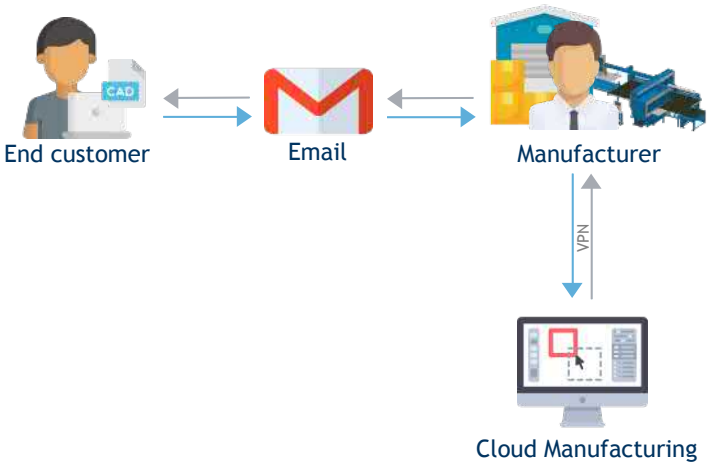


Cloud Manufacturing platform: Different connectivity options

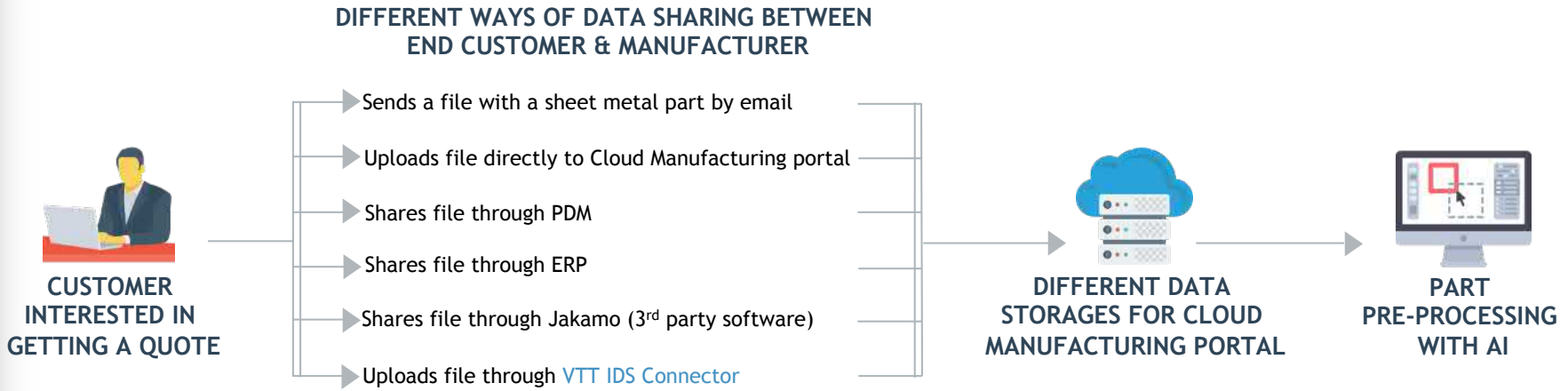
OPTION 1
DIRECT CLOUD CONNECTION



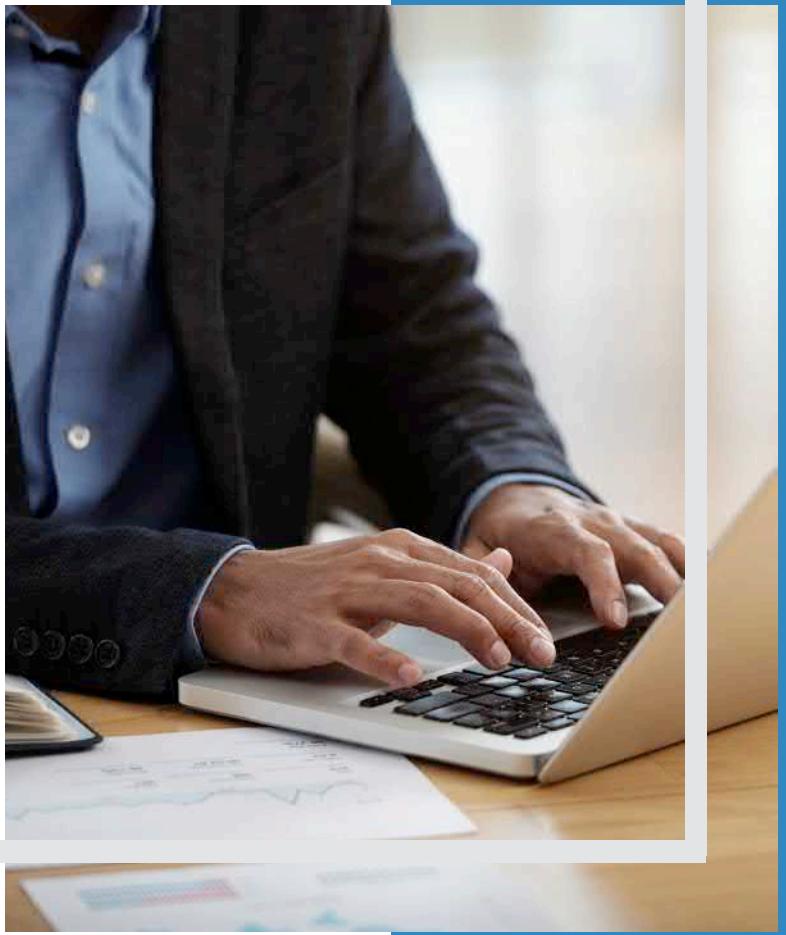
OPTION 2
MANUAL FILE UPLOAD



Different ways of data exchange in business ecosystem



CLOUD MANUFACTURING PLATFORM:
USER INTERFACE



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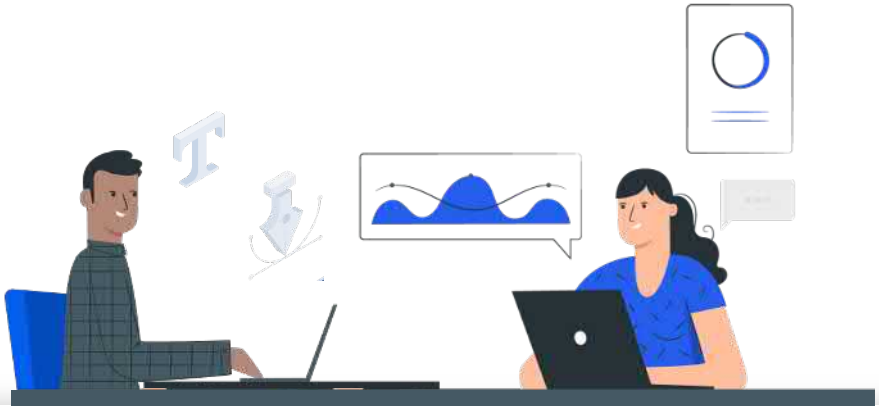
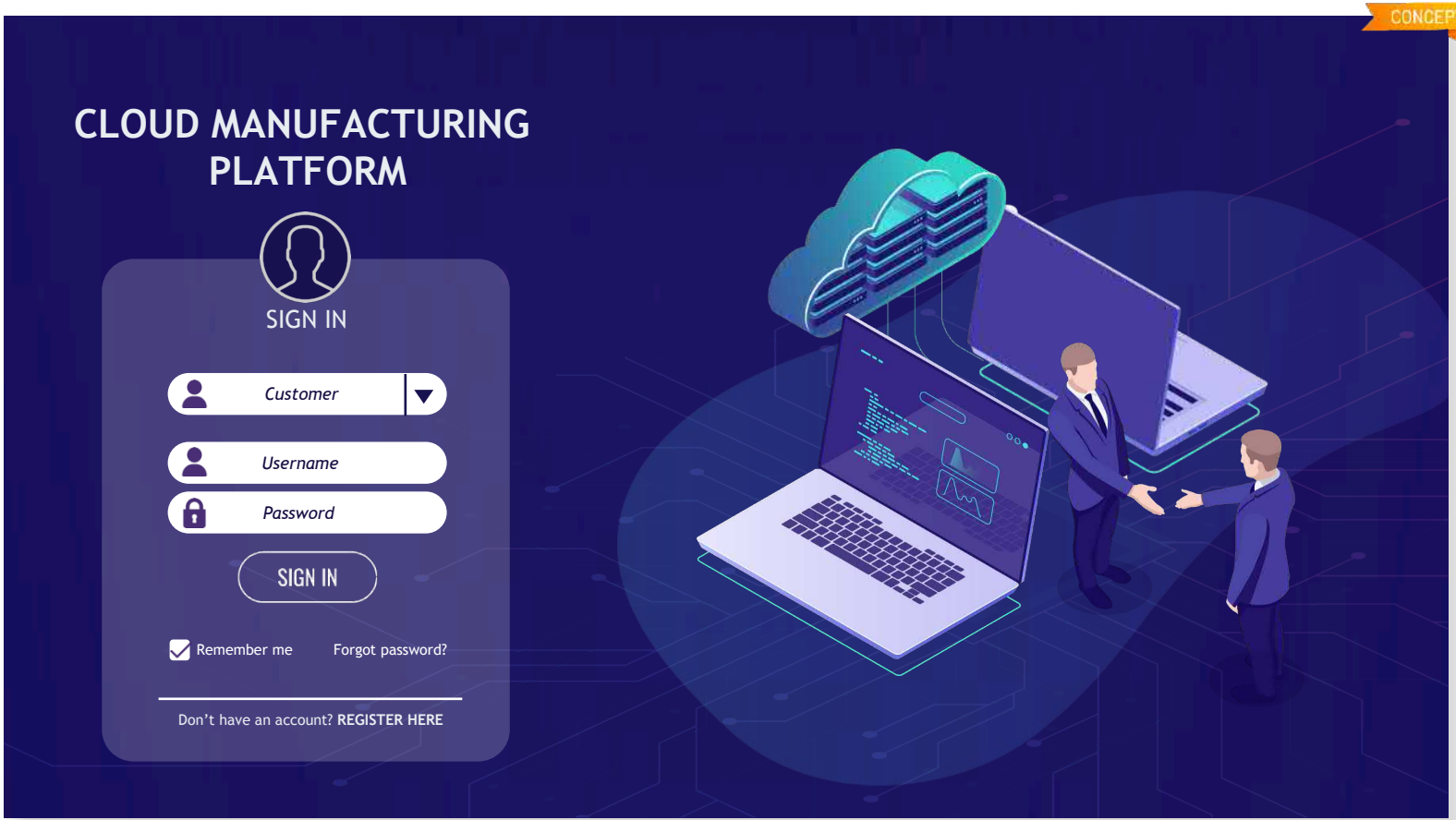
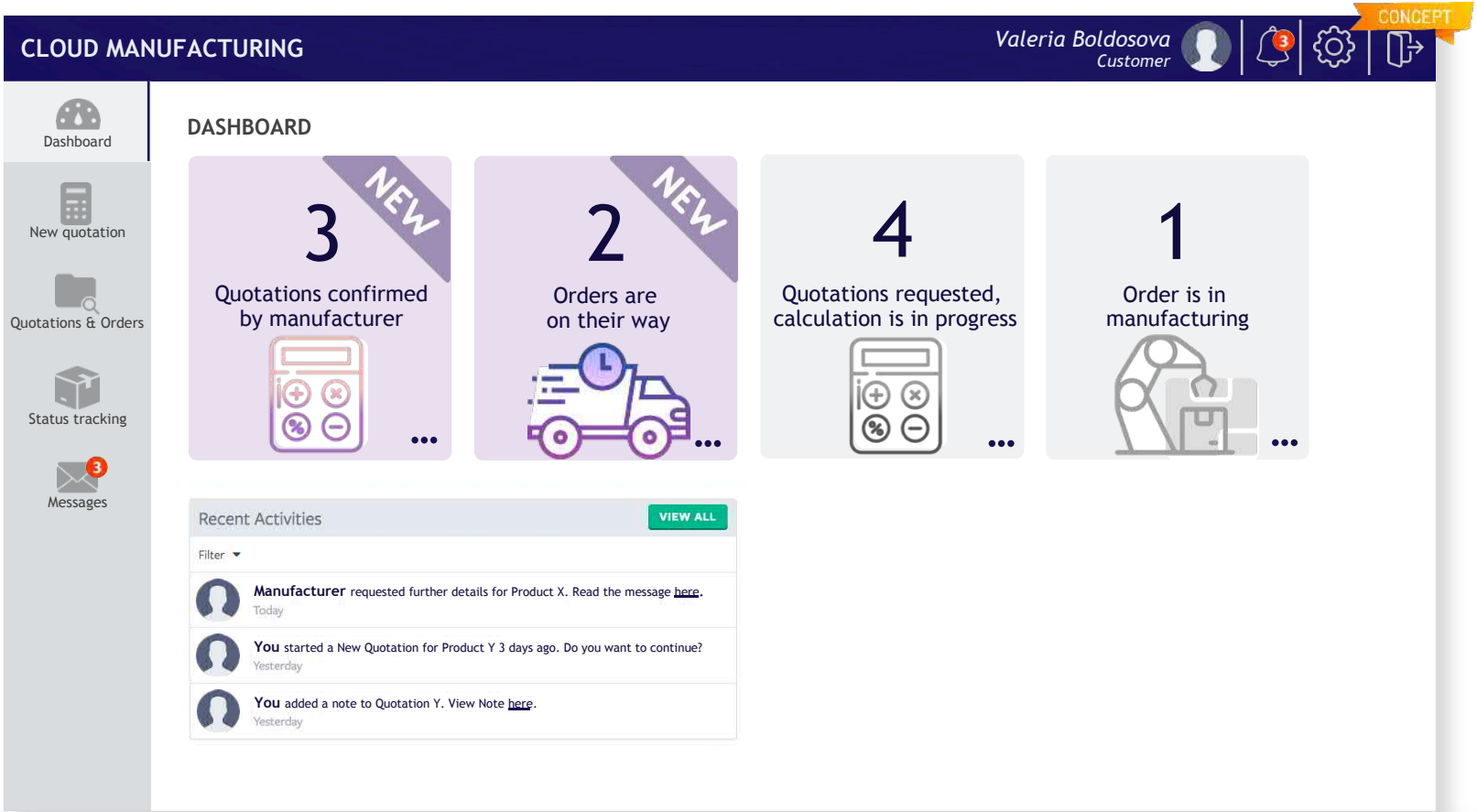
END CUSTOMER
interface



End customer interface: Landing page



End customer interface: Dashboard



End customer interface: Uploading sheet metal part design

CLOUD MANUFACTURING

CONCEPT

Valeria Boldosova
Customer

Dashboard
New quotation
Quotations & Orders
Status tracking
Messages 3

CREATE NEW QUOTATION

Project name:
Steel cabinet
New project

Customer name:
Customer X
New customer

UPLOAD YOUR DESIGN

Drag & drop file here
(e.g. DXF, Inventor, SolidWorks, SolidEdge)

or

BROWSE FILES

ARCHIVE OF RECENTS QUOTATIONS

2 days ago:

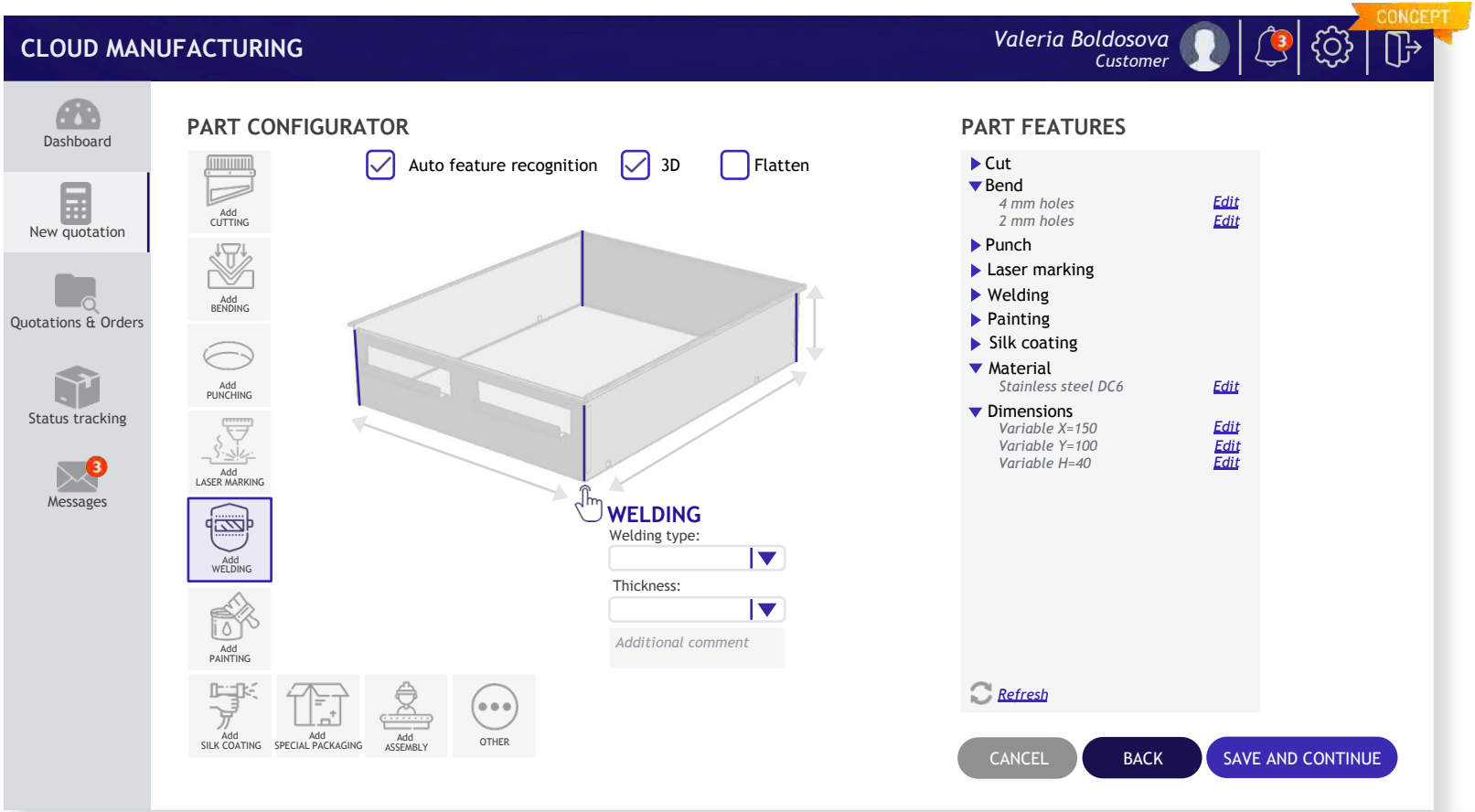
1 week ago:

Select to modify

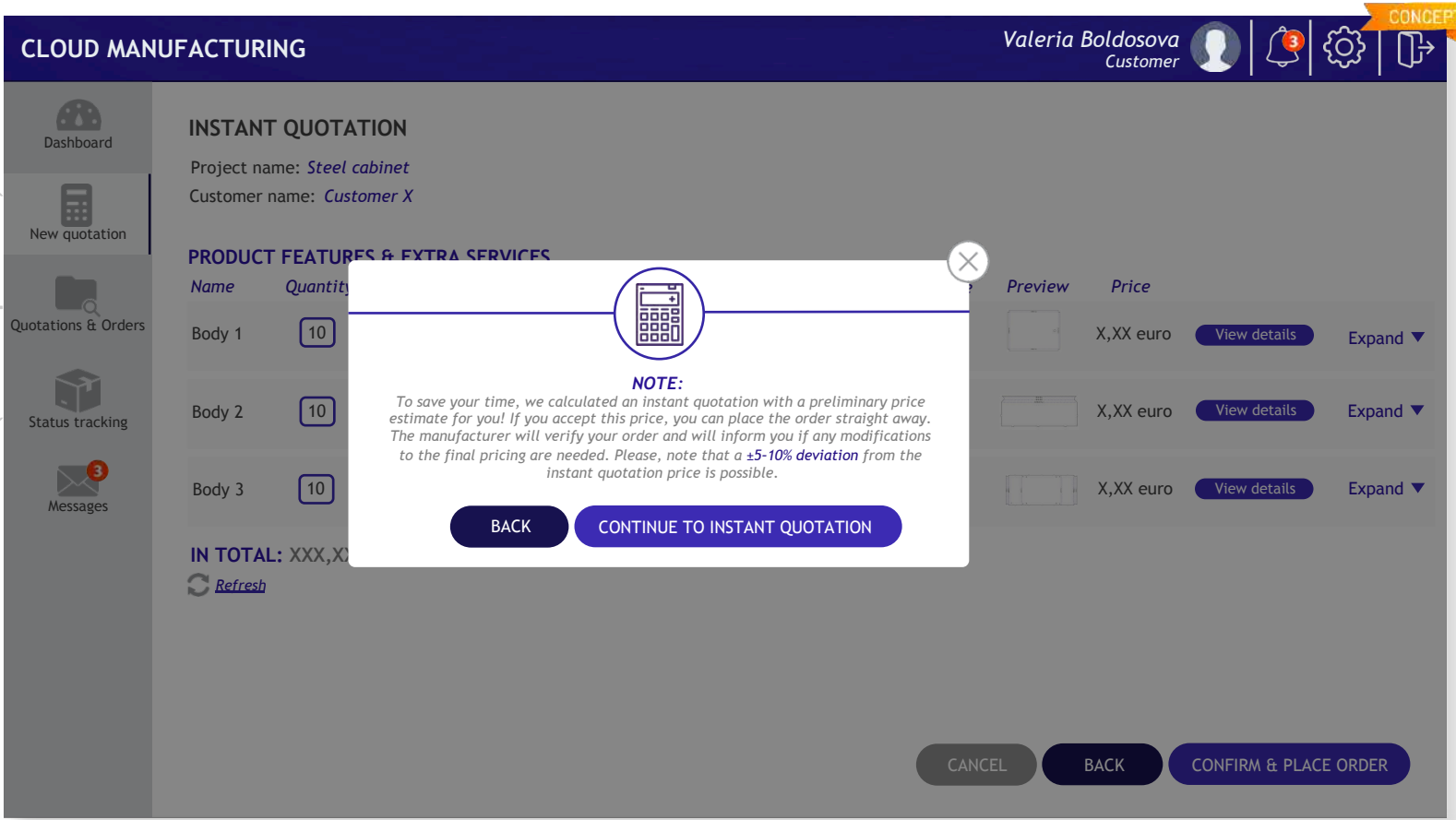
1 month ago:

CANCEL
SAVE AND CONTINUE

End customer interface: AI pre-processing & extraction of part features



End customer interface: Generating instant quotation



OPTION 1 (instant quotation)

End customer interface: Accepting instant quotation & placing order

OPTION 1 (instant quotation)

CLOUD MANUFACTURING

Valeria Boldosova
Customer

CONCEPT

- Dashboard
- New quotation
- Quotations & Orders
- Status tracking
- Messages (3)

INSTANT QUOTATION

Project name: *Steel cabinet*
Customer name: *Customer X*

PRODUCT FEATURES & EXTRA SERVICES

Name	Quantity	Size	Material	Cutting time	Bending time	Preview	Price		
Body 1	10	528.42mm × 407.42mm	Stainless steel	1m, 33s	2m, 27s		X,XX euro	View details	Expand
Body 2	10	500.00mm × 199.14mm	Stainless steel	1m, 46s	2m, 12s		X,XX euro	View details	Expand
Body 3	10	889.70mm × 379.99mm	Stainless steel	1m, 26s	3m, 27s		X,XX euro	View details	Expand

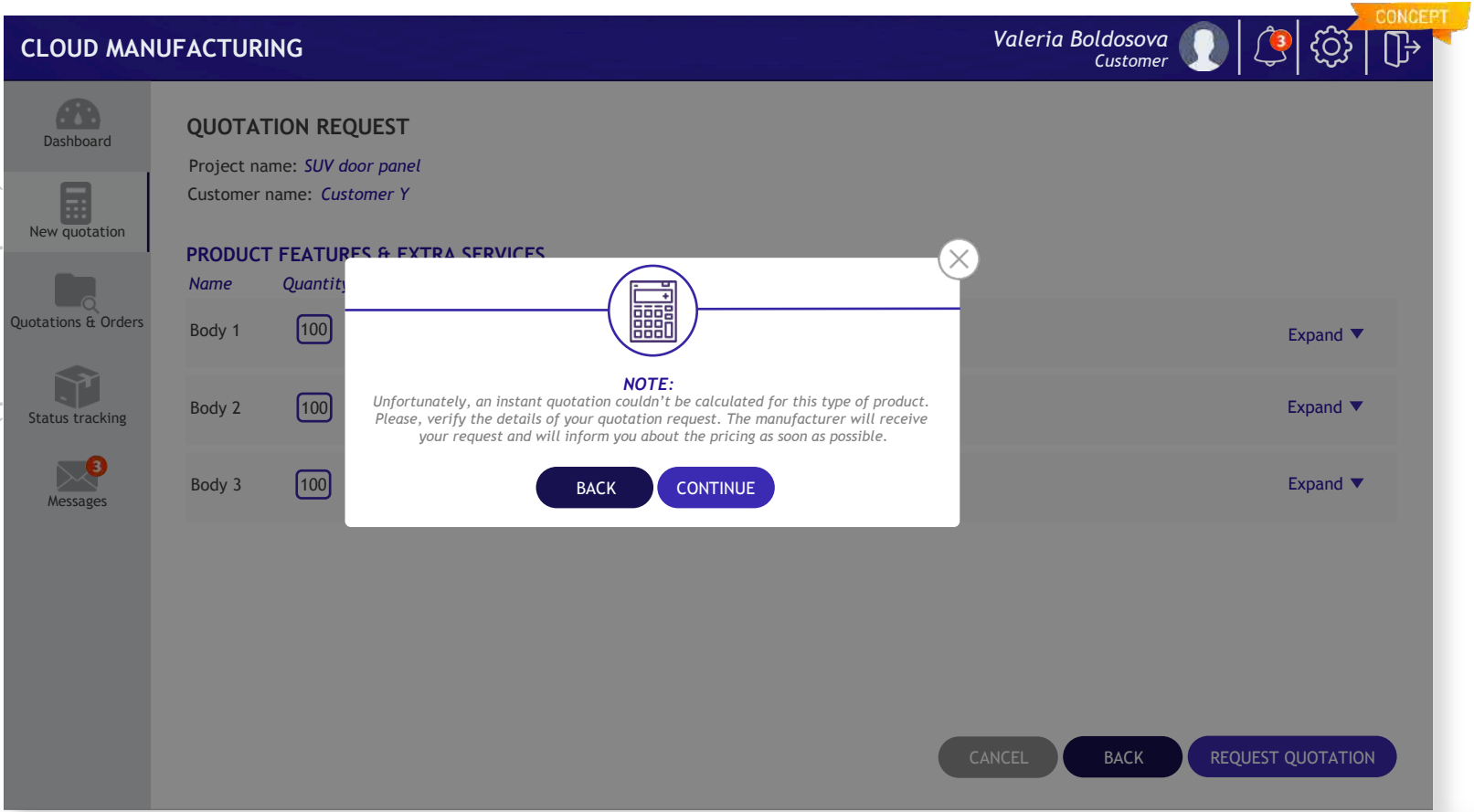
IN TOTAL: XXX,XX euro

Refresh

CANCEL | BACK | CONFIRM & PLACE ORDER

End customer interface: Submitting quotation request (if complex part)

OPTION 2 (quotation request)



End customer interface: Submitting quotation request (if complex part)

OPTION 2 (quotation request)

CLOUD MANUFACTURING

CONCEPT

Valeria Boldosova
Customer

Dashboard
New quotation
Quotations & Orders
Status tracking
Messages

QUOTATION REQUEST

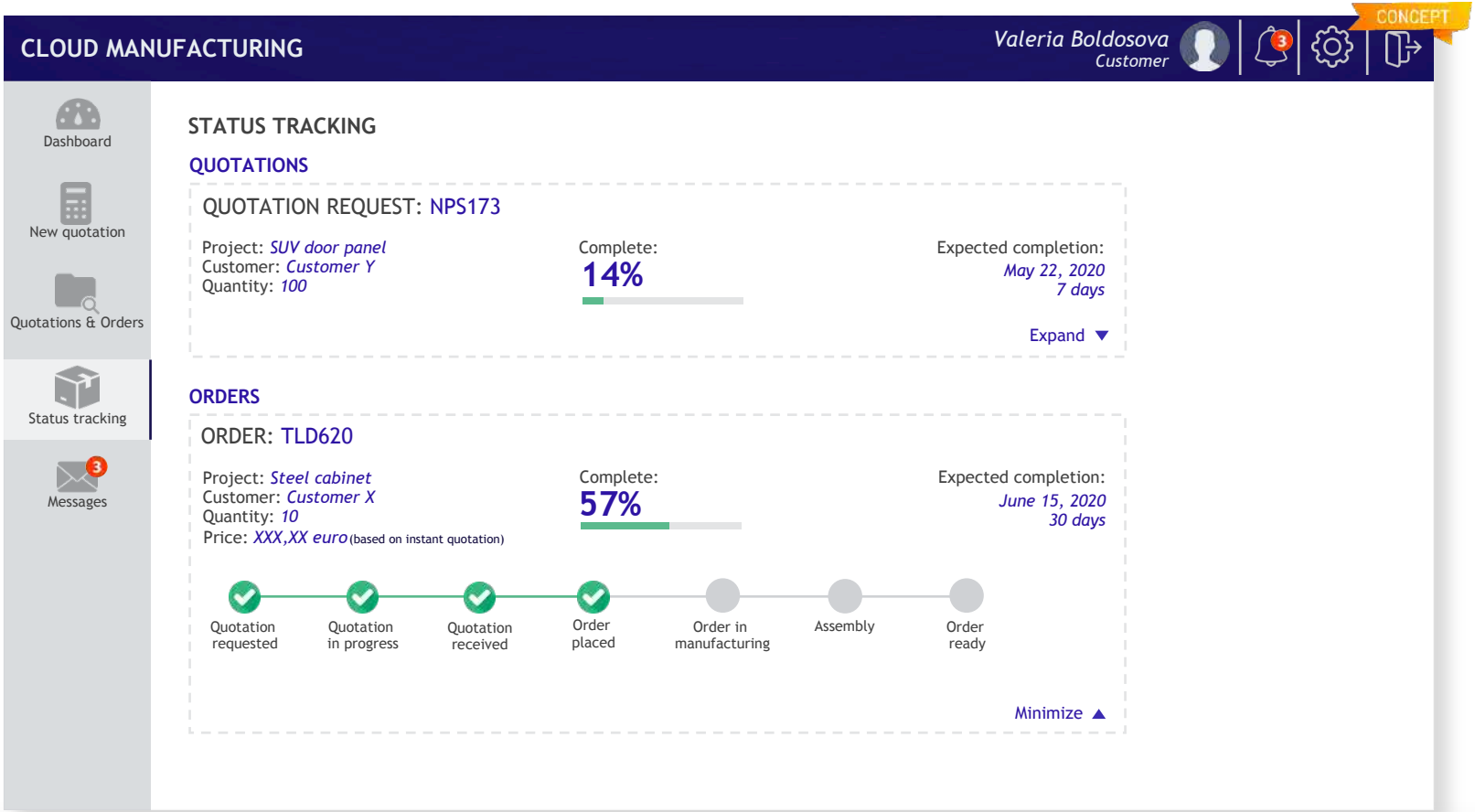
Project name: *SUV door panel*
Customer name: *Customer Y*

PRODUCT FEATURES & EXTRA SERVICES

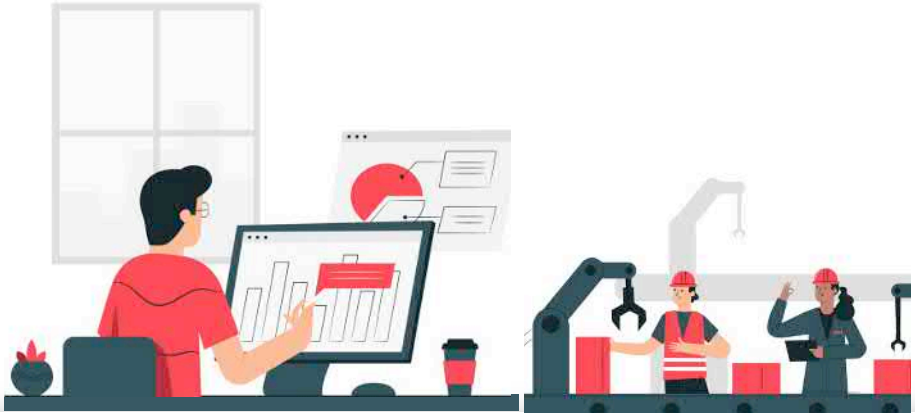
Name	Quantity	Size	Material	Preview		
Body 1	100	528.42mm × 407.42mm	Stainless steel		View details	Expand
Body 2	100	500.00mm × 199.14mm	Stainless steel		View details	Expand
Body 3	100	889.70mm × 379.99mm	Stainless steel		View details	Expand

CANCEL BACK REQUEST QUOTATION

End customer interface: Tracking status online

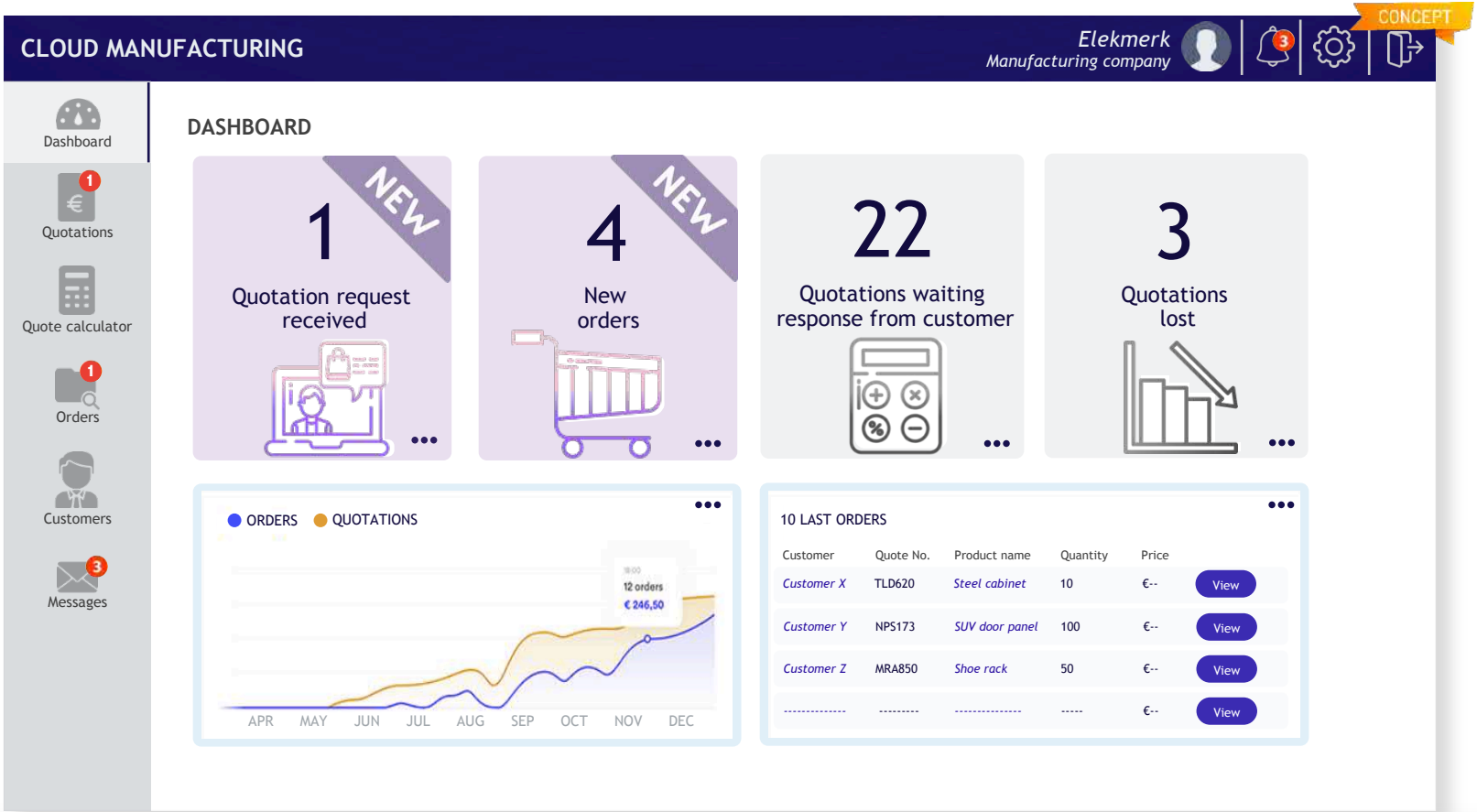


MANUFACTURING COMPANY
interface



Manufacturer interface: Landing page

Manufacturer interface: Dashboard



Manufacturer interface: Processing quotation request & informing the customer

OPTION 1 (online quotation request)

CLOUD MANUFACTURING

CONCEPT

Elekmerk
Manufacturing company

Dashboard
Quotations
Quote calculator
Orders
Customers
Messages

ONLINE QUOTATION REQUEST

Project name: *SUV door panel*
Customer name: *Customer Y*
Quotation number: *NPS173*

PRODUCT FEATURES & EXTRA SERVICES

Name	Quantity	Size	Material	Cutting time	Bending time	Material usage	Preview	Price	
Body 1	100	528.42mm × 407.42mm	Stainless steel	1m, 33s	2m, 27s	2 sheets		x,xx euro	Edit
Welding								x,xx euro	Edit
Painting								x,xx euro	Edit
Special packaging								x,xx euro	Edit
									Minimize ▲
Body 2	100	500.00mm × 199.14mm	Stainless steel	1m, 46s	2m, 12s	2 sheets		x,xx euro	Edit Expand ▼
Body 3	100	889.70mm × 379.99mm	Stainless steel	1m, 26s	3m, 27s	4 sheets		x,xx euro	Edit Expand ▼

Open in CAD/CAM

DELIVERY TIME

dd.mm.yyyy | Open production calendar

IN TOTAL Refresh

Estimated cost of production: xxx,xx euro
Selling price (+10% margin): xxx,xx euro

CANCEL | BACK | CONFIRM & SEND TO CUSTOMER

Manufacturer interface: Manually uploading sheet metal part design

OPTION 2 (no cloud connection with customer)

CLOUD MANUFACTURING

CONCEPT

Elekmerk
Manufacturing company

Dashboard
Quotations
Quote calculator
Orders
Customers
Messages

QUOTATION CALCULATOR

Project name:
Shoe rack
New project

Customer name:
Customer Z
New customer

UPLOAD PART DESIGN

Drag & drop file here
(e.g. DXF, Inventor, SolidWorks, SolidEdge)

or

BROWSE FILES

ARCHIVE OF RECENTS QUOTATIONS

2 days ago:

1 week ago:

Select to modify

1 month ago:

CANCEL
SAVE AND CONTINUE

Manufacturer interface: AI pre-processing and extraction of part features

OPTION 2 (no cloud connection with customer)

CLOUD MANUFACTURING

CONCEPT

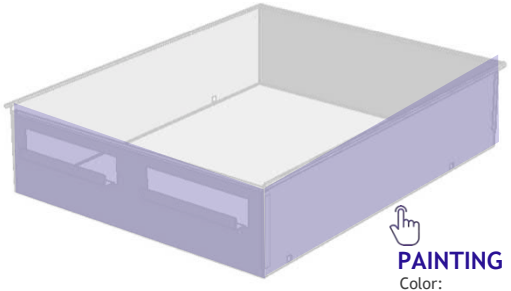
Elekmerk
Manufacturing company

Dashboard
Quotations
Quote calculator
Orders
Customers
Messages

PART CONFIGURATOR

Add CUTTING
Add BENDING
Add PUNCHING
Add LASER MARKING
Add WELDING
Add PAINTING
Add SILK COATING
Add SPECIAL PACKAGING
Add ASSEMBLY
OTHER

Auto feature recognition
3D
Flatten



PAINTING

Color:

Thickness:

Additional comment

PART FEATURES

- Cut
- Bend
  - 4 mm holes — Edit
  - 2 mm holes — Edit
- Punch
- Laser marking
- Welding
- Painting
- Silk coating
- Material
  - Stainless steel DC6 — Edit
- Dimensions
  - Variable X=150 — Edit
  - Variable Y=100 — Edit
  - Variable H=40 — Edit

Refresh

CANCEL BACK SAVE AND CONTINUE

Manufacturer interface: Generating instant quotation

OPTION 2 (no cloud connection with customer)

CLOUD MANUFACTURING

CONCEPT

Elekmerk
Manufacturing company

Dashboard
Quotations
Quote calculator
Orders
Customers
Messages

QUOTATION CALCULATOR

Project name: *Shoe rack*
Customer name: *Customer Z*
Quotation number: *MRA850*

PRODUCT FEATURES & EXTRA SERVICES

Name	Quantity	Size	Material	Cutting time	Bending time	Material usage	Preview	Price	
Body 1	50	528.42mm × 407.42mm	Stainless steel	1m, 33s	2m, 27s	2 sheets		x,xx euro	Edit
Welding								x,xx euro	Edit
Painting								x,xx euro	Edit
Special packaging								x,xx euro	Edit
									Minimize ▲
Body 2	50	500.00mm × 199.14mm	Stainless steel	1m, 46s	2m, 12s	2 sheets		x,xx euro	Edit Expand ▼
Body 3	50	889.70mm × 379.99mm	Stainless steel	1m, 26s	3m, 27s	4 sheets		x,xx euro	Edit Expand ▼

Open in CAD/CAM

DELIVERY TIME

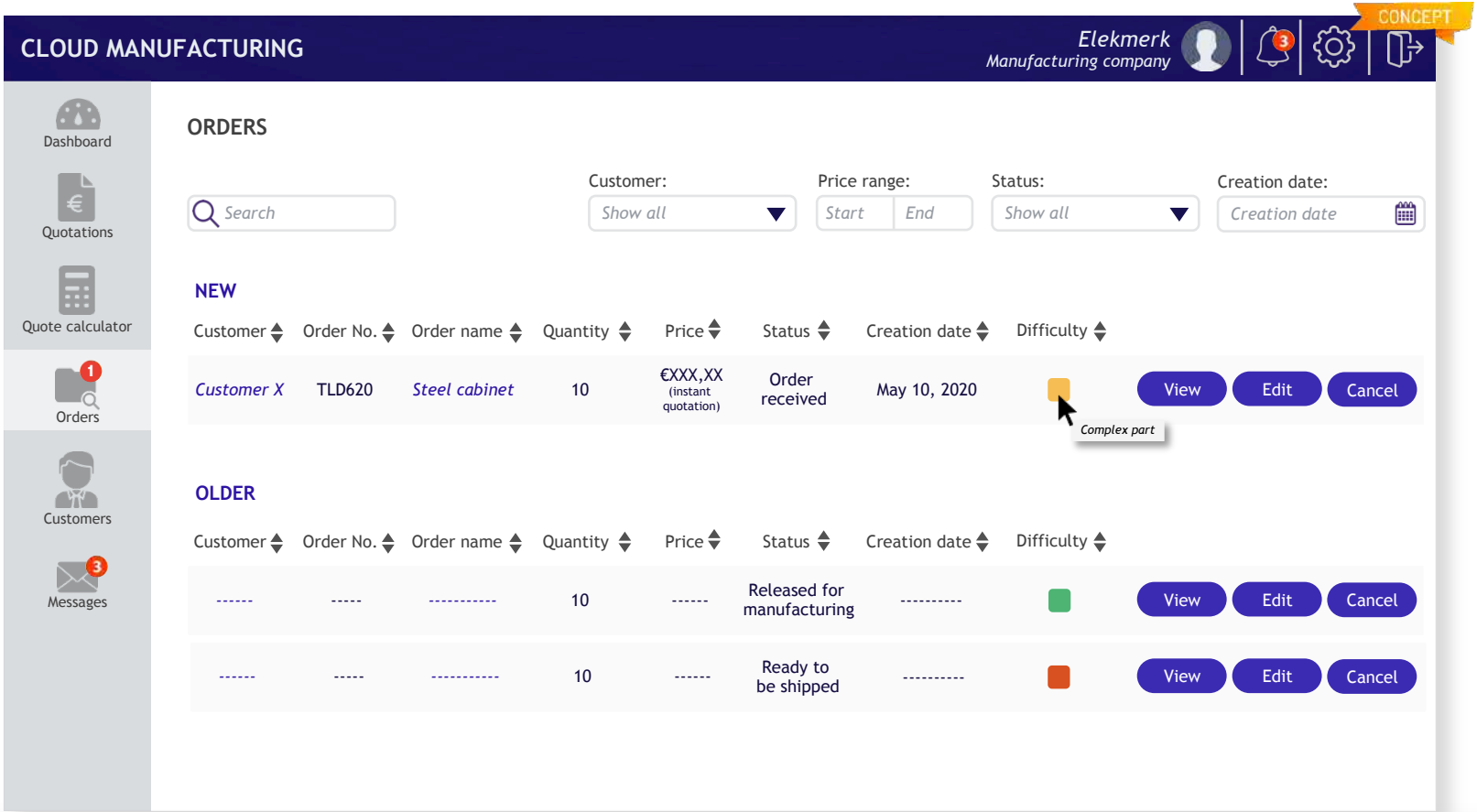
dd.mm.yyyy Open production calendar

IN TOTAL Refresh

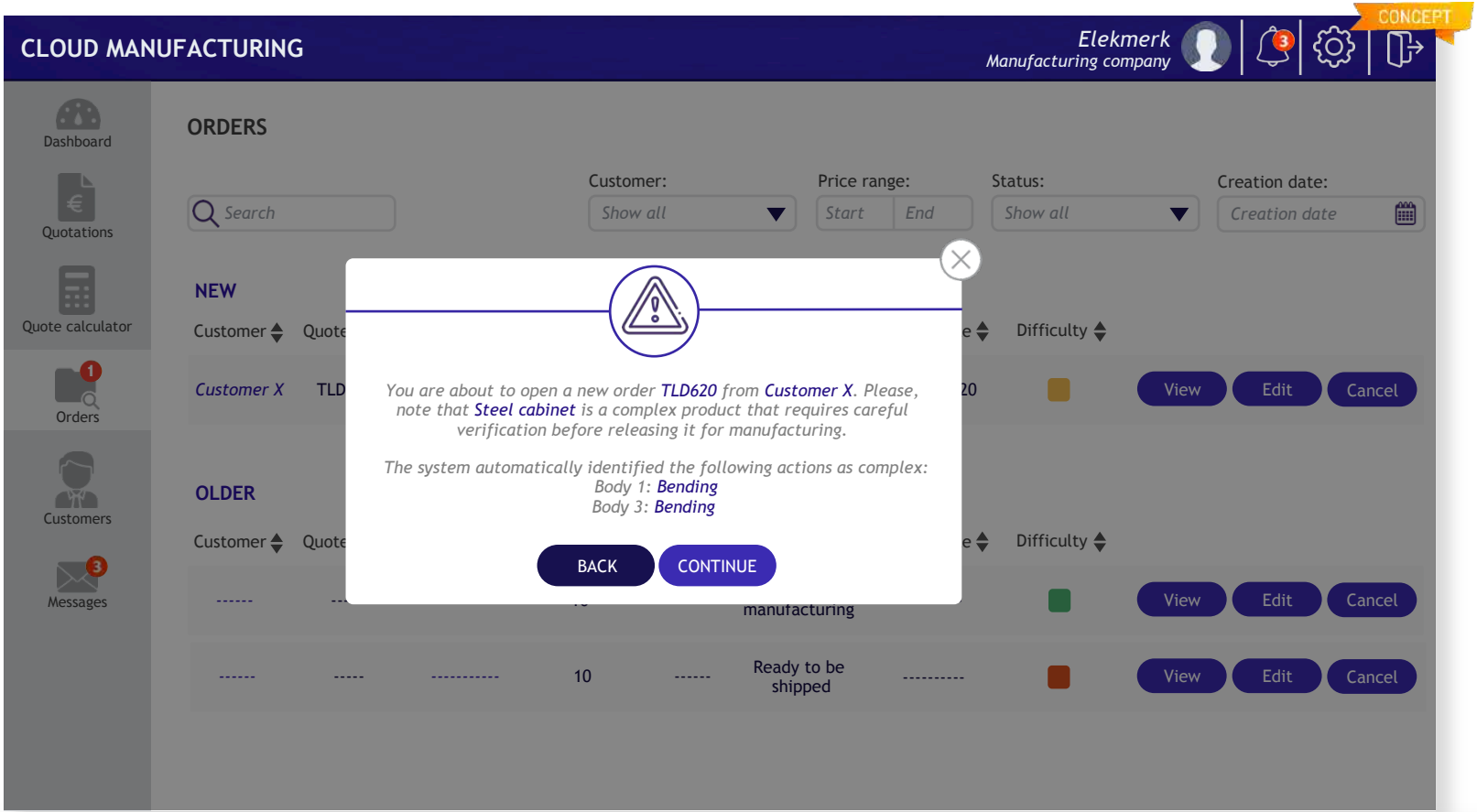
Estimated cost of production: xxx,xx euro
Selling price (+10% margin): xxx,xx euro

CANCEL BACK DOWNLOAD PDF

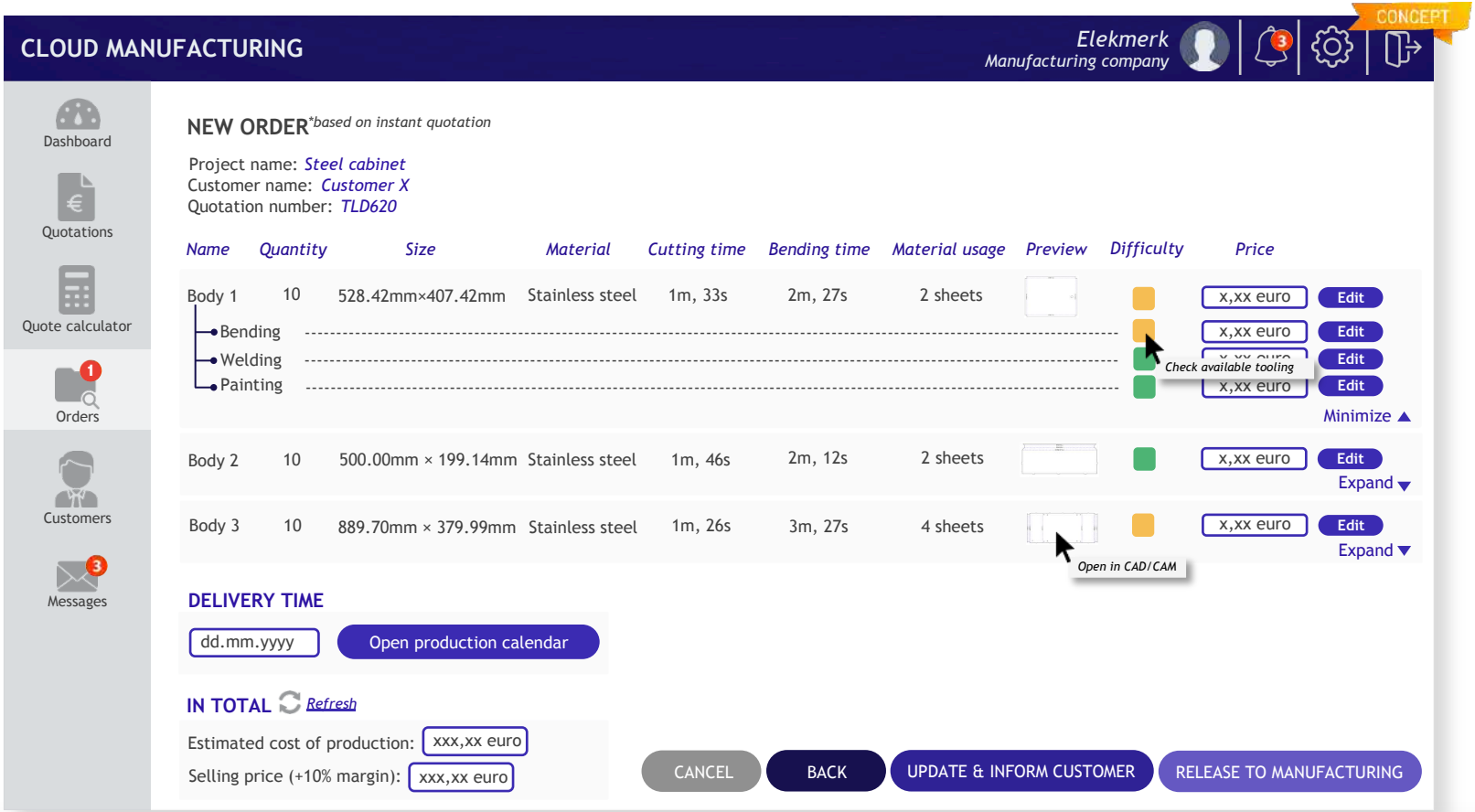
Manufacturer interface: AI guiding the user



Manufacturer interface: AI guiding the user



Manufacturer interface: New order processing & releasing to manufacturing



Benefits for sheet metal processing companies (e.g. Elekmerk/HT Laser)

1

Automated and digitized manual production operations

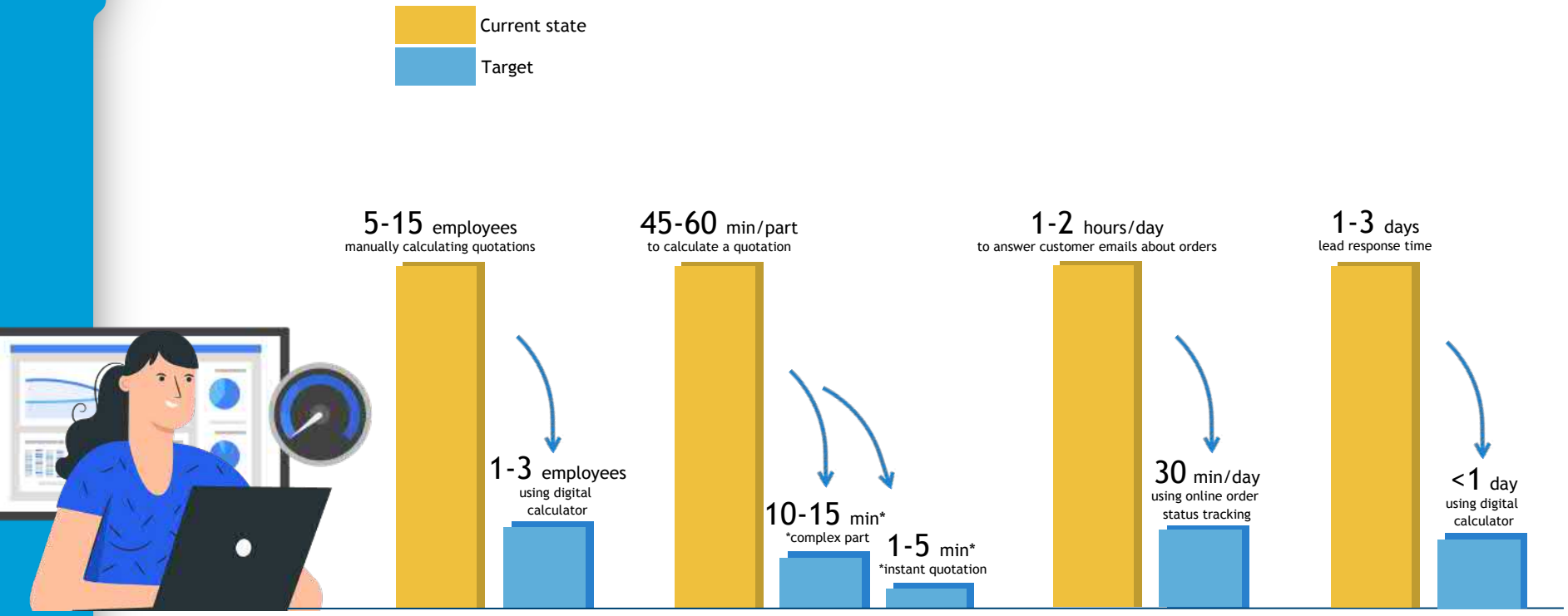
2

Less manual work and less human mistakes in order handling

3

Internal cost/time savings with new digital price calculation and digital order placing

Time and cost savings with Cloud Manufacturing platform



Benefits for end customers

2

Online ordering of parts in different formats
(2D DXF/3D models, files imported from PDM/ERP)

3

Less waiting time with
instant price quotation

1

Easy-to-use online CAD/CAM instead
of hand-drawn part designs

4

Improved traceability with order
status and tracking online

Integration of Cloud Manufacturing platform into daily work

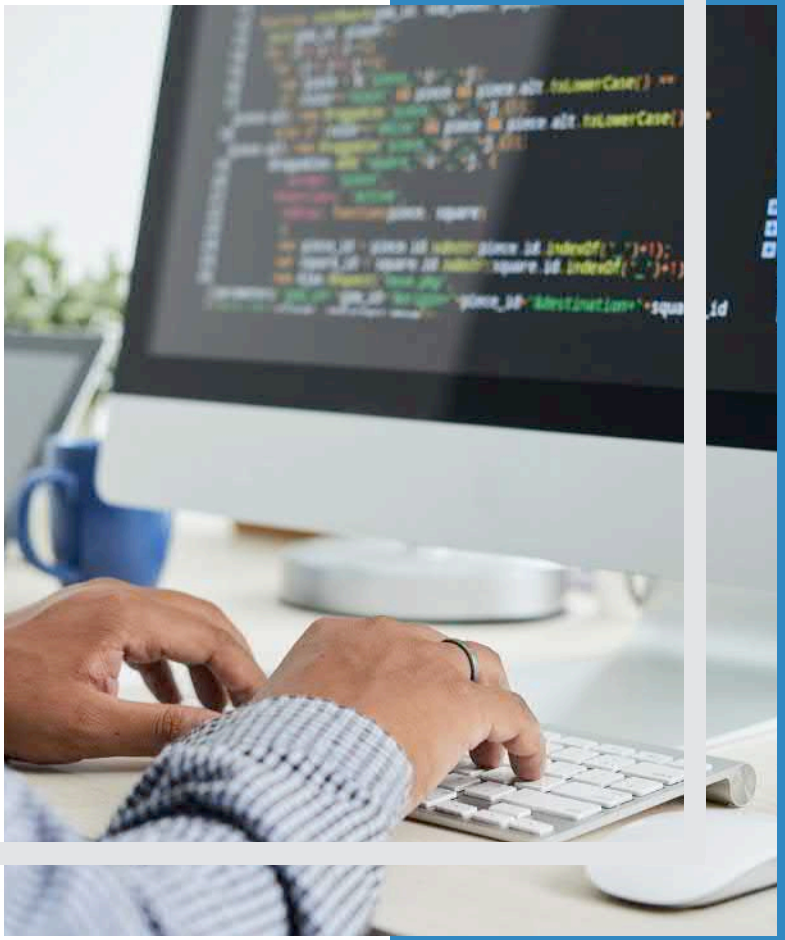
PHASE 1: ADVISOR

AI assists humans in calculating quotations

PHASE 2: AUTONOMOUS

AI calculates quotations autonomously without human supervision

CLOUD MANUFACTURING PLATFORM:
PRACTICAL IMPLEMENTATION



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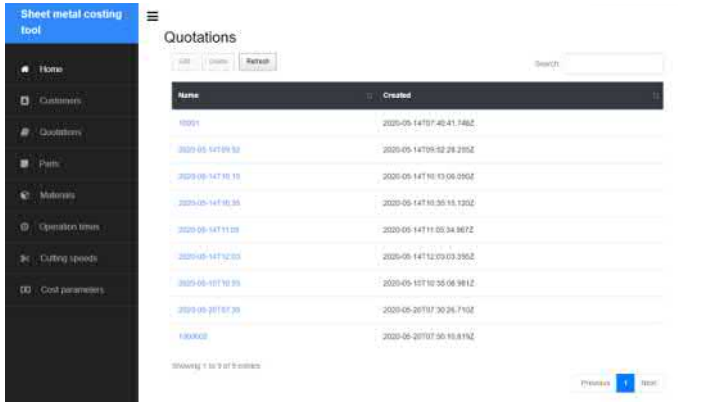
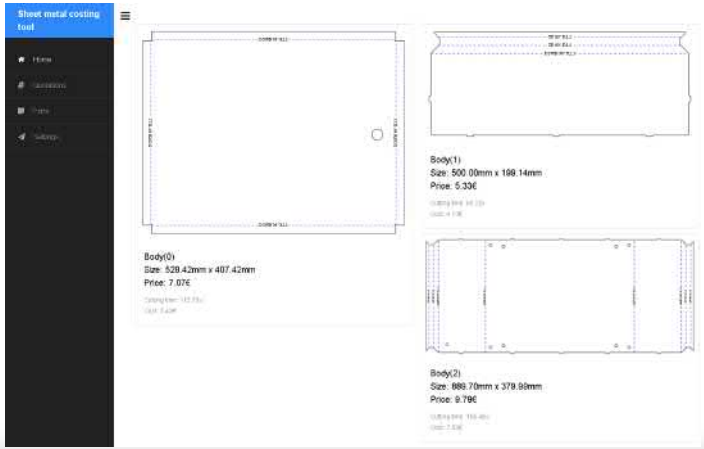
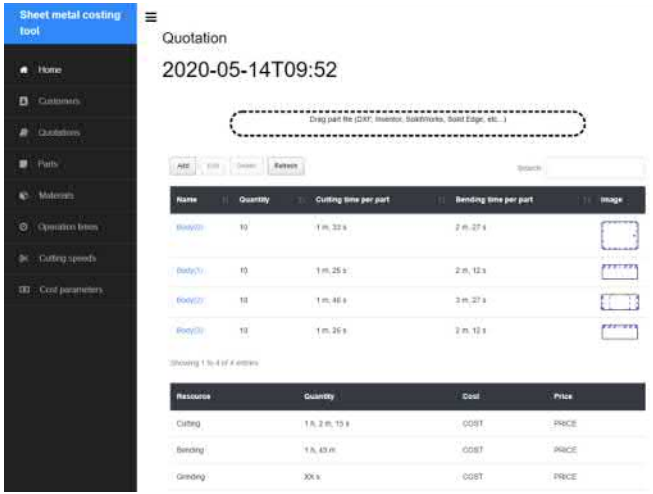
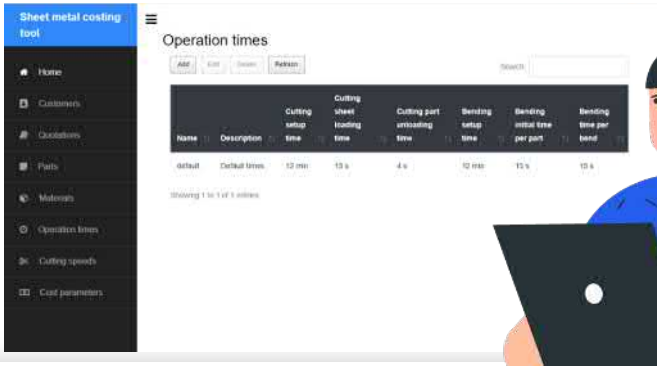
Digital cost calculation: Proof of concept

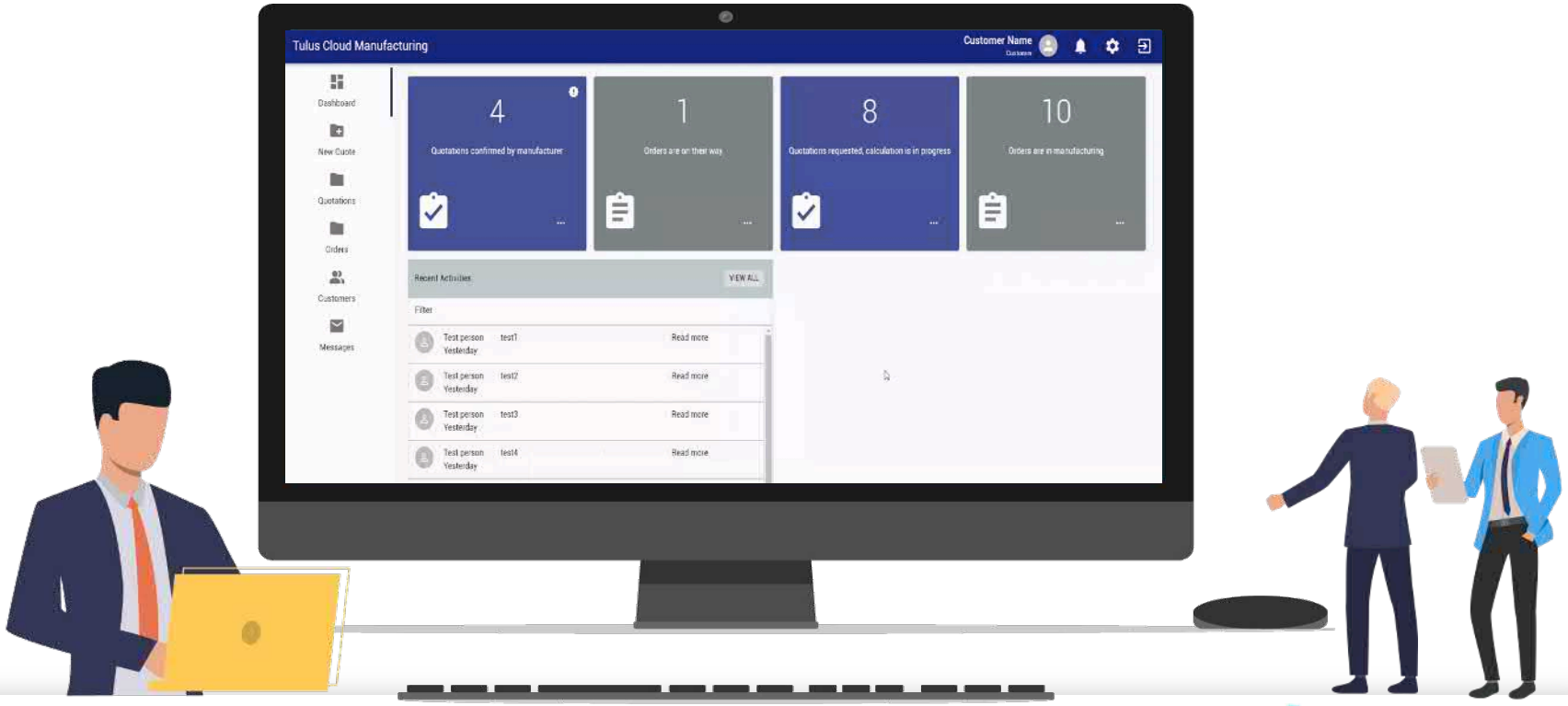




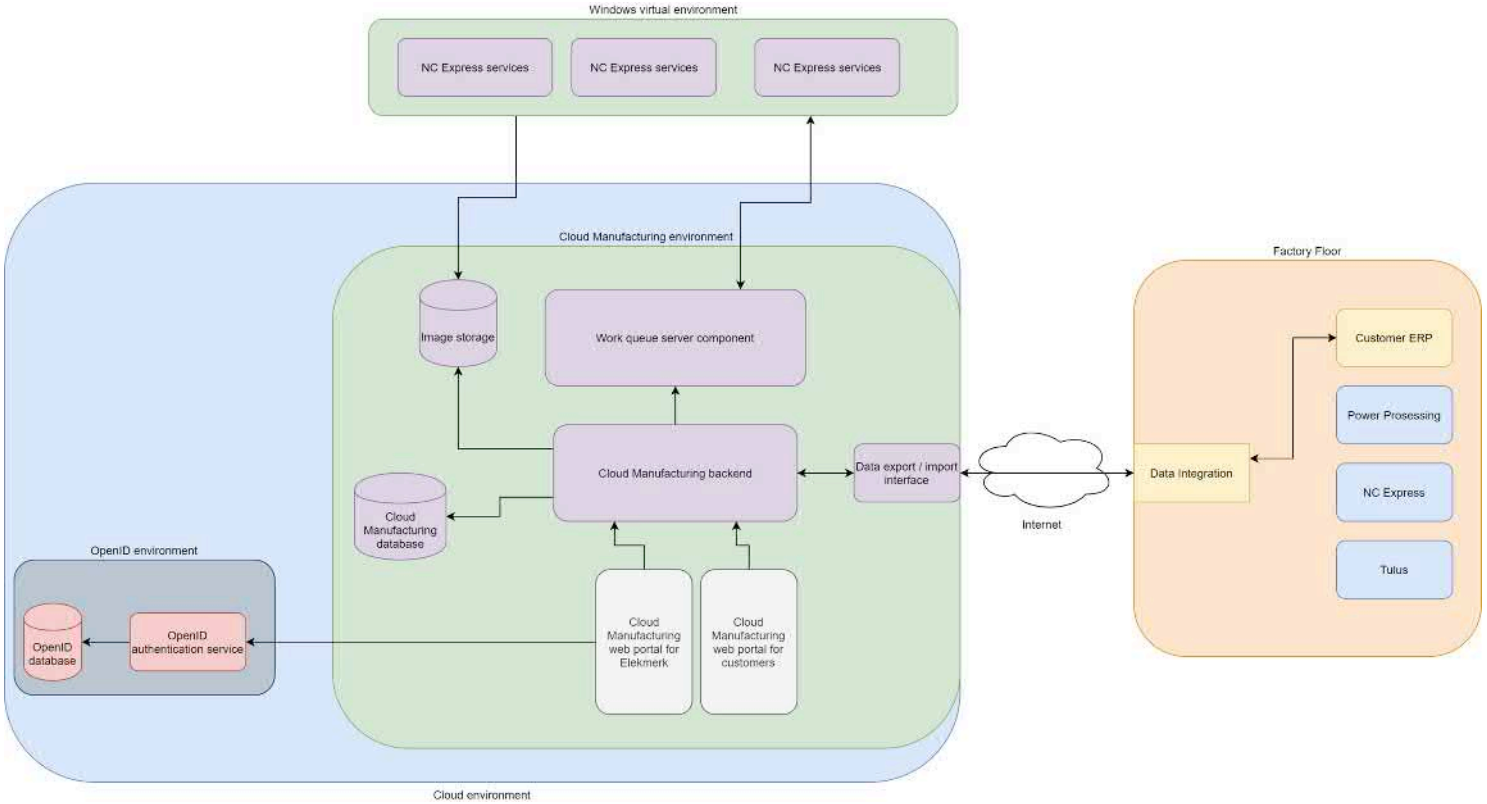




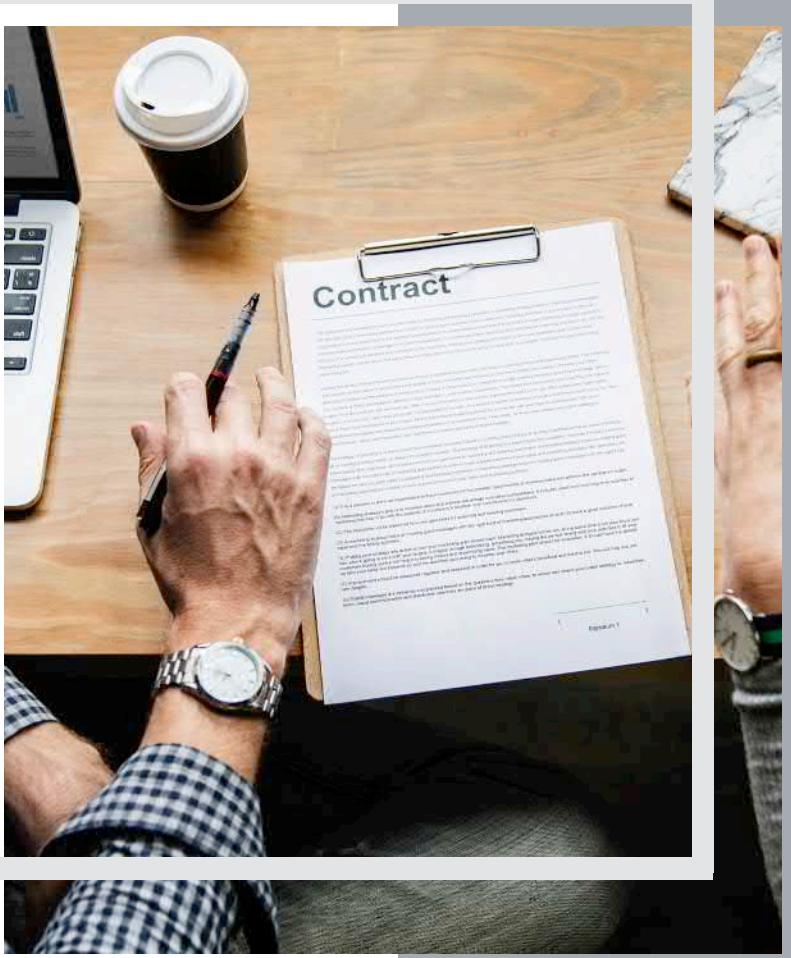
Cloud Manufacturing platform: Proof of concept, work in progress (Jubic)



Technical architecture, backend & user management (Jubic)



ONGOING ACTIVITIES:
LEGAL ISSUES & DATA PRIVACY
(COLLABORATION WITH UVA)



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Data privacy & ownership, IPR, legal contracts

What kind of legal aspects Prima Power should take into account when providing software as a service, desktop software to customers?

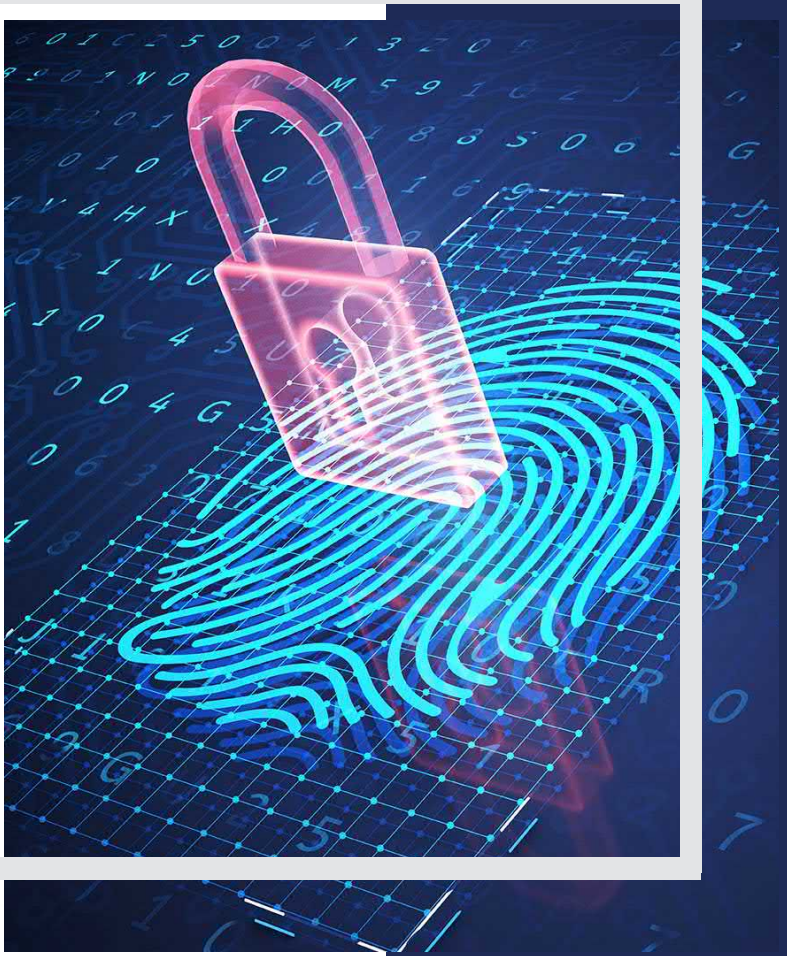
What are legal consequences if someone hacks Cloud Manufacturing portal and obtains customer data?

What should be included in legal contracts?
(1) A template between Prima Power and customers;
(2) A template for Prima Power customers and end users.

What is the role of international standards and International Data Spaces (IDS) Association?

Who owns data?

ONGOING ACTIVITIES:
CYBERSECURITY
(COLLABORATION WITH JYU)



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Cybersecurity, risk mitigation

What are the needs?

- The number of cyber attacks is continuously increasing
- Learn how to protect Prima Power Cloud Manufacturing Platform (hardware, software & data) from cyber attacks

Main focus areas in InDEx project:

- Cloud security, connection from local VPN to the cloud, factory network security
- Risk assessment
- Measures to address cybersecurity risks

Learning/competence development methods:

- Onsite workshops
- Participation in JYU courses

Industrial Data Excellence project: Prima Power case

SOFTWARE PROVIDER

Jubic

Practical implementation of Cloud Manufacturing platform

Technical architecture, back end and user management

MANUFACTURING COMPANIES

Prima Power

Collecting industrial requirements and specifications for AI-assisted order-delivery process

Developing Cloud Manufacturing platform: digital order placement, digital price calculator etc.

elekmerk

Pilot customer: providing sheet metal processing environment for testing Cloud Manufacturing platform

Collecting feedback from factory and office workers on the Cloud Manufacturing platform

UNIVERSITIES

Vaasan yliopisto

Jyväskylän yliopisto

Legal contracts, IPR, data ownership (UVA)

Cybersecurity, risk management (JYU)

ALL IN ONE
THE ONLY ONE

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