The Multidisciplinary Engineering Collaboration Hub at ANDRITZ

Bettina Klemke
Project Manager

Christian Gartner
Solution Architect
Legal Disclaimers

Safe Harbour

We may make statements regarding planned or future development efforts for our existing or new products and services. These statements are not intended to be a promise or guarantee of future availability of products, services or features but merely reflect our current plans and based on factors currently known to us. These planned and future development efforts may change without notice. Purchasing decisions should not be made based upon reliance on these statements.

These statements are being made as of October 26, 2020 and we assume no obligation to update these forward-looking statements to reflect events that occur or circumstances that exist or change after the date on which they were made. If this presentation is reviewed after October 26, 2020 these statements may no longer contain current or accurate information.

LEGAL DISCLAIMER

© ANDRITZ AG 2020

This presentation contains valuable, proprietary property belonging to ANDRITZ AG or its affiliates (“the ANDRITZ GROUP”), and no licenses or other intellectual property rights are granted herein, nor shall the contents of this presentation form part of any sales contracts which may be concluded between the ANDRITZ GROUP companies and purchasers of any equipment and/or systems referenced herein. Please be aware that ANDRITZ GROUP actively and aggressively enforces its intellectual property rights to the fullest extent of applicable law. Any information contained herein (other than publicly available information) shall not be disclosed or reproduced, in whole or in part, electronically or in hard copy, to third parties. No information contained herein shall be used in any way either commercially or for any purpose other than internal viewing, reading, or evaluation of its contents by recipient and the ANDRITZ GROUP disclaims all liability arising from recipient’s use or reliance upon such information. Title to and all intellectual property rights embodied in this presentation, and all information contained therein, is and shall remain with the ANDRITZ GROUP. None of the information contained herein shall be construed as legal, tax, or investment advice, and private counsel, accountants, or other professional advisers should be consulted and relied upon for any such advice.

All copyrightable text and graphics, the selection, arrangement, and presentation of all materials, and the overall design of this presentation are © ANDRITZ GROUP 2020. All rights reserved. No part of this information or materials may be reproduced, retransmitted, displayed, distributed, or modified without the prior written approval of Owner. All trademarks and other names, logos, and icons identifying Owner’s goods and services are proprietary marks belonging to the ANDRITZ GROUP. If recipient is in doubt whether permission is needed for any type of use of the contents of this presentation, please contact the ANDRITZ GROUP at welcome@andritz.com.
Bettina Klemke

Project Manager Smart Service

Bettina has been working as project manager in the global IT department at ANDRITZ AG since 2018. She has 6 years experience in managing software implementation projects in the machinery and plant engineering industry. Currently she is leading the development and implementation of a global collaboration platform on engineering and project information.
Christian Gartner

Solution Architect Smart Service

Christian has been working at Andritz since 2010. He has more than 10 years experience in software development based on Autodesk products. In his current role he is responsible for the architecture within Smart Service and work closely with the various project teams.
Agenda
Agenda

• ANDRITZ Group

• Metris - ANDRITZ Digital Solutions

• ANDRITZ projects and solutions

• Lessons Learned
THE ANDRITZ GROUP

ANDRITZ is a globally leading supplier of plants, equipment, systems and services for the pulp and paper industry, the metalworking and steel industries, hydropower stations, pumps, and solid/liquid separation in the municipal and industrial sectors as well as for animal feed and biomass pelleting

Global presence
Headquarters in Graz, Austria; over 280 production sites and service/sales companies worldwide

KEY FINANCIAL FIGURES:

<table>
<thead>
<tr>
<th>UNIT</th>
<th>H1 2020</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order intake</td>
<td>MEUR</td>
<td>3,036.7</td>
</tr>
<tr>
<td>Order backlog (as of end of period)</td>
<td>MEUR</td>
<td>7,396.6</td>
</tr>
<tr>
<td>Sales</td>
<td>MEUR</td>
<td>3,173.0</td>
</tr>
<tr>
<td>Net income (including non-controlling interests)</td>
<td>MEUR</td>
<td>83.3</td>
</tr>
<tr>
<td>Employees (as of end of period; without apprentices)</td>
<td>-</td>
<td>27,828</td>
</tr>
</tbody>
</table>

SALES BY REGION 2019 (%)
- Europe & North America: 56%
- Emerging markets: 44%

6,673.9 MEUR
A WORLD MARKET LEADER
WITH FOUR BUSINESS AREAS

PRODUCT OFFERING

PULP & PAPER
Equipment for production of all types of pulp, paper, tissue, and board; energy boilers

METALS
Presses/press lines for metal forming (Schuler); systems for production of stainless steel, carbon steel, and non-ferrous metal strip; industrial furnace plants

HYDRO
Electromechanical equipment for hydropower plants (turbines, generators); pumps; turbo generators

SEPARATION
Equipment for solid/liquid separation for municipalities and various industries; equipment for production of animal feed and biomass pellets

* Share of total Group order intake 2019
Metris
ANDRITZ Digital Solutions
With the **technology brand Metris**, ANDRITZ offers a broad portfolio of intelligent, digital solutions and products.

Metris technologies are tailored to the customer needs and optimize industrial procedures and processes.
METRIS DIGITALIZATION LANDSCAPE

TECHNOLOGIES
- Smart Sensors
- Big Data
  - Machine Learning
  - Artificial Intelligence
- Augmented and Virtual Reality
  - Simulation
- Condition Monitoring
- Smart Service

SERVICES
- Process Optimization

ENABLERS
- Secure Cloud
- Edge Systems
- Artificial Knowledge Base

ANDRITZ AG / AUTODESK UNIVERSITY 2020 / © ANDRITZ GROUP
**METRIS SMART SERVICE**

**Metris Smart Service** enables digital solutions to support various business processes by increasing the efficiency and benefit along the lifecycles in a digital way. Target is to exploit and explore convenient digital tools for our business areas and finally end-customers. The **connected, intelligent software solutions** support, simplify and optimize – internal and external – workflows and communication.

- **Engineering-Construction-Service Platform**
- **Metris Spare Parts Catalog**
- **Metris Digital Plant Documentation**
- **Metris Remote Assistance**
- **Field Service Management**
- **Metris Customer Care Portal**

Come and visit us! smart.service@andritz.com
ECS PLATFORM

Engineering -
Construction -
Service
INITIAL SITUATION & TARGETS

**Search** for latest engineering documents and data is **time consuming** for the whole value chain.

**High effort** for Service in collecting **as-built information**.

**No full transparency** of design change process.

Back-offices do **not get the info** they need to receive.

**Missing link** between construction site and back-office.

Enable **central access** the **latest information**.

Enhanced **collaboration** during engineering phase.

Enable **time efficient** processes.

Provide **reliable and transparent** information.

Enable **time efficient** processes.

Make the life for our **people at site** easier.
We provide **one integrated platform for seamless end-to-end processes**

We **digitalize** our **project lifecycle** to have **reliable, transparent information** at our fingertips, to enable **better cost, quality, and time efficient processes** for our ANDRITZ ecosystem.
PULP & PAPER DIGITALIZATION – TARGET ARCHITECTURE

Customer Front End & Experience

ANDRITZ Employee Front End & Experience

Backend System Infrastructure

Integration Layer

Data & Document Archive – Enterprise DMS

Engineering Data & Docs: Autodesk BIM360

Project Communication (MS Teams)

Metriz Customer Care portal

Cloud

Engineering → Procurement → Logistics → Site Installation → Commissioning & Start-up → Service

ERP

PLM

Other sources

CRM

ERP

PLM
ENGINEERING-CONSTRUCTION-SERVICE PLATFORM REQUIREMENTS

**DEVELOPMENT OF DEVIATIONS**
- Recording of any deviations (e.g. RFIs)
- Creation of NCRs & FWOs
- Cost controlling
- Solid data base for claims

**MOBILITY**
- Access latest engineering documentation on a mobile device
- Offline access to engineering data

**GET BIM READY**
- Digital twin
- Legal requirements
- Way to only extract relevant information

**DATA & DOCUMENT MANAGEMENT**
- Fast and reliable access to latest data and documents relevant
- Status info along the value chain

**Project Data & Document Management Layer**
- One source of truth
- Sustainable & searchable storage of information

**SITE REPORTING**
- Daily logs
- Summary reports
- Inspections
- Site project dashboard

**HEALTH, SAFETY AND ENVIRONMENT**
- Accident/Incident Reports
- HSE Statistics
- HSE Audits

**COLLABORATION**
- Share information with defined persons
- Integrated communication cycles linked to objects
- Red-lining/markups/comments
- Alerts on documentation changes
- Collaboration with external engineering

**ENGINEERING**
- Procurement
- Logistics
- Site Installation
- Commissioning & Start-up
- Service

- ECS
PROJECT TIMELINE

REQUIREMENTS DEF. AND TOOL EVALUATION
- June 2020
The platform concept has been defined based on business requirements along the value chain with focus on:

PILOT
July – December 2020
Five BIM360 pilots are currently in progress globally at Pulp&Paper with focus on:
- Engineering collaboration
- Design deviation process at site

IMPLEMENTATION OF PILOT SCOPE
2021
The functionalities that have been part of the pilots will further be adapted and implemented.

SCOPE EXPANSION
2021 onwards
Additional functionalities of BIM360 would be evaluated against ANDRITZ Pulp&Paper requirements, piloted and implemented.
MAIN BIM360 PILOT PROJECT

FACTS

ANDRITZ project

• New brownfield pulp line in South America
• ANDRITZ will provide four of the six most important process islands in the pulp mill
• Scope of supply on EPCC (Engineering, Procurement, Construction and Civil Construction) basis
• Latest designs in a “new generation pulp mill” to incorporate a bio-refinery concept for energy-efficient and environmentally friendly pulp production
• Currently in installation phase; Start up scheduled for 2021

BIM360 pilot

• September – December 2020
• One process island
• Currently about 30 users
• More than 7000 documents
• Site: Management and Supervisors
• Engineering: Project Engineering Management, Product Management, Engineers
BIM360 PILOT SCOPE

September – December 2020

Perform red-lining on engineering documents, create design deviations and perform workflow to responsible engineers.

Easy and central access to relevant engineering documents.

Functionalities are tested on mobile devices and offline.
<table>
<thead>
<tr>
<th>Name</th>
<th>Version</th>
<th>Size</th>
<th>Last updated</th>
<th>Updated by</th>
<th>Markup</th>
<th>Issue</th>
<th>Approval status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering and Design</td>
<td>--</td>
<td>--</td>
<td>Oct 26, 2020 12:15 PM</td>
<td>Christian Gartner</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>ID</td>
<td>Type</td>
<td>Sub-type</td>
<td>Title</td>
<td>Location</td>
<td>Assigned to</td>
<td>Company</td>
<td>Due date</td>
</tr>
<tr>
<td>----</td>
<td>----------</td>
<td>----------------</td>
<td>-----------------------------------</td>
<td>------------------</td>
<td>----------------------------------</td>
<td>----------------</td>
<td>------------------</td>
</tr>
<tr>
<td>15</td>
<td>Design</td>
<td>Design</td>
<td>2 holes are missing</td>
<td>111_Furnace Up...</td>
<td>Christian Gartner (outlook)</td>
<td>Andritz AG</td>
<td>Nov 26, 2020</td>
</tr>
<tr>
<td>14</td>
<td>Design</td>
<td>Client Feedback</td>
<td>test Issue type</td>
<td>-</td>
<td>Antonio Bosnjak</td>
<td>Andritz AG</td>
<td>-</td>
</tr>
<tr>
<td>13</td>
<td>Design</td>
<td>Client Feedback</td>
<td>new process workflow</td>
<td>-</td>
<td>Patrick Rodziewicz</td>
<td>Andritz AG</td>
<td>Oct 17, 2020</td>
</tr>
<tr>
<td>12</td>
<td>Design</td>
<td>Design</td>
<td>Potential design change</td>
<td>-</td>
<td>Patrick Rodziewicz</td>
<td>Andritz AG</td>
<td>Oct 6, 2020</td>
</tr>
<tr>
<td>11</td>
<td>Design</td>
<td>Design</td>
<td>Potential design deviation</td>
<td>102_Water Drum</td>
<td>Patrick Rodziewicz</td>
<td>Andritz AG</td>
<td>Oct 9, 2020</td>
</tr>
<tr>
<td>9</td>
<td>Design</td>
<td>Design</td>
<td>Describe the issue in section</td>
<td>-</td>
<td>Antonio Bosnjak</td>
<td>Andritz AG</td>
<td>-</td>
</tr>
<tr>
<td>7</td>
<td>Design</td>
<td>Design</td>
<td>Potential design change</td>
<td>102_Water Drum</td>
<td>Patrick Rodziewicz</td>
<td>Andritz AG</td>
<td>Sep 28, 2020</td>
</tr>
<tr>
<td>6</td>
<td>Design</td>
<td>Design</td>
<td>Update Drawing Notification</td>
<td>-</td>
<td>Antonio Bosnjak</td>
<td>Andritz AG</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>Design</td>
<td>Design</td>
<td>Needs redesign</td>
<td>204_Boll...</td>
<td>Antonio Bosnjak</td>
<td>Andritz AG</td>
<td>Sep 23, 2020</td>
</tr>
</tbody>
</table>
Digital Plant Documentation
Product Vision

• **Linking 3D and 2D engineering data**
  Enabled the link between objects/parts in 3D and 2D – visualizing their connections and interoperability

• **Central access to all relevant engineering metadata**
  All relevant metadata and object properties available with a button click

• **Color coded views**
  Filtering by specific object properties visualizes and focuses the model with color codes

• **Documentation linkage to DMS - system**
  Linkage with relevant documentation from DMS system on a granular (object/part) level

Provide a **digital version of a plant** with all relevant information connected within **one application**

Usage scenarios
- as ANDRITZ branded **digital twin** for engineering documents
- as **final-customer documentation** instead of paper folders
- connect with **machine performance data**…. 
digitalplant.andritz.com
WHY AN OWN APPLICATION

ANDRITZ corporate branding

Extend BIM360 functionality

- Linking of 2D & 3D on object level in a single view
- Integration of other data sources (meta data, IoT)
- Theming: Apply color coded views on the 3d model
SOLUTION ARCHITECTURE

- Digital Plant app
  - Custom developed web app.
  - Stack: Angular / Node.

- BIM360
  - Storage of all engineering documents.
  - User & permission management.

- APDB
  - Contains all relevant meta data & document links.

- DMS
  - Enterprise document mgmt system.
Lessons Learned
Close collaboration with end users

Basis for success

- On boarding sessions with the users
- Trainings
- Weekly Q&A sessions
- Weekly alignment meeting with the site
Data management

Handling of data from different source systems

- Import files
- Import meta data

Folders & permissions

- Avoid too many nested folders
- Assign permissions to roles instead of users directly.
- Don’t allow users to edit files which are automatically uploaded.
Process definition

• There are mainly 2 ways for the definition of the digitally supported process:
  • Define the whole workflow and process first, then start.
  • Start with basic process and perform continuous adaptions. → this is OUR WAY
• Define streamlined processes as much as possible so that they fit for all stakeholders (e.g. site installation and service)
• Implement requirements of daily tasks first
• Define when which system should be used for which purpose (PDM/PLM <-> BIM 360 <-> Enterprise DMS)
Expected Benefits

• Time saved in searching for documents during the project lifecycle
• Early prevention of potential, costly errors by having real time project information easily accessible for stakeholder along the value chain
• Enhanced collaboration and reduced information transfer effort (ANDRITZ, supplier, customer)
• No engineering or installation errors due to not having the latest version available
• Workflow based deviation process increases efficiency and transparency
• Efficient and increased collaboration between construction site and engineering
• Increased transparency on project status and progress
THANK YOU FOR YOUR ATTENTION!

BETTINA KLEMKE
CHRISTIAN GARTNER