



Valmet

Valmet Industrial Internet

Industrial Internet offering for Board & Paper



Valmet

A meaningful dialogue with data brings tangible results

Valmet Industrial Internet



Dialogue with data:

- Combining process and business data from different mill or plant systems
- Leveraging advanced analytics and Valmet's know-how to create new data driven applications
- Providing applications for operator assistance and new set points for the automation system

Results

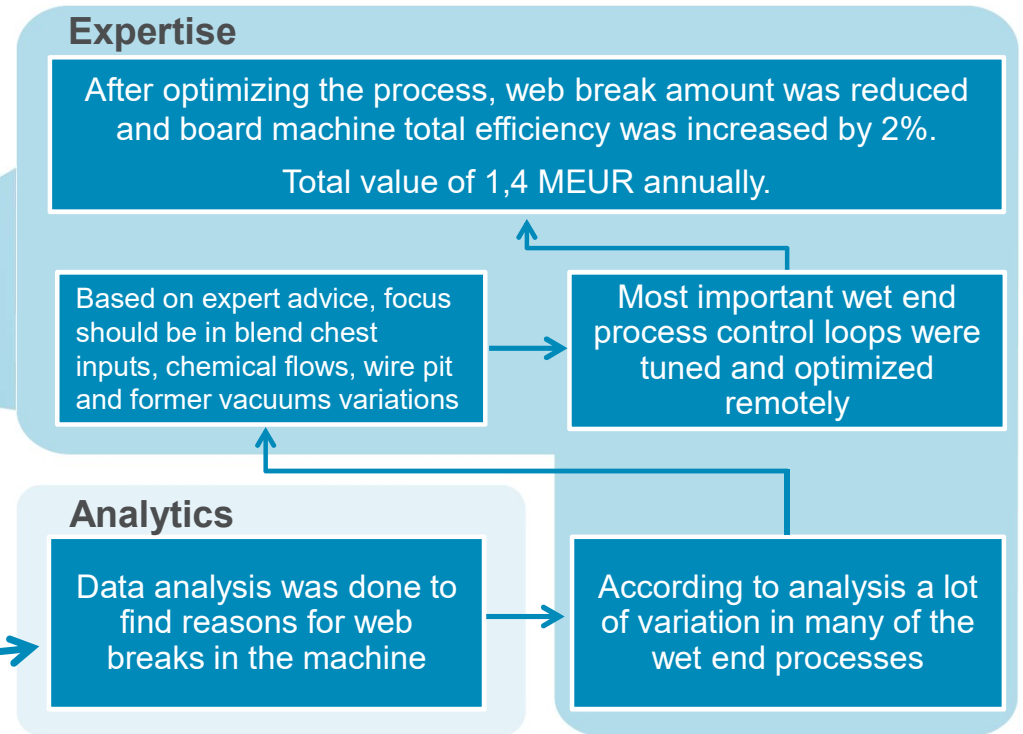
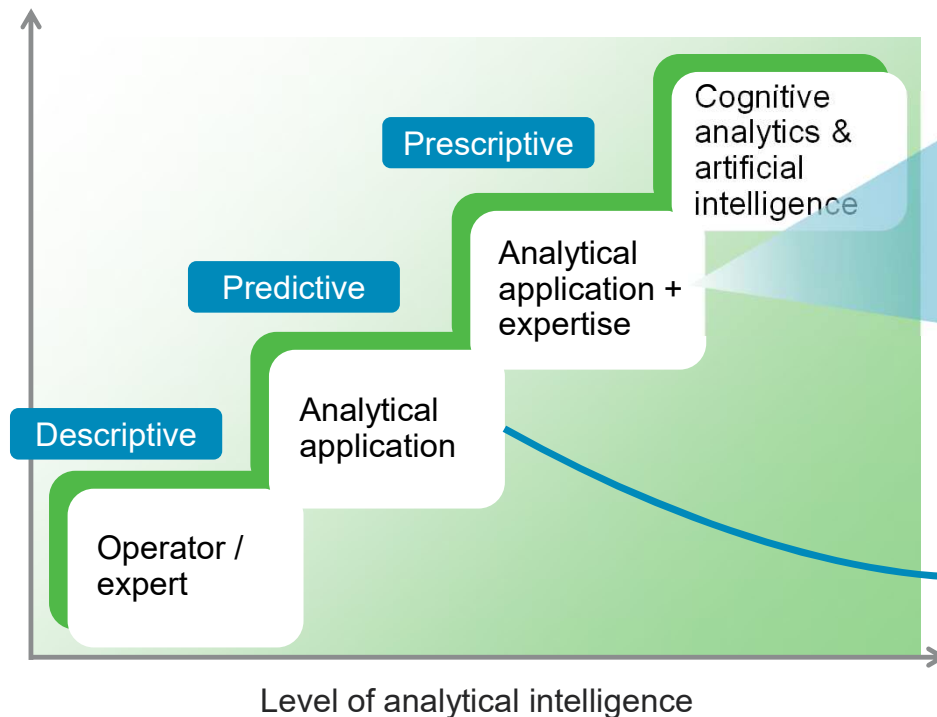
➤ Reduced raw material and energy cost

➤ Reduced downtime and unplanned stops

➤ Improved product quality

A meaningful dialogue with data based on analytics and expertise

Success of predicting and avoiding web breaks

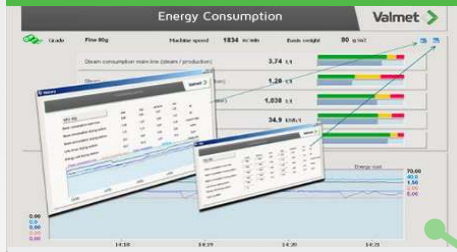


Example:

A board machine was suffering from web breaks and low efficiency

Valmet Industrial Internet - We empower our customers to move towards autonomous plants through data driven solutions and by collaborating across the value chain

Advanced applications



From analytical applications for reliability and performance to advanced process controls and information management

Valmet Performance Center



A virtual Valmet expert network providing remote support, monitoring and data analysis services

Valmet Customer Portal



A digital, personalized collaboration space and information channel.

Digitally enhanced, intelligent machines



A solid data source for Industrial Internet solutions and new digital services. Embedded intelligence for more autonomous operations.

Key Elements of the Industrial Internet



Solution ecosystem






Brings leading industry players and innovative start-ups together to co-create new value-adding services

Valmet Industrial Internet offering

Applications and services for board & paper producers






Advanced reporting and guidance

-  Process performance monitoring
-  Valmet Virtual Mill
-  On-site analysis & reporting

Asset reliability optimization

-  Paper Machine Diagnostics
-  MillTracer
-  Control loop performance monitoring
-  Condition monitoring remote analysis

Operations performance optimization

-  Real time quality prediction
-  Cost Monitoring & Optimization
-  Advanced process controls
For board and paper lines
-  Web break prediction
-  Dynamic centerline manager

Valmet Performance Center

-  Connectivity
-  On-demand expert support
-  Remote monitoring & optimization
-  Analytics as a service

Quality Prediction

Paper strength prediction combined with advanced process controls



Challenge: In the paper production process, there are still several quality variables, which can't be measured and controlled until the product is manufactured.

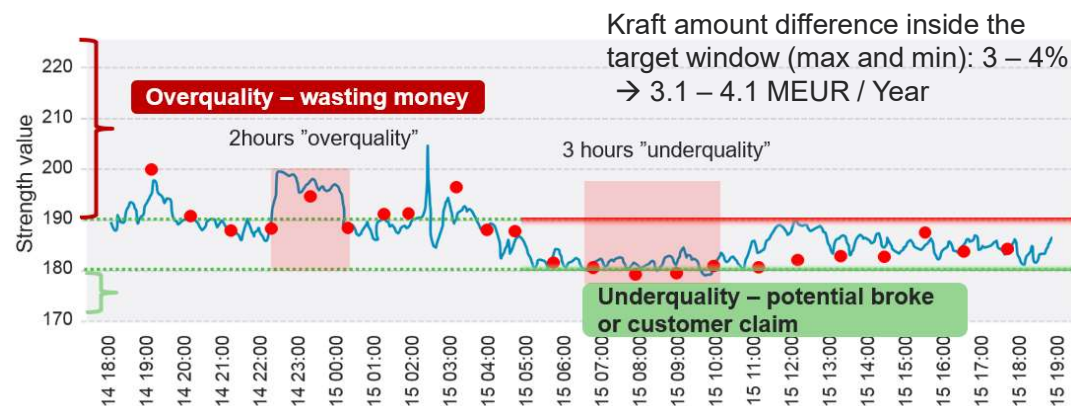
Solution:

- A decision support application for the operator to control stock preparation based on predicted paper strength level to minimize raw material cost.
- Remote service is in key role to maintain the application.

Example results from magazine paper:

- Real time information on paper strength level has enabled operator to control blending to allow 1-2% savings in kraft consumption (~1M€ per year)

Reel turn-up	10:15	11:20	12:25	13:30
Lab result	10:40	11:45	12:50	13:55
				
Strength	182mN	195mN	190mN	170mN

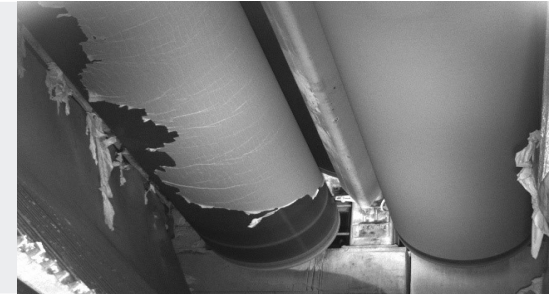


Web break Prediction

New services relying on data analytics and remote services

Challenge:

- Web breaks are causing a lot of unplanned operational downtime in the paper industry.
- In most cases, the operator does not know the real root cause
- There is information value, if you can predict them, but monetary value comes via preventing them happening.

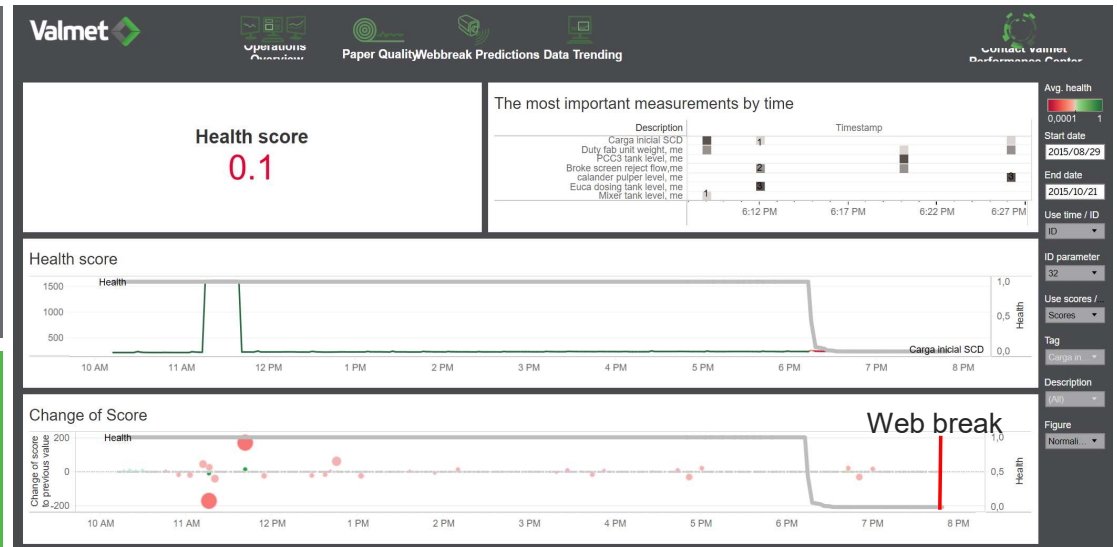


Solution:

- An analytical application that predicts upcoming sheet breaks in the process and communicates with operators through specific user interface
- The application also illustrates the root cause (contributing variables) for predicted web break

Results:

- Mill 1. 50% web break capture rate (2h in advance)
- Mill 2. 62% web break capture rate (2h in advance)



Dynamic centerline manager – new tool to help operator to maintain the best setpoints

Challenge: Controls need to be optimized for different process parameters. Centerlining the controls based on wanted outcomes can significantly increase runnability and produced tonnes and help reduce raw material and energy consumption without sacrificing end-product quality.

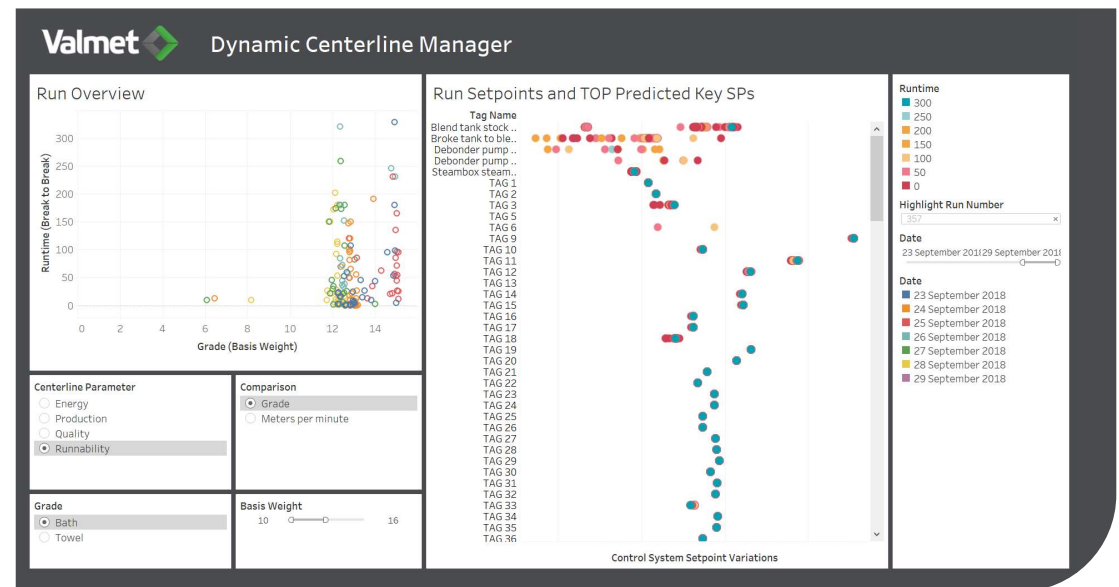


Solution:

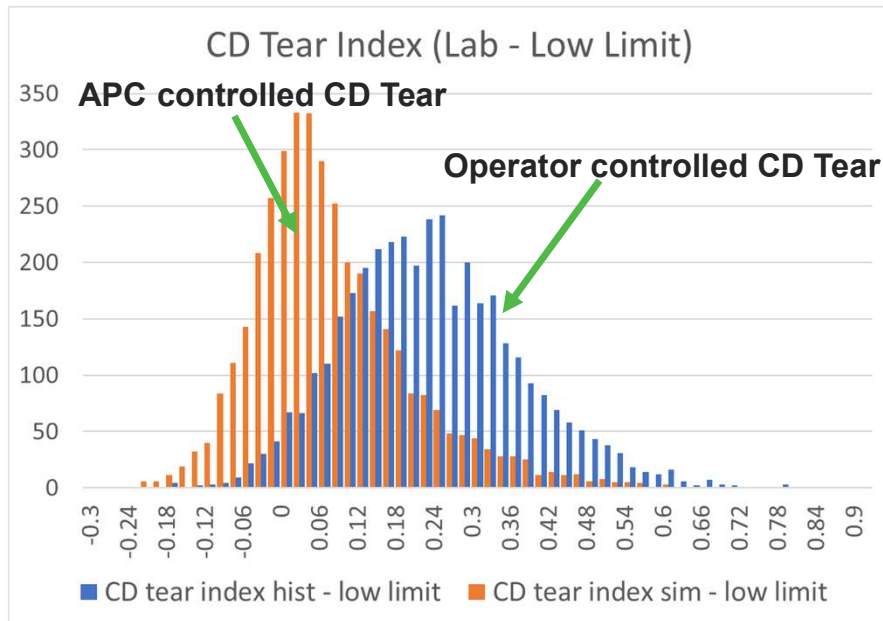
- An analytical application that predicts production runnability, product quality and production raw material and energy consumption based on controls
- The application highlights the key controls influencing to the variance of production

Results:

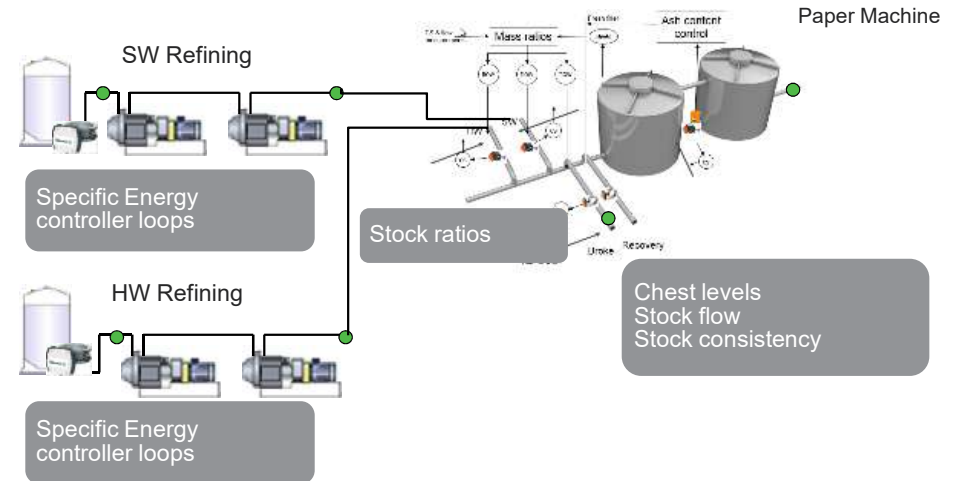
- Mill 1. Potential to increase daily production by 5-7% through intelligent controls optimization



Advanced process controls (APC) for board and paper CD Tear Index



Variable	Avg	Stdev	Avg Diff	Stdev Diff
CD tear index hist - low limit	0.233	0.139		
CD tear index sim - low limit	0.063	0.122	-73.0%	-12.1%



APC control runs quality closer to target (less overquality). Quality is closer to minimum accepted values

In this case simulated kraft saving equals ~1 MEUR / year (in addition to earlier savings due to Operator Guidance)



Valmet Performance Center

Valmet Performance Center

Easy access to the expertise you need



Remote monitoring and optimization

On-demand expert support

Analytics as a service

Board & Paper Performance Center

Service offering

		Valmet Industrial Internet connectivity	On-demand expert support	Remote monitoring and optimization	Analytics as a service
	Valmet Data Platform technology	X	X	X	X
	Secured data encryption and protection	X	X	X	X
	Access to Valmet Portal and operation panels	X	X	X	X
	Technical and production expert support		X	X	X
	Troubleshooting for any production or equipment related issue		X	X	X
	Remote expert start-up support		X	X	X
	Local field service support		X	X	X
	Monitoring and reporting by predictive operation and maintenance applications			X	X
	Predictive analyst advisory applications			X	X
	Data analyzing and proactive proposal			X	X
	Virtual collaboration meeting and on-site presence within agreed period			X	X
	Advanced analyzing and process studies				X
	Proactive proposal for improvements				X
	Virtual or on-site collaboration meeting together with Valmet specialist				X

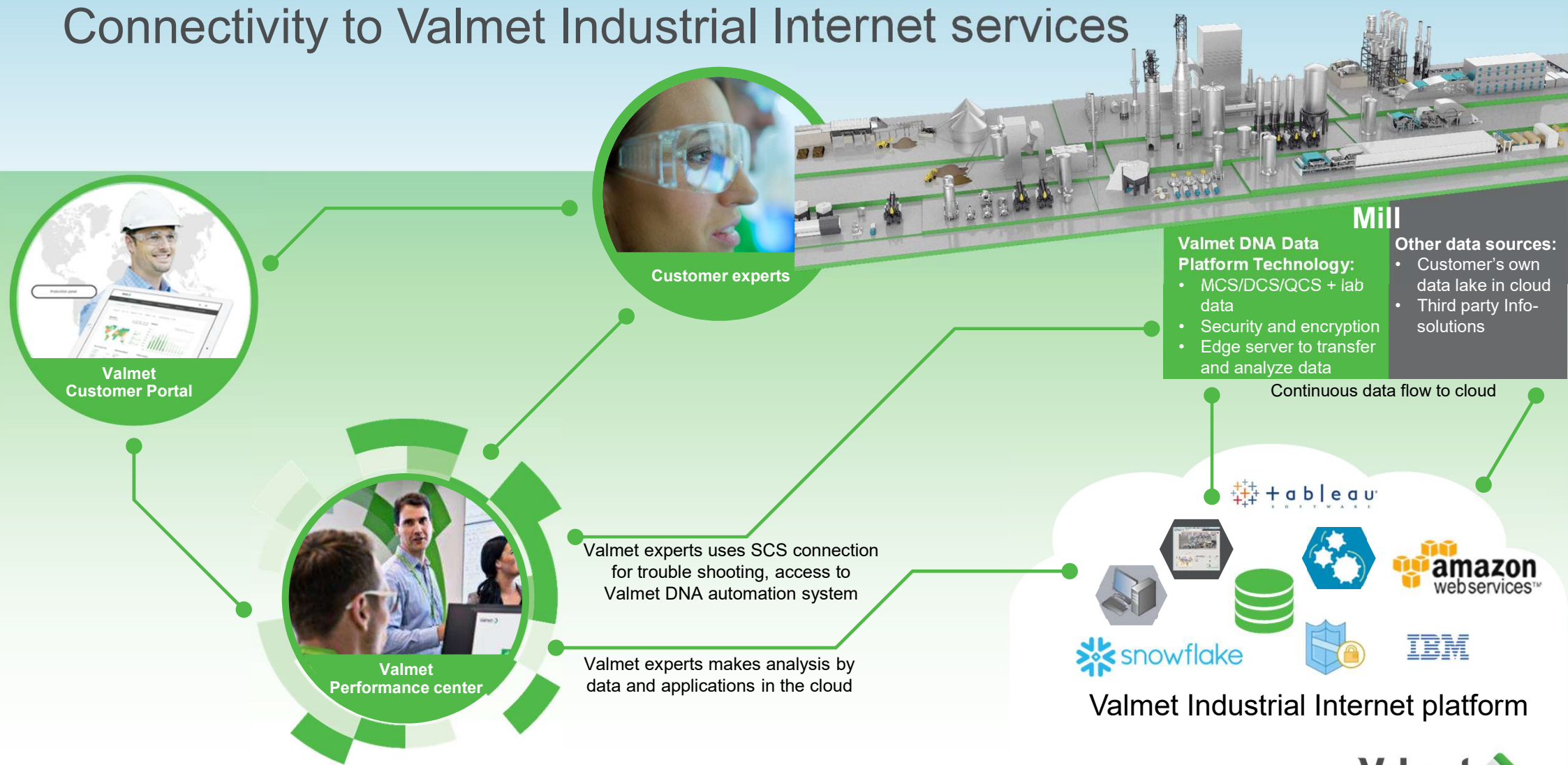
Customer value from basic reports and access to performance insights. Base for Industrial Internet applications

Faster troubleshooting and start-ups. Valmet delivery "insurance" for maintenance and production

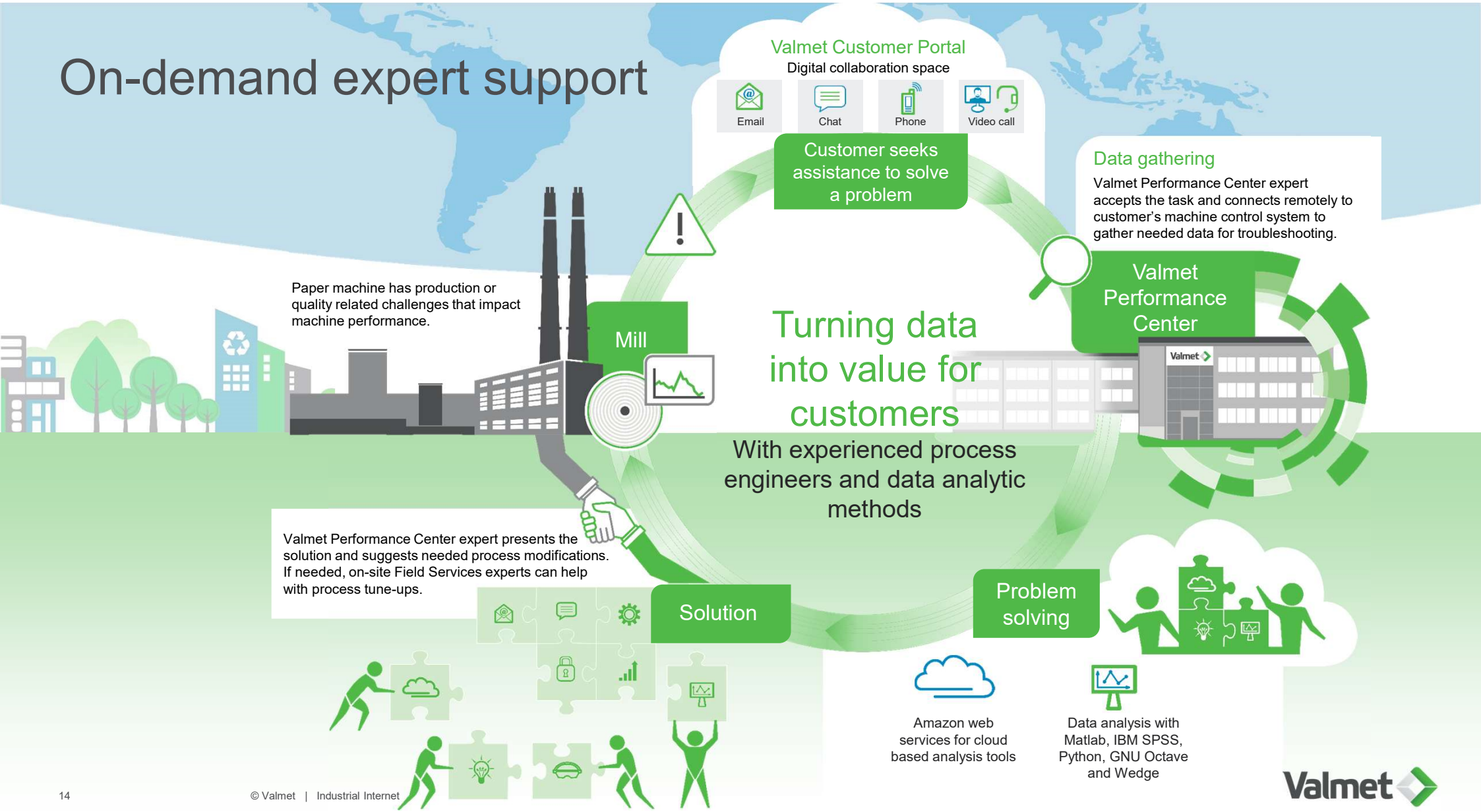
Better equipment availability and productivity through active monitoring and optimization

Increased productivity, quality and efficiency through big data, advanced analysis and proactive collaboration

Connectivity to Valmet Industrial Internet services



On-demand expert support

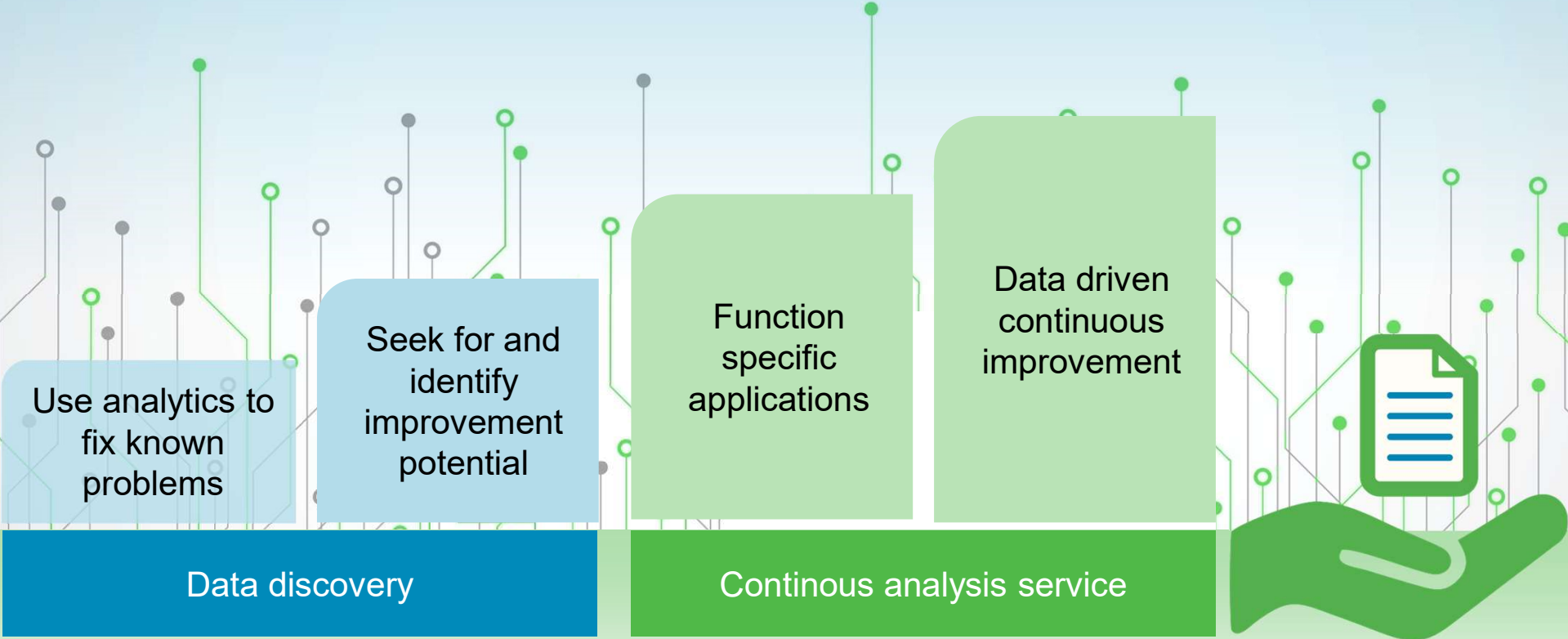


Remote monitoring and optimization

- Continuous remote monitoring and optimization of agreed KPIs
- Proactively handling early warnings and preventing them escalating into troubles
- System generated monthly reports of current status
 - Based on agreed KPI's
 - Including process expert recommendations
 - Each report includes progress follow up from previous month
- Customer has access to shared applications through Valmet Customer Portal



Analytics as a service



Valmet's Analytics as a Service solution

Data discovery for known issues

Date	Status	Parameter 1	Parameter 2	Parameter 3
2018-09-01	OK	100	50	20
2018-09-02	Warning	105	55	22
2018-09-03	Alert	110	60	24
2018-09-04	Shutdown	115	65	26
2018-09-05	Restart	100	50	20

Service description

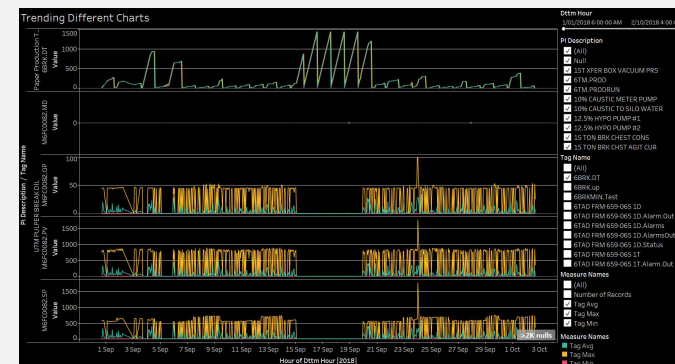
- Problem solving of a known issue done in collaboration between Valmet's Analytics and Process experts and Customer's experts
- Leverages advanced analytics tools and methods to pinpoint the challenges in more detail – tools and Data Scientist skills also enable analyzing larger sets vs. conventional analysis
- A well planned and standardized way-of-working to ensure efficiency
- Data transfer done one-off off of customer's necessary systems (DCS, Maintenance, MES, etc) (in collaboration with customer's IT organization if no remote connection to Valmet exists yet)
- End-result a thorough analysis and action-point recommendation for both process and information management development

Benefits

- Markets fastest and most cognizant issue analysis times to reduce time-value-of-money and process losses
- Thorough analysis through the usage of advanced analytics methodologies and process expertise
- Scales according to problem from hours to months worth of work

Traditional analysis vs Analytics as a Service –expert support

Traditional analysis	Analytics as a Service
Analyze and conclusions <ul style="list-style-type: none"> • Leakage in hydraulic cylinders assumed, much based on earlier experiences • Decision to replace cylinders with advisory services 	Analyze and conclusions <ul style="list-style-type: none"> • Analyze larger period of data from hydraulic system – 8 hours • Conclusion: Incorrect valve mounted in the component. Change valve
Actions and results <ul style="list-style-type: none"> • Order new cylinders: 10 000 EUR • Order external resources on site OEM: 10 000 EUR • Unplanned shut down: 24 hours • Lost production: 150x 	Actions and results <ul style="list-style-type: none"> • New Valve: 15 EUR • Order external resources on site OEM: 0 EUR • Unplanned shut down: 10 minutes • Lost production: 1x
Savings: <ul style="list-style-type: none"> • Equipment: 10 000 EUR • Services: 10 000 EUR 	
<ul style="list-style-type: none"> • Downtime: 23 hours, 50 minutes • Production: 149x worth production 	



Valmet's Analytics as a Service solution

Data discovery for seek and identify improvement potential



Service description

- A service to get started with more visible, intelligent and data-driven operations
- An agile and structured approach to collaboratively design operations analytics and identify areas to improve
- An efficient way to identify further areas of improvement due to the involvement of Valmet Experts in Analytics and Processes in collaboration with Customer's Operations Experts
- The outcome is a proposal on process areas to concentrate on as well as a clearly defined roadmap to further digitalize operations, be it more intelligent processes and equipment or advanced analytics to move forward with

Benefits

- Effective approach with data, which identifies focus areas that have a true potential to deliver tangible benefits

Indicative Overview

Data Discovery

Step 1 - Data Collection

- Ensure data collection from automation (and other) systems 1 week before onsite visit
- If possible, provide data to Valmet beforehand – if not, ensure data is ready on site
- Ensure that tag descriptions are available, PI Charts are available etc.

Step 2 - Onsite research

- Day 1: Half Day Kick-off, Industrial Internet introduction and PVO targets
- Day 2: Operator interviews and shadowing, meeting with management
- Day 3: Definition of cases, opportunities and prioritization
- Day 4: Design of first phase dashboards, data definition and collection
- Day 5: Verification of cases and wrap-up

Step 3 – Offsite analysis and findings

- Analyzing the data based on agreed targets and cases
- One review loop with site operations and Valmet to validate ongoing work
- Presentation of end results
- Planning of potential next steps
- (1 weeks worth of work from Valmet Core Team, Done during 1 month after site visit)

Onsite service design and data deep-dive: indicative week-level plan

Before	Date / Time	Monday	Tuesday	Wednesday	Thursday	Friday
<ul style="list-style-type: none"> • 3-5 th Skype interviews with Customer's key stakeholders • Ensure data availability and collection from onsite systems • Valmet Internal alignment and understanding of Customer's onsite setup of equipment, systems, controls, APCs • Arranging practicalities • 2 weeks allocated 	Morning <ul style="list-style-type: none"> • Welcome and kick-off meeting (2h) • Setting of targets – review of current Customer performance on-site • Review available data with IT 	<ul style="list-style-type: none"> • Interviews: Shift management / production management / control room staff 	<ul style="list-style-type: none"> • Interviews: Shift management / production management / control room staff 	<ul style="list-style-type: none"> • Work shadowing (continued if needed) • Validate needs with control room staff • Ensure availability of needed data • Data: Work on analyzing data 	<ul style="list-style-type: none"> • Synthesis: Prepare overall synthesis, scope and next steps plan • Prepare a preliminary design of dashboards to communicate targets 	<ul style="list-style-type: none"> • Synthesis: Conduct week ending workshop • Confirm cases, opportunities and priorities • Agree on next steps and targets
	Afternoon <ul style="list-style-type: none"> • Site tour and intro to Equipment • Interviews of Site Manager and other key site management 	<ul style="list-style-type: none"> • Work shadowing and interviews of key people (control room staff, development manager etc.) 	<ul style="list-style-type: none"> • Work shadowing (continued if needed) • Data: Work on analyzing data • Define cases, opportunities and priorities 	<ul style="list-style-type: none"> • Travel 	<ul style="list-style-type: none"> • Site Management 	
<ul style="list-style-type: none"> • Customer participants (TBA) in addition to visiting team* 	<ul style="list-style-type: none"> • Site Management Lead 	<ul style="list-style-type: none"> • Shift Manager, Site Operator(s), Site Production Manager(s), IT / Automation Lead 	<ul style="list-style-type: none"> • As needed 	<ul style="list-style-type: none"> • As needed 		
<ul style="list-style-type: none"> • War room needed for the whole week, permission to film for communication purposes 			<ul style="list-style-type: none"> • *Visiting team: <ul style="list-style-type: none"> • Valmet core team: Service Designer, Data Scientist, Process Analysis Expert • Technology support team: Process Equipment Experts • Valmet support team: Business and Sales 			

Valmet's Analytics as a Service solution

Function specific advanced analytics applications

Parameter	Value	Unit	Alarm
Blend tank 1000...
Blend tank 1010...
Blend tank 1020...
Blend tank 1030...
Blend tank 1040...
Blend tank 1050...
Blend tank 1060...
Blend tank 1070...
Blend tank 1080...
Blend tank 1090...
Blend tank 1100...

Service description

- A service to design and implement digitalized data-driven tools to provide insights into operations
- Run as a project designed together with the customer
- Supported by change management for the adoption of digital technologies on-site
- Continuous updates and features published to customer based on Valmet's development roadmap
- Secure data integration policies and modern Artificial Intelligence technologies utilized

Benefits

- Develop your operational efficiency with clear continuous insights into operations and recommendations made by experts
- Designed-for-industry solutions which are continuously developed



Valmet's Analytics as a Service solution

Data-driven continuous improvement

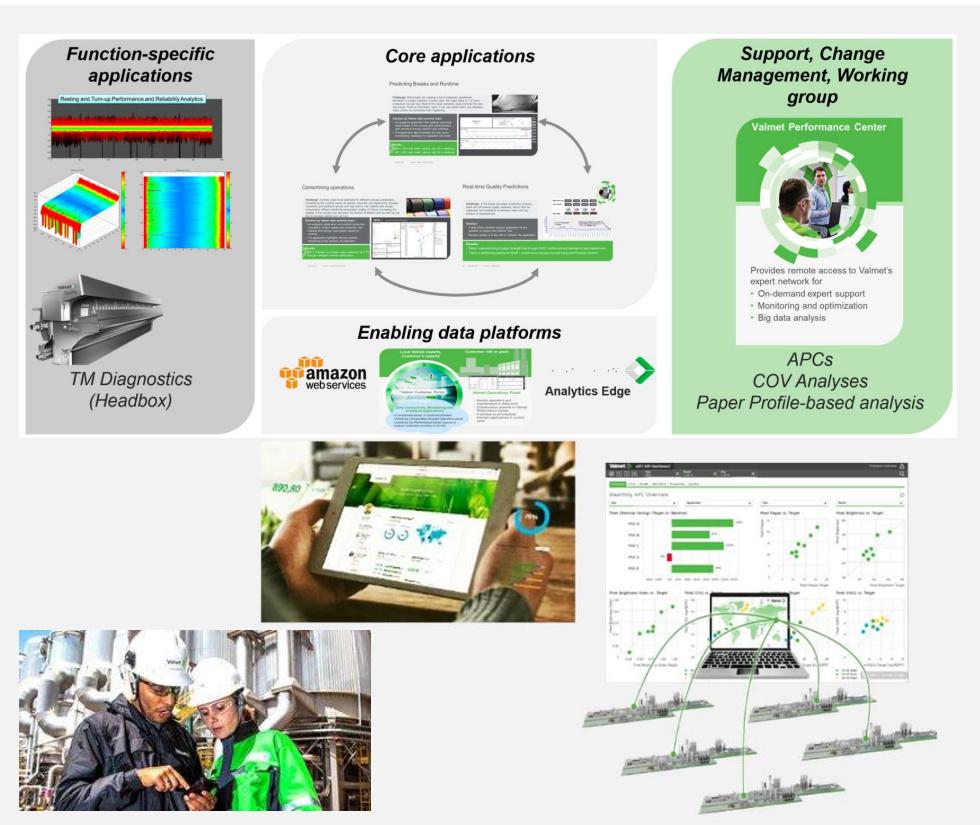
Area	Key Metrics	Current Status	Target	Notes
Production	Throughput	95%	98%	Review process
Quality	Defect Rate	0.5%	0.2%	Investigate causes
Energy	Consumption	120 kWh/ton	110 kWh/ton	Optimize settings
Maintenance	Downtime	5%	3%	Preventive actions
Environment	Emissions	10 ppm	8 ppm	Filter maintenance

Service description

- Holistic data-driven continuous improvement service to identify, implement, improve and develop the way-of-operating
- On-site support to work on managing change needed and supporting mill management and operations with ideas from the larger Valmet network
- Collaborative development of novel solutions to ensure a market leading position through joint innovation
- Technologies deployed in a way to gain maximum benefits (f.ex. Operator Advisory tools, Artificial Intelligence-driven automation, etc)

Benefits

- Optimized end-to-end operations and service practices gained with a data-driven approach
- Ensure a market leading position with digital technologies and artificial intelligence to ensure competitiveness
- Services developed specifically to the customer needs and way to operate



Valmet Industrial Internet

How we serve our customers

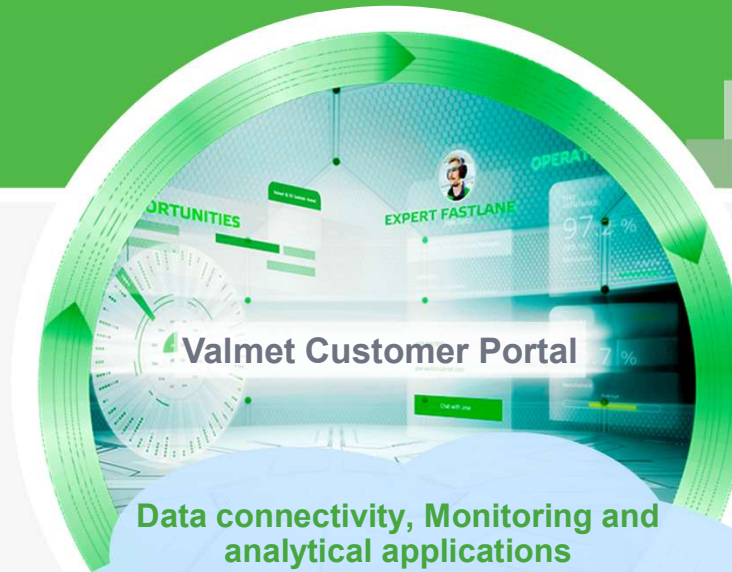
Valmet Performance Center



Provides remote access to Valmet's expert network for

- On-demand expert support
- Monitoring and optimization
- Analytics as a service

Local Valmet experts, Customer's experts



Valmet Customer Portal

Data connectivity, Monitoring and analytical applications

- In on-premise server or cloud environment
- Utilized by mill operators through Operations panel
- Utilized by the Performance Center experts to support customers remotely or on-site

Customer mill or plant



Valmet Operations Panel

- Assists operators and maintenance in daily work
- Collaboration channel to Valmet Performance Center
- A window to all Industrial Internet applications in control room



Valmet Customer Portal is our common digital collaboration space

Current service modules:

Operations panel

A window to Industrial Internet services for real-time monitoring and predictive work

- Performance monitoring
- Analytical applications
- Paper Machine Diagnostics

Expert fastlane

A fast and simple way to contact Valmet experts

- Access to Valmet Performance Center
- Valmet contacts
- Group discussions

Learning

Building internal capability – easy access to Valmet Learning Services

- Course search
- Training selection
- Pre-sign up

Opportunities

New business opportunities and innovations

- Shared roadmap
- Idea sharing
- Valmet references

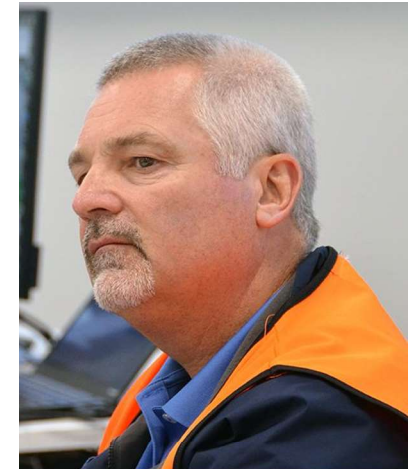
Greenpac PM1 in United States

Board machine with full Valmet Service Support

”

I think the data connected with Valmet Paper Machine Diagnostic is a very powerful tool for us. We had a press wreck event in April and I was impressed the way Valmet ended up to find same root cause for the wreck strictly from the data than we did by investigating the machine. That gave us confirmation we were on the right track and helps us in trying to prevent similar event in the future.

Murray Hewitt, General Manager of Greenpac Mill



Results

- Machinery failures accurately predicted
- Unplanned shutdowns and production losses avoided
- More controlled operation
- All information about process components located in one place, reduced risk of lost information

Grades
Recycled liner
Wire width
9 050 mm
Production speed
915 m/min
Start-up
2013

