The Guide to

Data-Driven Manufacturing Excellence

(and how to prevent fan disasters)

Quva

Content

"Data is not information, nor knowledge, nor wisdom. This guide tells how to start the journey."

– Matti Ketonen
Business Development Director
Metsä Board

"Examples of big data analytics from internet companies are not relevant for us; this guide is."

– Samuli Puhakka
Master Black Belt
Orion Corporation

"If you want to see through the digitalization hype, you should read this guide."

– Johan Abrahamsson
Mill Manager
Hallsta Paper Mill

"The guide illustrates the difference between post data analysis and useful real time information. Data turns into information when operators are basing their decision to real time facts."

– Jarno Hämäläinen
Director, S&OP and Logistics
Fazer Bakeries

Graphic design and illustrations: **pasituomaala.com**

1. Introduction

As a quality or production manager of an industrial company, you already are fully aware of the potential that lies in your production data. The data stream captures all indications, causes and consequences of process malfunctions and anomalies – in other words, everything you need to boost operations, streamline processes and guarantee consistent end quality. You are holding a real gold mine in your hands, but all the treasures remain hidden, because you lack sufficient tools to get a hold of them. Frustrating? We bet. And it's not only frustrating, but also crucial to your competitive strength and the customer experience you provide. It would be mere stupidity to leave this data unharnessed.

Digitalization, as much as people fuss about it, is not just a buzzword. We can be sure that it is changing the operational environment of industrial businesses at an ever-increasing pace. We put together this guide for people like you who know what it takes to stay competitive amid constant change, by seeking to:

1. create new working methods where data helps tame the chaos instead of increasing it.
2. quit staring in the rear-view mirror and putting out fires in your operations and start managing your operations proactively and systematically.
3. save money by minimizing losses and second-rate products.
4. get the most out of your employees' tacit knowledge throughout the organization.
5. make quality a joint effort within the company.
6. awaken dormant decision-makers to outline future policies based on usable data.
7. enhance customer experience.

We hope this guide gives you insights into the opportunities for optimizing the production process and its quality, as well as courage to tap into the potential of data in your production and customer service.

The experts who share their views in this guide:

Emil Ackerman
Managing Director
Quva

Joni Salmi
Operations
Development Manager
UPM Raflatac

Mikko Nieminen
Production Manager
Stora Enso

2. Manufacturing excellence – and what's data got to do with it?

Quality isn't created in corner offices, on the designer's desk or in the quality meetings of engineers. Quality is created every moment of every day, on the production line – and by every single employee.

A data-tool can be harnessed to serve the needs of the executives, the R&D department or the engineers, but the only way to truly optimize quality throughout the production chain is to provide the people in charge of the actual manufacturing with sufficient quality tools.

Efficient and usable tools improve the quality of processes and end products not only directly, but also indirectly, through increased employee motivation. When you guarantee your employees an opportunity to participate in quality development and to influence their own work, they find more meaning in what they do, which results in higher quality and better communications. And believe me, doing things right in terms of processes, products and customer service won't go unnoticed by your customers.

This is how your business benefits from data throughout the production chain - all the way to the customer!

PROCESSES
- visibility into the production chain
- predictive quality assurance and maintenance
- easy identification of production anomalies

BUSINESS
- integral quality culture
- solid customer experience
- cost-effectiveness

PEOPLE
- strong communication
- happy employees
- making the most of every employee's expertise

Manufacturing excellence

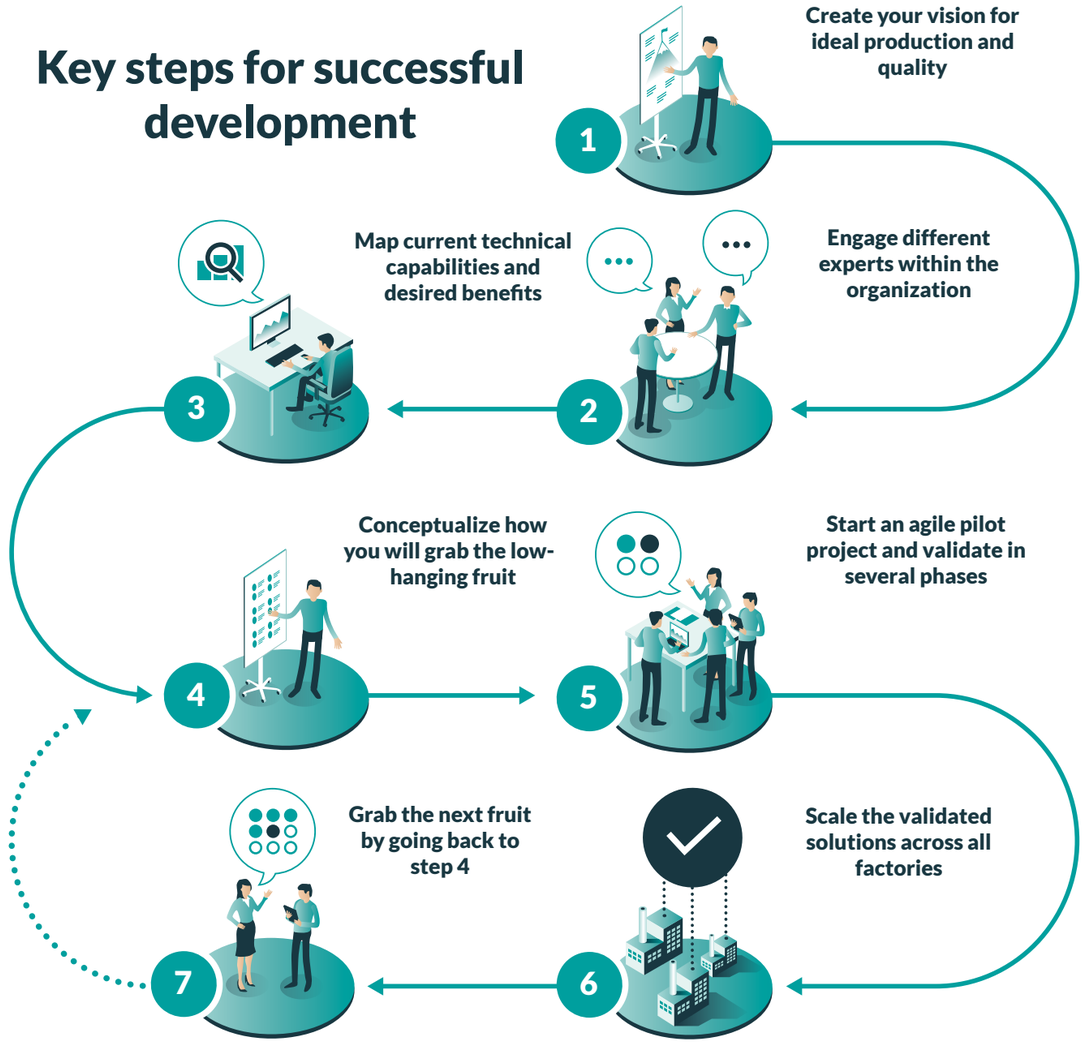
THIS IS HOW YOUR CUSTOMER SEES IT
- competitive pricing
- innovative range of products
- high delivery reliability
- consistent end quality
- swift actions in problem situations
- agility throughout the production chain

3. Utilize the collected data to improve quality

"Our organization really excels at collecting all sorts of data of quality and production. But where do we find the time to analyze all that data, especially since it needs to be processed in real-time?"

A data analysis solution refines the data you collect into a visual format that is easy to read and utilize. You get the relevant information at the right time to the right people, whether it is the operator, the engineer, the R&D specialist or the executive seeking support for their decision-making process. Next, you will learn how to harness that information in quality assurance and management throughout the organization.

Key steps for successful development



3.1. If the finished product reveals production anomalies, you are miserably late

What are your excuses for production anomalies and fluctuations in end quality?

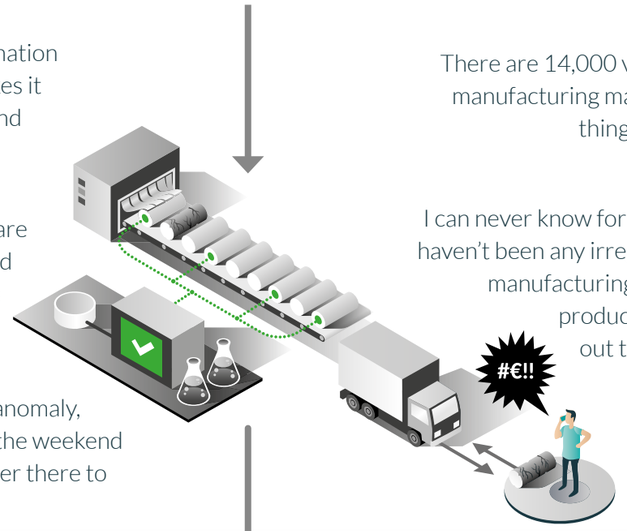
A quality anomaly is a combination of several factors, which makes it humanly impossible to find and fix the cause.

Most production anomalies are only noticeable in the finished product, which means losses are inevitable.

We cannot locate and fix an anomaly, because it happened during the weekend and we didn't have an engineer there to work things out.

There are 14,000 variables on the manufacturing machine, so many things go unnoticed.

I can never know for sure that there haven't been any irregularities in the manufacturing process of the product we're sending out to the customer.



Quit making up excuses and take anomalies under control with data analysis:

"Only big data eliminates the possibility that we unknowingly dispatch a product whose manufacturing process or end quality has deviated from normal."

You can catch and fix the anomalies in your multivariate processes before they result in losses and financial damage.

You are able to locate multi-factor combinations that were previously difficult or impossible for human resources to find.

The tool is easy to use, allowing any member of your staff to utilize data in the detection of anomalies and their causes.

Troubleshooting happens in real-time, which means you can save time and begin repair work immediately.

3.2. Fix the broken phone in your production with visual data

Is the communication chain in your production and manufacturing just a game of telephone? The operator test runs a new product and wants to communicate certain things to R&D. The operator informs the supervisor, the supervisor informs the operating engineer, the operating engineer informs the development manager and the development manager informs the R&D department. What do you think happened to the message?

You need to run a product that was last run several months ago. Who remembers what the product looks like, let alone the running parameters? Someone surely took notes, but where are they and is there someone who can actually read them? The only way to produce consistent end quality with this kind of process is by accident!

How long is the communication chain in your production?

"The multivariate manufacturing process holds so much information that the capacity of human memory and written communication is simply inadequate. If data analysis is overlooked as a process management and communication tool, a great quality potential is left untapped."

Quality equals communication. If you want to fix quality, fix communication first.

- A visual presentation of the data communicates needed information so unambiguously that it leaves no room for interpretation.
- All operators share a knowledge of how to run a certain product in order to optimize end quality and use of resources every time.
- R&D gets direct visibility to products and processes, eliminating the possibility of losing crucial information along the communication chain.

3.3. Without a predictive analytics tool, losses are inevitable

Think back to your previous waste batch.
You ran a special product tailored to your customer's needs, and only once finished, you realized that the quality didn't match that of the previous delivery.

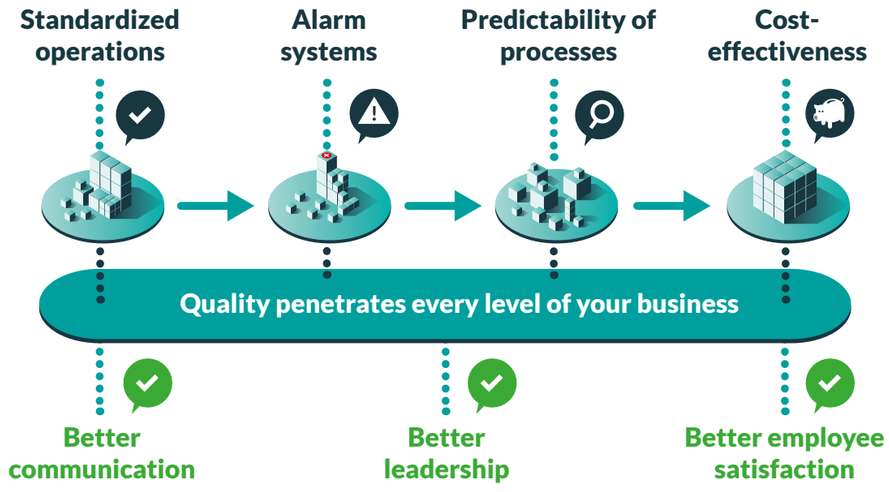
- How much did it cost you?
- How much would it have cost you if the poor quality batch had been delivered to the customer, resulting in complaints and compensations?
- How much would it have cost you if the customer had taken offence and switched suppliers?

Automated data analysis helps you eliminate financial losses caused by producing second-rate products. Comparative history data gives the operator full real-time visibility to the level of end quality that can be expected with the current parameters. The system guides the operators towards the right parameters and anomalies, allowing them to come to their own conclusions concerning the run.

By providing your operators with the right data analytics tool, you are giving them a chance to make the right decisions about how to run the machines. Every employee in your plant has the right to do their jobs as well as they can. When the operators have the chance to readjust poor settings along the process, they know for sure they are producing desired quality, which guarantees them a peace of mind at work.

By utilizing predictive data, you can save money in machinery and maintenance. The system can be harnessed to monitor the condition of the machinery – measuring temperature, torque, sound or vibration, for example. You are alarmed if the data suggests future problems. This allows you to better anticipate servicing and repair needs, as well as take downtime into account when organizing operations.

How much financial damage has poor quality and waste cost you this year?



3.4. Quality culture cannot be forced

A data tool is no quick fix capable of making good decisions and optimal choices in its users' stead. The best results and maximum benefits can only be gained if you utilize the knowledge, experience, and expertise of all your employees in the use and development of the tool. When the implementation and development is a joint effort, using the tool becomes more meaningful. As a result, the tool enhances work motivation, quality culture, and a shared customer-centric attitude throughout the organization.

The steps towards better quality culture and overall quality in the digital age

1. Make quality a joint effort and a shared value in the entire organization by providing all employees with a meaningful way to influence the challenges in their work and to take responsibility for the quality of their own work.

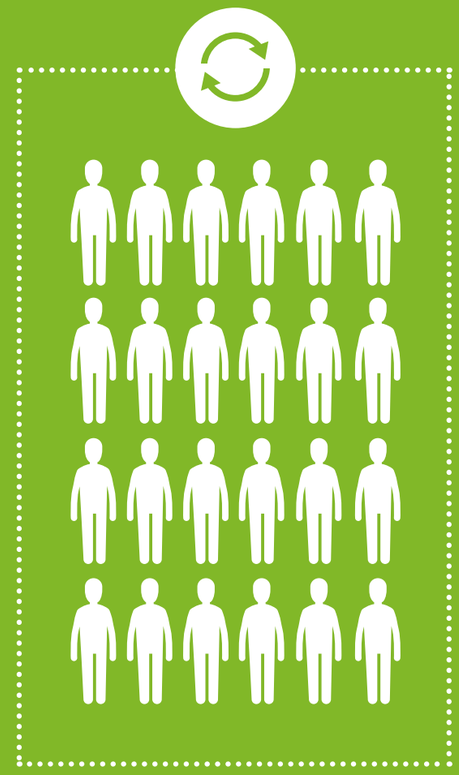
2. Utilize individual expertise in the development work. Individual employees have an enormous amount of tacit knowledge of the manufacturing processes and work methods. Tap into that, and you are ready to make quite a quality leap.

3. Let the production workers participate in the development of the quality tools, as well. Showing them that their opinion and effort is appreciated and valued does wonders to motivation, commitment and job satisfaction.

4. Don't force it – give it time. Once the employees see the benefits of the tool in their own work, using it becomes meaningful and spontaneous, strengthening engagement in shared quality goals.

5. Remember: A tool carries no value in itself, but as an enabler. Along with the service provider, build and configure the tool with thought and effort, so that it serves your specific needs and is so easy to use that anyone can effortlessly utilize it in everyday work.

In your personnel, is the use of digital tools spontaneous or inflicted?



"We only have a couple of engineers on each production line. In terms of quality, it is crucial to engage operators in the development work. It makes a huge difference whether you have two people or forty-two people developing your operations."

Is the thought of investment still too terrifying?

Too right! Leave the opportunities of data untapped now, and you'll see the results in a few years.

Lose money

- You detect anomalies after they are visible in the end product, resulting in production losses.
- You service and repair machinery retrospectively and welcome unplanned production downtime.
- You maximize energy consumption and minimize utilization rate.

Waste work hours

- By avoiding automation, you are able to increase time-consuming manual work.
- Troubleshooting is slower.
- Not everyone can utilize the tools, but you always need an engineer.

Lose customers

- You maximize quality fluctuations and customer dissatisfaction.
- Handling of complaints is slower.
- You are rigid and inflexible in reacting to customer needs.

4. Case UPM Raflatac

"In our facility, we face the typical challenges of a special products manufacturer. We don't manufacture bulk, but special products tailored to every customer's specific needs and of the highest quality requirements. We might run several thousand items every year, making it impossible for the operators to remember all the parameters and specifics of every single product.

This challenge we are tackling with the data analysis tool. The tool gives each operator visibility into how the product has been run in the past and how it should be run now. The user observes in real time, if a critical setting deviates from past settings or specified limit values. We no longer have situations where the operator doesn't have the time or opportunity to access critical information about a certain setting.

The system has also made the handling of complaints more efficient. Without structured history data, handling of complaints requires strong detective skills. To get to the bottom of the cause of the quality deviation, you need to backtrack your own processes and dig up a plethora of data and information. With the data analysis system, all existing process and quality data is easily compiled into graphic views, making root cause analysis much quicker.

"The biggest added value we are seeking is the stability of everyday work and quality, and the real-time management of processes."

Joni Salmi,
Operations Development Manager,
UPM Raflatac

5. Case Stora Enso

”Our guiding thought behind the creation of the tool is the engagement of all employees. We don’t want to support a work culture where only engineers develop operations and operators just carry out the work. Who would be better able to develop the quality of work than those who do the work every day?

When the tools are made available to everyone, the management of quality deviations is no longer dependent on engineers. We want to make the tools and automation so easy to use that any production worker is able to detect anomalies in real-time and solve issues immediately, whether on a weekday or the weekend.

Next, we are hatching an idea for utilizing the tool in customer service. If the customer’s product is not functioning correctly, we would be able to connect the product to process values and to analyze with a mobile device how the delivery in question deviates from normal. That would make troubleshooting and handling of complaints faster, resulting in a happier customer.”

”In my mind, digital tools have two jobs to be done. What an engineer currently does semi-manually through statistical analysis, happens fully automatically in the future, supporting the employees’ work 24/7. And when we go even further, digitalization allows us to do analyses that we can’t even do right now.”

Mikko Nieminen,
Production Manager,
Stora Enso

6. By managing quality you actually manage customer experience

Your customers are constantly looking for more competitive prices, higher quality and more agile service. That is only natural, after all, as they answer for the production chain to their own customers. The most valuable thing you can offer them is to carry your own responsibility in the value chain.

You can do that by producing consistent quality, swiftly reacting to your customers’ needs and complaints, and, most importantly, taking care of corrective measures – guaranteeing impeccable quality in the future. By managing quality in a systematic manner, you are building customer experience that, in the end, determines whether the customer orders from you or your competitor.

”Production efficiency means nothing unless our product quality is at such a level that our customers want to keep ordering from us.”

”The possibility to be proactive in manufacturing has never been greater. Today we can create the possibility to analyse unprecedented amounts of data from our manufacturing environment and be ahead of the events. This guide helps to understand how.”

– Roy Sibbald
Manufacturing Excellence Officer
Pipelife International

“In lack of crystal ball, I recommend utilizing approaches presented in this guide.”

– Asko Sipola
Sourcing Manager
Hartwall

”In industries with high quality requirements, the utilization of real time process data is of vital importance as it gives you the right moment to dig up the abnormalities. The tracks are still fresh and you have better opportunities to find out the root causes. Real time SPC-profiles of products and visualized results help you to find out abnormalities and save also time for your research engineers.”

– Antero Tamminen
Quality Manager
SSAB EUROPE

Quality equals communication. What do you want to communicate to your customer?

Even if you don’t utilize digital tools in the management of your operations and end quality, your competitors certainly will. Do you want to give them a head start? Or do you want to book a demo with us?

Emil Ackerman
+358 45 2086 816
emil.ackerman(at)quva.fi