

BIZERBA



WHITE PAPER

Optimizing the Ready Meal Industry with Software



Table of Contents

Table of Contents	2
1 Introduction	3
2 Exploiting Hidden Potential	3
2.1 The Key to Increased Efficiency	4
2.2 Batch Tracking: What, When and Where	5
2.3 Effectively Reduce Overfilling.....	5
3 Focusing on OEE: Optimization as a Closed-Loop Process	5
4 Optimization Approaches	7
4.1 Reducing Planned and Unplanned Downtimes	7
4.2 Maintaining Fast Machine Cycles	8
4.3 Reducing Wastage.....	8
5 Easy Entry	9
About Bizerba	11



1 Introduction

Every economically minded company has the goal to operate profitably and productively. However, customer satisfaction and dependable delivery are as important as a favorable financial situation and profitable growth. Against this backdrop, efficient plant and machine utilization play a central role. However, many companies operate below their theoretical machine capacity for different reasons, including insufficient machine availability and machine performance, unplanned production downtimes, inefficient processes and poor planning. Reliable tools are required to make machine utilization times more transparent and to identify any sources of losses. Metrics like OEE (Overall Equipment Effectiveness) can be used to analyze production data, to initiate improvements and to measure their effectiveness.

The following white paper demonstrates how software-based device networking can be used to acquire and analyze production-related data. It also highlights how the ready meal industry can use these data and metrics in order to achieve efficient plant operation and to improve its productivity. Any inefficiencies will stand out more clearly, enabling well-directed investments into processes and equipment.

2 Exploiting Hidden Potential

When asked about the performance of their production, plant managers will tend to talk about production volumes, the number of flawless products or the assembly performance of their plant. However, these figures can hardly make meaningful statements regarding the performance of the company as a whole. For instance, although production volumes may be good, the quality of the products may leave room for improvement. Even if volumes and quality are satisfactory, this does not allow any conclusions regarding productivity.

The value creation of a plant is much better reflected by its OEE. This metric was developed in 1971 by the Japan Institute of Plant Maintenance in order to determine, monitor and constantly improve productivity and profitability, i.e. the efficiency of manufacturing plants.

Typically, the OEE of a machine consists of three main components:



Figure 1: Components of Overall Equipment Effectiveness (Source: Bizerba)



Availability Factor

The availability factor is the ratio between downtime and theoretical production time. If a plant has a scheduled operating time of 16 hours and actually operates for 16 hours, its availability factor is 100 percent. In the real world, however, every machine will be subject to short downtimes when operators set up a new product, fill up printer paper or simply take a break. An availability factor of 50 percent indicates that scheduled jobs cannot be executed for different reasons, including lack of raw materials, medical leave of operators or a machine whose frequent defects slow down the plant's operation. In the context of a company processing ready meal products, tangible recommendations for actions can quickly be given if the availability factor is known.

Performance Factor

The performance factor is the ratio between the theoretical performance of a machine and its actual performance. If the schedule mandates a production of 100 ready meals per minute and the plant only produces 80, the performance factor is 80 percent. The reasons for this can be manifold and must be analyzed individually. For instance, operators may not supply enough products, or the machine may be too slow in construction including the preparation process and subsequent processing stages. While the plant itself might be able to deliver more performance, the processes are in a poor state. Comparisons between different devices also are an interesting optimization aspect. Quite frequently, the performance of specific machines falls behind significantly. Taking a close look at the relevant conditions usually reveals tremendous potential for optimization.

Quality Factor

Finally, the quality factor states the percentage of parts that were produced with the desired quality level. For instance, wastage occurs if a product contains metal or plastic parts, if labels are faulty or if the packaging has other deficiencies. This is a sensitive aspect in the food sector and especially for ready meal products. If the quality is poor, it makes sense to examine this factor more closely.

Thus, availability, performance and quality are the three indicators revealing the area to be analyzed and optimized in more detail. By multiplying these three figures, production managers get an OEE value revealing the operating efficiency of a machine or a line. A value of 100 percent would be the ideal scenario, but this is rarely realistic. Nonetheless, any economically minded large-scale ready meal producer should strive to approach this value as close as possible.

2.1 The Key to Increased Efficiency

Over many years, production metrics have been an essential instrument for production planning, monitoring and control purposes in the automotive industry, and they have advanced this industry significantly. Quite often, however, the ready meal industry is still hesitant to use these metrics. Due to changing general conditions, they could make important contributions to achieve significant performance increases.

Increasing customer demand for new product variants including organic products and products without lactose, salt or gluten is an aspect currently transforming the industry. Many manufacturers have adopted a strategy of diversification, resulting in a large variety of different product variants. This, in turn, challenges the food-processing industry to efficiently produce smaller and smaller batches with shortening lead times.

Facing constantly rising labor expenses, plant managers must also lower their production costs in order to remain profitable in the long term. They must uncover hidden resources and analyze how



productivity is impacted by downtimes and the installation of new machines. Staff must be used as effectively as possible even during planned downtimes including cleaning and maintenance work. Costs resulting from insufficient maintenance planning can be three times higher than the costs caused by missed maintenance work.

2.2 Batch Tracking: What, When and Where

Food producers have the burden of proof if marketed products turn out to be defective, and they must be able to track the processes of the relevant batch along the entire production chain. Batch-tracking software enables transparent tracking of the entire manufacturing process including all ingredients.

This is particularly relevant for products covered by the pre-packaging regulation (Fertigpackungsverordnung – FPackV). According to this regulation, pre-packaged food with a filling weight of up to 10kg may not fall below the indicated nominal weight. Compliance with the nominal weight must be documented in detail during production in order to have proof at a later date. Failure to comply with this regulation will often incur severe penalties for food producers.

Batch tracking enables the provision of the following evidence:

- Production logging as proof to legal authorities.
- Storage of production data to prove the delivery of correct quantities.
- Archiving of FPackV figures to prove filling weights.
- Central archiving of records on aspects including detected foreign bodies for production optimization and quality assurance

2.3 Effectively Reduce Overfilling

Underfilled packages reaching the market can entail legal consequences for food manufacturers. On the other hand, overfilled packages are a nuisance as well. So-called giveaways will result every time the nominal weight is exceeded. Efficient production methods should strive to reduce this to zero, and specific production metrics can help to constantly optimize this metric.

3 Focusing on OEE: Optimization as a Closed-Loop Process

Instead of being a one-time event, optimization via OEE is always a closed-loop process (see Fig. 2).

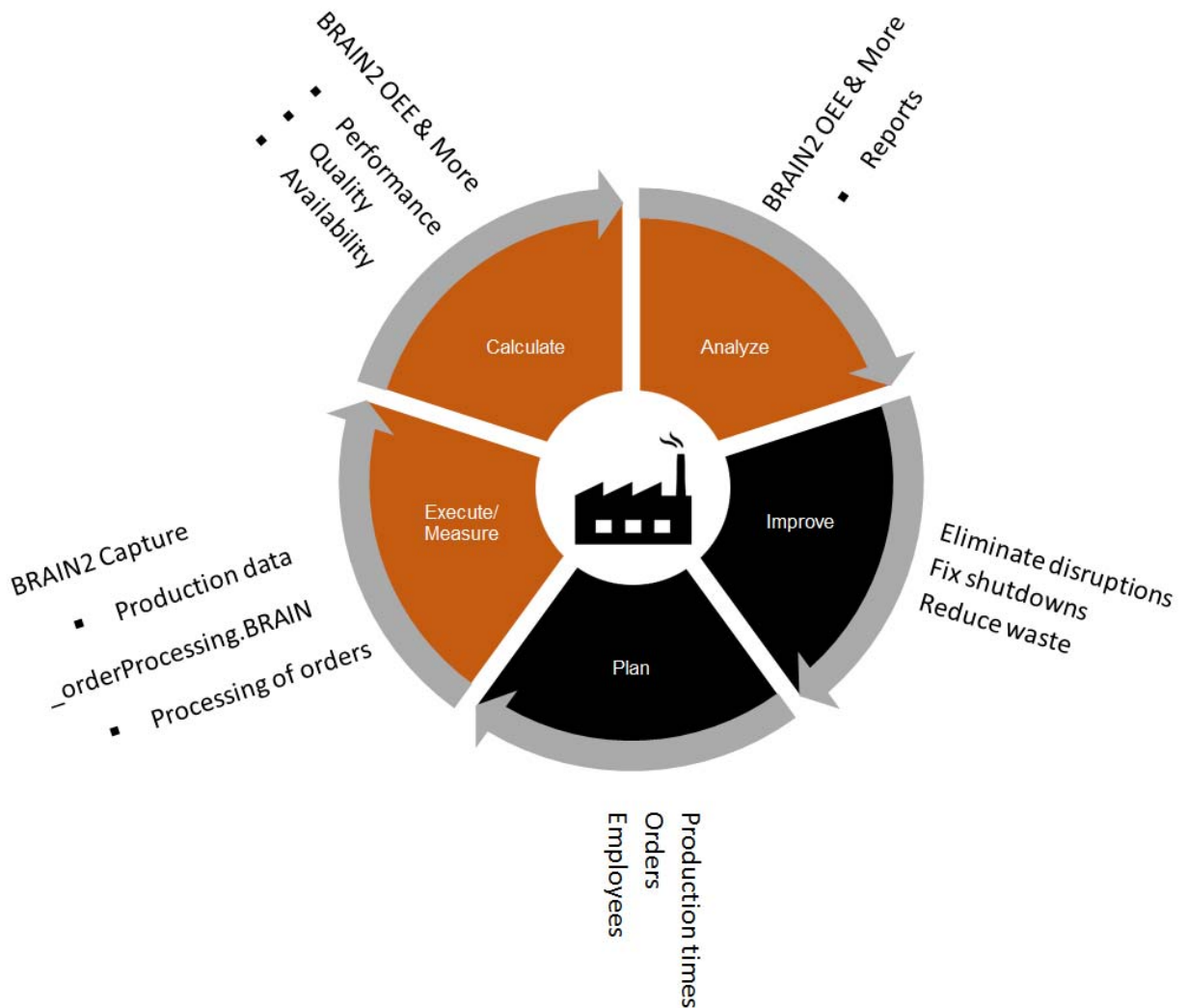


Figure 2: Process Optimization is a Closed-Loop Process

Step 1: Identifying the Potential

In the first step, it is necessary to detect the optimization potential regarding availability, performance and quality. Production and order-processing data are primary candidates for this analysis. For this purpose, software modules like Bizerba BRAIN2 Capture store single production-related values and complete data records in a centralized database. In addition, information on detected contaminants is also stored. Labeling jobs can also be analyzed with order-processing software. Next, the OEE software module analyses the aggregated production data to quickly determine if the line is operating effectively. Any deficiencies occurring in the production process can be analyzed and eliminated. According to experience, the first trends emerging within a few weeks will lead to initial optimization opportunities. However, this metric does not include any information concerning the reason for insufficient availability. This is where additional reports come into play to illustrate why and how long a specific line was unavailable.



Step 2: Taking Action

In a second step, production managers can take measures to eliminate disruptions, resolve downtimes and reduce wastage. For this purpose, managers must optimize the entire workflow instead of optimizing just the processes running on the plant. Ideas for improvement often emerge during daily operation. If possible, new solutions should therefore be implemented in a coordinated manner with all involved persons. For instance, production will be positively impacted if employees have the opportunity to contribute to the design of new processes and structures. Enormous savings can be achieved if employees can be sensitized in order to reduce the response times (e. g. the time between a machine failure and the beginning of repair work). Shortening the setup times and the time required for proactive maintenance will also have a positive impact on OEE.

Step 3: Checking the Results

The cyclic process then starts again. The software determines exactly the impact of the initiated measures on the performance of the line, thereby making performance, quality and availability transparent and understandable again. Depending on the production line, the OEE can be increased by a few percent, yielding savings of several millions of euros in large operations.

Therefore, high availability of production equipment does not come by chance. Instead, it is the result of forward-looking action. Step by step, manufacturers will approach their primary goal of timely, economic food processing, and production downtimes and losses of raw material can be avoided effectively.

4 Optimization Approaches

Although it is not new to use OEE for production optimization, there is a clear trend towards an increasing use and relevance of the OEE factor in the food-production environment. OEE is determined by three main influence factors that also yield opportunities for optimization.

4.1 Reducing Planned and Unplanned Downtimes

Although an ideal production line would run 24 hours a day, the real world is characterized by frequent unplanned downtimes that may have different reasons:

- Technical machine problems
- Unplanned cleaning
- Lack of material (raw material, packaging etc.)
- Unplanned maintenance work
- Insufficient staff
- Product transitions
- Power-supply failure



Downtime											
Date		=									
		=									
		02.03.2015									
		06.03.2015									
	Line	Start	End	Product change	Cleaning	Missing Material	Maintenance	Missing Operator	Technical Problem	Pause	Productive
Montag 02.03.2015	Line 1	8:00	17:00	10 min	2 Std	30 min	15 min	25 min	0 min	45 min	4 Std 55 min
	Line 2	9:00	17:00	10 min	1 Std	10 min	0 min	0 min	20 min	10 min	6 Std 10 min
	Line 3	8:00	18:00	20 min	20 min	0 min	10 min	50 min	0 min	10 min	6 Std 10 min
Dienstag 03.03.2015	Line 1	8:00	17:00	10 min	2 Std	30 min	15 min	25 min	0 min	45 min	4 Std 55 min
	Line 2	9:00	17:00	10 min	10 min	10 min	0 min	0 min	20 min	1 Std	6 Std 10 min
	Line 3	8:00	18:00	20 min	50 min	0 min	10 min	20 min	0 min	10 min	6 Std 10 min
Mittwoch 04.03.2015	Line 1	8:00	17:00	10 min	30 min	30 min	15 min	25 min	2 Std	45 min	4 Std 55 min
	Line 2	9:00	17:00	10 min	1 Std	10 min	0 min	0 min	20 min	10 min	6 Std 10 min
	Line 3	8:00	18:00	20 min	50 min	0 min	10 min	20 min	0 min	10 min	6 Std 10 min
Donnerstag 05.03.2015	Line 1	8:00	17:00	10 min	2 Std	30 min	15 min	25 min	20 min	45 min	4 Std 55 min
	Line 2	9:00	17:00	10 min	10 min	10 min	0 min	0 min	20 min	1 Std	6 Std 10 min
	Line 3	8:00	18:00	20 min	50 min	0 min	10 min	20 min	0 min	10 min	6 Std 10 min
Freitag 06.03.2015	Line 1	8:00	17:00	10 min	30 min	30 min	15 min	25 min	2 Std	45 min	4 Std 55 min
	Line 2	9:00	17:00	10 min	1 Std	10 min	0 min	0 min	20 min	10 min	6 Std 10 min
	Line 3	8:00	18:00	20 min	50 min	0 min	10 min	20 min	0 min	10 min	6 Std 10 min
07.04.2015 09:30								BRAIN2:		Page 1 von 1	
User: Administrator										Bizerba GmbH & Co. KG	

Figure 3: Example of a BRAIN2 OEE Report – Analysis of Reasons for Downtimes (Source: Bizerba)

If the line is powered down by an operator, BRAIN2 records the reasons for this directly at a terminal. Plant managers can thus initiate targeted analyses based on these data. An accumulation of issues can be identified and combatted with suitable measures. For instance, plant managers can take direct action if lacking raw material has become a frequent issue. By getting better insight into their processes, companies have the opportunity to optimize the productivity of their staff. Automation reduces the time required for documentation and report generation, leaving the employees more time for different tasks.

4.2 Maintaining Fast Machine Cycles

In order to maintain fast machine cycles, it is necessary to ensure a smooth material flow and to identify any weak links in the production chain. These deficiencies can be detected by OEE analyses and focused cycle monitoring. It is specifically important to reduce any device downtimes because even minor machine downtimes can bring downstream processes to a complete standstill. This, in turn, can have a negative impact on delivery obligations, which will influence the cash flow and may result in a loss of valuable customers in worst case scenarios. Furthermore, maintenance costs can be reduced by monitoring and documenting production disruptions and device performance at regular intervals. By getting valuable insight into the causes of disruptions, managers can work out suitable solutions.

4.3 Reducing Wastage

There are many potential reasons for quality issues in food-production operations, including overfilling and underfilling, faulty packaging, unreadable data on the label or broken ready meal products. It is a primary goal to achieve a uniform, high quality level in order to eliminate any rework or the complete loss of a batch in the first place.

BRAIN2 can be used to specifically analyze the inspection results. The software reveals the frequency of quality deviations and shows if wastage can be attributed to overfilling or underfilling. This enables the definition of measures aiming at long-term quality improvements.



5 Easy Entry

With its connectivity to Bizerba devices, the BRAIN2 OEE software module provides a good entry path into production optimization. The software presents the measured OEE figure in an illustrative manner and can effectively analyze the production data.

For instance, information concerning day-to-day machine performance, a 30-day overview and other forms of presentation are available in order to provide detailed insight into the performance of a production line. After just a few weeks, the analyses will reveal initial trends, and optimization opportunities will stand out clearly.

Even if just one Bizerba device is used in a production line, it will be possible to draw conclusions about the entire facility. In most cases, the Bizerba solution will be located at the end of the production line where it can determine the OEE factor of the entire plant, irrespective of the element responsible for falling behind the desired factor. In addition, the data can be forwarded to a high-level IT system.

Supporting all common Windows operating systems and databases, BRAIN2 is easy to integrate into existing systems. In addition to acquiring and analyzing significant production metrics, BRAIN2 OEE calculates efficiency metrics including spare capacity, downtimes and production disruptions. In addition, per-product performance and the performance and wastage of an entire line are automatically displayed by the module.

If it is used efficiently in the ready meal industry, the OEE metric will reveal opportunities for cost reductions achieved by reduced material use, and it will also show how to achieve higher quality and less wastage. Connectivity between equipment and software generates new opportunities to acquire and analyze production data for a targeted optimization of the production lines. Analyzing the metrics will provide distinct indications on where productivity can be increased and how the plant can be operated economically.

Additional BRAIN2 Modules

In order to offer more than just a transparent OEE presentation, Bizerba provides additional software modules for a comprehensive production documentation.

BRAIN2 Formulation

In the production of ready meal products, the dosage of all ingredients at milligram accuracy is specifically important. Even a single overdosed ingredient can make a product worthless. If ready meals containing too much salt are marketed, customers will select a different product the next time they go shopping, resulting in lost sales. The BRAIN2 Formulation software leads operators through the entire process. The software can centrally manage all master data including material information, basic recipes, operating regulations, and instructions. Plant managers can therefore trace all batches back to a specific operator. With a suitable interface, the data can be supplied to high-level ERP systems.

BRAIN2 Prepack Compliance

The food industry is obliged to provide flawless product data for each batch. Severe penalties may be incurred if manufacturers are unable to prove that their pre-packaged products had the correct weight according to the pre-packaging regulations. BRAIN2 Prepack_Compliance can provide transparency because all relevant data can be viewed by product ID, production time or batch ID.



For analysis and archiving purposes, reports about weighing results, law-compliant weighing and data archiving can be automatically stored as a file or hardcopy, keeping the effort to a minimum.

§ Collection of statistics data sets

Weigh price labelers and checkweighers

- Transfer of statistics data set, e.g. FPV Europe, no borders

Report

Reporting on collected data

- Report as pdf, xls, ...
- Printing of report
- Targeted evaluation

Data exchange

- Web service (for 3rd party / IT)
- Export CSV

Figure 4: Functionality of BRAIN2 Prepack_Compliance (Source: Bizerba)

BRAIN2 Capture

Cloud-based backup software also provides the opportunity to execute all data store operations in the cloud, saving time and effort for backup operations and the commissioning of new devices. As backups are automatically transferred into the cloud in a cyclic manner, companies do need to initiate and store their backups manually, making it easy to compile reports on 'giveaways'. Any problem sources can also be identified quickly.

The screenshot shows the BRAIN2 Capture software interface. At the top, there are navigation buttons like 'Refresh list', 'Print', and 'Report Print Template'. Below that, there are filter options for 'Single Packages' and 'Filter'. The main area displays a table of statistics with columns for Package Type, Article Name, Article Number, Number of Packs, Low Weight, High Weight, Total Weight, Pack Average, Record Count, Start Time, and End Time. The table shows three rows of data for different package types: SinglePackage (Debreecziner), SinglePackage (Knoblauchwurst), and SinglePackage (Kochsalami). A 'Close' button is visible next to the table. At the bottom, there are navigation tabs for 'Product data', 'Process data', 'Result data', 'Reporting', 'Scheduler', and 'System data'. The status bar at the bottom right shows 'en (English)' and 'Localhost:2015'.

Package Type	Article Name	Article Number	Number of Packs	Low Weight	High Weight	Total Weight	Pack Average	Record Count	Start Time	End Time
SinglePackage	Debreecziner	7	121	0.199 KG	0.204 KG	24.372 KG	0.201 KG	121	02.12.2014 15:27:11	02.12.2014 15:32:02
SinglePackage	Knoblauchwurst	2	181	0.190 KG	0.224 KG	36.321 KG	0.201 KG	181	02.12.2014 14:37:03	02.12.2014 14:43:44
SinglePackage	Kochsalami	5	331	0.199 KG	0.204 KG	67.304 KG	0.203 KG	334	02.12.2014 14:58:36	02.12.2014 15:17:40

Figure 5: Example of BRAIN2 Capture statistics (Source: Bizerba)



Contact

Bizerba (UK) Ltd

2-4 Erica Road
Stacey Bushes
Milton Keynes
Buckinghamshire
MK12 6HS

Phone +44 1908 68 27 40

Fax +44 1908 68 27 77

info@bizerba.co.uk

www.bizerba.co.uk

About Bizerba

Bizerba offers its customers in industry, trade, and logistics a globally unique solution portfolio of hardware and software around the central value "weight". This portfolio includes products and solutions related to slicing, processing, weighing, cashing, checking, commissioning and labeling. A wide range of services from consulting and service, labels and consumables to leasing complete the portfolio.

Since 1866 Bizerba has made a significant contribution to the developments in the area of weighing technology and today is represented in 120 countries. The customer base includes globally operating companies in trade and industry as well as retailers, bakeries and butcheries. With around 3.700 employees worldwide and with its headquarters in Balingen, Baden Wuerttemberg, Bizerba has been in the same family for five generations. Additional production facilities are located in Germany, Austria, Switzerland, Italy, France, Spain, China and USA. Bizerba also has a global network of sales and service locations.