TEKNOSAVO

OPTIMIZED PERFORMANCE FOR WOOD PROCESSING.

TEKNOSAVO

GLOBALLY PROVEN EXPERTISE IN OPTIMIZATION

Teknosavo is specialized in delivering optimization systems and on-line measurement systems for wood processing industries and customer projects demanding electrical, automation, software and mechanical engineering.

Established in 1988, Teknosavo has developed highly sophisticated technical know-how in wood processing industries. During our years of operation, we have gained thorough knowledge of our large-scale clients' target processes in the global markets. Working in Teknosavo's two units in Finland, Savonlinna and Järvenpää, our experienced engineering and programming professionals in measurement systems technology and debarking process are committed to creating reliable products and systems with our fine-tuned work methods.

ISO 9001

DNV

CERTIFIED FIRM

NEXT-GENERATION DEVICES

With the extensive R&D programs developed in close cooperation with our clients, we continue to bring next-generation on-line measurement systems to the market. This work has led to a full product family that serves our customers' diverse needs and specifications.

CONSULTING SERVICES

Our consulting services provide our clients with know-how gathered during many years of experience. We assess our client company's operations, quality of wood and chip preparation process to ensure high-quality end results.

CERTIFIED QUALITY

In order to fulfill our promises to our customers, we have developed an internal quality system for our operations, which has been credited with the ISO 9001 certificate. We are committed to providing our staff with training programs to keep up with the latest developments of the industry.

MORE SPEED, MORE CAPACITY – BETTER PROFITABILITY

The need for efficiency in wood processing industry is more pronounced than ever due to the competitive market space. With Teknosavo's highly developed automation, electrical, software and mechanical engineering, we are able to take our customers' business to the next level.

Our optimizing systems with the latest technologies create significant savings in energy and raw material costs. In addition, Teknosavo's systems, which embody Finnish technology know-how, accelerate and facilitate the production process. On this scale, as the annual amounts of wood processed in pulp industry account for many million cubic metres per debarking plant, even one percent decrease in raw material loss is a significant saving.

MODIFIED TO SUIT ALL NEEDS

Teknosavo's technologies can be widely used in the global markets as they can be modified to suit different types of wood. Our products can be installed in new as well as existing wood processing lines.

HIGH EFFICIENCY

Our solutions optimize the productivity level regardless of work shifts. Shift changes can be made without stopping the production line. This ensures a steady production level at all times.

ECONOMIC BENEFITS

Investing in optimization technology creates savings in steady, high-quality production with minimized idle time, maintenance costs and raw material loss.

EASY TO MONITOR

With Teknosavo's solutions, production line operators can focus on monitoring the system instead of continuous manual control.

CONTROL THE ENTIRE PROCESS

With Teknosavo's WoodSmart™ solutions, the entire production process can be optimized and stabilized to the optimum level.

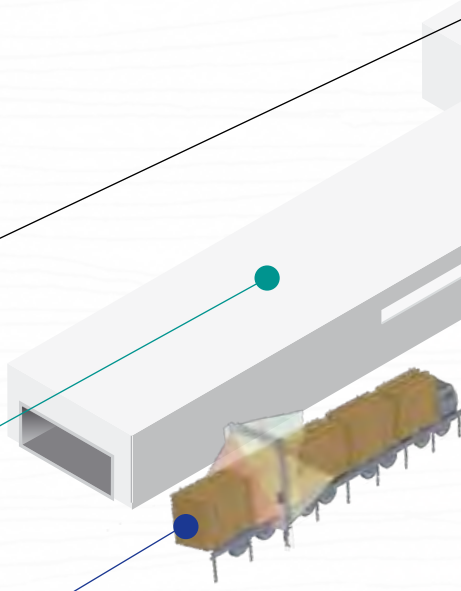
HIGH QUALITY END-PRODUCT

Our measurement systems optimize the degree of cleaning and ensure the high quality of the end-product.

HIGH TECHNOLOGY SOLUTIONS FROM GATE TO DIGESTER

WoodSmart™ has been developed to control the entire debarking process in order to stabilize production and optimize the degree of cleaning and yield. The on-line measurement of several process parameters enables total optimization of the debarking process from the drum filling degree and the bark content of logs to measuring chip quality.

The system calculates the best control variables for debarking and maintains the wood flow as stable as possible. The on-line measurement of different process parameters has great advantages and enables total optimization of the debarking process. WoodSmart™ can be installed in any existing or new woodrooms.



REPORTSMART™

ReportSmart™ reports the collected data and calculations of measured parameters in real time. It gathers information in a database that allows the browsing of previous values and data. If needed, the data can be exported to spreadsheet programs, such as MS Excel.

FEEDSMART™

The laser measuring device for logs was developed to measure the wood flow on the drum infeed conveyor. The device measures the diameter, length, volume and wood level before debarking.

FILLSMART™

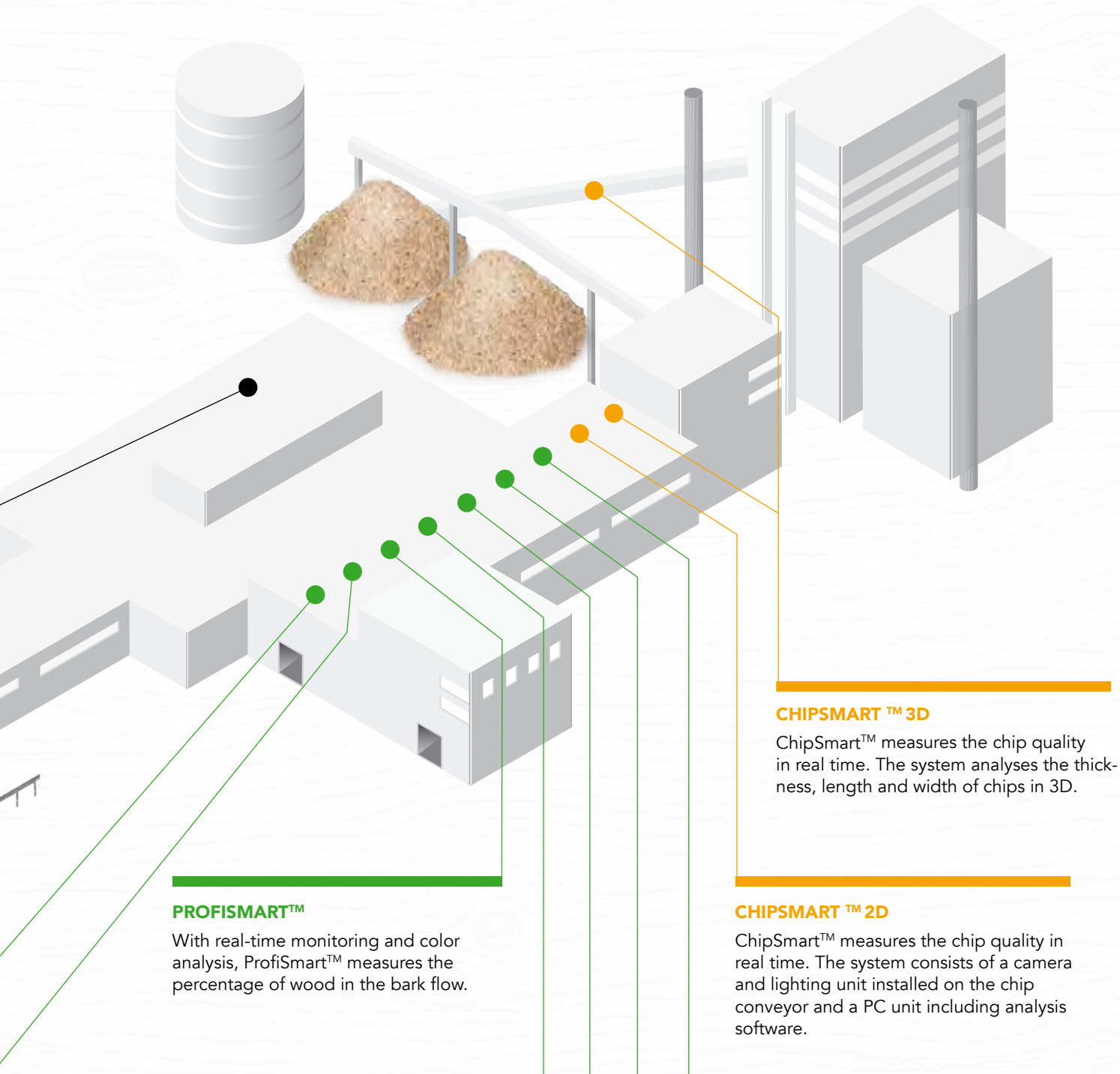
FillSmart™ measures the drum filling degree with optical data. The system provides real-time analyses of the image data to minimize fiber loss in debarking.

TRUCK MEASUREMENT STATION

Teknosavo's Truck Measurement Station enables the measurement of volume, quality and total amount of wood in a stack directly from the truck.

QS MEASUREMENT

QS Measurement system measures a small sample (1-2%) of wood on the debarking feed table with laser measuring devices.



CHIPSMART ™ 3D

ChipSmart™ measures the chip quality in real time. The system analyses the thickness, length and width of chips in 3D.

CHIPSMART ™ 2D

ChipSmart™ measures the chip quality in real time. The system consists of a camera and lighting unit installed on the chip conveyor and a PC unit including analysis software.

PROFISMART™

With real-time monitoring and color analysis, ProfiSmart™ measures the percentage of wood in the bark flow.

STONESMART™

Installed to the end of the drum chipper line, StoneSmart™ detects stones or metal with a sonic sensor.

LOGSMART™

The laser measuring device for logs was developed to measure wood flow on the drum chipper line. The device measures the diameter, volume and crookedness before chipping.

SOUNDSMART™

With a sensor plate in the material flow, SoundSmart™ detects foreign particles such as stones, metal particles and lumps of ice.

BARKSMART™

The measurement device sends wood cleanliness data from the debarking drum chipper line to the control system, enabling real-time debarking control.

365

WoodSmart™ pays back the investment **in one year.**
Example: Debarking of softwood with 1% decrease in wood loss creates annual savings of 0.7M€ in raw material and energy.

THE STATION MEASURES 100% OF THE INCOMING RAW MATERIAL.

TRUCK MEASUREMENT STATION

Teknosavo's Truck Measurement Station enables the measurement of volume, quality and total amount of wood in a stack directly from the truck. Stationed near the gate, the Truck Measurement Station contains a camera and laser system, connected to analysis software. The station measures 100% of the incoming raw material.

With the quality, size and volume information, the debarking process can be optimized to ensure high quality and cleanliness of wood.

PRECISE MEASUREMENTS AND ANALYSES

Teknosavo provides solutions for the precise measurement of wood length, size, volume and quality before the debarking process. Whether the amount is a sample measured from the production line or a larger quantity measured directly from the truck, Teknosavo can provide a solution. The data is then analyzed and the refining process can be calibrated to achieve high quality results as well as to reduce additional costs in material loss.

QS MEASUREMENT

QS Measurement system measures a small sample (1-2%) of wood fed to the debarking feed table with laser measuring devices and camera units. Integrated into the production line, QS Measurement creates savings as the need for manual work is significantly reduced. Without slowing the speed of the conveyor, the system measures the wood and sends the data and images to the measurement station.

QS Measurement device sends the measurer the amount of items that are below the size limit or that have technical or quality defects, for example rot. In unclear assessments, the measurer can manually make a quality decision that the QS Measurement then saves for future reference. With homogenous raw material and high quality fibers, costs are reduced as less material and energy are needed in the process.

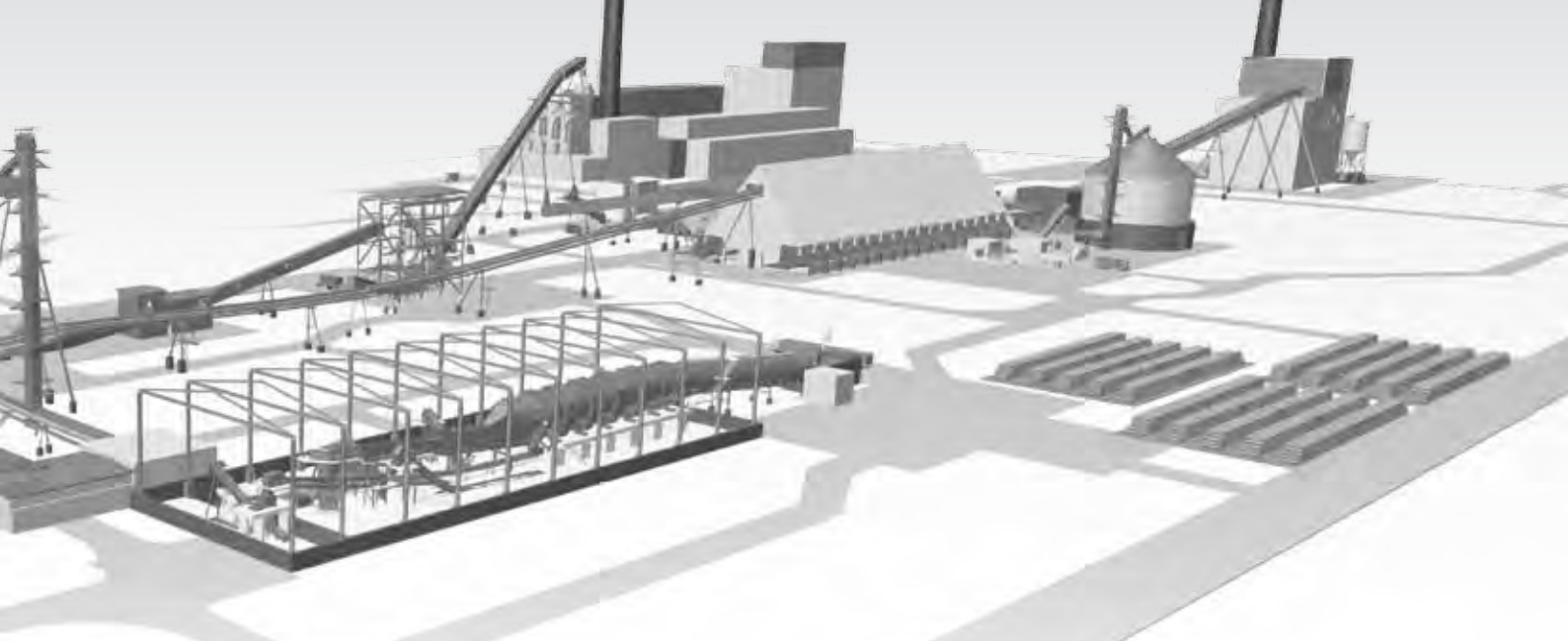
FEEDSMART™

The laser measuring device for logs was developed to measure wood flow on the drum infeed conveyor. The device measures the diameter, length, volume and wood level before debarking.

With correct measurements, the debarking process can be optimized to the highest precision.

80%

Around 80% of Finland's **round wood debarking is optimized** with WoodSmart™.



OPTIMIZED DEBARKING – HIGHER TURNOUT

With Teknosavo's real time measurement devices, the wood debarking process can be monitored and controlled precisely to produce the highest quality end product. The measurement device sends wood cleanliness data to the woodroom control system, thus enabling real-time automatic control of debarking. The wood cleanliness data can also be presented in the control room on a separate display, whereupon any necessary control actions can be done manually.

BARKSMART™

BarkSmart™ is an optical measurement device which continuously measures the percentage of bark in relation to the wood surface on logs after the debarking drum. The system provides real-time analyses of the measurement data and sends the cleanliness degree data to the control room for operators. The data can be used in debarking control so that the logs will be debarked to the desired optimum standard of cleanliness. Correct log cleanliness reduces chemical costs during pulp processing as well as wood loss in debarking. In addition, more accurate cleanliness data enables more accurate control of debarking for different seasons – significant savings can be acquired even with small reductions in use of chemicals and wood loss.

The BarkSmart™ system consists of a camera unit and a PC unit including analysis software. The camera takes a picture of the wood flow and sends the data to the PC unit for a color analysis. This results in wood cleanliness data, which can be connected to the WoodSmart™ process optimization system, to the woodroom main control system, or shown in the control room on a separate display. The system provides automatic calibration and cleaning.

TECHNICAL DETAILS

Wood species: Birch, spruce, pine, aspen and eucalyptus
Measuring range: > 95% of visible material surface in measuring area
Operating system: Windows
Installation height: Between camera and lighting unit and conveyor: approx. 1.7 m

PROFISMART™

ProfiSmart™ is an optical measurement device that continuously measures the share of wood in relation to bark on the bark conveyor. The system provides real-time analyses of the measurement data for operators. The data can be used to control debarking so that unnecessary wood loss can be minimized – more accurate data enables more accurate wood quality control. The ProfiSmart™ system consists of a camera unit and a PC unit including analysis software. The camera takes a picture of the bark flow and sends the data to the PC unit for a color analysis. The result shows the percentage of wood in the bark flow. The measurement data can be connected to the WoodSmart™ process optimization system, to the woodroom main control system or shown in the control room on a separate display. The system provides automatic calibration and cleaning.

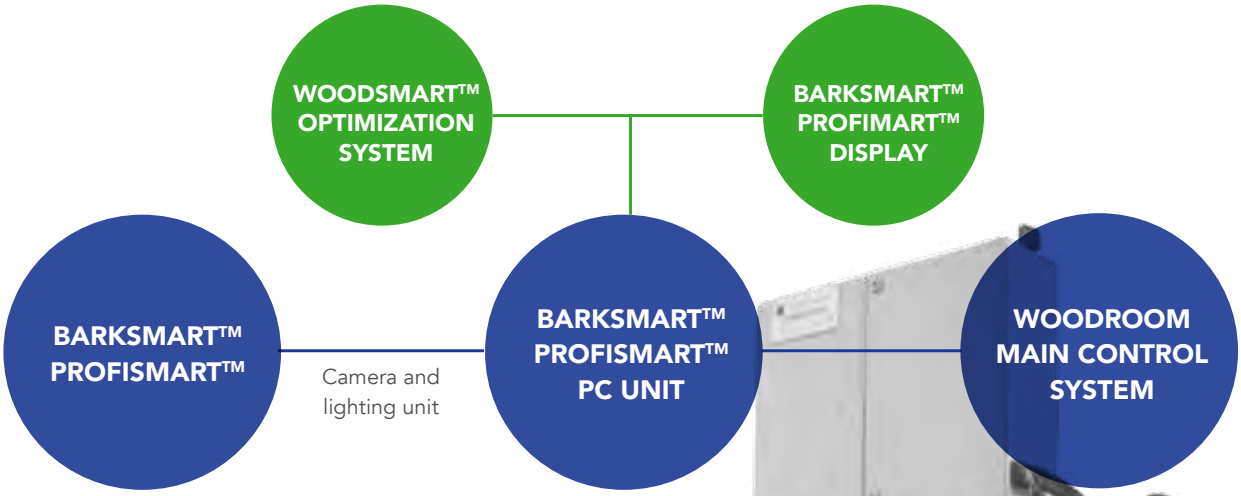
TECHNICAL DETAILS

Wood species: Birch, spruce, pine, aspen and eucalyptus

Measuring range: > 95% of visible material surface in measuring area

Operating system: Windows

Installation height: Between camera and lighting unit and conveyor: approx. 1 m



CLEAN MATERIAL FLOW ENSURES HIGH QUALITY

With Teknosavo's devices, controlling foreign particles in the material flow is simple. Stones, metal pieces and lumps of ice can be detected in the log, chip or bark flow.

When the devices detect foreign particles in the material flow, an alarm signal is sent by opening or closing contact to a higher system. On the log flow, StoneSmart™ sends a stop signal to the drum chipper line's control circuit. SoundSmart™ signals an alarm to the pneumatic gate on the chip line, through which the material flow can be directed outside.

SOUNDSMART™

The SoundSmart™ equipment consists of a sensor plate installed in the material flow and a control box. The control box contains the power supply and the SoundSmart™ electronic cards. The contact data on the card can be used directly to control the actuator or the data can be connected to a higher system. In case the amount of material is large, several sensors can be installed in the same material flow. The SoundSmart™ system is adjusted parametrically via the card's RS-232 bus. The same bus can be used for monitoring and log writing. A PC program for the Windows operating system is delivered with the SoundSmart™ card. With the PC program, managing the properties of the card and monitoring the operation is simple.

TECHNICAL DETAILS

Power supply:	230 V AC	**Alarm relay:**	NO/NC max. 1 A
Current max.:	650 mA	**Connection:**	RS-232

Reduction in wood loss with optimized debarking process equals up to 1 million euros* in annual savings.

1-4%

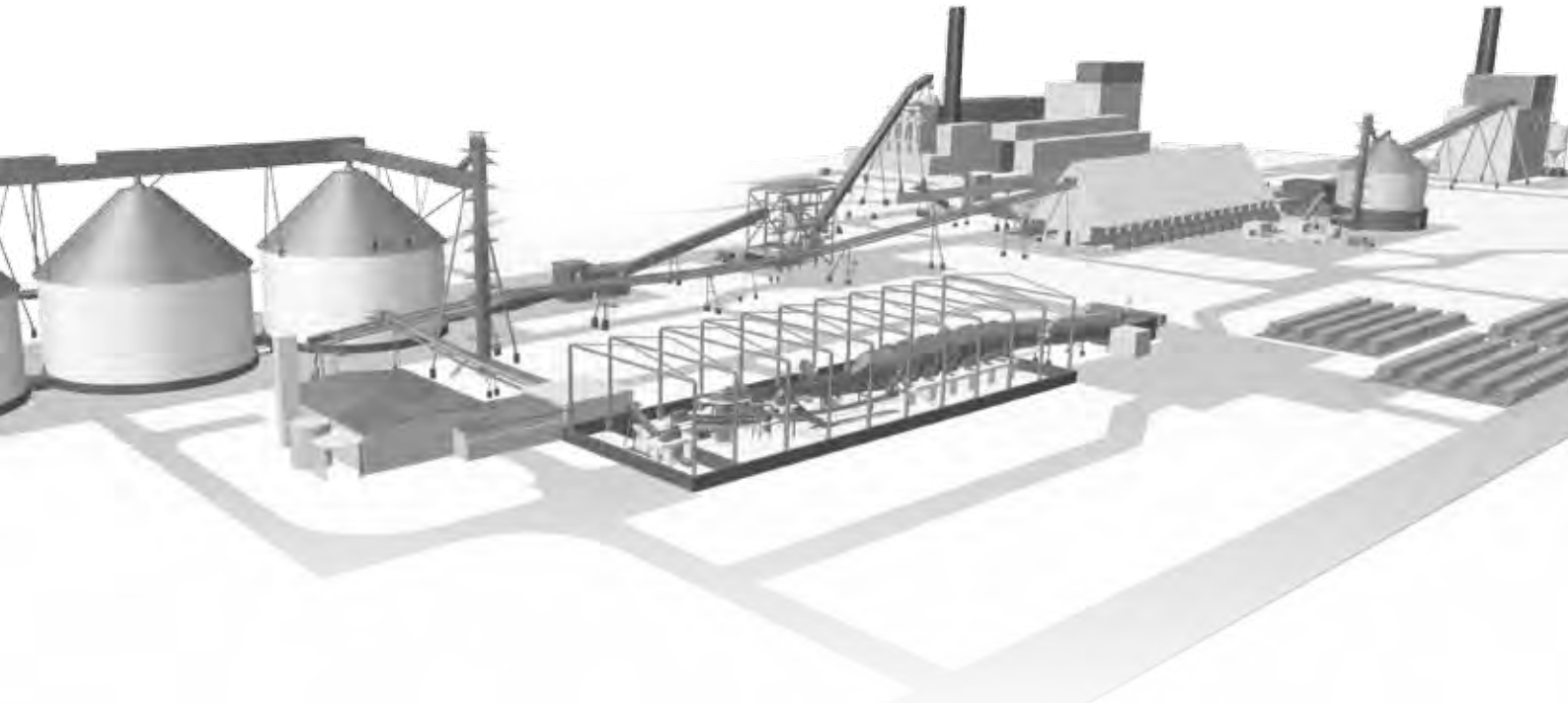
* Pulp mill, capacity 600 000 tons / year

STONESMART™

The StoneSmart™ equipment consists of a sonic sensor installed in the rotating spike roll end on the drum chipper line and a control box, which contains the power supply and the StoneSmart™ electronic cards. The contact data on the card can be used directly to stop the line or the data can be connected to a higher system. The basic application consists of two sensors installed with two spike rolls, but if needed, several sensors can be installed in the same drum chipper line. The StoneSmart™ system is adjusted parametrically via the card's RS-232 bus. The same bus can be used for monitoring and log writing. With the PC program, managing the properties of the card and monitoring the operation is simple.

TECHNICAL DETAILS

Power supply:	230 V AC	**Alarm relay:**	NO/NC max. 1 A
Current max.:	650 mA	**Connection:**	RS-232



OPTIMUM PRODUCTION LEVELS

Optimal filling degrees are important to the steady run of wood processing. With real-time data, managing the material flow is simple even when the quality of the wood varies.

With FillSmart™'s and LogSmart™'s fine-tuned calibration possibilities for various wood species, system idle times due to blockages or other problems are minimized. As measured data and alarms are sent to the control system, the staff can focus on monitoring instead of constant manual control.

FILLSMART™

FillSmart™ is an optical camera-based drum filling degree measurement system. The system provides real-time analysis of the image data and sends the drum filling degree information to the control room for operators. The data can be used in controlling the correct drum filling degree in order to minimize fiber loss in debarking. The biggest benefit of the optical measurement is that changes in wood quality do not affect the realistic filling degree value.

Fresh large-sized birch and dry softwood is typically very challenging for the traditional fill degree measurement based on weight scale or hydrostatic pressure gradient measurement. With FillSmart™, measurements can be calibrated according to wood species and quality.

TECHNICAL DETAILS

Camera system: Suitable for all debarking drum and gate types

Measuring range: Over 95% of drum's inner space
Calculation frequency can be defined in the user interface

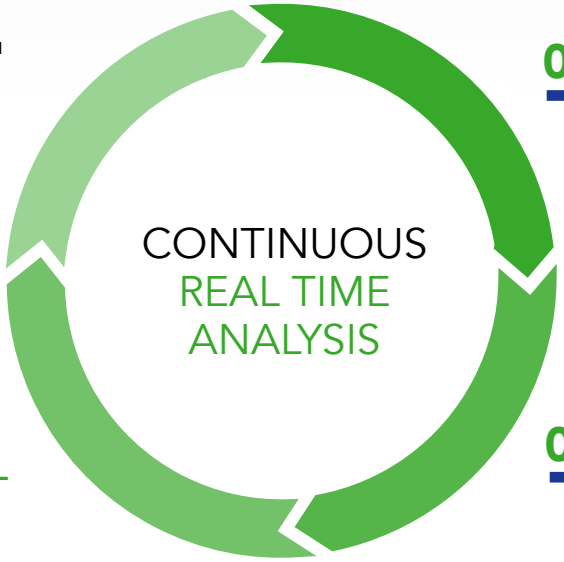
Operating system: Windows

Installation distance: Approximately 5.0 m from the drum

TEKNOSAVO'S SYSTEMS KEEP PRODUCTION ON TRACK

04 **WOODSMART™ OPTIMIZATION SYSTEM**

01 **BARKSMART™ / PROFISMART™**
Laser unit / Camera unit



03 **WOODROOM MAIN CONTROL SYSTEM**

02 **PC UNIT REAL-TIME DATA COLLECTION**

LOGSMART™

The laser measuring device for logs was developed to measure wood flow on the drum chipper line. The device measures the diameter, sweep and volume before chipping to eliminate chipper chute plugs. If a log is too big in diameter or too crooked, or two parallel logs or too much wood is simultaneously fed to the system, the system alarms and stops the line. The alarm and stop values can be adjusted for each line. The alarms and measured data is sent to the debarking control system, as well as to the WoodSmart™ process optimization system, to the woodroom control system, or shown in the control room on a separate display.

TECHNICAL DETAILS

Wood species: Birch, aspen, eucalyptus, spruce and pine
Measuring range: 100% of the conveyor width
Operating system: Windows
Installation height: Approximately 1.7 m above the conveyor

HIGH CHIP QUALITY – SMOOTH PRODUCTION

CHIPSMART™ 2D

ChipSmart™ 2D was developed to measure chip quality in real time. The system consists of a camera and lighting unit installed on the chip conveyor and a PC unit including analysis software. The camera takes a picture of the chip flow and sends the data to the PC unit for a color analysis. The result shows chip quality data such as chip surface brightness, the extent of bark and other impurities in the chip flow, changes of chip surface moisture, changes of chip size classification and material volume flow on the chip conveyor.

The measurement data can be used for debarking control, monitoring the condition of the chipper blades or purchased woodchip to avoid unnecessary disruptions later in the process. The data can be connected to the WoodSmart™ process optimization system in the woodroom main control system, or shown in the control room on a separate display.

TECHNICAL DETAILS

Wood species: Birch, spruce, pine, aspen and eucalyptus

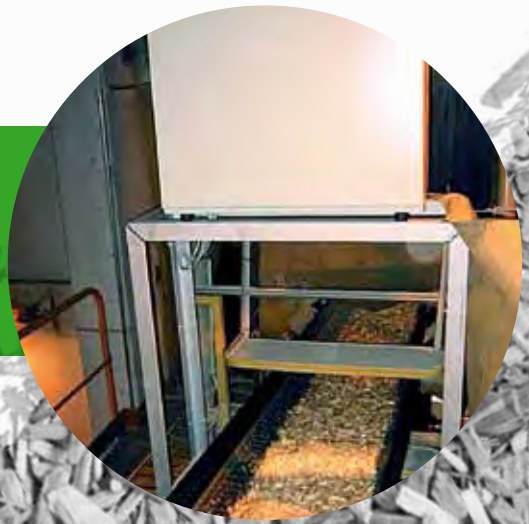
Measuring range: > 95% of visible material surface in measuring area

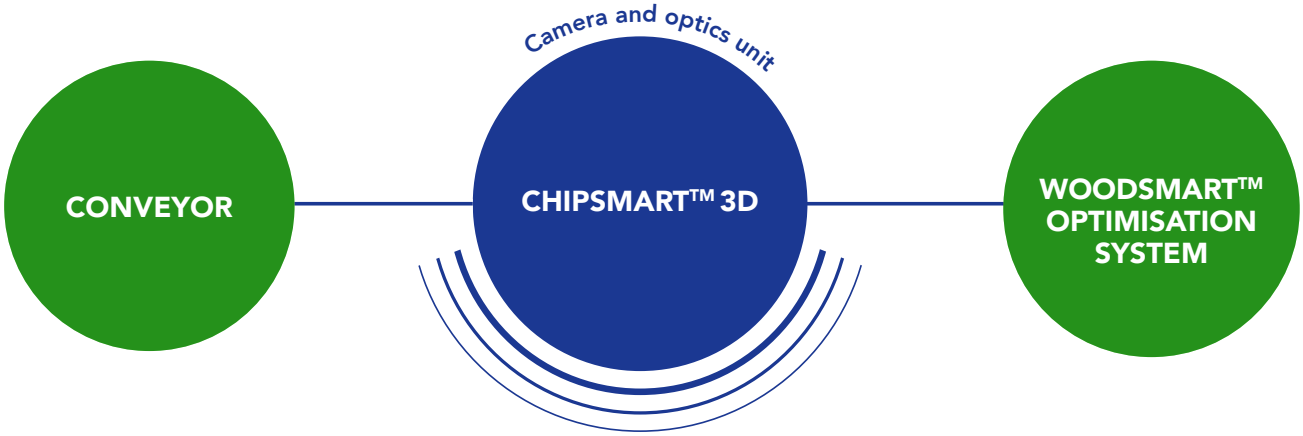
Operating system: Windows

Installation height: Between camera and lighting unit and conveyor: approx. 800 mm

CHIPSMART™ 2D MEASURES:

- Changes in chip surface brightness
- The extent of bark and other impurities in the chip flow
- Changes in chip surface moisture
- Changes in chip size classification
- Material volume flow on chip conveyor





CHIPSMART™ 3D MEASURES:

- Thickness
- Length
- Width
- Oversized chips
- Overthick chips
- Large accept
- Small accept
- Pin chips
- Sawdust

CHIPSMART™ 3D

ChipSmart™ 3D measures chip quality in real time. The measuring device can be installed near the chip pocket located after the chipper in the paper/pulp mill's woodroom, in the chip screening system, at the purchased chips reception facility, near the chip bin's discharge conveyor at the chip refining plant, or near the pulp digester's loading conveyor. The device can also be used to analyze manual samples or the quality of by-product chips sold at the sawmill.

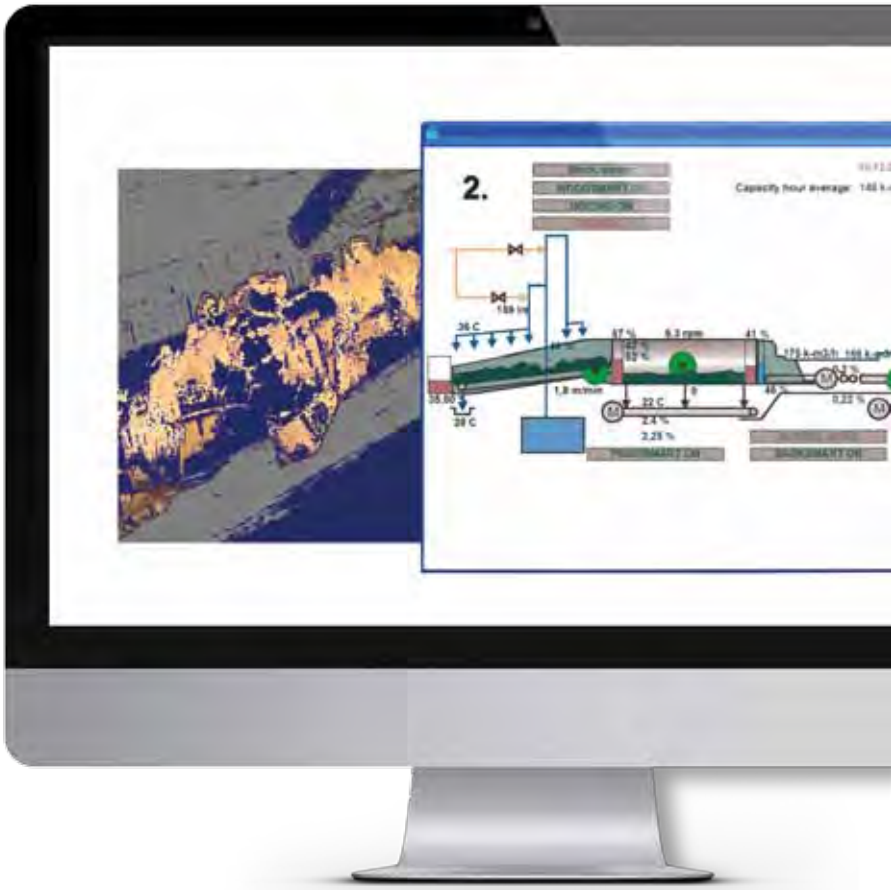
The device's automatic sampler enables the extraction of representative samples from the main chip flow. The type of the sampler and treatment of the sample chips after measurement can be configured individually for each industrial end user. The ChipSmart™ 3D system consists of a chip classification unit placed above the measurement device's own separate chip conveyor, a camera and optics unit, a display screen, and a PC unit housing the analysis and maintenance software.

TECHNICAL DETAILS

Wood species:	Birch, aspen, spruce, pine, eucalyptus
Measuring capacity:	5 liters of chips per minute
Measuring area width:	400 mm
Operating system:	Windows
Power input:	110/230 V, 50 Hz, 24 V DC
Connections:	Digital (8 x I, 8 x O), 2 x analogue (4-20 mA signal), Ethernet remote connection, OPC interface
Protection class:	IP 55 (EN60 529)

TEKNOSAVO – OPTIMIZATION BY HEART

Our core competences are automation, electrical, software and mechanical engineering as well as delivering turnkey solutions for our customers' wood process optimization needs. With our extensive know-how in providing full scale solutions, we also provide consultation services. We audit wood and chip preparation, as well as assess operational and end-product quality at pulp and paper mills, independently from system and main equipment suppliers.



24/7 DATA COLLECTION AND REPORTING

REPORTSMART™

ReportSmart™ is a Windows-based application that is used for reporting purposes in the WoodSmart™ woodroom optimization system at pulp and paper mills. This application consists of data collection and calculation of desired measured parameters. Measured values can be followed via chart displays in real time. It is also possible to look through the stored data in the database. If needed, the information can be exported to spreadsheet programs, such as MS Excel.

Other properties of the ReportSmart™ application are for example disturbance data management and manual input of data, including post-correction, as well as making customized Web- and MS Excel-based reports. ReportSmart™ is in fact a part of the information system for operators and management (MIS). This software is independent of hardware manufacturers due to its OPC interface.

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