



FEED AND BIOFUEL

# BIOMASS PELLETING TECHNOLOGIES

HOW CAN WE HELP FUEL YOUR BUSINESS?

**ANDRITZ**

ENGINEERED SUCCESS

# Feeding and fueling the planet

**Dedicated to feeding and fueling the planet**

**ANDRITZ is vital to ensuring a reliable global supply of aqua feed, animal feed, pet food, and biofuel. With full process lines accounting for half the world's production of aqua feed and biomass alone, we continuously support leading producers in achieving the highest levels in safety, quality, and control from feedstock to final product.**

**HOW  
CAN WE HELP  
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# ENGINEERED SUCCESS

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## LET'S FEED AND FUEL YOUR BUSINESS

The future of food and energy is full of ambitious ideas such as novel nutrient blends, unique feed properties that boost conversion rates, and high capacity process lines that virtually eliminate waste. To seize upon these opportunities, feed and biofuel producers demand a partner they can trust to deliver the right production capacity with the right service and expertise today – and for decades to come.

As a partner with more than 180 years of industry experience, no one knows more about these opportunities than ANDRITZ. From initial feedstock analysis to grinding, conditioning, and drying. From extrusion and pelleting all the way through to the largest parts and service supply chain on the planet. Together with leading producers in all major markets worldwide, our knowledge, services, and solutions continue to drive the evolution of tomorrow's feed and biofuel production.



# Boosting your business from field to fuel

ANDRITZ manufactures and supplies every key processing machine in the pellet production line. We also offer single machines for the production of biomass pellets, solid biofuel, and waste pellets.

With over 350 reference plants, ANDRITZ is a global leader in biofuel pelleting technology. ANDRITZ pellet mills produce more than 50% of all biofuel pellets worldwide, and ANDRITZ has held a market share of over 50% since the pioneering of biofuel pelleting in the 1980s.

If correctly managed, biomass is a sustainable fuel that can deliver a significant reduction in net carbon emissions as compared to fossil fuels. The amount of CO<sub>2</sub>-neutral fuel produced with equipment from ANDRITZ replaces almost five million tons of oil per year.

## SEVERAL DIFFERENT RAW MATERIALS CAN BE USED FOR BIOMASS PELLETING

- Sawdust
- Bark
- Wood chips
- Straw
- Bagasse
- Energy grasses
- Pellets

## RAW MATERIAL SOURCES

- Timber industry
- Sawmills
- Paper industry
- Furniture industry
- Building industry
- Agricultural by-products

## SOME OF THE ADVANTAGES OF PELLETING

- Simple handling
- Reduced transport cost
- Better storage capabilities
- Homogenous fuel of identical standard
- Environmentally friendly
- CO<sub>2</sub> neutral fuel

## GRINDING AND PELLETING

ANDRITZ makes grinding and pelleting equipment for converting forestry and agricultural by-products into uniform, densified fuel pellets for large-scale power and heat generation, and for heating private homes.

## KEY PROCESSING MACHINERY

In the private market, as well as the market for large-scale power stations, there is a rapidly growing need for environmentally friendly fuel. This growth is a consequence of the Kyoto Protocol, which covers more than 160 countries, representing over 55% of the global greenhouse gas emissions.

ANDRITZ design solutions are centered around highly advanced key machinery for wood grinding and pelleting, including chippers and dryers for the processing of wet and/or green wood prior to the pelleting pro-



## GRINDING

Multimill B



43"



cess. By converting wood chips into compressed wood pellets, density can be substantially increased from 60 kg/m<sup>3</sup> to 650 kg/m<sup>3</sup>, which generates significant savings on transport, storage, and handling, as well as a variety of other environmental advantages.

### LEADING MARKET SHARE

ANDRITZ is a major player in supplying and supporting wood pellet producers all over the world and holds a share of more than 50% of the biomass fuel market as well as the wood grinding market.

**When it comes to fueling the future of your business, our commitment covers your operation's entire life cycle. From the first feedstock analysis in the field, through non-stop biofuel production.**

## PELLETING

LH



5" Ace



PM30



Biomax



Paladin



# Process flow for biomass pelleting

## PRE-GRINDING SIZE REDUCTION

Raw material intake: Wood chips  
Wood chips supplied in sizes of 50+ mm must be reduced in a chipper and hammer mill before entering the drying process. Use of the 43" hammer mill in the pre-grinding stage boosts particle size distribution using an energy-efficient rotor design and comes with replaceable wear liners for the grinding chamber.

## DRYING

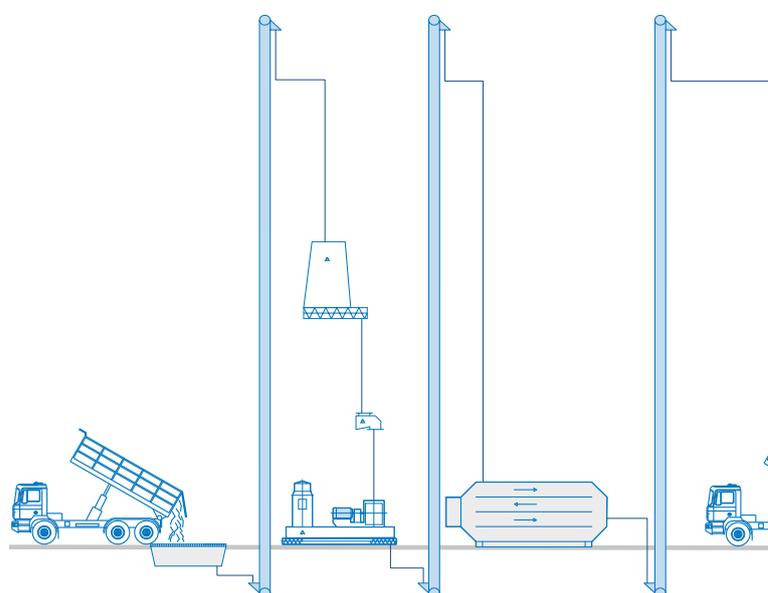
Raw material intake: Sawdust  
The drum drying system dehydrates raw materials before they enter into the fine-grinding process. To ensure the product is dried evenly, the raw material is conveyed pneumatically through a stream of hot gases and dried in a convective process until it reaches a residual moisture content of approximately 10–12%.

## FINE-GRINDING

By finely grinding the raw materials in the 43" fine grinding hammer mill it is possible to achieve most homogeneous pelletizing raw material. The large surface area and the open fibers of the ground product facilitate steam absorption in the cascade mixer. Steam and high temperature soften the lignin in the wood, which allows pelleting to take place without the addition of binders. The 43" hammer mill variable hammer speed to optimize the grinding process by carrying the wood meal on to a cyclone or filter for separation.

## PELLETING

ANDRITZ offers two types of biomass pellet mills. Both ensure high output and effective control over pellet quality. The dimensions of these pellet mills have been fixed to withstand great force and come with replaceable wear parts. The level of process control obtained by using the ANDRITZ pellet mill ensures



CHIP INTAKE

CHIP GRINDING

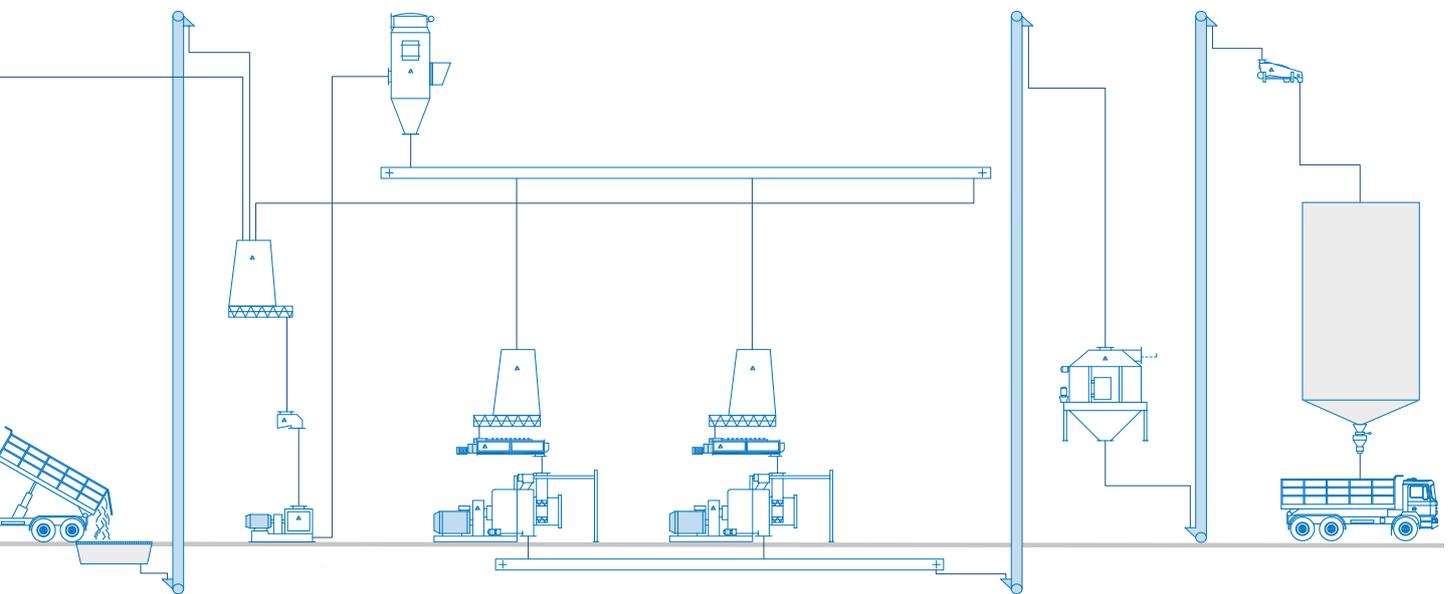
DRYING

SAWDUST

high flexibility and optimum energy utilization. The energy consumed to operate the pellet mill and heat the steam corresponds to 2.5–3% of the wood energy content.

## COOLING

The intense friction applied in the die during the pelleting process causes additional heat to develop. Coolers are in place to reduce critical temperatures before sifting, packing and storing the wood pellets. ANDRITZ coolers utilize the surrounding air to lower the temperature of the pellets, resulting in a pellet temperature 5 to 10 °C above room temperature. The diameter of wood pellets and the holding time in the cooler are crucial in determining the size of the cooler needed.



**FINAL SIFTING**

Finally, the pellets pass through a sifter to remove crumbs and dust which get recirculated back into the process.

**PROCESS CONTROL**

ANDRITZ offers modularly designed, computerized controls for individual key machines, complete processing channels, and complete plant controls.

**50% of the world's biomass pellets are produced by ANDRITZ.**  
**How can we help fuel your business?**

# Waste pelleting

Waste by-products can be highly valuable! A wide variety of materials that are considered waste can be transformed, in most cases, into marketable recycled goods. Among many other production processes, pelleting can further increase the value of these products.

## WHY PELLETIZE WASTE?

As a part of the pelleting process, loose materials are converted into compact pellets through the application of pressure and heat. Compressing the structure increases its mass by a factor of 10. For example, in pellets with a diameter of 3 mm, the density will increase up to 30 mm. This increase provides advantages in handling and storing the waste, and significantly reduces transportation costs.

## WASTE PELLETS AS BIOENERGY

By using renewable forms of energy, it is possible to reduce our dependency on fossil fuels. Waste material mixtures containing products of high calorific value, such as paper, plastic, and silica, can result in a valuable type of pellet for use in the bioenergy industry, filling a gap in our heating and electricity use.

## WASTE PELLETS RECYCLED INTO NEW PRODUCTS

Waste pellets made of pure surplus materials; by-products of another production process, such as celluloses plastic, can be made suitable for many types of applications.

The molding process demands stable pellets at bulk densities of approx. 400 kg. Clean plastic pellets can be used in this molding processes to form all sorts of new products like certain types of furniture.

## MATERIALS FOR WASTE PELLETING

- Composite materials for substitute fuel
- Paper sludge
- Plastics PE and PP
- Wood
- Carpet waste
- Household waste

## PURE MATERIALS FOR RECYCLING INTO NEW PRODUCTS

- Plastics
- Stabilizers
- Compost
- Sewage sludge
- Chemicals
- Chicken manure
- Electronic waste
- Industrial dust
- PUR foam (e.g. refrigerator recycling)

## ADVANTAGES OF PELLETING

- Simple handling
- Reduced transport cost
- Better storage capabilities
- Homogenous fuel of identical standard
- Specified bulk material for further processing
- Environmentally friendly



Paladin pellet mill  
2000 BM

## PELLETING

The ANDRITZ Paladin pellet mill ensures high output and efficient control of the pelleting process. The pellet mill is dimensioned for large forces and designed with exchangeable wear parts.

The robust Paladin pellet press with twin drive provides smooth operation with low vibration levels. The belt drive and heavy-duty pellet chamber ensure reliable and safe production.

# Keep your business growing with our global service network

Our aftermarket sales, service and support sets us apart from our competitors. Our partnership does not end with the purchase or installation of our equipment; it extends to ongoing maintenance, service, and support of all ANDRITZ Feed and Biofuel processing equipment, as well as all other manufacturer's product lines.

## OUR SERVICES

Our expertly trained team of service professionals are ready to help with:

- After-sales services, support, and follow-ups
- Spare and wear parts, maintenance, and repairs
- Process optimization
- Training of plant operators

## FIELD SERVICES

We offer our customers excellent field services, where our service technicians come to your location for assistance. The vast experience of our field service specialists is unmatched – backed by the full knowledge and technical support that only the equipment manufacturer can provide.

## BENEFITS

There are several benefits to be gained from continuous upgrades, optimizations, and services on your equipment:

- Maximum production
- Process knowledge and experience
- Reliability and cost efficiency
- Reduced life cycle costs
- Short and effective shutdowns
- Improved energy efficiency



**AFTERMARKET**

Service and support



**GEORGIA BIOMASS**

Georgia Biomass, based in Waycross, Georgia

# ANDRITZ: Boosting efficiency at the world's largest biofuel production plant

Georgia Biomass, located in the Southeastern region of the United States, is the leading supplier of sustainable wood pellets and the largest, most modern facility of its kind in the world.

The company's product, made from Southern Yellow Pine, is exported to several European countries currently attempting to reduce their use of fossil fuels by utilizing renewable energy sources such as solar power, wind power, and sustainable wood pellets.

The Southern Yellow Pine, a conifer native to Georgia, grows at a very rapid rate as compared to many other species. Because this variety of pine matures in approximately 30 years, it is

an ideal renewable resource for power generation, industrial applications, and residential heating.

During Georgia Biomass' design phase, the ANDRITZ hammer mill and pellet mill were identified as the best equipment for meeting the extreme production needs Georgia Biomass would face and from the wood yard to pellet production, ANDRITZ technology can be found throughout the plant.



"This is a large operation," says Mark Gaddy, Chief Operating Officer. "We have ten double stacks of ANDRITZ hammer mills and 22 ANDRITZ PM-30 pellet mills, 21 of which are running at all times. We also use ANDRITZ conditioners and coolers. These are very robust and effective products."

The pelleting operation begins when dried wood chips arrive at the ANDRITZ hammer mills. The wood chips processed at the plant come from a mix "long wood" or harvested trees and "alternate feed stock" or reclaimed wood that is residual from other processes such as lumber production.

Conditioning follows the grinding process. ANDRITZ conditioners inject low-pressure steam into the wood particles, not only adding heat but also activating the lignin in the wood fibers, improving the stability and overall quality of the finished product.

The final stage of the process takes place in the ANDRITZ coolers, finishing and further increasing the durability of the pellet. Strength is a critical factor in this process, as these small finished pellets have a long journey aboard rail cars bound for Savannah and then outbound transportation overseas.

Since commencing operations in April 2011, the Waycross plant has created more than 90 direct jobs locally and 300 more indirect jobs. "Safety, environmental compliance and sustainability are paramount," declares Gaddy. "To achieve the highest standards, we need the right processes and equipment, but above all, we must have the right partner."

"ANDRITZ has been by our side since the start," Gaddy states. "It is a really successful long-term relationship. Scaling up a pelleting process for a plant of this size certainly creates some challenges. Together we have continuously improved quality and production rates. ANDRITZ has always been there to help us test new approaches, solve issues, and find creative solutions. The key challenges have been addressed, and as a result, the plant is running at full capacity."

Mark Gaddy emphasizes that, apart from the reliable equipment itself, ANDRITZ has delivered a unique level of service. "They've really gone above and beyond the call of duty," he says. "We are running 24/7/365, and sometimes we need immediate service on a weekend or holiday. ANDRITZ has always met our needs, which has included a member of the ANDRITZ staff jumping into a truck and bringing the parts right to our door – on Christmas Eve. That service means a lot to us."

**"It all comes back to the quality of our equipment and the optimal operating conditions we've learned to create together with ANDRITZ."**

**MARK GADDY**

Chief Operating Officer, Georgia Biomass, Georgia

**GEORGIA BIOMASS CERTIFICATIONS**

- Forest Stewardship Council (FSC®) Chain-of-Custody certification
- Forest Stewardship Council (FSC®) Controlled Wood certification programs
- Programme for the Endorsement of Forest Certification (PEFC®)
- Sustainable Forestry Initiative® (SFI®) chain-of-custody certification
- European Pellet Council ENplus® A1 Certified Producer

With production already running at optimal rates, nearly 750,000 metric tons, Georgia Biomass is always looking for new ways to reduce maintenance costs and increase profitability. "Wear parts are a big chunk of our expenses," Mark Gaddy says. "The challenge is to extend the lifetime of these parts to decrease expenses and increase runtime. The ANDRITZ commitment," Gaddy adds, "extended to setting up a machine shop in nearby Savannah to service those parts that can be refurbished, saving us even more time and money."

ANDRITZ has helped us to refine lubrication formulations and optimize running conditions to improve performance. The ANDRITZ system also enables us to monitor and control energy use, which is vital for both sustainability and cost control."

Above all, Georgia Biomass needs to meet its customers' expectations. "They want proven sustainability, safe production, the right quality, dependable supply and on-time deliveries," Mark Gaddy says. "It all comes back to the quality of our equipment and the optimal operating conditions we've learned to create together with ANDRITZ."





## GLOBAL SUPPLIER – LOCAL PRESENCE

With sales, service, engineering, manufacturing and production sites located all around the world, ANDRITZ Feed and Biofuel is truly a global organization with a local presence. ANDRITZ is vital to ensuring a reliable global supply of aqua feed, animal feed, pet food, and biofuel. With full process lines accounting for half the world's production of aqua feed and biomass alone, we continuously support leading producers in achieving the highest levels in safety, quality, and control from feedstock to final product.

How can we help grow your business?

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