

Modern AAC Factory with clean workshop

Autoclaved Aerated Concrete (AAC) industry has more than 50 years' development history in China and has also achieved an unprecedented scale of development. According to incomplete statistics, as of 2021, China has built more than 2,100 AAC production plants. During the process of development, AAC has undergone many numerous milestones. AAC equipment has changed from a mechanical mode to an automated mode and then to an intelligent direction. AAC factories have changed from old and small type to high-tech scale. This reflects the improvement of AAC field's industrial development requirements for the working environment, the need to reduce labor intensity, and the advocacy of green development of energy conservation and emission reduction. In this article you will learn more about modern Autoclaved Aerated Concrete factories built by Dongyue.

Nanyang Tiantai New Material Intelligent Manufacturing Technology Co., Ltd.

Tiantai AAC is affiliated to Tiantai Cement Group. On June 24, 2022, a new generation of fully automatic and intelligent Autoclaved Aerated Concrete production line invested by Tiantai was put into production. The production line is manufactured by Dongyue Group and adopts the intelligent workshop design. There is no equipment operation roar, and no dust generated from the plant. The entire production line

is fully automated, including batching, precuring, cutting, autoclaving, finished products packaging, and waste recycling, etc, all of which can realize the autonomous operation of the system.

Workers drive electric shuttles to transport Autoclaved Aerated Concrete blocks from conveyor belts to storage yard. In the storage area, Autoclaved Aerated Concrete blocks and panel are neatly stacked, like like pieces of art, which subverts people's impression of the noisy and messy traditional concrete factories.

Diversified siliceous materials as raw materials for AAC production

In many areas, AAC factories need to be established to supply AAC products to surrounding cities. Among them, siliceous materials for raw materials account for 65% to 70%. However, due to the lack of siliceous materials, the factory setup will be stopped or the production cost is too high. Therefore, in addition to the application of common siliceous materials such as quartz sand, river sand, fly ash, etc., Dongyue Group has developed and expanded some other waste materials such as ceramic tailings, gold tailings sand, iron slag, water slag, granite sawdust, fluorite ore tailings etc. The proportion of waste used as siliceous raw material to replace the use of natural sand. It only gives AAC factories more options, but also solves the problem of solid waste utilization generated from other industrial production, which is serving multiple purposes.

Tiantai Cement uses the local abundant glass tailings, granite and shale as siliceous materials, and consumes about 180,000 tons of industrial solid waste annually, becoming a landmark enterprise in local solid waste utilization.

Nanyang Tiantai AAC factory put into production





Super smooth AAC panel surface

Quality equipment is the cornerstone of AAC factory guarantee

High precision and intelligent cutting unit

Cutting machine is the core production equipment to ensure the dimensional accuracy of AAC products. Dongyue's cutting equipment not only can achieve a guarantee no less than 99.5% qualified rate, but also is equipped with a complete automatic waste cleaning system, which realizes the scraping of side cutting machine scraper, horizontal cutting machine steel wire cleaning, vertical cutting machine both ends of waste cleaning and cutting machine support cleaning, which can completely omit the cleaning personnel of the cutting system.

When producing panel product, use servo motor to control the tongue and groove blades' movement with high positioning accuracy and fast response speed.

The steel cutting wire position on the horizontal cutting machine can be adjusted automatically through the servo motor and module and it also can realize the automatic detection and alarm of the broken wire, and display the broken wire position on the operating table to improve work efficiency.

The vertical cutting machine is equipped with perfect human-computer interaction components, such as lighting, cutting wire changing platform, waste cleaning device, etc., which is more user-friendly.

Equipped with automatic machinery

Automatic feeding of aluminum powder paste: The feeding of aluminum powder paste adopts automatic weighing and feeding equipment.

Automatic oiling equipment: The brushing of mould box is realized by automatic oil brushing machine or oil throwing machine.

Automatic packing system: When the blocks are packed, the automatic packing machine can automatically pack 1.2 meters, 1.0 meters in length, 1.2 meters, 1.5 meters in height, 1.2 meters, 1.25 meters in width and other dimensions, and can carry out different directions, vertical or horizontal. The packaging method can also be bagged by a cold stretch film machine.

Panel steel mesh and cage automatic processing system: During the preparation for the panel steel mesh and cage, the processes like the adjustment of steel rod position, the steel mesh welding, the steel cage assembly and the steel rod cleaning can be realized automated control.



Autoclaves at work



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AAC BLOCK&PANEL PRODUCTION LINE MANUFACTURER



DONGYUE MACHINERY
GROUP CO.,LTD

SINCE 1994





Company profile

Founded in 1954, Dongyue Machinery Group Co., Ltd. has been always committing to the development and application of green wall building material technology. Dongyue has been promoting the Autoclaved Aerated Concrete Block And Panel System Solutions to the all over the world.

Dongyue offers the A to Z whole project consultancy service including suitable overall equipment selection, investment feasibility study, factory design and estimation, raw material formula, production line debugging, production management training, etc., all of which will help the customer to start and run the project successfully in shortest time to catch the market. Up to now, Dongyue Machinery Group has supplied more than 500 project cases in all over the world and been exported to 30 countries and regions such as Russia, Mongolia, Kazakhstan, Uzbekistan, Iran, Saudi Arabia, India, Indonesia, Vietnam, the Philippines, Singapore, etc and has overseas offices in 5 countries to provide customers with high-quality after-sales service.

We believe, Dongyue brand will be your best partner in AAC field. Because from Dongyue, what you get is not only the AAC equipment, but the whole AAC world.

Dongyue Service System



Service system Project planning period

assist customers to complete a series of preparations such as market survey, economic analysis, raw material testing, whole plant planning, project report, etc.



Project implementation period

Provide technical guidance for civil construction, equipment installation, raw material formula, standards products, raw material formulas, train workers, and transfer and production management experience, etc.



Project use period

Provide equipment upgrade, software program update, technical support, Product construction method, Types and applications of construction tools Types and applications of dry mortar, etc.



Promote AAC industries

Promote AAC products all over the world, publicize its superior performance and advantages as well materials. In order to make AAC products more widely used,

Dongyue built the first AAC production line in the following countries



Central Asia: The first AAC production line in Uzbekistan

Southeast Asia: The first AAC production line in the Philippines, Vietnam, Myanmar, Cambodia

South Asia: The first AAC production line in Nepal, Bangladesh

Automatic autoclaving system: It has become the standard choice for newly built AAC factories. Dongyue Group's automatic steaming adopts pressure-time control design mode. The autoclave curing process parameters such as vacuuming, heating, constant temperature and pressure decreasing can be set through the computer to get the pressure-time curve during each stage. The system automatically adjusts the valve opening according to the set parameters and the main pressure, realizing completely intelligent and precise control. The automatic control ensures the uniformity of pressure changes at each node, also ensures the stability of each autoclave curing cycle, which greatly improves the production efficiency, and reduces the influence of the autoclave curing control on the product qualification rate.

Centralized control system



Diversified product unloading system

At present, the designed production capacity of most AAC factories has reached no less than annual 300,000 m³ capacity, which means that at least 1,000 m³ of AAC products will be unloaded every day which has a higher and more requirements for product unloading, packaging, and transshipment.

The product unloading methods of Dongyue Group Design include:

- 1) Automatic sorting of blocks and panels: The same clamping crane can realize automatic identification and clamping of block and panel products, which is convenient and fast
- 2) Block unloading packaging: Can meet the packaging requirements of different sizes, automatic packaging with bags, automatic coding (brand

name, production date, etc.), automatic filming, etc.

- 3) Panel unloading packaging: multiple forklift working stations are designed for the unloading line, there are also fast traversing conveyor chains, automatic packing belts after panel layered stacking, and the panel products also can be turned over 90 degree to realize different direction packing if needed, etc.
- 4) Pallet-free packaging: In order to reduce the investment of wooden pallets or steel pallets in AAC factories, especially to solve the problem that pallets cannot be returned after long-distance transportation, Dongyue Group has also designed and developed the pallet-free packaging system for AAC blocks, which adopts clamping crane, robot hand, chain conveying and automatic packing machine realizes automatic packing. The system has many advantages like occupying a small area, small installed power and not requiring a large concrete foundation, which can meet the requirements of new or existing production lines.

Clean workshop with state-of-the art production equipment



Measures to reduce power consumption during production - Intermittent Stirring Control

In the AAC production plants, optimizing and improving the operation system of electrical equipment can also provide strong support for promoting the improvement of overall energy efficiency. In response to the problem of large power consumption in the fresh slurry production stage of the AAC industry, Dongyue Group successfully developed the Intermittent Stirring Control technology, and successfully applied it in the AAC Plants in Jiangsu Chudong, Shaanxi Hengji Huike and Lanzhou Tianke, and achieved excellent results. In energy saving and emission reduction.

In the AAC industry, the fresh slurry is stored in a large storage tank after production. In order to prevent the slurry from settling, the stirring work in

large storage tank is a 24-hour non-stop operation. According to the sedimentation degree and the on-site process test, when the sedimentation reaches more than 15%, it will affect the dispersion of the slurry, and when it reaches more than 40%, the stirring work will be difficult to start up and running again. Therefore, when the precipitation is within 25 minutes, starting the stirring again can achieve the effect of energy saving without affecting the production process. Intermittent Stirring Control is a cycle where the stirring device runs for 5 minutes and then stops for 25 minutes, then runs again for 5 minutes.

Energy-saving effect: The annual production time is more than 11 months, the total power consumption is 797,800 kWh, and the total power consumption after the technical upgrade is 288,000 kWh.

Annual electricity saved:
797,800 kWh - 288,000 kWh = 509,800 kWh

Table 1: Experimental and statistical table of Jiangsu Chuding New Building Materials Co., Ltd.

Items	Conventional control system	Intermittent Control System
Equipment operating days	340	340
Total running power consumption (kWh)	797,840	258,021
Local electricity price/kWh	0.75 RMB	0.75 RMB
Electricity consumption (RMB)	598,380	193,516

Photovoltaic solar energy at Nanyang Tiantai AAC factory



Powering factories with photovoltaic power

The AAC plant and the finished product shed have a large area, which can generally account for 50% of the plant area. The joint area between production workshop and finished product stacking shed of Tiantai AAC Factory's is around 16,605m², and the roof is covered with solar photovoltaic panels, with a paving area of 9,232m². Currently, solar panels can generate 1.923 million kWh per year. Solar panel power generation is greatly affected by the sunlight exposure time length.

The power consumption of the production line is also affected by factors such as product type and output. The solar panels of the Tiantai factory can supply up to 53% of the power consumption of the whole factory. In areas with long hours of sunlight, solar panels can even supply the entire power consumption of the AAC factory.

Actively promoting the application of photovoltaic solar energy is a good way for AAC manufacturers to contribute to green development and reduce carbon emissions.

5G + Smart AAC Factory management

5G + Smart Factory realizes the intelligent management of the production process from the whole chain of production data to the whole life cycle. Using 5G new air interface technology, based on the overall planning of the factory, coordinating the DCS system, PLC system, ERP system, one-card system, etc., and deploying the MES system and intelligent production QSmart, and introducing 5G inspection AGVs and handling AGVs. Combined with 5G to integrate the above independent operating systems, from ERP order management to raw material transport vehicles using a card to enter the factory, AGV automatically goes to the sampling point and waits to



Data screen can track the amount of raw materials and make a horizontal comparison analysis

transport the sampling materials to the inspection department, DCS system and PLC system upload the data of each production link to MES. At the same time, the intelligent production QSmart realizes the functions of real-time display of product output, production capacity, in-out and out-of-stock information, real-time analysis and export.

The AAC enterprise uses intelligent manufacturing technology to schedule production according to orders, and realize factory and equipment maintenance, cargo tracking, autonomous logistics, and artificial intelligence algorithms in a timely manner to automate manual supply chain processes.

End

In order to promote AAC equipment to various countries and regions around the world, and let more people know, understand and accept AAC products, Dongyue professionals have traveled to more than 50 countries and regions and successfully exported more than 100 AAC production lines (successfully help customers set up more than 1,200 production lines) and accumulated a lot of experience in building factories. Dongyue will formulate a process plan (raw material formula) according to the characteristics of local raw materials, plan the overall layout of the factory according to the local conditions, design the automation level according to local labor conditions, and design the most suitable equipment according to the customer's investment budget.

In addition, Overseas offices will be set up in countries where production lines are concentrated to facilitate maintenance.

In the future, AAC factories will be more diversified, intelligent and smart. Dongyue Group is always willing to provide more users with the most complete equipment and the most comprehensive services, and join hands with more enterprises to create a bright future for the AAC industry in all over the world. ●



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