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Green Range
Gottwald





Photo: Dr. G. Schmitz



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Photo: Empson AG

A general awareness of ecological matters is beginning to take hold in industry, and this development presents ports and terminals and, as a consequence, the manufacturers of handling machines, with constantly changing technological challenges

Signs of the Times

Globalisation, long-term energy and consumption needs coupled with climate change have had dramatic effects on our environment and are key discussion topics in these troubled times. The increasing economic interlinking of markets is a feature of world trade and, as a result, of global cargo handling.

Sustainable Handling Logistics

In view of the greater awareness for environmental issues and related laws and regulations which also affect terminal concessions, the operators of ports and terminals, too, are obliged to take a more responsible stance in regard to the environment. As a result of this, greater emphasis is being placed on the sustainable development and design of the machines they employ.

Environmentally Aware Technologies

These developments have brought the focus to bear on cargo handling equipment using low-consumption, environmentally aware technologies – to reduce exhaust, noise, dust and light emissions and to optimise the use of limited space.

It is against this backdrop that Gottwald Port Technology, a subsidiary of Demag Cranes AG, sets visible milestones with its products, systems and drive technologies whose operation is economical and environmentally compatible at the same time.





Gottwald cranes make use of electrical drives, which are considered to be particularly economical and environmentally compatible. In addition, if the cranes are connected to an external power supply, the electrical energy generated by the crane's lowering and braking motions is returned to the mains.

Power Efficiency

Throughout its range of crane products, Gottwald uses electrical drives powered either from the on-board state-of-the-art diesel generator or externally from the terminal's electricity supply.

Use of External Power Supplies

If the crane is connected up to the terminal's low or medium-voltage electricity supply, the electricity recovered by the lowering and braking actions is returned to the harbour mains, which results in an even greater increase in the machine's efficiency.

Increased Efficiency when Using Diesel Generators

When the on-board diesel engine is being used, as is particularly the case with independent, mobile machines, Gottwald now applies dynamic brake resistors and a new hybrid drive to boost efficiency.

Dynamic Brake Resistors

When the main drives return electrical energy to the crane's internal power system and if none of the consumers connected to that circuit currently require energy, these dynamic, steplessly controlled

brake resistors dissipate far less excess energy by converting it to heat than was the case in earlier forms of the technology. In this way, considerable power savings have been achieved and the machines' overall energy-efficiency ratings much improved.

Innovative Hybrid Drive

Gottwald has now gone a step further by introducing the hybrid drive – a combination of the on-board diesel-powered generator and electrostatic energy storage. Here, the energy recovered from the crane's braking and lowering motions is stored in wear and friction-free high-performance capacitors (ultracaps) and used for the next work cycle. The energy is stored as electricity and is not converted at all, which provides a high degree of efficiency.

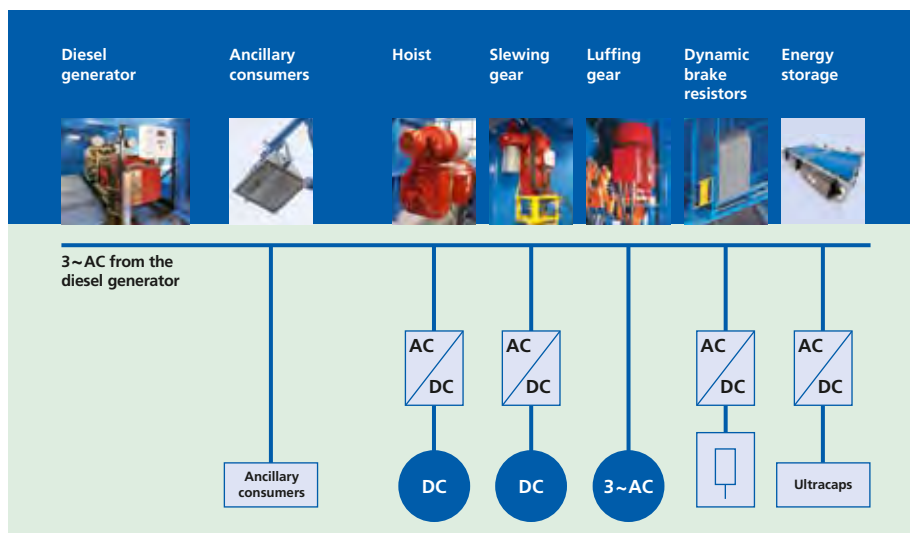
Fuel Savings in the Double-Digit Percentage Range

The combined use of dynamic brake resistors and hybrid drives in Gottwald Harbour Cranes not only reduces fuel consumption by a double-digit percentage amount, it also means that, in the long-term, smaller and therefore more fuel-efficient diesel engines can be used.



Existing Gottwald Harbour Cranes can be retrofitted to use dynamic brake resistors, which reduces their fuel consumption

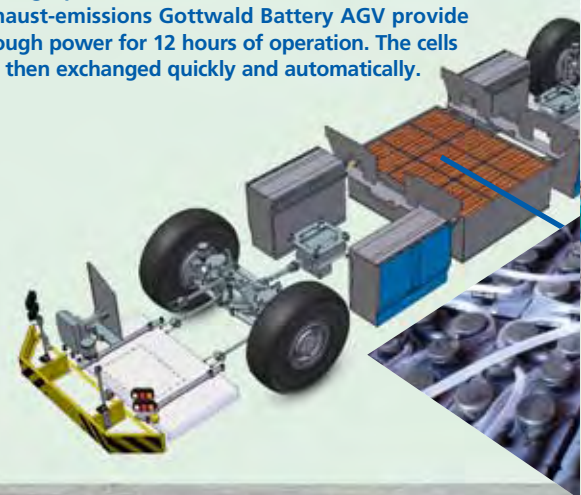
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Using dynamic brake resistors and high-performance capacitors produces a significant improvement in energy efficiency



The high-performance batteries used in a zero exhaust-emissions Gottwald Battery AGV provide enough power for 12 hours of operation. The cells are then exchanged quickly and automatically.



Emission Reduction

The ability of Gottwald machines to make use of external electricity together with the associated bypassing of the combustion engine and the use of battery-driven handling machines all contribute to reducing pollution from fuel emissions in ports and terminals. The volume of soot particles, NO_x, sulphur, carbon monoxide emissions and CO₂, a key factor in climate change, is sustainably reduced.

Reducing Exhaust Gases

Where diesel generators are required, Gottwald uses only state-of-the-art diesel engines. These are high-efficiency engines with lower emissions and are designed with current and future environmental provisions in mind, such as the European Euromot and the American EPA, which are anticipated to become more stringent in time.

These measures are reinforced by the development and application of state-of-the-art energy recovery technologies which save fuel and also further reduce emissions. The use or inclusion of biofuels for diesel engines can also make an increasingly important contribution to carbon-neutral operation.

Smaller Fleet and Lower Emissions

In the field of automation, too, Gottwald is making pioneering new developments. The completely new Lift AGV enables the container transport and storage processes in the stacking crane interchange zone to be decoupled, which means that the number of vehicles is reduced for the same productivity – with corresponding reductions in fuel consumption.

Achieving Zero Exhaust Emissions

In developing its Battery AGV, Gottwald has achieved its objective of producing cargo-handling machinery with zero exhaust emissions. This Battery AGV dispenses with combustion engines completely and draws its power from high-performance batteries. By the same token, using an external energy infeed for Harbour Cranes also completely prevents exhaust gas emissions from these machines in ports.

Reducing Dust Pollution

To minimise dust caused by handling bulk materials, it is common to use closed grabs. With the same aim in mind, modern hoppers employ underpressure systems and water injection to suppress dust, and conveyor belts can be enclosed for the same reason. Ancillary equipment of this type can be included together with Harbour Cranes in complete turnkey solutions provided by Gottwald.



A fleet of battery-driven Gottwald AGVs produces

0

exhaust emissions in the terminal



Gottwald's harbour cranes meet the requirements for further reduced noise emissions in accordance with Directive 2000/14/EG



& Light Noise Reduction

Avoiding and reducing the use of on-board combustion engines by using external power from the terminal's electricity supply not only has a positive effect on the total amount of energy required and exhaust emissions, it also reduces the noise levels of Harbour Cranes. At the same time, making use of external power sources reduces the maintenance costs for the on-board drive unit.

As well as drive units with the latest generation of diesel engines, Gottwald will place its trust in the future in machines with high-performance batteries wherever it is technically and economically feasible, for example in AGV and Lift AGV automated container transport vehicles, which will guarantee particularly quiet operation.

Less Light Pollution

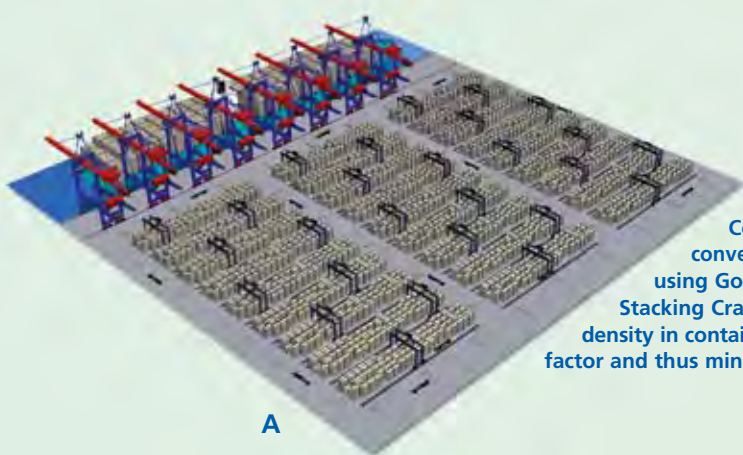
Automated cargo handling machines also dispense with the need to ensure bright lighting of large areas of the terminal. This not only cuts back on expensive energy, it also reduces light pollution, which, together with noise and exhaust gas emissions, is felt to be a considerable nuisance, especially close to residential areas.

New Lighting Technology

At the same time, Gottwald is counting on new lighting technologies to reduce scattered light, such as systems with prismatic lenses which bundle the light beam.

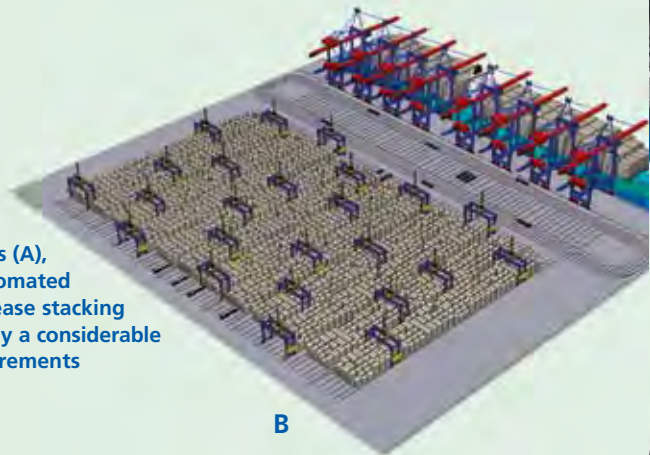


Automated cargo handling machines prevent light pollution and, in the case of Gottwald's battery-powered AGV, also result in reduced noise pollution since there is no longer a diesel engine on board. Bypassing the diesel engine by tapping in to the terminal's electricity mains for mobile applications such as Gottwald's Mobile Harbour Cranes, also reduces noise levels.



A

Compared with conventional solutions (A), using Gottwald ASC Automated Stacking Cranes (B) can increase stacking density in container stackyards by a considerable factor and thus minimise land requirements



B

Optimising Space

The space available in port and terminal areas is a finite resource and intended expansion often comes into conflict with municipal and other planning developments. One result of this is that the existing space, which may not be too extensive, needs to be exploited in the most efficient manner possible.

Gottwald Provides Suitable, Environmentally-Aware Solutions

- Consultancy services including terminal simulation to focus on cargo handling solutions that maximise productivity in the smallest space possible
- ASC Automated Stacking Cranes, with their excellent space efficiency rating, offer 1-over-5 solutions, and Twin ASCs consisting of a pair of cranes running on a common set of rails provide stacking densities of up to 1,350 TEUs per hectare, which is a significant improvement over conventional stacking systems

- Mobile Harbour Cranes with their high handling rates and mobility, especially where quay space is limited
- Portal Harbour Cranes provide optimum use of the quay space beneath the crane portal
- High-performance Floating Cranes are a real alternative and they do not require any additional quay area.

Increased Productivity

Machines and services provided by Gottwald can boost productivity in existing terminal sites to such an extent that more cargo can be moved with the same number of machines, or even fewer, and without a need for buying more land or developing the site.

m²



Gottwald offers solutions to the problem of limited quay space by providing not only versatile Mobile Harbour Cranes but also Portal Harbour Cranes, with their drive-under portals, Floating Cranes and Portal Harbour Cranes on barges which are independent of quays



Manufacturing Responsibility

Responsibility for our environment and sustainability start at the manufacturing stage at Gottwald Port Technology. Some typical examples:

- Avoiding waste and dealing responsibly with unavoidable waste and separating it for recycling
- Sophisticated light and heat management to noticeably reduce the amount of energy consumed at the facility
- State-of-the-art paint shop with an automated air-conditioning system incorporating heat recovery to ventilate the sections currently being worked in
- Use of water-based paints and solvent-free cleaners
- Active noise protection throughout the facility, which also fosters good relations with our neighbours.



As the manufacturing facility for Gottwald's handling machines, the company headquarters demonstrates numerous examples of environmental protection



Product Solutions

As the technological leader for Mobile Harbour Cranes and pace-setter in the automation of terminal logistics, Gottwald takes its obligations towards the human race and our environment very seriously.

We never cease to develop and optimise our products and services because solutions for more environmentally-aware cargo handling require sophisticated, reliable technologies. Along this path we keep discovering new potential for improvement. Both in concepts and in details. This ranges

from reduced-emission technological ideas through to consumables such as biodegradable hydraulic fluids and the addition of biofuels.

We promote sustainable development in terminal logistics through environmentally compatible technological solutions which then feature in state-of-the-art Gottwald products.





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