



DRY CARGO *international*



■ **Gottwald extends Generation 5 with addition of Model 2 harbour crane to its Small Crane Family**

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Gottwald introduces

new Model 2 harbour crane

Model 2 Harbour Crane as a G HMK mobile harbour crane with a chassis (right) and as the new G HRK rubber-tyred portal harbour crane, featuring the new manoeuvrable drive-under portal (left) The G HRK will be the prototype for the market launch.



First member of Small Crane Family widens Gottwald's appeal to smaller terminals

Since 2006, Gottwald Port Technology GmbH (Gottwald), a subsidiary of Demag Cranes AG, has been redefining standards in worldwide cargo handling with its Generation 5 harbour cranes.

As part of the company's continuous development activities, the range of models has been steadily expanded. Gottwald has now extended its Generation 5 by adding the completely new Model 2 harbour crane to the Small Crane Family. Model 2 is not only a new crane model, it is also available to terminals as a new type of Gottwald crane — a G HRK rubber-tyred portal harbour crane. The target group for Model 2 is made up of smaller terminals in maritime and river ports.

Looking back, 'You Name it, We Crane it' was how Gottwald launched its Generation 5 harbour cranes in 2006, thus writing a new chapter in the history of mobile harbour crane technology.

High handling rates and lifting capacities, impressive versatility and/or a high degree of specialization, cost effectiveness in terms of purchase and operation, at the same time individual tailor-made solutions and excellent reliability, safe working, ergonomic work processes and environmental friendliness — these are the clearly defined demands placed on state-of-the-art cargo-handling solutions.

These demands are met in full by Gottwald's Generation 5 harbour cranes, which are built with lifting capacities of up to 200 tonnes and working radii of up to 58m for terminals and

vessels of all sizes and categories and for all applications. This concept has been made possible by consistent application of the modular design principle and a high quantity of carry-over parts.

The combination of types and a wide range of variants, together with an advance-order programme, provide individual solutions with simultaneously short delivery lead-times. Terminal operators all over the world, who have bought in excess of 300 cranes since the introduction of Generation 5, have benefited from this concept. This includes customers who, before Generation 5 became available on the market, had tended towards individually manufactured custom-built cargo handling equipment.

GOTTWALD'S CRANE FAMILIES

Gottwald's range of cranes consists of three crane families each designed to meet the specific needs of the main target groups. After Gottwald initially launched its Generation 5 Large Crane Family at the beginning of 2006, consisting of the particularly high performance models 6, 7 and 8, the company went on to expand the range of harbour cranes with its Models 4 and 3 in 2007 and 2010 respectively in the Medium-Sized Crane Family. Cranes in the Medium-Sized Crane Family are designed as compact machines for standard requirements. The new Model 2, the successor to the HMK 170 of which more than 150 had



The three dedicated Gottwald crane families from left to right: Small Crane Family; Medium-Sized Crane Family; Large Crane Family. Each of the crane families is designed to meet the specific needs and applications of its main target groups.



been built, has now replaced the last of the Generation 4 cranes. At the same time, the launch of Gottwald's Model 2 introduces the first member of the Small Crane Family.

MODEL 2 HARBOUR CRANE

The entry level crane for professional cargo handling

The first member of the Small Crane Family has been specifically engineered to meet the special requirements of smaller terminals in maritime and river ports. As with all other machines in Gottwald's crane families, Model 2 combines proven technology with innovative advancements, which means it is

continuing the company's tradition of providing field-tested, reliable harbour crane technology.

With a maximum lifting capacity of 80 tonnes, radius of up to 40m and hoisting speeds of up to 120m/min, Model 2 offers considerably better lifting capacity, two metres more radius and faster working speeds than its predecessor, the 63 t HMK 170 mobile harbour crane, enabling better handling rates to be achieved.

In comparison with its predecessor, it offers numerous new features in terms of its construction and drive technology, such as AC powered hoists and slewing gear units, already used highly successfully on Model 3 for the first time. Potential customers interested in Model 2 can choose from a broad range of options for enhancing ergonomic working, productivity and environmental compatibility. Amongst others, there is the energy-efficient hybrid drive and equipment for making use of quayside connections to the harbour mains.



HMK 170 mobile harbour crane handling general cargo in the Port of Antwerp, Belgium. More than 150 of the predecessor of Model 2 were sold.

VERSATILITY ... TO MEET ALL REQUIREMENTS ...

Model 2 crane variants

As with all the Generation 5 models, Model 2 is available in many different variants. The sheer range of variants available, including the lifting gear and slewing gear drives, drive units and types, is a typical characteristic of Generation 5 and is based on differing needs, e.g. the terminal infrastructure, type of cargo, goods being handled and the required lifetime and cargo handling performance.

Model 2 is available to the market in three variants. Of these, there are two configurations as two-rope cranes and one as a four-rope grab crane for professional bulk handling. The two two-rope variants, equipped with a single hoist, have maximum lifting capacities of 63 tonnes up to a radius of 21m (maximum load moment 1,323 metric tonnes) and 80t up to 17m (maximum load moment 1,360 metric tonnes). They are ideally suited to handling containers and general cargo alongside barges, coasters and feeder vessels with up to eight container rows.

The four-rope variant, fitted with a second hoist, and with a 25-tonne grab curve for A8 classification (32-tonne grab curve for A7) is designed for professional handling of bulk materials such as coal, ore, agribulk and biomass, alongside barges, coasters and Handysize vessels. The four-rope grab crane has a maximum lifting capacity of 63 tonnes and a maximum radius of 38m.

Gottwald's modular range of cranes includes several types of cranes: for use on the quayside but also for applications in mid-stream and even on the open sea.



...AND FLEXIBILITY ...

for every infrastructure, the right Model 2 crane

Irrespective of the crane variants mentioned above, Generation 5 and, as a result, the new Model 2, now encompasses all the Gottwald crane types introduced since 1956. These include:

- ❖ conventional G HMK mobile harbour cranes on rubber-tyred chassis;
- ❖ G HSK portal harbour cranes on individually tailored rail-bound portals;
- ❖ floating cranes (G HPK and G HSK portal harbour cranes on barges) on individually designed barges; and
- ❖ stationary G HPK pedestal-mounted harbour cranes.

These types of cranes, which all use mobile harbour crane technology from the slew ring up and which were developed by Gottwald for different terminal scenarios, are now being extended on the occasion of the market launch of Model 2 by the addition of a new G HRK rubber-tyred portal harbour crane with a mobile, drive-under tyre-mounted portal. Once again, Gottwald has demonstrated its pioneering approach among the manufacturers of mobile harbour cranes.

The G HRK rubber-tyred portal harbour crane is a crane type aimed specifically at the existing requirements and needs of smaller terminals in maritime and river ports. Here, Gottwald is often faced with terminal infrastructures that offer very little room to manoeuvre and where drive-under handling machines

are preferred, which is why Gottwald, based in Düsseldorf, Germany, has built its first Model 2 prototype as a G HRK rubber-tyred portal harbour crane.

G HSK AND G HPK CRANE TYPES – for particularly individual solutions

As with all the Generation 5 crane models, Model 2 will also be available to terminals in all the known crane types. Terminal operators who opt for a G HSK portal harbour crane, G HPK floating crane, G HSK on a barge or G HPK pedestal-mounted harbour crane (this last is a stationary installation), are provided with individually tailored portal, barge and pedestal solutions designed and manufactured by us. In the field of floating cranes in particular, Gottwald covers the full range of possibilities: from a simple floating crane through to turnkey floating crane solutions for handling cargo alongside the quay, for mid-stream transshipment and even on the open sea.

HARBOUR CRANE TECHNOLOGY IN DETAIL – key assembly modules

From the slew ring up, all Gottwald crane types within any one family have corresponding geometries and are equipped with the same assembly modules: the tower, machinery house, cab and boom etc. With rail-bound cranes made by Gottwald, the height and width of the portal are adapted to the local conditions in

THE TYPES AND VERSATILE VARIANTS OF MODEL 2 HARBOUR CRANES

Crane type	Variant	Max. lifting capacities (t)			Max. hoisting speed (m/min)			Max. radii (m)	
		63	80	63* 25**	85	100	120	38	40
G HMK	2204	●				●			●
G HRK	2304		●		●				●
(G HSK/G HPK)	2204 B			●			●	●	

* Heavy-load operation (top), four-rope grab operation (bottom); ** A8 classification, 32-tonne grab curve in A7 classification.

G HRK rubber-tyred portal harbour crane

THE MOBILE PORTAL SOLUTION FOR NARROW QUAYS

INNOVATIVE COMBINATION OF TYRES AND PORTAL

Narrow but highly frequented and even blocked quays are a typical feature in many smaller terminals in maritime and river ports. In response to infrastructures of this kind, Gottwald has drawn on its many decades of experience in building G HMK mobile harbour cranes (on conventional rubber-tyred chassis) and G HSK portal harbour cranes (on customer-specific rail-bound portals) to

produce the G HRK rubber-tyred portal harbour crane.

The new crane type combines the benefits of G HMK mobile harbour cranes — that is, excellent mobility since the cranes can be quickly and easily travelled — with the advantages of portal solutions offered by G HSK portal harbour cranes: road trucks, rail vehicles and conveyor belts can be used beneath the portal. On the G HRK, this blend incorporates the generously sized standard propping portal with a propping base of 12.5m x 11m, combined with mobile harbour crane technology, which has been proven a thousand times.

MOBILE, DRIVE-UNDER PORTAL

This mobile, drive-under solution can pay for itself within a very short time. Thanks to the portal design which provides a clearance height of 6m and clear width of 9.5m, terminal transport vehicles can easily pass beneath the G HRK rubber-tyred portal harbour crane, which maintains mobility under the crane.

As a result of the portal being mounted on tyres, the G HRK rubber-tyred portal harbour crane is, itself, mobile and can — similarly to the conventional G HMK mobile harbour cranes — quickly and easily travel from one part of the terminal to another. In this way, this crane design

With a clear width of 9.5m and a clearance height of 6m, not only is the portal itself mobile, but it also ensures uninterrupted mobility on the quayside beneath the portal.



reduces the overall number of cranes required in a terminal and, as a result, investment costs.

The portal axles are in four alignments. The 16 tyres, the same size as those used for Gottwald's conventional G HMK mobile harbour cranes, are mounted in pairs in subframes which can be swivelled through up to 40° for crab steering. It is even possible to turn the new G HRK rubber-tyred portal harbour crane on-the-spot. The crane's tight turning circle, crab steering and on-the-spot turning all add up to excellent manoeuvrability, which means quick and easy positioning of the crane alongside the vessel, even where space is at a premium.

The two axles in each pair are spaced 2.1m apart. The spacing of 4.2m between the two inner pairs of axles means that a fifth axle can be fitted between them, retaining the same 2.1m spacing, if the G HRK rubber-tyred portal harbour crane is also to be used on quays with surface pressure restrictions, e.g. when travelling the crane.

The wheels of the rubber-tyred portal harbour crane have vertical terrain compensation of ± 250 mm to surmount obstacles as the crane is being travelled. This compensation is effected hydraulically due to the crane construction and not via the mechanical equalizer beams usually found on Gottwald cranes.

the same way as the number of wheels, which depends on the permitted quay loading. On the new G HRK rubber-tyred portal harbour crane, the portal is standardized in the same way as the chassis of the well-known G HMK mobile harbour crane.

THE CLASSIC G HMK MOBILE HARBOUR CRANE – Model 2 chassis

In the case of the classic G HMK mobile harbour crane with its H-shaped propping system, a propping base of 11.5m x 11m, mechanical equalizer beams to provide vertical compensation and with a rubber-tyred chassis, the crane is equipped with four axles. The spacing between the two pairs of axles is 2.1m, which means it is 450mm greater than that on the Medium-Sized and Large Crane Families of Gottwald cranes, where it is 1.65m throughout the range.

The greater axle spacing on the Model 2 cranes, which corresponds to the axle spacing used for the portal solution on the new mobile G HRK rubber-tyred portal harbour crane, ensures better distribution of the forces into the quay structure while the crane is being travelled, which is of particular importance when the load-bearing properties of the quay are restricted.

The chassis of the G HMK mobile harbour crane and the portal of the G HRK rubber-tyred portal harbour crane are also designed to allow a fifth axle to be included in case the four-axle version is likely to be insufficient for a particular quay structure.

The enclosed, soundproofed, compact diesel-powered generator unit is mounted on the chassis on the G HMK mobile harbour crane, while, on the G HRK rubber-tyred portal

harbour crane and G HSK portal harbour crane, this power pack is mounted on the portal. On the floating crane and pedestal-mounted harbour crane, the generator unit is located in a suitable position on the barge or close to the pedestal.

MACHINERY ROOMS

There are two additional machinery rooms on a base platform at the rear of the tower. The one closer to the tower houses the hydraulic installations and the second, adjacent, room contains the electrical systems and control unit. This construction reflects the philosophy of the Small Crane Family, for which the designers placed considerable emphasis on compact dimensions and reduced weights of the components. A key objective of this design was to facilitate transport and efficient erection on-site under difficult conditions. Such difficult conditions may be a lack of erection cranes or a particularly inaccessible site.

Positioned above the hydraulics and electrics rooms there is the hoist which is easily accessible for servicing and has a maximum hoisting speed of 120m/min, and which is also attached to the rear of the tower. The hoist drive, consisting of the electric motor and oil-cooled planetary gear integrated in the rope drum, can be fitted with optional weatherproofing, if required. The four-rope grab variant for professional bulk handling is fitted



On Model 2 cranes, seen here during erection of the prototype, the machinery and ancillary equipment are housed in a container mounted on the portal or chassis and in machinery rooms attached to the base platform at the rear of the tower.

with a second hoist to enable it to operate the two closing ropes, and this hoist is mounted above the first one.

The slewing gear, which has a rotary speed of 1.4 or 1.6min⁻¹, is mounted in the lower section of the tower. For the first time, this Gottwald harbour crane is fitted with slewing gear units with electric brakes which are released by solenoid valves.

AC POWERED HOISTS and slewing gear units

As the pacesetter in mobile harbour cranes and associated drive

technology, Gottwald has, for many years, made use of reliable DC electric motors for its hoists and slewing gear units in cranes of all sizes and ratings. When Model 3 was launched two years ago, the drive concept was enhanced for this, the smaller crane in Gottwald's Medium-Sized Crane Family, by fitting AC technology for the hoists and slewing gear units.

AC technology has been used successfully in numerous industrial applications, including mobile handling machines, and has shown itself to be cost effective, environmentally compatible and easy to service and, in addition, is available at prices that maintain this company's value-for-money approach.

The advantages of AC technology are these:

- ❖ regular maintenance of carbon brushes is no longer required;
- ❖ gentle, power-dependent starts mean reduced power surges for the generator;
- ❖ simplified integration of such equipment as energy storage media (ultracaps); and
- ❖ improved connection characteristics for quayside power sources due to reduced power supply disturbance, such as improved cosφ and mitigated line-side harmonics.

TOWER AND BOOM

Depending on the crane type, the tower of Model 2 cranes is connected to the chassis, portal or pedestal via a roller bearing slew ring and is a torsionally rigid, welded box construction. The construction ensures excellent transmission of forces and moments into the crane substructure and, via this path, the quay. The upper section of the tower has been designed to allow the luffing cylinder to recede into the tower as it retracts. Access to the tower cab is protected from the weather, ergonomically designed and convenient via stairways angled at 50°. The cab is positioned high up and forwarded on the tower to ensure an optimal view into the vessel's hold.

Access to the top of the tower is by ladders. The large tower platform provides easy, safe access to the rope pulleys for maintenance work.

The torsionally rigid three-chord boom is a tubular lattice construction attached high up on the tower. The permanently play-free bolted flange connections between the boom root and boom tip sections ensure a high

degree of rigidity and accurate crane motions.

ELECTRIC DRIVES – economical and environmentally friendly

Like all of Gottwald's harbour cranes, Model 2 also uses electricity as its energy source — which is the most popular form of energy in ports and terminals due to its cost effectiveness and environmental friendliness.

The machines are powered either from an on-board state-of-the-art diesel-generator or externally from the terminal's

electricity supply. The latter option significantly improves the efficiency of the drive system. In addition, electrical energy recovered during lowering and braking can be returned to the mains. Further advantages are the complete avoidance of exhaust gases and considerably reduced noise emissions in the terminal. If the terminal draws its electricity from regenerative energy sources, the crane owner also benefits from an improved crane life cycle assessment.

The diesel-generators fitted on-board guarantee optimum efficiency and low fuel consumption. In contrast to the Generation 4 predecessor, Gottwald's Model 2 now uses dynamic brake resistors as standard, which results in significantly improved energy management since fuel consumption can be reduced by as much as 15.2%*.

GOTTWALD'S HYBRID DRIVE – future orientated and sustainable

If the local quay infrastructure does not allow the Model 2 crane to be connected to an external power supply, Gottwald's hybrid drive provides reductions in fuel consumption of up to 23.2%*. The hybrid drive also results in lower noise emissions as the diesel engine has quieter running characteristics.

In the hybrid drive — a combination of an on-board diesel-powered generator and electrostatic short-term energy storage — the energy recovered during the crane's lowering and braking actions is stored and then made available to the crane's power system for the next work cycle. The short-term storage medium is provided by electrostatic wear and friction-free double-layer capacitors, which store the energy as electricity so it does not have to be converted, and have a high efficiency

* Achieved under specific deployment conditions and based on experience gained from operating a Gottwald Model 6 crane over a period of more than one year.



Gottwald cranes are equipped with efficient drives. Using external power supplies or the hybrid drive significantly improves the machine's overall energy-efficiency rating and the terminal's carbon footprint

rating, power density and cycle rate, which makes them ideally suited to the tough conditions of professional crane operation.

PRODUCT AND FEATURES

To ensure safe, ergonomic, economical crane operation and easy maintenance, Model 2, like all the Generation 5 machines, is equipped with numerous practical enhancements as standard, backed up by a range of optional features.

The standard features include dynamic brake resistors, automation aids for repetitive processes such as propping the crane, a camera on the boom head, a centralized lubrication system for the slew ring, boom root and luffing cylinder bearings and the ergonomically designed, comfortable tower cab with safe access via the weatherproof stairway system inside the tower.

Features such as the load guidance system including linear load motion, load antisway, point-to-point handling mode and hoisting height limiting, to mention just a few of the many options, are available and are intended to assist the crane driver in achieving high handling rates.

It's diversity that counts

GENERATION 5 CRANE DESIGNATIONS

Example: Model 2 as a rubber-tyred portal harbour crane, G HRK 2204 B variant

 **HRK 2204 B**

G	Gottwald logo element
HRK	the crane type is a rubber-tyred portal harbour crane (new type)
2	Model 2
2	lifting capacity range/hoist variant
04	number of axle alignments
B	four-rope grab crane variant for professional bulk handling

The designations given to the Gottwald cranes reflect the diversity of types and variants available in Generation 5. These names are both an expression of the company's innovation and confirmation of its tradition.

The crane-type abbreviations HMK, HSK, HPK and now HRK, have the 'G' for Gottwald as a notable prefix. The abbreviations are followed by the details of the model and hoist variant, the number of axles, axle alignments or the number of wheels fitted to the four corners of rail-bound portals. If the crane is designed for use with a four-rope grab, it will have a 'B' suffix. The most important parameters for each of the harbour cranes can be clearly derived from these names.

Professional bulk handling machines



Like the predecessor HMK 170 EG the Model 2 will also be available as professional bulk-handling machine with a four-rope grab, seen here as G HSK 2232 B.

Gottwald is a key supplier of machines and services relating to the handling of bulk materials. With handling capacities of up to 1,850tph** (tonnes per hour), the four-rope grab cranes are among the most powerful in the industry.

The HMK/HSK 170 EG, as the predecessor of Model 2, was a welcome addition to bulk terminals in small maritime and river port terminals, which is why Gottwald's Model 2 will also be available as a four-rope grab variant.

The key to this positioning in the bulk-handling market is, apart from the crane itself, in the systematic approach — the aim to enable the best possible blend of cargo-handling machines, like the new Model 2, with adjacent handling equipment, work processes, software and crane personnel.

As a consequence, Gottwald has not merely concentrated on developing high-performance harbour crane models, but also expanded its product range by the inclusion of complete packages for the quayside logistics chain in bulk terminals. These include, apart from Model 2 itself, hoppers and conveyor belts installed on the quayside. Added to these are such services as consultancy through the International Dry Bulk Competence Centre (IDBCC) in the UK and software designed specifically for bulk handling equipment by Gottwald's software subsidiary, DBIS.

** Depending on site and operating conditions

OUTLOOK

With the launch of Model 2 as the first member of its Small Crane Family, Gottwald has set a clear standard to be followed in professional cargo-handling at smaller terminals in maritime and river ports. By expanding its already generous range of products by the inclusion of the mobile G HRK rubber-tyred portal harbour crane, this company, based in Düsseldorf, Germany, is, once again, living up to its pioneering reputation and its claim 'You Name it, We Crane it': in other words, offering operators of particularly confined terminals who are on the look-out for mobile and, at the same time, drive-under handling machines, innovative solutions that combine proven mobile harbour crane technology with a standard portal. This new solution can, if the

need arises, be transferred to other Gottwald cranes.

The close relationship between the new G HRK rubber-tyred portal harbour crane and the conventional G HMK mobile harbour crane, and the repeated use of AC technology for the hoists and slewing gear drives are in line with this world market leader's sense of development continuity in mobile harbour cranes and other crane types derived from them.

The high degree of acceptance of mobile harbour crane technology and the variety of crane types resulting from that success and customer impetus provide confirmation for the company that, with its new G HRK rubber-tyred portal harbour crane, it has developed a cargo-handling that will exactly meet the market requirements in its designated field.

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