A new dimension in logistics in the paper industry

24/7 production and logistics operation

DEMAG

Customer
Palm Paper in King's Lynn, UK

Reels being handled in 24/7 production operation at Palm Paper in the UK. New dimensions in paper production.

The task: challenging
The solution: technology made by Demag

OUTSTANDING PAPER FACTORY

When Palm Paper put its PM 7 paper machine into production in King's Lynn to serve the British newspaper industry in 2009, it became one of the highest-performing paper factories in the world. The installation, which includes the world's largest stock preparation facility, produces high-quality newsprint from completely recycled paper.

There were also new challenges for us – not only due to the speed of the PM 7 with its enormous output. We supplied the crane systems for the production and storage operations at the Palm Paper paper mill on the East Anglia coast. Besides the logistics strategy at the facility, a new solution was also needed to pick up the packed rolls of paper.

24/7 OPERATION AT 2,200 M/MIN

24/7 newsprint production with a daily output of more than 2,800 kilometres of paper measuring 10.63 m in width imposes demanding requirements on the downstream processes. Since the paper is produced to order for almost all customers, the in-house materials handling systems must have a seamless interface with the customers' logistics operations. This combines two complex workflows. The requirement was to provide an integrated solution for the intermediate storage and shipping of 400,000 tonnes of newsprint.

Requirements

DEMAG FOR ALL CRANE LOGISTICS NEEDS IN KING'S LYNN

Palm Paper ordered the crane technology including all crane runways for production, maintenance and the automated paper-roll shipping store: for us, Palm Paper in King's Lynn became the largest paper industry project to date.

DR. WOLFGANG PALM, OWNER OF PALM PAPER, COMMENTS:
"Our PM 7 in King's Lynn is a success story – also thanks to our partner Demag, who provided us with help and planning advice from the very beginning. We are highly satisfied with the way the project was handled, the proven performance of the installation and the implementation in our systems."

NEW DEMAG GRIPPER TECHNOLOGY

We supply complete crane solutions from a single source including the required load-handling attachments. For the paper-roll shipping store, a new mechanical gripper system has been developed which sets new standards for handling and utilisation of the storage areas – which provides a significant increase in speed and performance.

THE CRANES EMPLOYED IN KING'S LYNN:

- Paper production
  - Two 150-tonne process cranes on the PM 7
  - Six double-girder overhead travelling cranes with capacities from 10 to 125 tonnes in various areas for stock preparation, maintenance and production
- Paper-roll shipping store
  - Six fully automated double-girder overhead travelling cranes with mechanical grippers
  - Demag warehouse management system (WMS) with a direct interface to the host computer at Palm Paper.

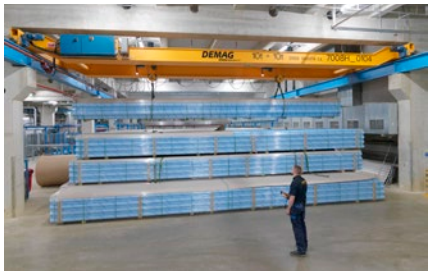
Mechanical grippers set new standards for automated handing of paper rolls

At a glance

Reliable and versatile cranes

Process crane at the dry end of PM 7

7 Overhead travelling crane above the packing machine



Overhead travelling crane for handling cores

CRANES WITH UP TO FIVE HOIST UNITS FOR EVERY APPLICATION

Two Demag process cranes with load capacities of 150 tonnes, which have been used for handling reels and maintenance of machinery since the PM 7 entered service, had already played a major role in the erection of the paper machine.

One crane, which operates at the wet end, is equipped with a 150 tonne crab to lift and turn the roller out of the machine. A masterslave function ensures that the lifting motions are absolutely synchronised for combined operation with two further 75-tonne hoist units.

SEMI-AUTOMATED CRANE POSITIONING

The crane operating above the dry end picks up the empty reels and returns them to the empty-reel store. It also lifts full reels onto the reel trolley, which transports the load on rails at right angles to the parallel second rewinder. Thanks to the semi-automated crane control system, repeated positioning operations are carried out quickly and precisely, which provides improved speed, safety and reliability for the process and the operator. Each fitted with two further 10-tonne cantilever crabs, the two crane installations have the required flexibility to perform repair and maintenance tasks.

CRANES AND WORKSTATIONS

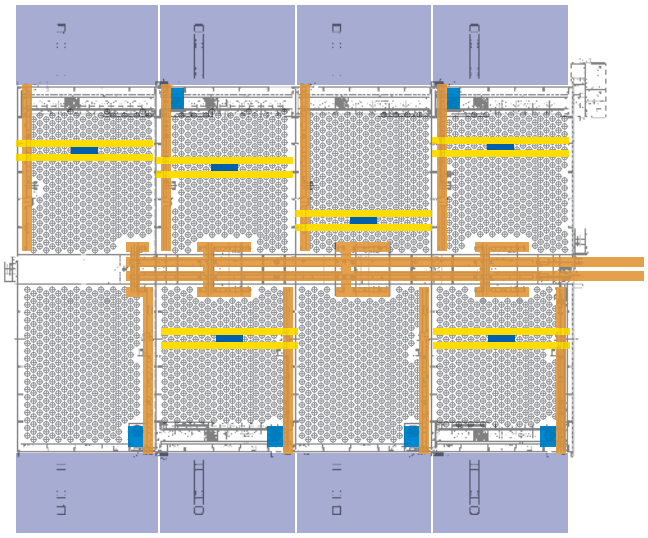
A process crane that operates above the second rewinder is equipped with two 16-tonne hoist units for transporting the empty reels between the reel trolley and the rewinder.
In addition, we supplied five other double-girder overhead travelling cranes with load capacities of between five and 125 tonnes for process and maintenance applications:

- in the recycling paper processing facility
- above the packing machine
- in the roller store
- for handling cores
- in the mechanical workshop.

Store layout

for higher capacity, more speed

The store at Palm Paper consists of four bays (112.5 x 36.05 m), crossed by conveyor systems. Two adjacent bays are divided up into a grid pattern for stacks of rolls measuring between 750 and 1,350 mm in diameter, two others are divided up into a grid pattern for stacks of rolls measuring between 1,200 and 1,600 mm in diameter. This arrangement provides optimum utilisation of the available space. With a theoretical fill level of 100%, the store will have a total capacity of 65,000 tonnes covering a total area of more than 12,000 m².



- Process cranes
- Gripper maintenance area
- Conveyor systemk
- Lorry loading zonee

HONEYCOMB LAYOUT

A honeycomb arrangement of the rolls of paper provides the best possible utilisation of the available space. Thanks to the new Demag gripper technology, the honeycomb layout can also already be used with the automated storage and order-picking operation for sets of rolls employed today.

Two double-girder overhead travelling cranes operate on each of the crane runways in bays 1 and 3. The cranes are assigned to dedicated working zones and, if required, one crane can also sustain the normal processes. One crane operates in each of bays 2 and 4. In combined storage and retrieval mode, the cranes can handle almost 400 rolls of paper per hour.

BENEFITS OF THE AUTOMATED CRANE-SERVED STORE

- Optimum utilisation of the available storage space (more than 30% less than manually served stores)
- Careful and gentle handling of the rolls of paper
- Maximum safety for operating personnel.

Rolls of paper being stored in stacks

24/7 production operation at Palm Paper in the UK

Our solution

New Demag gripper system for the paper industry

New gripper system for high handling rates

NEW SPECIAL GRIPPER FOR PAPER

To transport rolls with paper wrapping, we have developed a gripper system that can be used to firmly pick up single and sets of rolls with a constant contact pressure.

SIGNIFICANT INCREASE IN HANDLING RATES

The rolls of paper are transported by the conveying system to the store transfer points at the same height level as the PM 7. The warehouse management computer positions the process cranes with millimetre precision above the centre of the paper rolls. Depending on the roll dimensions, up to four rolls of paper can be picked up simultaneously in each operating cycle.
Under computer control, the groups of rolls (overall height of 3,600 mm, total weight of up to 6 tonnes) are precisely transported to their destination and stacked to heights of up to 11.5 m. Due to the compact gripper arm design, the rolls of paper can be stacked very close together at a maximum distance of only 150 mm apart. Rolls are retrieved direct by crane onto conveyor lines on level 0.

FIRM HOLD, SAFE, RELIABLE AND FAST

- The six gripper arms require only a minimum of space
- Fully automated handling of the rolls of paper
- Up to four rolls of paper in one operating cycle
- High speeds without any damage to the rolls of paper
- Safe handling thanks to reliable design even if two of the gripper six arms fail
- Redundant secondary monitoring sensors installed in the gripper.

The system

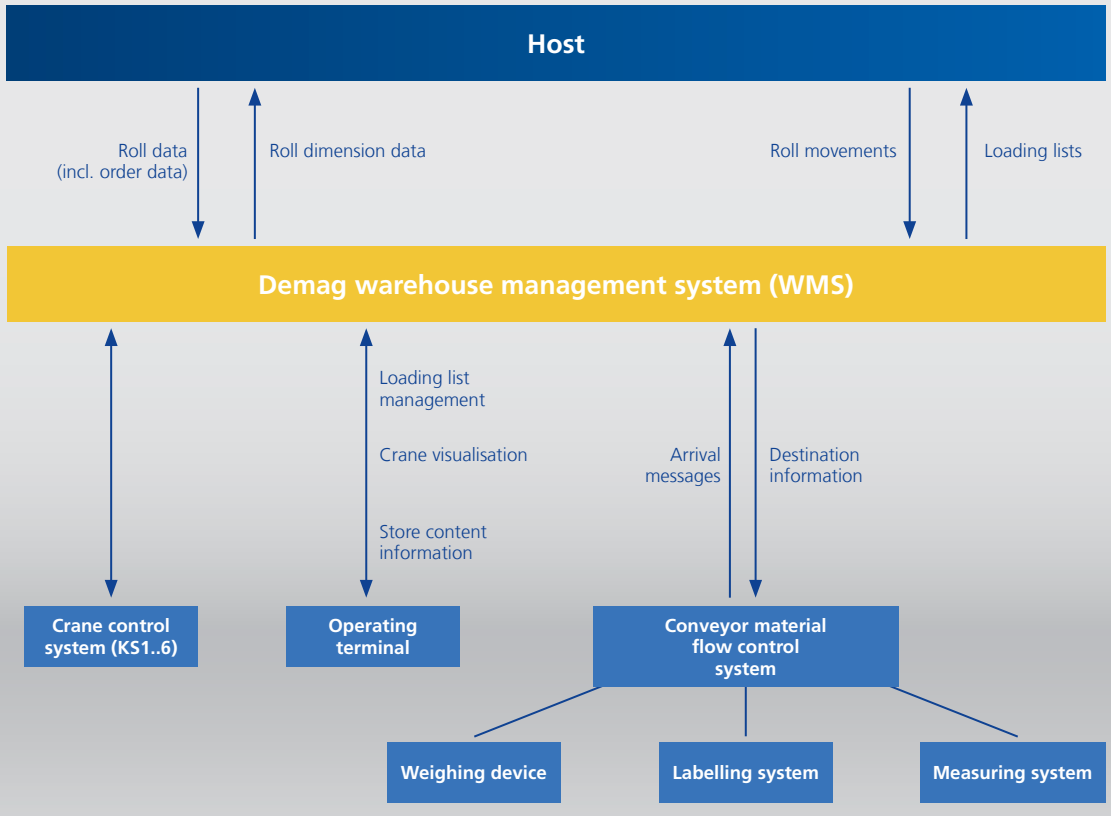
Logistics strategy – warehouse management system

All of the cranes are controlled by the Demag warehouse management system (WMS). This system links the production operation with the cranes in the paper-roll shipping store and the store logistics system, and also with the customer's host system.

The data on the produced rolls of paper are received from the customer's host computer system. The Demag warehouse management system communicates the destination for the rolls to the conveying system and to the crane control system. The rolls of paper are measured, labelled and stored fully automatically.

SCHEDULED RETRIEVAL

For retrieval, the host computer sends the loading lists to the WMS, which ensures that the rolls of paper are transported just in time to the lorry-loading bays. Every day, up to 9,600 rolls are moved and assigned in this way – carefully controlled by the warehouse management system.



Demag warehouse management system with interface to the customer's host system

Details

Complete range of intralogistics solutions with proven Demag Service

COMPLETE SOLUTIONS FOR THE PAPER INDUSTRY

We supply process crane solutions tailored to meet specific requirements worldwide. The paper industry is a key sector for which the company has unique industryspecific expertise to ensure efficient intralogistics processes in paper mills:

- crane solutions to serve paper machines and
- automated cranes and load handling systems for paper roll stores
- planning of roll stores including control systems
- warehouse management systems with interface to customer's host computer.

FULL SERVICE FOR THE PAPER INDUSTRY

In peak periods, up to 1,500 tonnes of paper are produced, buffered and staged ready for shipping at Palm Paper in King's Lynn every day. We offer comprehensive support throughout the lifecycle of the crane installations with its range of services.

- Maintenance and service agreements tailored to meet individual needs
- Remote diagnosis and maintenance
- Highly specialised pool of service engineers for process crane applications
- World-wide spare parts service
- Installation modernisation.

WE SUPPLIED 14 CRANES FOR THE PAPER MILL OPERATED BY PALM PAPER IN KING'S LYNN

Operating site	Crane type	Hoist units with load capacity [t]					Track gauge [mm]	Load handling attachments
Paper machine								
Wet end	ZKKW	150	75	75	10	10	30,100	Balancer for changing reels
Dry end	ZKKW	150	75		11	11	30,100	Balancer, non-rotatable reel spreader
Rewinder 2	ZKKE	16	16				22,000	Spreader for empty-reel transport
Production processes								
Core handling	ZKKE	10	10				13,500	
Roller store	ZKKW	62.5	62.5				21,540	
Packing machines	ZKKE	10	10				21,540	Spreader for rolls of packing paper
Mechanical workshop	ZKKE	5					5,600	
DIP stock preparation	ZKKE	20					28,700	
DIP stock preparation	ZKKE	12.5	6.3				9,900	
Automatic paper-roll shipping store								
3 automatic cranes in bays 1 and 2	ZKKW	6					35,500	Mechanical gripper for rolls up to 1,350 mm in diameter
3 automatic cranes in bays 3 and 4	ZKKW	4					35,500	Mechanical gripper for rolls up to 1,600 mm in diameter

ZKKW: process crane with multi-purpose open winch unit
ZKKE: standard double-girder overhead travelling crane

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