



## **White Paper**

# **Cabling for Material Handling**

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### *Synopsis*

This report is intended to give a general overview of the material handling market – which includes everything from fork-lift trucks and special elevators to small and large cranes – and to provide information about how Nexans is serving this market, mainly in the area of large cranes.

The paper opens with a definition of material handling, and briefly explores world trends and opportunities, concluding that in a world of open markets and global trade, material handling has a solid future ahead of it, requiring expansion, reinvestment and innovation on a worldwide scale. The paper then focuses on several challenges facing material handlers, who want to move bigger loads, more quickly and intelligently. These challenges give rise to a list of expectations of cable suppliers. Finally, the third section presents Nexans' overall solutions for the four key crane functions, and explains how its customers benefit from the Nexans' product and service approach.

This report is followed by an Appendix containing a list of recent Nexans success stories, innovations and references.

## 1. INTRODUCTION: A HEAVYWEIGHT IN THE WORLD ECONOMY

*“Material handling is the movement of raw goods from their native site to the point of use in manufacturing, their subsequent manipulation in production processes, and the transfer of finished products from factories and their distribution to users or sales outlets.”*

**Encyclopædia Britannica**

*“Every time a customer picks an item from a shelf, an entire industry stands ready to make sure that item is replaced and available for the next customer – quickly, transparently, and at a reasonable cost. It is easy to overlook the distribution infrastructure that fulfils demand for the large variety of goods consumers expect to be available anytime, anywhere.”*

**Mike Ogle**

Material Handling Industry of America

### What is material handling?

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According to the U.S. Department of Commerce and Bureau of Labor Statistics, material handling and the logistics associated with it are a \$60 billion dollar industry in the United States, employing nearly 300,000 people. These figures do not include the ships, trucks, and airplanes used to carry goods, but do include the yearly combined consumption of material handling equipment (like cranes, hoists, conveyors, monorails, carts, lift trucks and robots, etc.).



They also include a host of related services in which data-based material handling logistics play an ever more important role to ensure that the right product is delivered in the right condition, in the right quantity, to the right location, at the right time, in a safe manner, and at the right cost.

Given the all-pervasive nature of material handling and the rapid increase in world trade, especially to and from the Far East, it is next to impossible to arrive at an accurate figure for material handling in global terms. However, since the United States represents 20% of the world economy, it would be reasonable to suggest that material handling currently represents some \$250 to \$300 billion per year worldwide, and this is probably a conservative estimate.

Well over 1,000 competitors produce material handling equipment and systems around the world, although global output is dominated by a comparative handful of firms headquartered primarily in the developed nations. The traditionally fragmented world material handling industry has been consolidating at a fairly rapid pace in recent years, with larger-scale merger, acquisition and divestiture activity continuing even in the lackluster climate of the early 2000s. Further consolidation is expected, as barriers to entry rise with the increasing technological intensity and globalization of the business, and price competition remains high.<sup>1</sup>

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<sup>1</sup> From an abstract of *World Material Handling Equipment*, done by the Freedonia Group. The full study is available at [http://www.the-infoshop.com/study/fd11311\\_world\\_material.html](http://www.the-infoshop.com/study/fd11311_world_material.html)

Today's material handling is an integrated process from the source of raw materials to the manufacturing or assembly plant, and then to final delivery. Modern systems strive to achieve economies of scale through transporting large quantities (bulk carriers) and in standardized units (containerized shipping).

Material handling also includes the manufacturing process. Moving single-flow assembly lines use overhead cranes and handling equipment to make everything from consumer items and white goods to large manufactured products, like passenger aircraft and railway locomotives. Many of these assembly-line techniques are used in rail and harbor terminals to move goods and materials around the world. Thus, material handling is in many ways a macro application of the industrial process, itself.

## **Some basic large crane types**

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The real backbone of the material handling industry is cranes, both large and small. This White Paper will concentrate on the crane business, although material handling equipment also includes fork-lift trucks (which account for a large share of the market in the U.K.), conveyers, monorails, elevators, etc.

Cranes serve four main sectors: general engineering projects; manufacturing and heavy industry; ports and freight-handling facilities; and the building and construction industry.

For example, in a container terminal located in a port or at a multimodal train hub, both inbound and outbound containers are unloaded and loaded, while adjacent storage yards temporarily store containers in transit. The storage yard is usually divided into rectangular regions called *blocks*, which are typically seven rows wide. Six of these rows are used for storing containers in *stacks*, and the seventh for truck passage. Containers are stored on top of each other to a height of five or six levels, with the top level left empty to accommodate container movement.

The placing of a container in a stack, or its retrieval, is carried out by huge cranes called yard cranes. The most commonly used yard cranes are *Rubber Tired Gantry Cranes (RTGs)*. The RTG stands on two rows of tires and spans the seven rows. The horizontal bridge has a spreader (hoist) that moves across the width of the block between rows one to seven to pick up and put down a container in any stack or onto a truck. Lateral movement of the spreader is made possible by a festoon cable, providing both data and energy, hanging under the bridge in a series of U-shaped loops. The RTG also moves forward and backward on its tires for the full length of the block.

An even larger version of this crane is the *Rail Mounted Gantry Crane (RMG)* which usually covers 13 rows between its legs, and serves a stack height of six containers. RMGs are fixed to a given block, unlike the smaller RTGs, which can be moved from block to block on their rubber wheels. The RTG's greater flexibility is what makes it the most commonly used container handling crane for storage yards.

Another common crane type is a *Quayside Crane (QC)* or *Ship-to-Shore (STS)* crane which loads or unloads containers close to the vessel, from and to Internal Trucks (ITs) which take them to the storage yard for storage until they are picked up by consignees.

However, within in the four main crane sectors mentioned above, there are literally hundreds of crane types manufactured around the world by the leading OEMs, including:

- Hydraulic Lattice Boom Crawler (Sumitomo, Japan)
- RTG (MI Jack, USA)
- Marine self-propelled Floating Crane (Waagner-Biuro, Germany)
- Quayside Crane (ZPMC, China)
- Mobile truck-mounted Telescopic Crane (CKD Mobilni, Czech Republic)
- Rail crane (Cowans Sheldon, UK)
- Hydraulic Deck Crane (MSI Hercules, USA)
- Tower Crane (Kroll, Demark)
- Mobile telescopic crane (Luna, Spain)
- Railway cranes: breakdown, track-laying, maintenance (Gottwald, Germany)
- etc.<sup>2</sup>

Aside from hydraulic telescoping technologies, one important variation in various crane constructions is the incorporation of a large mono spiral or cylindrical *reel* on which data/energy cables are coiled. This requires a cable with special characteristics in terms of tensile strength, high mechanical stress, and fast operating speeds.

STS cranes, RTGs and RMGs are fitted with a *spreader* or hoist to assure up and down lifting capacity. Here, too, all spreader cables must deliver rapid acceleration/deceleration and high operating speeds.

Finally, although we have focused on the large top-end cranes, it must not be forgotten that thousands of small and medium-sized crane types are used for all of the applications mentioned above (bulk handling, manufacturing, and distribution). Small cranes are often used on assembly lines, and small-scale handling operations.

## **World trends and opportunities**

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In order to fully appreciate the rapid expansion of material handling growth in the world, it is interesting to examine the case of the port of Hong Kong, not only because of the high volume of goods handled, but also because of its strategic location in East Asia, and its concerns with heightened service levels and efficiency.

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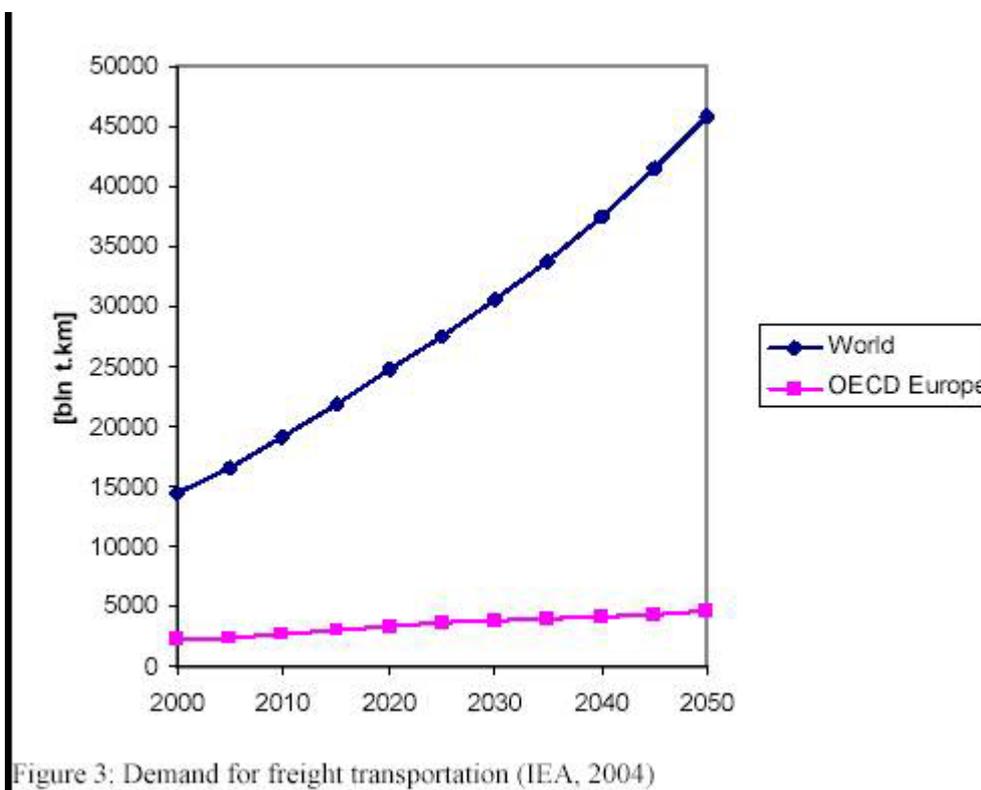
<sup>2</sup> For more information, consult [www.lifting-world.co.uk](http://www.lifting-world.co.uk)

According to a recent paper on decision-making in material handling in a container terminal:

Hong Kong is the busiest container port in the world. Container shipping is the lifeblood of Hong Kong's economy. Hong Kong is the principal entry port in the Southern China region, a region enjoying strong economic growth. The volume of containers transported through Hong Kong has been increasing by 10% yearly since 1986. The throughput in 2000 totaled 18.1 million TEUs.<sup>3</sup>

The throughput is estimated to reach 32.8 TEUs by 2016 (Report of Hong Kong Port Development Board, 1998). The intensity of container traffic in Hong Kong is estimated to be seven times that of New York, while the cramped space in Hong Kong container yards makes it very challenging to maintain high-quality service.<sup>4</sup>

If Hong Kong's port scenario predicates strong and continuous growth of around 10% annually for cargo handling in the next 11 years, the *Transport and communication bulletin for Asia and Pacific*<sup>5</sup> equally predicts a rapid increase in worldwide freight transportation: 200% until 2050. Note, that rates in OECD Europe will rise, too, but incrementally.



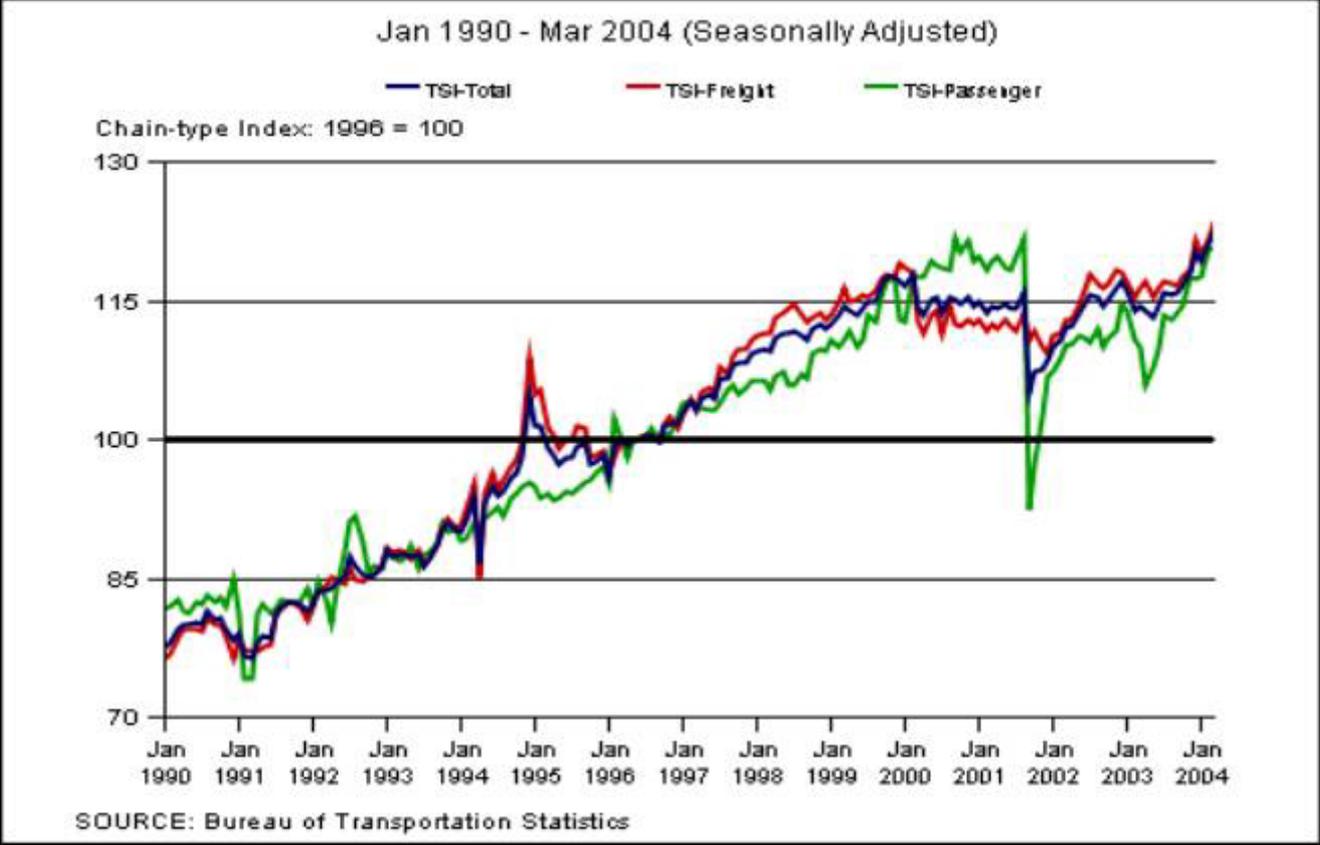
This growth is also based on the fact that air freight transport is expected to almost triple during the next two decades, and that maritime time transportation is expected to grow by 5% by 2010. Both of these trends are due to the easing of hitherto restraining trade barriers, and the subsequent increase in global trade. They will affect the need for world handling resources worldwide, especially since one definite trend is a multimodal approach to freight movement, with similar distribution centers located in close proximity

<sup>3</sup> A standard container size unit: twenty-foot equivalent unit (TEU)

<sup>4</sup> Katta G. Murty et al., "A decision support system for operations in a container terminal" at [www-personal.engin.umich.edu/~murty/DSSpaper](http://www-personal.engin.umich.edu/~murty/DSSpaper)

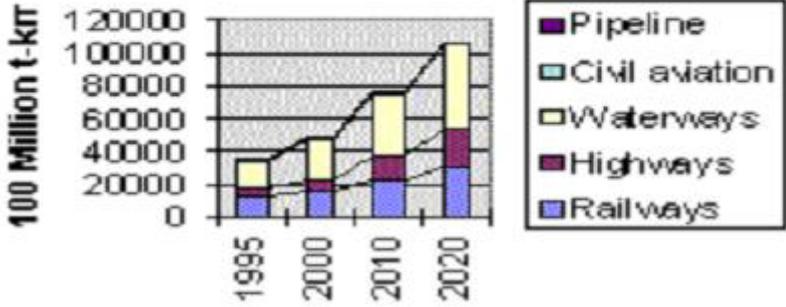
<sup>5</sup> See [www.unescap.org/tctd/pubs/files/bulletin70](http://www.unescap.org/tctd/pubs/files/bulletin70)

These dramatic growth figures are supported by the Transportation Services Index (TSI) used to gauge passenger and freight transportation growth in the US:



Figures from the Asian Area clearly support this increase. However, here waterways will clearly play a predominant role in moving freight traffic:

**Figure 4 Freight Traffic Turnover in 1996 -2020**



As the positive scenario for the port of Hong Kong, and the three sets of figures (World, US and the Asian Area) show, there is going to be a significant increase in global trade in the future. This increased traffic will have to be accompanied by an upgrade in material handling resources in all vital transport sectors if bottlenecks and delays are to be avoided.

Even in the short term, the worldwide market for material handling equipment and systems is projected to increase 6.2 percent per year through 2006. This will represent a significant recovery from the sluggish early 2000s performance that was negatively impacted by the global economic slowdown.

The principal factor fueling gains will be improved by conditions in the world economy, which will result in accelerating demand for goods and create opportunities for suppliers of goods-handling products and services of all types. In addition, the ongoing spread of e-commerce is expected to create greater need for warehouses and other storage facilities, stimulating further demand for material handling equipment and systems.

## **Where material handling growth will be strongest**

The most direct beneficiaries of economic recovery will be the mature, cyclical markets of the industrialized nations (the US, Canada, Western Europe and developed Asia/Pacific) many of whom have been in recession during the early 2000s. In addition, developing countries will see stronger commodity prices and rising global demand for electrical/electronic products, consumer durables and other items that tend to be widely exported from such countries.

The fastest per-annum growth is expected in the Asia/Pacific region, where numerous countries are undergoing rapid industrialization and where demand has been suppressed since the regional financial crisis of 1997–8. However, the booming volumes of incoming raw materials and outgoing finished goods through the Sea of Japan, the Yellow Sea and the South China Sea mean that there will be a massive expansion of infrastructure, especially port facilities and material handling equipment (large cranes). Meanwhile, Eastern Europe is also registering above-average growth in material handling demand, as markets for consumer and business products continue to increase during a successful economic transition phase.

The US, Japan and Germany are the world's largest producers of material handling products, each registering annual shipments in excess of US\$10 billion as of the early 2000s. Germany and Japan are by far the major net exporters, although China and South Korea are expected to become increasingly important global suppliers over the next several years.<sup>6</sup>

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<sup>6</sup> From an abstract of *World Material Handling Equipment*, done by the Freedonia Group. The full study is available at [http://www.the-infoshop.com/study/fd11311\\_world\\_material.html](http://www.the-infoshop.com/study/fd11311_world_material.html)

## 2. CHALLENGES AND CUSTOMER EXPECTATIONS

### Handling bigger loads

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The size of aircraft, ships and even trains (i.e. convoy length) has continued to increase over the years, and will continue to do so. In 1962, the BAC 111 offered 79 passenger seats. The new Airbus A320 super jumbo will carry 555 passengers on two decks.<sup>7</sup> An increase in size applies to cargo aircraft as well (freighters) to meet the challenge of air cargo tripling by 2018.<sup>8</sup> Similarly, trains are continuing to play a vital role in trade, and new transcontinental cargo-liners several kilometers long may soon be transporting goods between Europe and Asia in a mere eight days. Also, ships, both bulk and carriers, have vastly increased in size.



Originally, the size of the Panama Canal lock chambers (i.e. 35.5 × 304.8 meters) was the limiting factor for Panamax size ships. However, the first post-Panamax ships appeared in 1998. These vessels have dimensions that do not allow it to transit the Panama Canal. With beams of either 40 m or 43 m, they can carry respectively either 16 or 17 container rows across the deck. Now super-post-Panamax container ships with lengths of 400 meters and a beam of 50-54 (21-22 container rows on deck) are appearing which will be used for high-volume, long distance trade routes between northern Europe, Asia and North America.

Naturally, this growth in aircraft, train length, and ship size has an impact on the airport, rail hub, or harbor facilities where cranes and handling equipment play a key role. According to a study of Baltic World Ports (*Heavyweight Boxing*):

By far the biggest challenge for ports will be the need to expand infrastructure to accommodate the high container volumes resulting from calls by super-post-Panamax ships. We believe this aspect will require ports and their operators to introduce new handling techniques and terminal systems to achieve the rapid turnaround of ships and to accomplish a seamless interchange of containers with the various modes of inland transportation.<sup>9</sup>

Ship-to-Shore (STS) super-post-Panamax cranes are now installed in ports as diverse as Savannah, Georgia; Oakland, California; Singapore; Mumbai (Bombay), India; Colombo, Sri Lanka; Halifax, Canada; Southampton, UK, and Hamburg, Germany.

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<sup>7</sup> See [www.aerospace-technology.com/projects/a380/](http://www.aerospace-technology.com/projects/a380/)

<sup>8</sup> From the *Airbus Global Market Forecast*, available at <http://www.gpi.faa.gov/conference/procdoc2000/schof.pdf>

<sup>9</sup> For more information about ship size and the impact on ports and cranes, see *Heavyweight Boxing* at [www.thebaltic.com/supplements/World%20Ports/heavy.htm](http://www.thebaltic.com/supplements/World%20Ports/heavy.htm)

The move up in size has repercussions in the crane OEM market, and also affects subsystem and cable suppliers. Already “drum” manufacturers have been increasing production by 20-30 percent. There is a drive to reduce the total weight of the crane. This calls for lighter, stronger materials, including cables, and new state-of-the-art designs.

## **Speeding up the flow of materials and goods**

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Generally speaking, optimal efficiency of handling involves a balance between the desired speed of a shipment and its size, weight, and composition. To lower costs and boost efficiency, the ultimate goal is to minimize the berthing time of vessels, or the expensive waiting time of specialized all-cargo aircraft, railway freight cars, trucks, etc.

In one of the world’s busiest ports, Hong Kong, 18 berths add up to a 6-km-long loading/unloading line. On average, all the terminals process around 35 ocean-going vessels per day, with a container flow (in both directions) of about 32,000 TEUs<sup>10</sup> between the berths and the storage yard. There are close to 30,000 XTs (external or customer trucks) bringing export containers to or picking up important containers from these terminals every day.

To cope with this intense degree of activity, it is very important to have high crane speed both vertically and horizontally. For example, many 22-story-high super-post-Panamax cranes have a hoisting speed of over 60 m/min with an empty spreader and 30 m/min with a maximum load. The trolley traverse speed is 76 m/min and the gantry travel speed is 135 m/min. This means that over 30 cargo containers can be unloaded per hour to ITs (Internal Trucks) for transport to the terminal’s container storage yard.<sup>11</sup>

Material handling at this velocity, and even at far higher speeds, puts a lot of strain on cables and cabling systems in terms of flexibility, durability, high-temperatures, tension, torque and overall wear and tear.



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<sup>10</sup> A standard container size unit: twenty-foot equivalent unit (TEU)

<sup>11</sup> Katta G. Murty et al, “A decision support system for operations in a container terminal” at [www-personal.engin.umich.edu/~murty/DSSpaper](http://www-personal.engin.umich.edu/~murty/DSSpaper)

## **Adding intelligence to handling systems**

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Given the scale and complexity of any major handling facility, it is essential that computerized support tools be integrated, either to remotely operate the cranes and equipment, or to assist the complex logistics that are needed to move from an emphasis on storage to an emphasis on “flow through” supply chain management. In the past, inventories were always considered to be “at rest,” whereas now they are considered to be “in motion” according to recent just-in-time (JIT) philosophies.

According to one independent material handling consultant firm:

Customers today are challenging companies to deliver smaller lot sizes, higher levels of quality and shorter lead times. They have come to expect continuous technological breakthroughs that condense product development times and shrink product life cycles. The main driver that affects these changes is material handling equipment.<sup>12</sup>

This means that end-customers and their material handling suppliers and planners are clamoring for more intelligence. Even smaller cranes and robots used on industrial assembly lines must be smarter, providing more data transmission capacity for both control purposes in the manufacturing process, but also for accumulating valuable warehousing and distribution information.

A dedicated, static handling system is no longer adequate to meeting the every-changing buying habits of consumers and the distribution patterns for goods. Rather than operate as a stand-alone unit, cranes and transporters of all types will eventually be part of an information-rich, dynamic supply chain which will extend from initial material acquisition to the end point of sale and delivery. Automatic identification equipment such as scanners, RF identification bar codes, weighing systems and real-time location tracking will interlink with warehouse, transportation, and yard management software. Finally, a full-integrated, Internet-based material handling system will provide unprecedented visibility and flexibility to handle all kinds of material or goods, moving anywhere on the surface of the globe by air, sea or land.

This demand for information is what has led many crane and equipment manufacturers to already build higher data capacity into their products, whether hybrid energy/databus cables based on copper technologies, or full-fledged optical fiber solutions.

These “smarter” crane cables must meet the same high-speed movement and wear requirements mentioned above.

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<sup>12</sup> From the service offer of the material handling Logistics Consulting Group at [www.lcgrp.com/ehserv05.htm](http://www.lcgrp.com/ehserv05.htm)

## Customer expectations of cable suppliers

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Whether a wholesaler, a component and system supplier, a complete crane manufacturer (OEM) or an end-user – like a port/rail/air terminal authority, public utility, or heavy industry – all would like to see larger and faster cranes which can transport, load and unload safely and without the risk of costly delays and breakdowns. They would also like more control and data functions to facilitate operations and contribute to delivery logistics. Above all, they want both commercial off-the-shelf (COTS) cable products that can assure interoperability and easy procurement, and high-end cables which can help lower “expense per unit handled” and enhance efficiency.

The material handling industry also has specific expectations from cable manufacturers:

- a complete range of products and cabling solutions adapted to national and international specifications and patented technologies
- lighter, smaller cables for more compact and efficient cranes
- cables with durable sheaths to endure high acceleration and braking speeds, especially for spreaders
- cables for four different markets: general engineering; manufacturing and heavy industry; ports and freight-handling; and the building and construction industry
- hybrid energy/data cables for the main crane functions: festoons, reels, spreaders (hoists), and for control
- short deliver times to avoid expensive production and transport stoppages
- special cables for a new generation of large cranes designed for the super-post-Panamax environment
- technical support for high-end products and fast repair services
- special braiding to resist repeated tensile and torsion stress

### 3. NEXANS: THE GLOBAL EXPERT IN MATERIAL HANDLING CABLING

Nexans' global offer in the material handling sector is both broad and adapted to specific needs. Nexans cables are often thinner and lighter than those of the competition, thus saving money for a complete handling system. Also, the cables usually offer higher tensile strength (in terms of Newtons), thus ensuring a long life cycle for cranes, and an added safety factor for goods and personnel. High quality, resistance and reliability are also important factors for long-term savings. Permanent emergency stock availability, delivery logistics and rapid maintenance support, reduce, if not eliminate, the need for expensive safety inventories.

Nexans strong international presence and regional sales offices also meet the transnational nature of the industry. However, the extremely wide variety of cables from one single world-based supplier is certainly a unique advantage among the leading OEM crane manufacturers whose catalogue often contains multiple crane types and material handling solutions.

#### Solutions for four key crane functions

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Nexans produces an entire range of cables to serve the four critical functions of various crane types: festoons, reels, spreaders and control for both small and large cranes.

##### Festoon Applications

*Festoons are extendable all-energy or data/energy cables which permit the movement of a crane trolley back and forth along a horizontal beam supported by two towers that are often mounted on rubber tires (rubber-tired gantry cranes/RTGs) or on tracks (rail-mounted gantry cranes/RMGs). Since they can easily serve a large rectangular area, bridge cranes are widely used in storage yards in ports and train hubs. Overhead traveling cranes are a smaller version of this technology, and are often found indoors on factory assembly lines.*



Nexans produces standard low-voltage (up to 750 V) **PVC flat cables**, both screened and non-screened, which provide flexibility and compactness for fast-moving, small overhead traveling cranes. Similar **rubber flat cables** are used in extremely abrasive environments, or for extremely low or high temperatures (-40°C to 80°C) both indoors and outdoors.

**Rubber round cables** combine both data and energy with an integrated databus. These flexible, long-lasting cables are ideal for high-speed applications on large cranes, and are optimized to handle 200 MTM and more. This is definitely a high-end cable which is beginning to be much appreciated by leading large crane manufacturers.



For data transmission for bridge or gantry cranes, Nexans manufactures a **rubber-sheathed optical fiber** cable which is totally impervious to troublesome electro-magnetic interference. A smaller M cable was originally developed for mining equipment applications, but both it and the thicker R version perform excellently on ship-to-shore cranes in festoon and e-chain configurations. The R version even offers sufficient tensile strength for reeling.

### Reel applications

*Spring cable reels are used for the automatic reeling of cables on various types of moving equipment, including most hoisting and material handling devices, e.g. portal cranes, grabs, magnets, lift and working platforms, excavators, mobile cranes, transfer cars, transport systems, etc. Motorized cable reels use an electrical drive system for similar applications on many crane types and handling systems.*

Nexans manufactures both low-voltage and medium voltage polyurethane-sheathed **standard reeling cables** to feed and control motors on moving equipment. A multifunctional hybrid cable, they are rolled in mono or multi-spiral drums, providing maximum flexibility under high tension and traction.

**Heavy duty rubber cables** come in two versions for motor driven reels. A standard version can move at 120 meters per minute, while the thinner and lighter Reduced Torsional Stress (RTS) cable can deliver 200 MPM to significantly enhance crane operating speeds.

A 3 to 30 kV high-voltage **high-stress rubber cable** provides energy and data for large STS cranes in versions with or without fiber optics. Standard operation speed is 190 MPM, but with an integrated steel strength member, it can handle up to 240 MPM.



Nexans **reeling and strong reeling rubber optical fiber cables** are very similar to the rubber-sheathed optical fiber cables used for festoons. The strong-reeling (SR) version uses a steel strength member to provide the exceptionally high tensile strength needed to achieve very high speeds, up to 240 MPM.



Low-voltage and medium-voltage **flat reeling cables** are used mainly for container handling cranes, but also for special purposes requiring combined energy and data capability. Its flat form has a distinct advantage since a longer length of cable can be wound on one drum to accommodate long crane movements.



### Spreader applications



Spreaders (or hoists) are suspended elongated bars with attached hooks and/or chains used for lifting or lowering a freely suspended load. Special cables are required to provide low-voltage for the reeling application, to allow them to move up and down safely and rapidly.

Nexans **spreader reeling cables** provide control, often with rapid acceleration and at high operating and braking speeds. Since goods movement depends on the rapid attachment and swift movement of the spreader, this cable plays a critical role in one of the cranes most difficult functions.

### Control applications

Control cables allow an operator to command the three-dimensional movement of an individual object, package or container in close proximity via a hand-held control box.

Nexans **pendant cables** are supported by a steel strength member for optimum ruggedness. They can contain from 3 to 54 cores for multiple shipping or handling operations.



## Customer benefits

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Nexans' offer on the material handling market is built on several strengths. Since Nexans' reduced outer cable diameters can deliver the same energy and data capacity in a smaller size, or increased capacity in the same size, this means important cost savings for systems suppliers and OEMs. Lighter cables also greatly facilitate the construction of large cranes, allowing builders to serve the need for super-post-Panamax cranes in megaports and for large industrial operations. Reliability and ruggedness means fewer expensive breakdowns and work stoppages for the end-user. For example, new anti-torsion polyester braids greatly increase stability and minimize twisting. And a second sheath bonded with a third one gives the cables unsurpassed mechanical and chemical properties, including elongation at break, and resistance to abrasion, ultraviolet rays, and ozone.

In addition, Nexans offers a number of important services to meet growing material handling requirements. Shared **expertise** makes it possible to find the right cable product and solution for the right crane application. Sometimes this can be a standard, easily available COTs product; or it can be a special customized cable that can deliver both operational energy, and the high data capacity that users are demanding in an increasingly automated and integrated industry. Also, Nexans **global presence** means that multi-supplier programs and international joint ventures and projects are greatly facilitated. In keeping with the "philosophy" of material handling to deliver what customers need where they need it and reduce redundant emergency inventory, Nexans, too, has the logistics necessary to support its customers worldwide, especially in Europe and the Far East. Nexans has continued to develop new cable designs and materials so as to increase the **performance** of an industry which is always looking for ways to speed up operations, cut costs, and ensure reliability. Finally, Nexans has continued to build **partnerships** with its customers by coupling innovation with an assured source of supply. By working closely with wholesalers, suppliers, OEMs and end-users, year in and year out, Nexans knows where the material handling industry is headed, and what it needs to improve manufacturing processes and increase shipping capacity.

Furthermore, Nexans' new generation of material handling cables have gained important economic advantages for its customers:

- Important savings by reducing the types of cables required for a wide range of cranes and handling equipment
- process savings by being able to deliver cables in longer lengths
- installation savings because of smaller reeling and guiding systems (up to 40%)
- lower shipping costs (up to 20%)
- longer equipment life due to cables with high tensile strength and torsion resistance
- fast on-site repair to avoid costly delays

**By offering a wide range of cables and solutions based on a long experience of the material handling industry, Nexans is helping its partners to meet the 6 to 10% growth projected for this sector in the coming years.**

## 4. APPENDIX

### **Some recent Nexans success stories, innovations and references**

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- Nexans delivered advanced festoon and high-voltage reeling cables to Shanghai Zhenhua Port Machinery Company Ltd. (ZPMC), a worldwide supplier of container handling cranes and rubber tired gantry cranes (RTGs).
- Nexans is the leading supplier of pendant cable for the international original equipment manufacturer, KCI Konecranes Group, which produces Light Lifting Equipment, Industrial Cranes and Components, Heavy Duty Cranes, and Harbor and Shipyard Cranes.
- For the Swedish Atlas Copco Group, a world leading producer of construction and mining equipment, including underground loading equipment, Nexans provides a family of cables with high tensile strength that can handle shocks, tears to the sheathing, and rough handling in the tough mining and tunnel drilling environment.
- Nexans provides reeling cable for Delachaux, which produces motorized reeling drums and spring-operated reels needed for cranes in the steel industry and bulk handling cranes.
- Gottwald Port Technology is a manufacturer and supplier of port and railway cranes, including breakdown cranes for accident clean-ups, track-laying cranes, and various maintenance and universal cranes. Nexans recently provided them with HV cables for rail-mounted gantry cranes which will be used in a new Italian railway terminal.
- Nexans developed a special Optical Fiber cable that can be operated at 240 meters per minute, which is widely used in leading German steel plants.
- For Stemann in Germany Nexans provides flat-form reeling cables that are ideal for slow applications. An advantage of its flat form is that a longer length of cable can be reeled onto one drum. Stemann has been supplying reels to China.
- Nexans supplied spreader cable to the European Container Terminal in Rotterdam, which is the largest container port in Europe and to the MTL Terminal in Hong Kong.