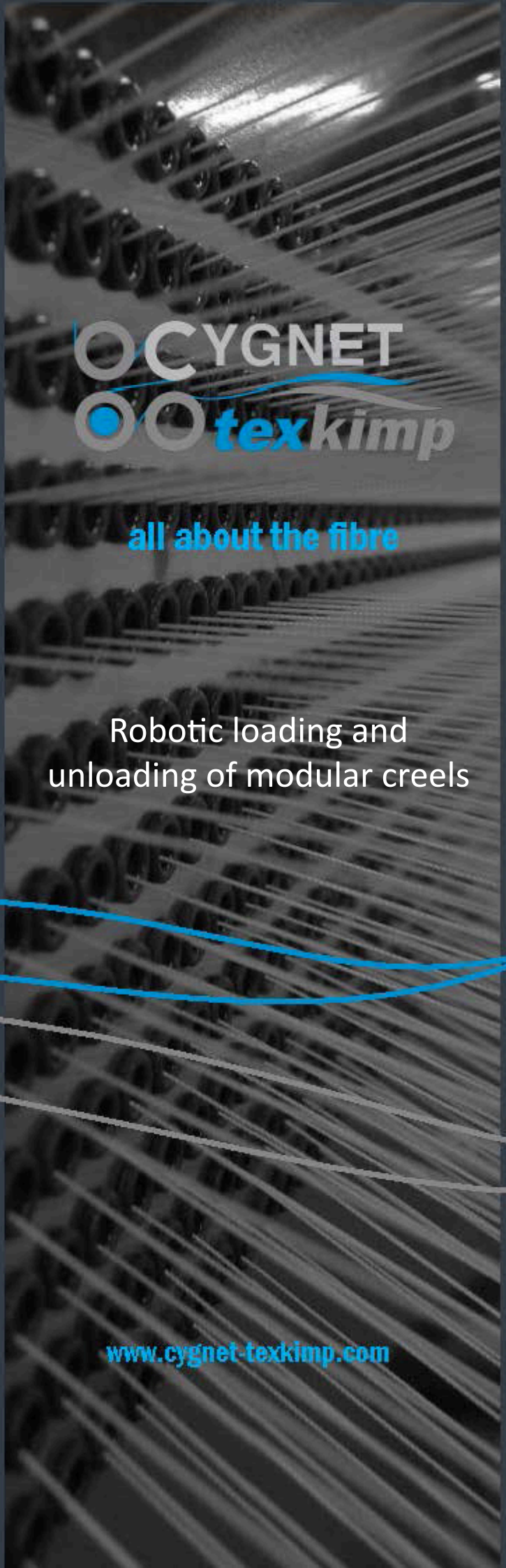

Robotic loading and unloading of modular creels

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Robotic loading and unloading of modular creels

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Continual efforts to improve production speed, reduce downtime and drive profitability in the fibre processing industry are fuelling increased take-up of mobile modular creels which allow offline loading and unloading of large fibre packages.

And now robotic handling technologies are helping fibre manufacturers increase the efficiency and accuracy of their processes yet further, by removing the need for manual handling and its associated weaknesses.

Remote loading and unloading modular mobile creels enable fibre manufacturers to load packages of fibre away from the main creel, without interrupting production. Once loaded, the mobile module can be plugged into the production cycle with minimal downtime, set-up or format changes.

By automating the loading and unloading of the mobile creel, manufacturers can optimise the process even further, and in doing so increase the rate at which they feed fibres into downstream processes; therefore driving productivity and profitability.

> *The operational benefits of loading and unloading the creel offline using robotic technology are clear and considerable*

Increased capacity
Using a robotic handling system gives manufacturers the opportunity to manage larger, heavier packages of fibre safely, and therefore open themselves up to efficiencies of scale, longer runs, less frequent change-overs and increased output.

Improved production cycle
Scheduled maintenance, cleaning, and set-up or format changes are all unavoidable interruptions in the production cycle, but by loading and unloading the creel offline using mobile sections, manufacturers can dramatically reduce scheduled stoppages for creel changeovers, which can take anything from two hours to two days to complete depending on product type and number of positions.

Enhanced quality
When it comes to maintaining quality, manual handling can be problematic for fibre manufacturers.

> *Oils and acids on human skin can impair the quality of sensitive and valuable fibres like carbon fibre, while dropped or bumped bobbins can easily cause damage to the product*

Robotic handling technologies allow fibre manufacturers to process bobbins of fibre efficiently without the need to touch them. Picking robots and specially-designed bellows-type grippers hold the bobbins securely by their internal cores, without making contact with the fibre, and therefore ensuring its quality.

Cygnet Texkimp is a machine builder and fibre handling specialist with over 40 years' experience in the design, build and integration of fibre handling and processing technologies. We are driving innovation in this field and have earned our reputation for delivering the most efficient and progressive processing machinery in the market, based on the highest quality fibre handling technologies. Our creels are used by manufacturers in more than 30 countries and include the largest and most advanced machines of their type in the world.

CYGNET texkimp

The Process

Step 1: **Package pallets are loaded into the system**
An operator loads pallets containing bobbins or packages of fibre onto the automatic creel loading system where a signal light indicates that the pallet has been correctly loaded. The operator scans the barcode on one of the bobbins on the pallet using a hand-held scanner and the specific pallet data is recorded onto an MES system.

Step 2: **Mobile creel is loaded into the robot cell**
The creel is docked securely into the robot cell before the process can continue. A batch code is assigned to the creel and recorded by the MES system before a barcode label is printed and attached to the creel. When the process is complete, and before the creel can be undocked, the operator scans the batch barcode label and records the exact location of each bobbin on the creel.

Step 3: **Bobbin pallets are loaded into the robot cell, and waste packaging pallets removed**
At intervals, an operator will be needed to load bobbin pallets into the robot cell and remove waste packaging pallets. Correct positions for both are marked on the floor, and guide and datum stops also ensure positional accuracy. The barcode on the bobbin pallet is scanned to identify it before the system can begin its work. Meanwhile, a sensor detects when the waste packaging pallet is becoming full, and an audible and visual indicator signals to the operator to replace it.

Step 4: **Starting the robot cell**
The robot cell will begin its work only when the following steps have been completed:

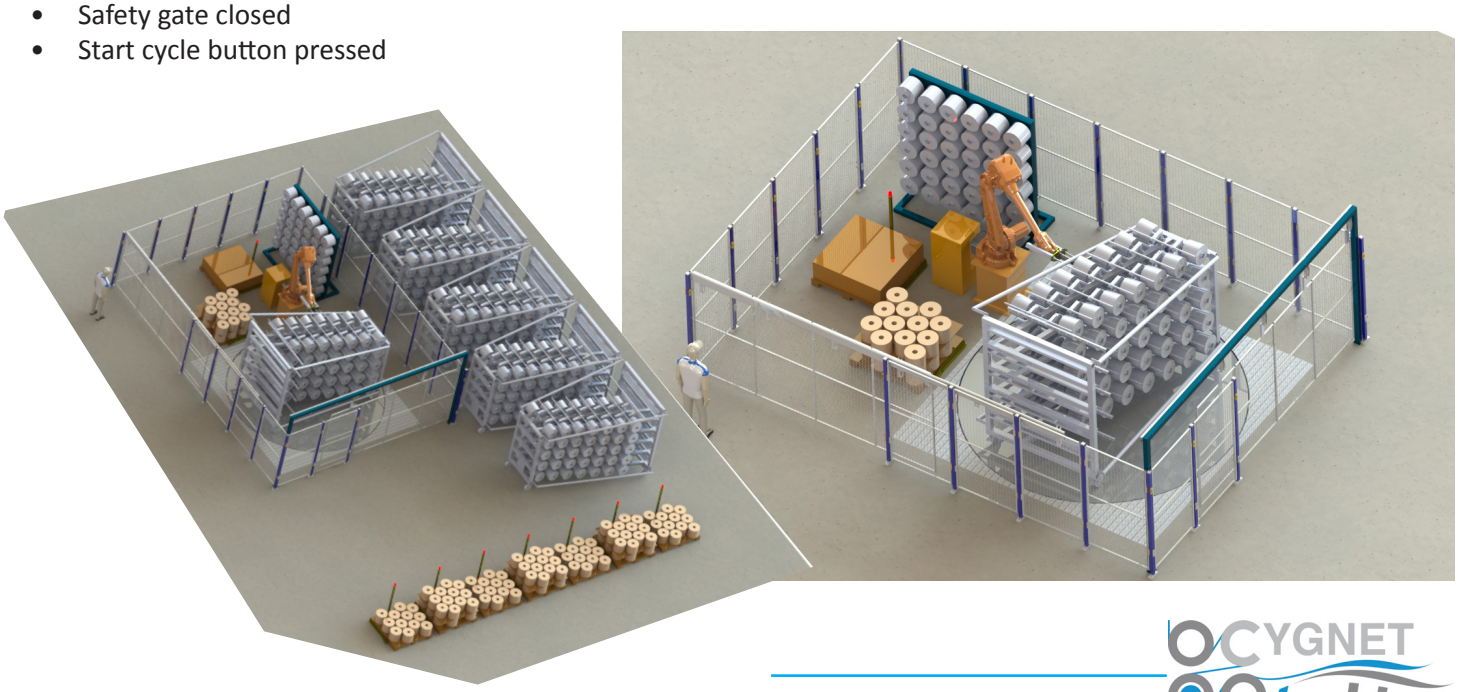
- Mobile creel loaded
- Bobbin pallet loaded and product available
- Waste packaging pallet loaded
- Barcodes successfully read
- Safety gate closed
- Start cycle button pressed

Step 5: **Empty bobbin cores are unloaded**
The robot unloads empty cores from the creel using a core gripper. The gripper is aligned accurately with each core using a camera system. Empty cores are deposited into a stainless steel chute which sends them to a movable bin.

Step 6: Bobbins are loaded onto the mobile creel
Once the empty cores have been unloaded from the creel, the system automatically replaces them with full bobbins. The camera system first identifies whether or not a die-cut board needs to be removed from the package containing the bobbins. If so, the robot activates a vacuum gripper frame mounted with suction cups to grip and remove the board and deposit it on the waste packaging pallet. The vacuum gripper is then retracted and the core gripper begins to select and lift bobbins before loading them onto the mobile creel. Again, the camera or vision system determines the positions of the bobbins and loads them accurately on the creel's bobbin holders.

When the first side of the creel has been fully loaded, the creel is automatically rotated on a flush floor turntable, before the process is repeated and the second side of the creel is filled with bobbins.

Step 7: **Full mobile creel is loaded**
When the mobile creel is full of bobbins, the alarm system indicated to the operator that it is ready to be removed from the robot cell. The operator presses the request to enter button and is allowed access to the cell to collect the creel and transport it to a staging area where it is loaded onto the main creel. A sensor detects the creel's presence and automatically scans its barcode to identify it and confirm that it is in the correct location.



Step 8: **Quality control**

Bobbin inspection

The system allows the operator to request the removal of single bobbins at any time for inspection. The operator triggers the removal of a bobbin or bobbins by any of the following actions:

- Entering an individual bobbin number into the system
- Entering a range of bobbin numbers into the system
- Requesting the next bobbin, without specifying a particular bobbin number

The identification number of each removed bobbin is automatically forwarded to the MES system while the bobbin itself is placed on a mobile storage frame for evaluation by the operator. Once complete, the operator can request that the bobbin is returned to the creel by simply pressing the appropriate button.

Batch bobbin inspection

A slow-motion operating mode can be selected to allow visual inspection of entire batched of bobbins. This allows the operator to examine each bobbin for approximately five seconds, at a height of 1500mm from floor level, at a position close to the perimeter guarding and next to the viewing window.

Faulty bobbins identified during this inspection can be ejected from the process and its data blocked from the MES system. The bobbin itself is placed on the mobile storage frame within the robot cell for closer inspection.

Next Step: **Towards a fully autonomous system**

Incorporating AGVs

By incorporating AGVs (autonomous guided vehicles) into the process, manufacturers can remove the need for additional operators to transport packages of fibre around its facility, from winders, cablers and storage to the robot cell, and to load and unload the cell. Not only does this speed up the process, it also allows manufacturers to work safely with larger packages of fibre and ensure the quality of the product being handled.

The AGV system is built into the truck and can be operated manually at any time without restriction.

To find out more about our technologies and services, and to discuss your requirements, please contact Charlie Stables on **charlie.stables@cygnet-texkimp.com** or call **+44 (0) 1606 338748**

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