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## **MODULAR COIL SHUTTLE SYSTEM** SOLUTIONS FOR COIL LOGISTIC SYSTEMS



# INCREASING REQUIREMENTS FOR COIL LOGISTIC SYSTEMS

In state-of-the-art rolling facilities, there is a growing demand for smart and fully automatic coil logistic systems. The need for the highest levels of coil quality on the one hand and reliable, flexible and low-maintenance coil transport solutions on the other is increasing.

## THE CHALLENGE

To ensure the highest possible quality of the finished product it is best to manipulate the coils as little as possible between coiling and coil storage. Additionally, a wide distance needs to be covered by a transport system, which ideally consists of a very limited number of movable parts in order to minimize the maintenance effort. This necessitates the use of very few, quickly exchangeable and long-life wear parts and also the application of a common spare part strategy for hot and cold rolling mills. Typical coil transport solutions like walking beam, chain and pallet conveying systems cannot sufficiently fulfill these requirements.

Investment as well as operating costs are significant criteria for rolling mill solutions. Typically, very limited foundation work (especially for revamps or transport extensions) and reduced time for erection and commissioning are key factors, as well as a short start-up time for a fully functional and reliable coil transport solution.

Ideally, the system should be easily extensible in several stages. It is also an advantage if the coil transport system is independent of product mix developments after installation, e.g. increased coil dimensions, coil weight.

## THE SOLUTION

### MODULAR COIL SHUTTLE SYSTEM – THE NEXT GENERATION OF COIL LOGISTIC SYSTEMS

The Modular Coil Shuttle (MCS) system is a rail-based coil transport system arranged in a loop design. There is a loaded track (coils are transported from down coiler area to the coil yard or the next processing facility) and an unloaded track (the empty cars are transported back to the coiler). These two trackways are identical. Multiple stations located around the track perform several movements, like shifting, turning or lifting/lowering of the MCS car. These modules can be flexibly arranged to realize each plant layout according to the customer's needs.

The system is designed to transport hot coils, but can also be adapted easily to transport coils in cold rolling facilities, by elimination of the heat protection measures.

The MCS cars travel on simple rails mounted at floor level, so there is minimal foundation work.

The capacity of the coil transport system can be adapted to current operating requirements by varying the active number of cars. This combination of features makes the system highly flexible.

The self-driven cars are equipped with on-board electronics and allow "plug & play" installation, as well as deinstallation and operation.

Typical operations such as marking or strapping are also integrated into the system.

The Modular Coil Shuttle system is the ideal solution, especially for long-distance coil transport solutions and modernization projects where quick installation and minimal foundation work are crucial.

The solution is extensible and separate plants can be connected, stepwise, if necessary, ensuring the highest level of flexibility.

## MAIN ADVANTAGES OF THE MODULAR COIL SHUTTLE SYSTEM

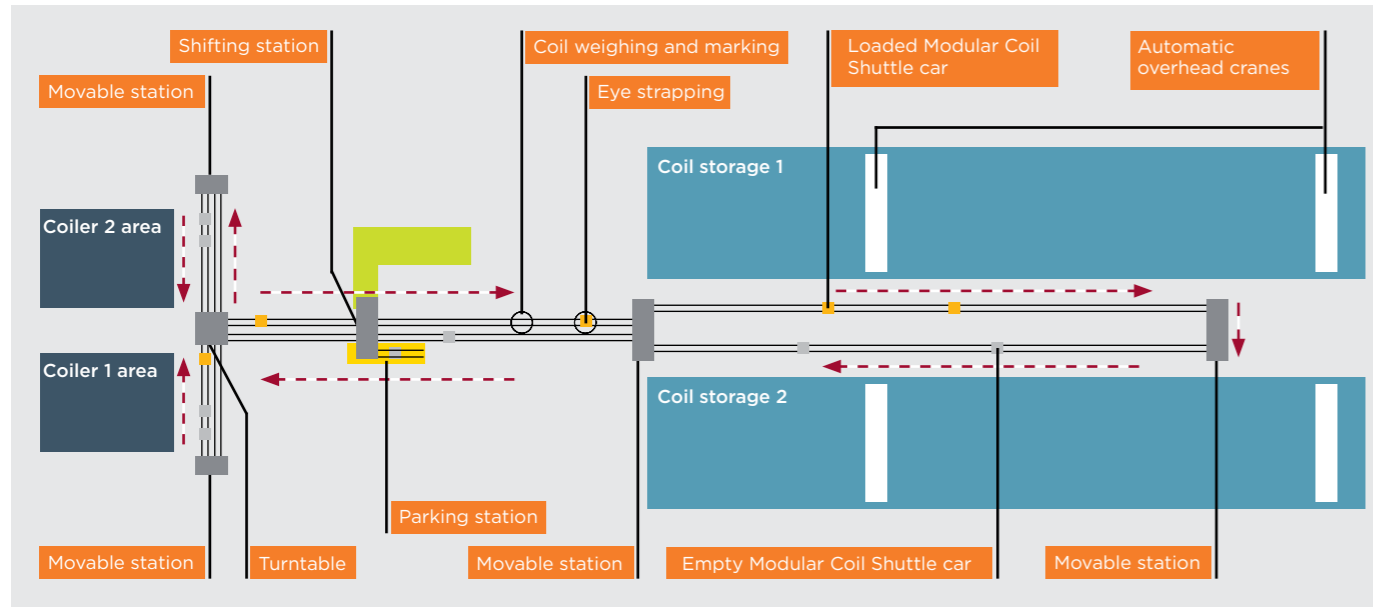
- Individually customized coil logistic solutions
- Low investment and operating costs
- Fast erection and commissioning
- Plug & play installation and deinstallation
- High operational flexibility
- Reliable coil transport solution
- Non-deterioration of coil surface and edges during transport
- Easy and low-cost coil transport extension for further development steps
- Smart, fully automatic coil logistic solution including crane handling





# MODULAR COIL SHUTTLE SYSTEM

## ALLEGHENY TECHNOLOGY INC., USA



### OVERVIEW OF THE PLANT

Allegheny Technology Inc. has installed two down coilers with a circumference strapping device located in front of each down coiler. The coils are strapped before they are placed on the Modular Coil Shuttle car. Once loaded, the car moves to the turntable, where the transport direction is rotated by 90°.

The car then moves to the weighing and marking position, passing the shifting station in the process. If a coil is selected for inspection, the loaded car stops at the shifting station and is taken out of the main transport line (at an angle of 90° to the transport direction) by the station. This station can also be used to remove / add MCS cars to the transport system by temporarily connecting to the parking lane at the opposite side of the shifting station.

Within the coil storage area, which consists of two bays, automatic cranes (the position of the car is communicated to the cranes) lift the coils from the cars, which run back to the down coiler area when unloaded. Lateral movements between loaded and unloaded tracks are executed by movable stations.

### PLANT DATA

Coil diameter	950 - 2,150 mm
Strip width	660 - 2,083 mm
Strip thickness	1.78 - 25.4 mm
Max. coil temperature	840 °C
Min. coil temperature	Ambient temperature
Max. coil weight	40 t
Annual production capacity	3,500,000 t
Max. number of coils per hour	48
Max. MCS car speed	1 m/s (loaded)
MCS cars installed	13
Rail distance (1 full loop)	340 m

# MODULAR COIL SHUTTLE CAR



Modular Coil Shuttle car on a turntable



Unloading a Modular Coil Shuttle car by crane

### VERSATILE

The Modular Coil Shuttle car is designed to transport hot rolled coils as well as coils from cold processing facilities. The MCS car can be operated under harsh ambient conditions (e.g. heat, dust) and is capable of handling products with the highest surface and strip edge requirements.

### SMART

The MSC car is equipped with an electrical gear motor. A loaded car reaches a maximum speed of 1 m/s, compared with a speed of approximately 2 m/s for an unloaded car.

The power is supplied via conductor rails and current collectors which are mounted on a swiveling arm on the car. An antenna is also mounted on the arm to enable communication with the central PLC via industrial wireless LAN. The car is equipped with an absolute position measuring system to track the absolute position over the entire transport distance. The required positioning window of +/- 5 mm can be met easily and accurately. This is important especially when transferring the coils from the down coiler by coil lifting car. The car is also equipped with coil detection for material tracking purposes.

### USER-OPTIMIZED

Whenever a Modular Coil Shuttle car needs to be removed from the track, the swiveling mounted arm can be unlocked and fixed in a raised position. The car can then be lifted by crane. Adding a car to the transport system is just as easy; once it has been placed onto the rails, the swiveling arm is moved to a traversing position and locked. The car is then ready for operation.

If a car is in a position where it cannot be taken by crane (crane shadow zones, tunnel), it can be shifted by a second car, irrespective of whether it is loaded or not (towing mode).

### MAIN BENEFITS

- Minimized amount and extended service life of spare parts
- No wear parts on track
- Communication between MCS cars and automatic cranes for optimized transport routes
- "Plug & play" installation / deinstallation of MCS cars
- Absolute position measurement of MCS cars - even in event of power breakdown absolute position remains available
- Fully automated system
- Possibility to connect to the superordinated logistic systems

## MOVABLE STATION



Lateral movement of the coil cars

The movable station is used to shift the loaded or unloaded Modular Coil Shuttle cars perpendicular to the main transport direction of the MCS car in order to facilitate lateral movements if the transfer route is changed. A movable station is, therefore, typically placed at the end of the transport system to ensure that the loop is closed.

## TURNTABLE



Change of direction for cross transfer

The turntable allows for a direction change of the Modular Coil Shuttle car of up to 90°, creating “T” and “L” shaped rail track connections. Depending on the layout of the coil transport area, the turntable is equipped with one or two rail segments.

## SHIFTING STATION



Removal of cars from the main transport line

The shifting station is used to remove a Modular Coil Shuttle car from the main track for coil inspection or maintenance, or to return an MCS car after coil inspection or maintenance to the main track. Up to three segments are shifted simultaneously (as one station) so that the main track is not interrupted after a car has been removed.

## WEIGHING AND MARKING



Coil identification is done by weighing and marking

At this station the coil is weighed and marked on its circumference and face side. The weight of the empty Modular Coil Shuttle car is known from the calibration weight taken at approximately every hundredth lap. The weight of the coil is determined by weighing the loaded car.

## MODULAR COIL SHUTTLE SYSTEM THE NEXT GENERATION OF COIL LOGISTIC SYSTEMS



### UNIQUENESS

Extraordinary flexibility in terms of plant layout as well as fast reaction to changes in operational requirements (e.g. buffering of coils or fewer MCS cars needed), combined with the high level of automation of the Modular Coil Shuttle system, has resulted in a superior and unequalled coil logistic system.

### FLEXIBILITY AND RELIABILITY



### REDUCTION OF COSTS



### THE FULL PACKAGE

#### FLEXIBILITY

Modular components make customized layouts as well as the subsequent extension of coil transport easy. The number of active Modular Coil Shuttle cars can be adapted to actual production demands, ensuring high operational flexibility, while the MCS system is also capable of buffering finished coils beside the track without compromising production.

#### RELIABILITY

Thanks to the high redundancy of the whole Modular Coil Shuttle system and the use of components with proven robustness and durability, reliability is second to none. Meanwhile the bar has been raised even higher through “plug & play” installation and also the “towing-mode” of MCS cars.

#### INVESTMENT COSTS

Fast installation, minimal foundation work and the use of standardized equipment keep investment costs low. No hydraulics or pipings are needed to run the Modular Coil Shuttle system, except in the lifting station. Standard rails are used to cover the transfer distance, making easy extension of the MCS system a big advantage.

#### OPERATING COSTS

Maintenance and operating costs can be kept to a minimum because of the small number of wear parts, especially those used for the rail track, and the fact that a Modular Coil Shuttle car consists of identical parts for both hot and cold processed coils.

#### MODULAR COIL SHUTTLE SYSTEM

The incredible flexibility, reliability, high level of automation and low maintenance and operating costs of the Modular Coil Shuttle system, a solution of Primetals Technologies for the next generation of coil logistics, combined with the demand for non-deterioration coil surfaces and edges during transport of the coil from down coiler to coil storage, are what set this solution apart.

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A joint venture of Mitsubishi Heavy Industries and partners

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