

# Lifter Wagon Method\*

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## 1 Introduction

In the civil and architectural works in urban districts, the limitations from existing facilities, structures, etc. often compel builders to execute these works in narrow space, making it difficult to obtain work yards and stock yards for machinery and materials. In addition, the execution of work requires the installation of temporary structures such as work stages, and this results in a lengthened construction period and increased construction cost, as is generally known.

At Kawasaki Steel, a construction technique in which heavy construction machines are loaded on a movable stage has been developed and put into practical use in order to execute work virtually on land even in the pile driving work on the sea or water. As embodiments of this technique, **Photo 1** shows the construction work of a wharf on the sea and **Photo 2** shows the construction work of a super platform structure on a flood-regulating pond.

Jointly with Taisei Corp. and Odakyu Construction Co., Ltd., Kawasaki Steel has recently developed the "lifter wagon method" by which super platform structures are efficiently constructed in saved space by making the most of the above know-how.

## 2 Component Machines of the Lifter Wagon Method and Places Where This Method Can Be Applied

A general view of the construction site where this method was adopted is shown in **Photo 3** and the specifications of component machines are shown in **Table 1**. The equipment used in this method comprises:

- (1) A propulsive wagon that provides the work stage for heavy construction machines
- (2) A lifter which supports the wagon and which regu-

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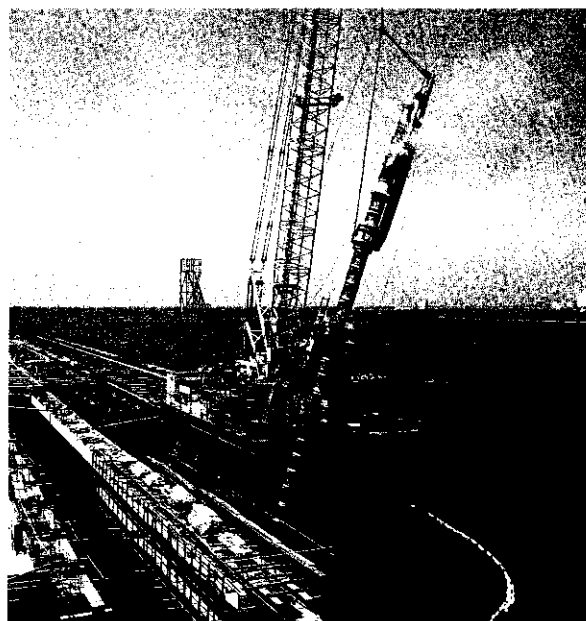


Photo 1 Wharf construction using wagon method

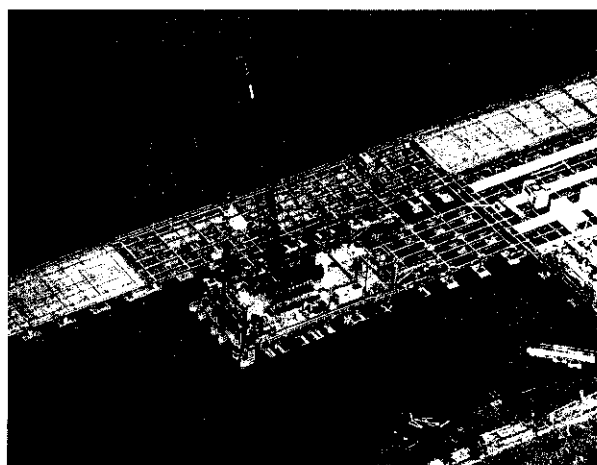


Photo 2 Construction of super platform structure over flood-regulating pond using wagon method

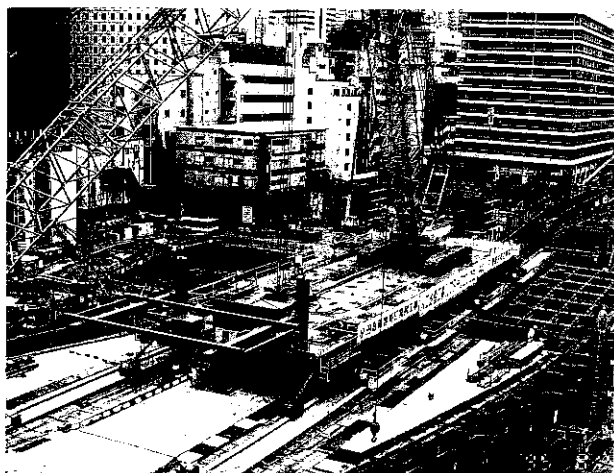


Photo 3 View of lifter wagon method

Table 1 Typical specifications of lifter wagon method

Wagon	Size (m)	36 × 12
	Weight (t)	190
Lifter		8
	Size (m)	1 700 × 3 500
	Weight (t)	1 100
	Lifting capacity (t)	200
	Lift stroke (mm)	521
Jack	(unit)	2
Rail	(set)	2
Pallet car	(unit)	4

lates the horizontality of the wagon

- (3) A propulsive jack for moving the wagon
- (4) A pallet car that feeds the machinery and materials necessary for construction

Under this method, the wagon builds a new super platform structure while moving span-by-span on the super platform structure of structural steel built by itself. An approximate flow of construction is shown in Fig. 1. A launching base is first built by the usual method. In many cases, part of the structure finally built is used as the launching base and also as the material yard after the launching of the wagon. Furthermore, a commercial crane, not a special one, is loaded on the work stage. The construction of the wagon is such that members are easily assembled using bolts at the local site.

The features of this lifter wagon method are summarized as follows:

- (1) Because the wagon moves on the rails on the super platform structure built by it, a large surrounding work space is not required.
- (2) Lifters that permit the control of the wagon level are

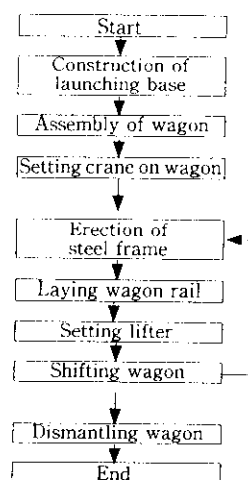


Fig. 1 Construction flow chart

installed in the supports that support the wagon on the rails, making it possible to maintain the horizontality of the working plane of cranes. Therefore, safe construction is possible.

- (3) The machinery and materials necessary for constructing the super platform structure are transported from behind the wagon by a pallet car moving on the rails used by the wagon, enabling efficient construction.

The construction method using temporary stages is a representative example of methods usually adopted for a construction environment of limited space. However, because the lifter wagon method does not require the construction and demolition of temporary stages, the construction period can be substantially shortened. With such features, this method is effective in efficiently building super platform structures in the space over railroads, roads, rivers, etc.

### 3 Examples of Application

Photo 4 shows an example in which this method was applied to the construction of a super platform structure over a railroad. The major quantitative features are shown in Table 2. The building site is enclosed by the route of another railroad that runs parallel to this route, as well as the construction site of a high-rise building, and existing buildings, making it difficult to secure construction space. Furthermore, the period allotted for the construction of the super platform was very short in the total development project including the buildings to be constructed. Nevertheless, the super platform structure could be completed within the construction period owing to the adoption of the lifter wagon method.

### 4 Conclusive Remarks

The lifter wagon method has the great feature that

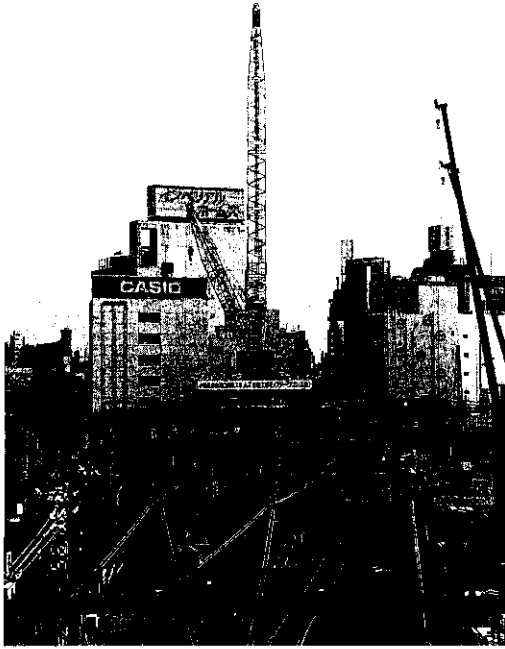


Photo 4 Lifter wagon method over railroad

Table 2 Major quantitative features

Area of deck	(m <sup>2</sup> )	10 000
Length of deck	(m)	350
Steel frame	(t)	3 400
Pre-cast concrete panel	(pcs.)	3 300

work can be executed in a short construction period without requiring a large work space. It is expected that in urban development (redevelopment) projects, where builders are compelled to execute work in narrow space, will increase in number while at the same time demand is growing to provide open space that offers many amenities using super platform structures. It is expected that this method will be aggressively used in these fields.

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