

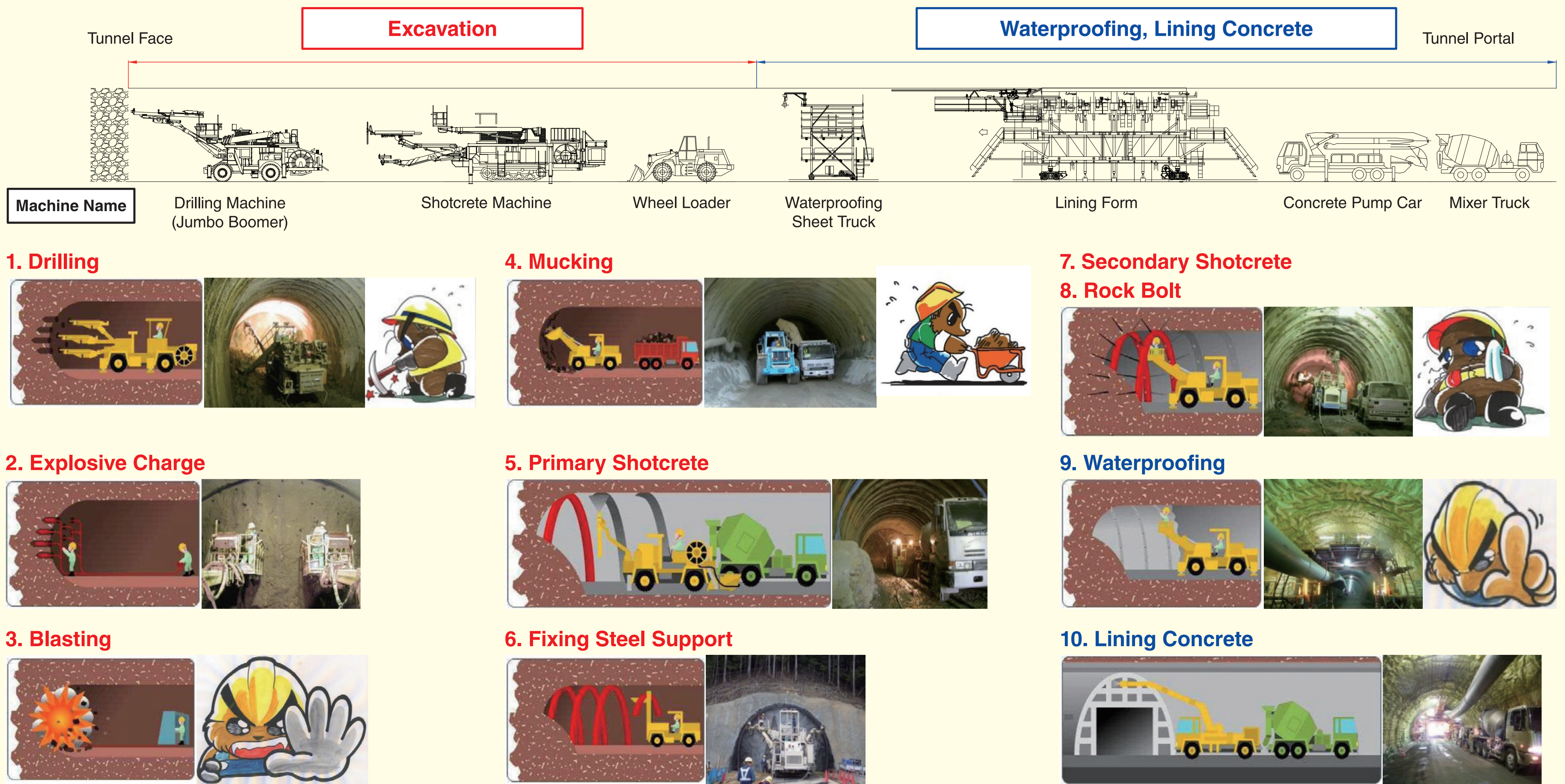
# Steel Support Handling Machine

One operator can fix steel support without workers entering tunnel face.

## INTRODUCTION

MAEDA CORPORATION developed the “Steel Support Handling Machine”. If you use this machine, you can minimize human works then prevent rock falling accidents.

### Working Procedure of NATM Tunnel



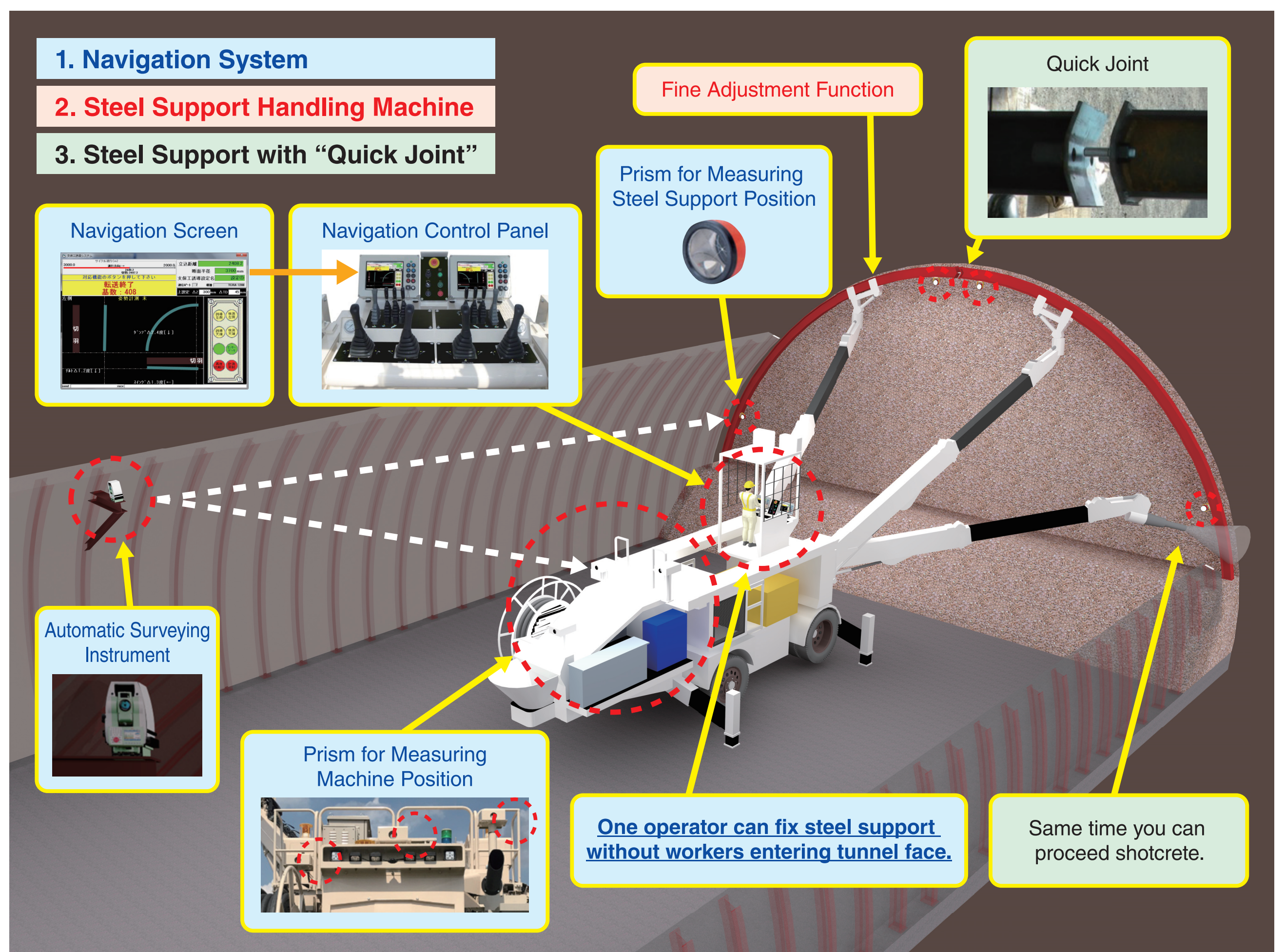
## OVERVIEW

Without entering to tunnel face, operator can fix the steel support from cockpit by “Navigation System”. Steel support can be jointed by “Quick Joint” instead of nuts & bolts. Finally you can improve productivity with safety measures.

## EFFECT

Improving Safety & Productivity

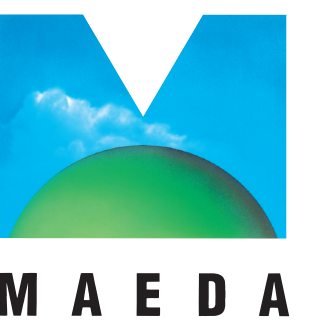
	Conventional Method	Our Method
Safety Improvement	4-Workers Working in Tunnel Face	No Worker Working in Tunnel Face
Productivity Improvement with Reducing Labors	 1-Operator, 4-Workers	 1-Operator



Steel Support Handling Machine



# Multi Function Tunnel Lining Method



## How to Complete High Quality Tunnel Lining

There are eight technologies in “Multi Function Tunnel Lining Method” to improve quality of tunnel lining concrete.

	Name	Description
1	Compaction System for Crown Part	Compaction
2	Floating Vibrator System	Compaction
3	Horizontal Concrete Pouring	Pouring
4	Monitoring Concrete Filling Pressure	Pouring
5	Mist Moisturizing	Curing
6	Curing System with Balloon Bulkhead	Curing
7	Remote Controlling System	Pouring
8	Back Scratching Poker Vibrator	Compaction



Picture of Multi Lining Form

## Multi Function Tunnel Lining Method

### 1 Compaction System for Crown Part

It is a construction method in which vibrator is installed in advance at the crown part and compacted by pulling out after the concrete pouring.



Hose Reel Type



Pipe Sliding Type

### 8 Back Scratching Poker Vibrator

You can compact concrete at the crown part by inserting vibrators from hatch after filling concrete.

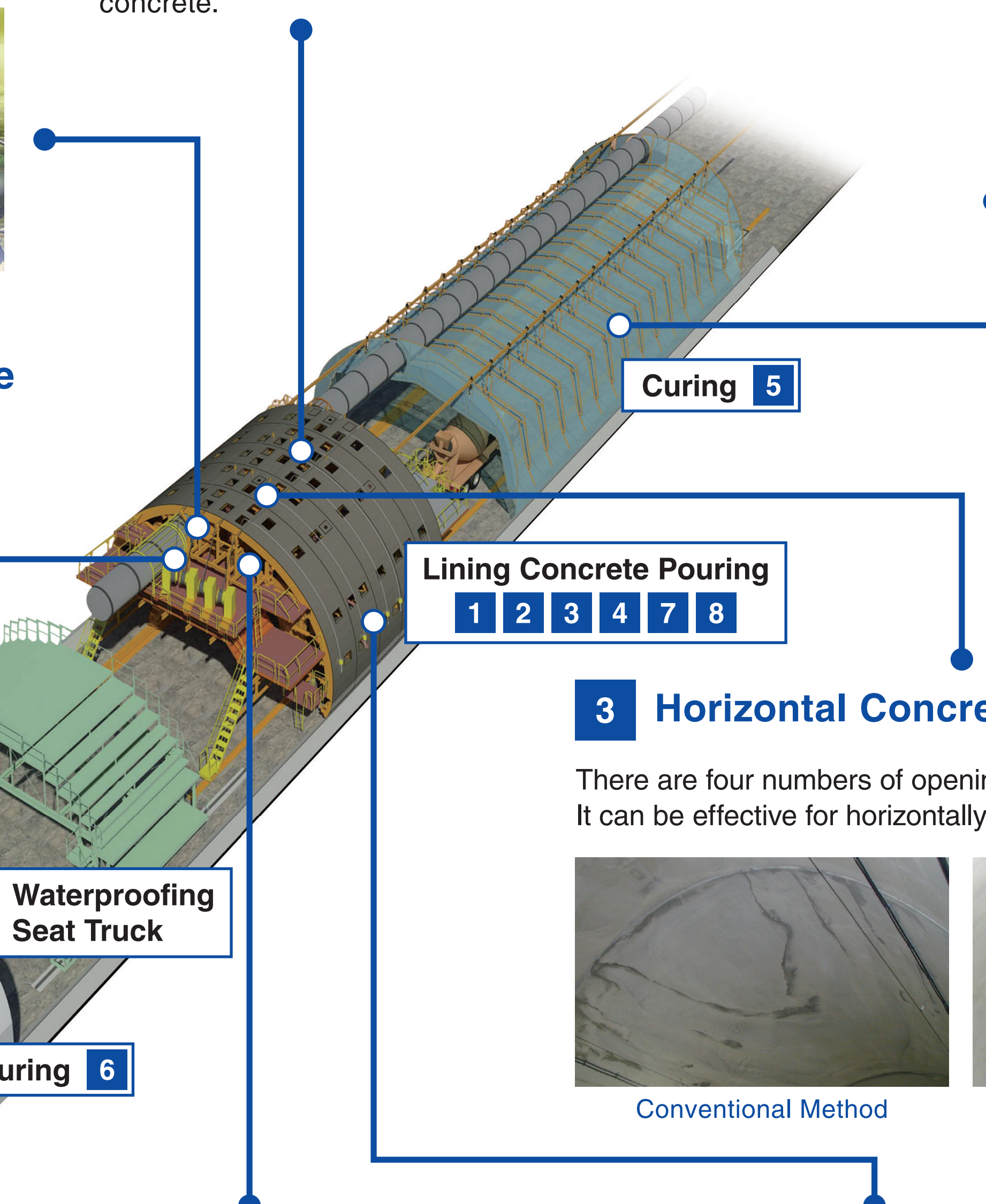
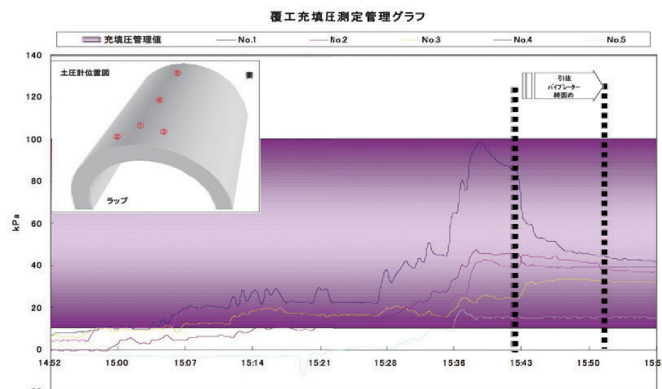
### 5 Mist Moisturizing

Sliding nylon house is keeping sufficient for concrete curing.



### 4 Monitoring Concrete Filling Pressure

You can monitor the concrete filling pressure in PC screen to avoid collapsing form work.



### 3 Horizontal Concrete Pouring

There are four numbers of opening for concrete pouring. It can be effective for horizontally concrete placing.



Conventional Method



Our Method

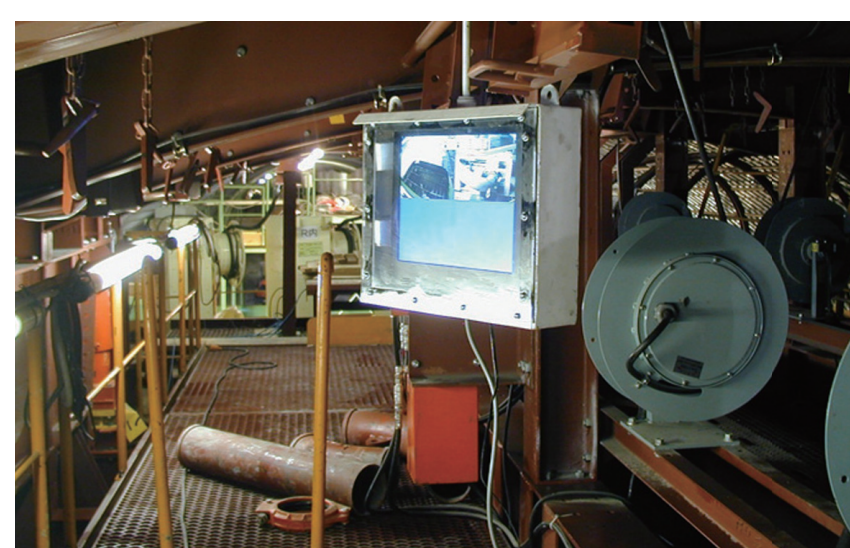
### 6 Curing System with Balloon Bulkhead

Balloon bulkhead blocks natural ventilation after the tunnel breakthrough.



### 7 Remote Controlling System

Remote controlling system can be reduced human resources.



### 2 Floating Vibrator System

Poker vibrator with floater follows concrete surface level while concrete pouring.

