

Directorate for Roads of Vietnam

Summary Report

Socialist Republic of Vietnam

Verification Survey with the Private Sector
for Disseminating Japanese Technologies
for Overload Vehicle Detecting By Weigh-
in-motion System

May, 2018

Japan International Cooperation Agency

Tanaka Scale Works Co., Ltd.

1. BACKGROUND

Owing to the rapid growth of Vietnam's economy, the number of cargo trucks for road transportation in the country has been increasing rapidly. Many cargo trucks are overloaded; this leads to the following problems:

- ① Severe accidents caused by brake failure and axle breakdown
- ② Physical damage to national roads and bridges:
 1. Shortened lifespan of roads and bridges
 2. Depressed or distorted road surfaces that cause traffic accidents and traffic jams.

Such damaged roads require repairs. However, without reducing overloading in trucks, the roads would require repeated repairs. Currently, Vietnam is expanding its national road and highway networks, and it is likely that the cost of road maintenance will increase further owing to overloaded trucks.

2. OUTLINE OF THE PILOT SURVEY FOR DISSEMINATING SME'S TECHNOLOGIES

(1) Purpose:

Introduction of the loadcell type weigh-in-motion system as an effective method to curb the overloading of trucks.

The weigh-in-motion system will be adopted as a standard weighing station system and installed nationwide.

(2) Activities:

Design a weigh-in-motion system for Vietnamese roads.

Install the weigh-in-motion system on Vietnam's national roads, which are prone to heavy traffic.

To legally enforce the weigh-in-motion system, obtain type approval and pass verification test by Vietnam Metrology Institute.

DRVN and local police officers to conduct truck overloading checks by using the weigh-in-motion system to verify the effectiveness of the system.

(3) Information about the product/ Technology to be Provided

1. System Provided

- Loadcell-type weigh-in-motion systems with a car number plate detection system and data processing software for two lanes.
- Loadcell-type weigh-in-motion system without camera and software for two lanes.

8. Manning Schedule

	Year		2015				2016				2017				2018		
	Quarter		1	2	3	4	1	2	3	4	1	2	3	4	1	2	
DRVN attending Learning Program in Japan		28															
Civil work for WIM 1 & 2 (from Haiphong to Hanoi)				90													
Install WIM 1 & 2				90													
Type approval test										65							
Verification test for WIM 1 & 2											30						
Camera system and software development			MAT THAN and ELCOM														
Civil work for WIM 3 & 4 (from Hanoi to Haiphong)													60				
Install WIM 3 & 4													60				
Verification test for WIM 3 & 4															20		
WIM test operation for overload control																12	

(unit: Person days)

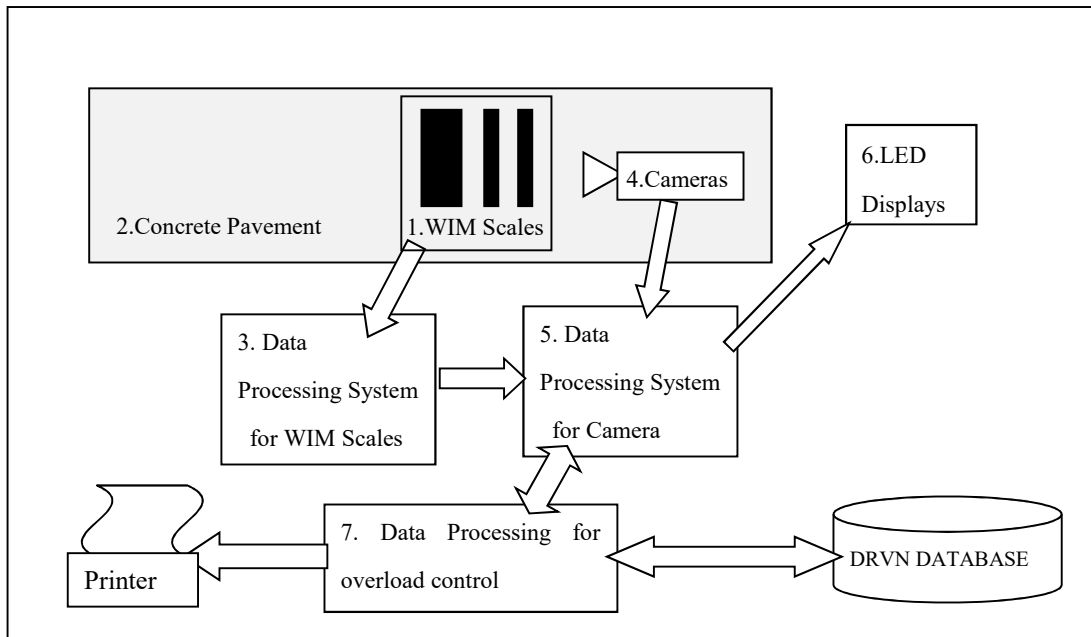
9. System Implementation

(1) Implemented functional blocks

The weigh-in-motion system consists of seven functional blocks:

1. Weigh-in-motion Scales: Installed in the road
2. Flat concrete pavement before and after weigh-in-motion scales
3. Data processing and control system for weigh-in-motion scales: installed 2 m above ground on a steel pole next to the scales to avoid destruction by drivers.
4. Cameras for automatic car number recognition system: installed on steel gates on the road.
5. Data processing system for cameras and automatic car number recognition: installed in a hut near weigh-in-motion scales. This system also controls LED displays.
6. LED displays for driver notification: installed on steel gate located 150 m from weigh-in-motion scales.
7. Data processing software for overload control: this software has access to DRVN registered truck database. The weight data obtained using the weigh-in-motion scales and truck registration data are compared using the software to determine whether the truck is overloaded. The software generates official documents for controlling the overloaded trucks and stores the data of all passing trucks in the DRVN database.

Block diagram of the Implemented System



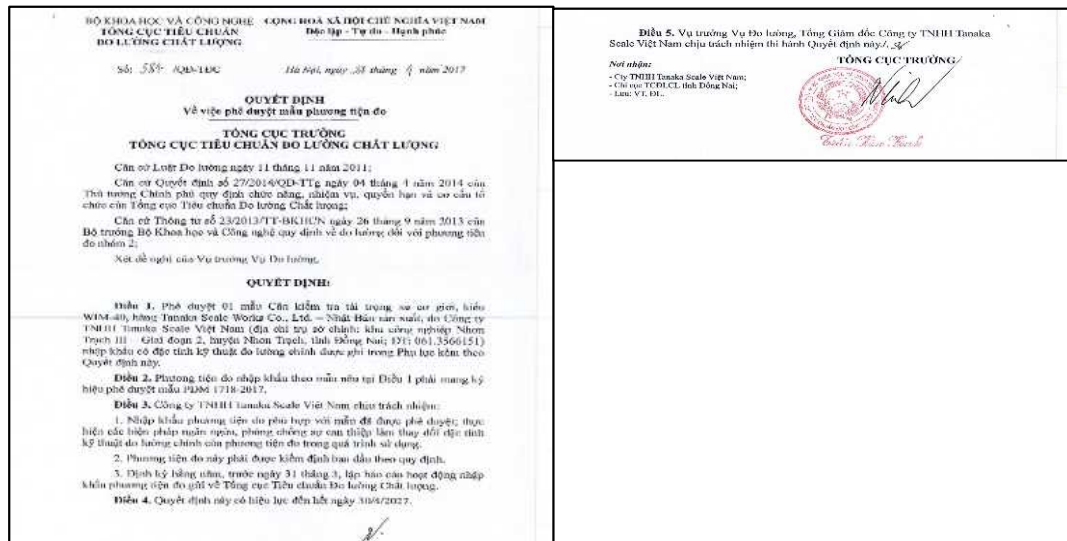
(2) Laws and certification for implementation

Weight data measured using the weigh-in-motion system is used for legal transactions, such as controlling overloaded trucks. Therefore, the system must be approved and certified by the Vietnam Metrology Institute according to the Vietnam Weigh and Measurement Law.

1. Type Approval:

The weigh-in-motion system must pass the type approval test of Vietnam Metrology Institute according to Vietnam Weigh and Measurement Law. The test comprises various electrical tests and structural tests.

One system type needs one type approval.



2. Verification Test:

After system type approval, each installed system must pass the verification test for legal use. The verification test is conducted by the Vietnam Metrology Institute according to the Vietnam Weigh and Measurement Law. Four verification certificates are required for the four WIMs installed.

VIỆN ĐO LƯỜNG VIỆT NAM
Vietnam Metrology Institute
Địa chỉ (Add.): Số 8 Đường Hoàng Quốc Việt,
Phường Nghĩa Đô, Quận Cầu Giấy, TP Hà Nội
Điện thoại (Tel.): (84-4) 37914878

CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập - Tự do - Hạnh phúc

GIẤY CHỨNG NHẬN KIỂM ĐỊNH
CERTIFICATE OF VERIFICATION
Số (s): V02.KD.079.17

Tên đối tượng: **Cân kiểm tra tải trọng xe cơ giới**
Object:

Kiểu: WIM-40 Số: 4905001601
Type: Serial No:

Nơi sản xuất: Tanaka Scale Works Co., LTD (Nhật Bản) Năm: 2015
Manufacturer: Year:

Đặc trưng kỹ thuật đo lường: Mức cân lớn nhất: Max = 40000 kg/trục đơn
Mức cân nhỏ nhất: Min = 2000 kg/trục đơn
Giá trị độ chia: d = 100 kg
Cấp chính xác: F 10
Tốc độ xe qua cân: (0-80) km/h

Nơi sử dụng: Km78, Quốc lộ 5 (Lân 2, hướng từ Hải Phòng đi Hà Nội),
Xã Lê Thiệu, huyện An Dương, TP Hải Phòng
Place:

Người/Đơn vị sử dụng: Cục Quản lý đường bộ I
User:

Phương pháp kiểm định: DLVN 48 : 2015
Method of verification: Cân kiểm tra tải trọng xe cơ giới - Quy trình kiểm định

Kết luận: Đạt yêu cầu kỹ thuật đo lường
Conclusion:

Số tem kiểm định: 16A.12618
Verification stamp No:

Thời hạn đến (nếu có): (*) 30-04-18
Valid until:

Hà Nội, ngày 28 tháng 04 năm 2017
Date of issue

Kiểm định viên
Verified by: Nguyễn Việt Thắng
PHÓ VIỆN TRƯỞNG
Trần Khắc Chiến

(*) Vui lòng tuân thủ các quy định về sử dụng và bảo quản
(With respectfulness of rules of use and maintenance)

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GIẤY CHỨNG NHẬN KIỂM ĐỊNH
CERTIFICATE OF VERIFICATION
Số (s): V02.KD.078.17

Tên đối tượng: **Cân kiểm tra tải trọng xe cơ giới**
Object:

Kiểu: WIM-40 Số: 4905001602
Type: Serial No:

Nơi sản xuất: Tanaka Scale Works Co., LTD (Nhật Bản) Năm: 2015
Manufacturer: Year:

Đặc trưng kỹ thuật đo lường: Mức cân lớn nhất: Max = 40000 kg/trục đơn
Mức cân nhỏ nhất: Min = 2000 kg/trục đơn
Giá trị độ chia: d = 100 kg
Cấp chính xác: F 10
Tốc độ xe qua cân: (0-80) km/h

Nơi sử dụng: Km78, Quốc lộ 5 (Lân 1, hướng từ Hải Phòng đi Hà Nội),
Xã Lê Thiệu, huyện An Dương, TP Hải Phòng
Place:

Người/Đơn vị sử dụng: Cục Quản lý đường bộ I
User:

Phương pháp kiểm định: DLVN 48 : 2015
Method of verification: Cân kiểm tra tải trọng xe cơ giới - Quy trình kiểm định

Kết luận: Đạt yêu cầu kỹ thuật đo lường
Conclusion:

Số tem kiểm định: 16A.12618
Verification stamp No:

Thời hạn đến (nếu có): (*) 30-04-18
Valid until:

Hà Nội, ngày 28 tháng 04 năm 2017
Date of issue

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GIẤY CHỨNG NHẬN KIỂM ĐỊNH
CERTIFICATE OF VERIFICATION
Số (s): V02.KD.159.17

Tên đối tượng: **Cân kiểm tra tải trọng xe cơ giới**
Object:

Kiểu: WIM-40 Số: 4905001603
Type: Serial No:

Nơi sản xuất: Tanaka Scale Works Co., LTD (Nhật Bản) Năm: 2017
Manufacturer: Year:

Đặc trưng kỹ thuật đo lường: Mức cân lớn nhất: Max = 40000 kg/trục đơn
Mức cân nhỏ nhất: Min = 2000 kg/trục đơn
Giá trị độ chia: d = 100 kg
Cấp chính xác: F 10
Tốc độ xe qua cân: (0-80) km/h

Nơi sử dụng: Km78, Quốc lộ 5 (Lân 1, hướng từ Hà Nội đi Hải Phòng),
Xã Lê Thiệu, huyện An Dương, TP Hải Phòng
Place:

Người/Đơn vị sử dụng: Cục Quản lý đường bộ I
User:

Phương pháp kiểm định: DLVN 48 : 2015
Method of verification: Cân kiểm tra tải trọng xe cơ giới - Quy trình kiểm định

Kết luận: Đạt yêu cầu kỹ thuật đo lường
Conclusion:

Số tem kiểm định: 34A-06199
Verification stamp No:

Thời hạn đến (nếu có): (*) 30-09-18
Valid until:

Hà Nội, ngày 29 tháng 09 năm 2017
Date of issue

Kiểm định viên
Verified by: Nguyễn Việt Thắng
PHÓ VIỆN TRƯỞNG
Trần Khắc Chiến

(*) Vui lòng tuân thủ các quy định về sử dụng và bảo quản
(With respectfulness of rules of use and maintenance)

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Độc lập - Tự do - Hạnh phúc

GIẤY CHỨNG NHẬN KIỂM ĐỊNH
CERTIFICATE OF VERIFICATION
Số (s): V02.KD.160.17

Tên đối tượng: **Cân kiểm tra tải trọng xe cơ giới**
Object:

Kiểu: WIM-40 Số: 4905001604
Type: Serial No:

Nơi sản xuất: Tanaka Scale Works Co., LTD (Nhật Bản) Năm: 2017
Manufacturer: Year:

Đặc trưng kỹ thuật đo lường: Mức cân lớn nhất: Max = 40000 kg/trục đơn
Mức cân nhỏ nhất: Min = 2000 kg/trục đơn
Giá trị độ chia: d = 100 kg
Cấp chính xác: F 10
Tốc độ xe qua cân: (0-80) km/h

Nơi sử dụng: Km78, Quốc lộ 5 (Lân 2, hướng từ Hà Nội đi Hải Phòng),
Xã Lê Thiệu, huyện An Dương, TP Hải Phòng
Place:

Người/Đơn vị sử dụng: Cục Quản lý đường bộ I
User:

Phương pháp kiểm định: DLVN 48 : 2015
Method of verification: Cân kiểm tra tải trọng xe cơ giới - Quy trình kiểm định

Kết luận: Đạt yêu cầu kỹ thuật đo lường
Conclusion:

Số tem kiểm định: 14A-05200
Verification stamp No:

Thời hạn đến (nếu có): (*) 30-09-18
Valid until:

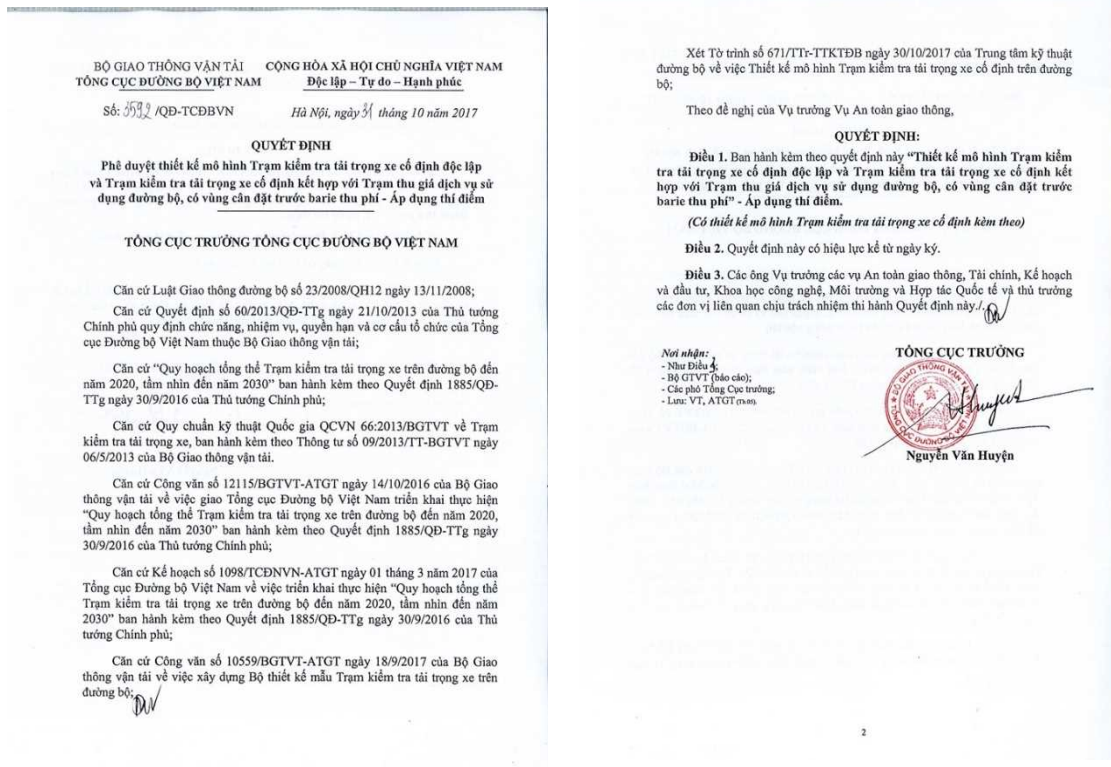
Hà Nội, ngày 29 tháng 09 năm 2017
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Kiểm định viên
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Trần Khắc Chiến

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3. Approval from the Ministry of Transport

The scale portion of the weigh-in-motion system is tested and approved by the Vietnam Metrology Institute. However, the entire system, including control software and control system, must be approved by the Ministry of Transport to facilitate the implementation of the system for official overload control.



10. ACHIEVEMENT OF THE SURVEY

(1) Outputs and Outcomes of the Survey

Experimental overload truck control operation was conducted from January 31, 2018, to February 5, 2018. In this operation, trucks with an overload rate of more than 120% were stopped and their drivers were arrested.

It was observed that 45,596 trucks passed the weigh-in-motion system, among which 24 were overloaded, and 13 drivers of such overloaded trucks were arrested. In the case of the other 11 overloaded trucks, in a few cases the overload rate was less than 120%, and some trucks escaped.

The test results show that most of the overloaded trucks appear during the night. Conventional overload truck control procedure dictates that a police officer should pull over suspicious trucks to the scale station. However, at night, it is very difficult to

identify overloaded trucks from the several thousands of trucks passing through.

Using the weigh-in-motion system, 13 such trucks were detected, and their drivers arrested. This number is outstanding, and it proves the high efficiency of the weigh-in-motion system for controlling truck overloading.

DATE	Jan 31 st Wednesday	Feb 1 st Thursday	Feb 2 nd Friday	Feb 3 rd Saturday	Feb. 4 th Sunday	Feb. 5 th Monday
TIME	Overload Trucks(Arrested Trucks) / Trucks Passed WIM					
24:00~01:00	---	0(0)/490	0(0)/490	0(0)/507	0(0)/415	0(0)/223
01:00~02:00	0(0)/260	0(0)/212	0(0)/196	1(0)/192	0(0)/98	0(0)/135
02:00~03:00	0(0)/235	1(1)/199	0(0)/187	0(0)/233	0(0)/23	0(0)/140
03:00~04:00	0(0)/284	0(0)/244	0(0)/275	0(0)/250	0(0)/105	0(0)/170
04:00~05:00	0(0)/373	0(0)/272	0(0)/327	1(0)/325	0(0)/140	0(0)/226
05:00~06:00	0(0)/394	2(1)/439	0(0)/404	1(0)/399	0(0)/184	1(0)/299
06:00~07:00	0(0)/461	0(0)/438	0(0)/410	0(0)/393	0(0)/201	0(0)/353
07:00~08:00	0(0)/334	0(0)/358	0(0)/331	1(0)/340	0(0)/279	0(0)/280
08:00~09:00	0(0)/411	0(0)/438	0(0)/386	1(0)/431	0(0)/342	0(0)/417
09:00~10:00	0(0)/418	0(0)/450	0(0)/455	0(0)/418	0(0)/336	0(0)/469
10:00~11:00	0(0)/458	0(0)/504	0(0)/491	0(0)/462	0(0)/300	0(0)/521
11:00~12:00	0(0)/511	0(0)/481	0(0)/480	0(0)/463	1(1)/245	0(0)/504
12:00~13:00	0(0)/170	0(0)/235	0(0)/189	0(0)/177	0(0)/111	0(0)/130
13:00~14:00	0(0)/418	0(0)/416	0(0)/453	0(0)/376	0(0)/268	0(0)/436
14:00~15:00	0(0)/373	0(0)/364	0(0)/406	0(0)/361	0(0)/266	1(0)/419
15:00~16:00	0(0)/387	0(0)/407	1(1)/435	1(1)/364	0(0)/264	1(1)/439
16:00~17:00	0(0)/397	0(0)/398	0(0)/428	0(0)/382	1(0)/303	0(0)/424
17:00~18:00	0(0)/374	1(1)/416	0(0)/442	1(1)/344	0(0)/251	0(0)/399
18:00~19:00	0(0)/377	0(0)/332	0(0)/361	0(0)/297	0(0)/199	0(0)/385
19:00~20:00	4(2)/284	0(0)/295	0(0)/268	0(0)/231	0(0)/164	0(0)/287
20:00~21:00	0(0)/301	0(0)/195	0(0)/238	0(0)/172	0(0)/185	0(0)/264
21:00~22:00	2(1)/	0(0)/233	0(0)/245	0(0)/190	0(0)/176	0(0)/255
22:00~23:00	3(0)/	1(0)/274	0(0)/209	0(0)/156	0(0)/185	0(0)/221
23:00~24:00	0(0)/285	0(0)/240	2(2)/213	0(0)/158	0(0)/166	0(0)/216
Total	9(2)/8499	5(3)/8330	3(3)/8336	7(2)/7529	2(1)/5014	3(2)/7888

(2) Self-reliant and Continual Activities to be Conducted by Counterpart Organization

1. The weigh-in-motion system is a precision equipment, and periodical maintenance is necessary. Moreover, the system must be verified by the Vietnam Metrology Institute:
 - ✧ Adjustment: once a year
 - ✧ Maintenance: once a year
 - ✧ Verification test: once a year according to the Metrology law
2. Install the weigh-in-motion system near Ho Chi Minh City for another pilot operation.
3. Install the weigh-in-motion system all over Vietnam's national roads for reducing the number of overloaded trucks in Vietnam.

11. FUTURE PROSPECTS

(1) Impact and Effect on Development Issues of Concern through Business Development of Product/Technology in Surveyed Country

1. Install loadcell-type weigh-in-motion systems all over Vietnam
With the loadcell-type weigh-in-motion system, it would be possible to control overloaded trucks effectively. However, the system installed in Haiphong city solves the overloading problem in only a limited area. To reduce the overloading of trucks in Vietnam, the weigh-in-motion system must be installed on all major roads in Vietnam.
2. Reduction of manufacturing cost
To install the weigh-in-motion system at multiple locations in Vietnam, the cost of the system must be reduced. The system used in this survey was manufactured in Japan. However, to ensure that the installation of this system all over Vietnam is feasible economically, the system must be manufactured in Vietnam to reduce manufacturing cost.
3. Educate maintenance engineers
For annual adjustment, maintenance, and repair work, it is necessary to educate local engineers to reduce the cost of system sustainability in Vietnam.

(2) Lessons Learned from and Recommendations based on the Survey Results

Once the weigh-in-motion system has established, truck drivers will find other loopholes and take detours. It is very important that various organizations, institutions, and technologies cooperate to control the overloading of trucks.

ATTACHMENT: OUTLINE OF THE SURVEY

Verification Survey for Disseminating Japanese Technologies For Overload Truck Detecting by Weigh in Motion System (Tanaka Scale Works Co.,Ltd. Sanjo Niigata Japan)

Vietnam Overload Truck Issue

- Increase in the number of overloaded trucks due to rapid economic growth
- Increased the occurrence of injuries due to breaking failure and axle breakage
- Trucks accelerate the deterioration of roads and bridges
- Expand the budget for Road Repair
- Inefficient control by police

Content of Project

- Introduce the Japanese overload control method to Vietnam
- Introduce the loadcell-type weigh in motion system (WIM) to Vietnam
- Transfer the manufacturing technology to the Tanaka Scale Vietnam factory and educate maintenance engineers in Vietnam to further spread WIM, resulting in prosperity

Technology from Japanese Private Sector

Weigh in Motion System is :

- ◎ Automatic weighing of all the trucks by embedding a weigh scale on the road
- ◎ Automatic car-number recognition for linking the car registration data
- ◎ Efficient method to control the night and days on which overloaded trucks pass
- ◎ Type-approved and pass verification test for legal control

Expected Outcome at Vietnam

- Reduction of accidents due to overloaded trucks
- Improve the lifetime of road
- Reduce the road-maintenance budget
- Economic growth by improving the logistics

Expected Outcome at Japan

- WIM-sales increase
- Increased employment in Japan
- Educating Japanese engineers to ensure collaboration with Vietnamese government and engineers

分野別アイコン例

