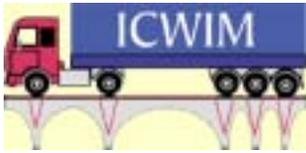




OVERLOAD VEHICLES SCREENING FOR ENFORCEMENT

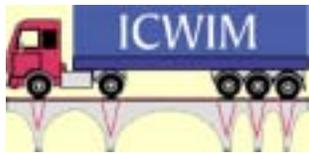
STANCZYK Daniel
France - CETE de l'Est

MAEDER Claude
E.C.M.



Presentation

- **FRENCH WIM NETWORK and OBJECTIVES**
- **SIMILAR DEVELOPMENTS in ASIA**



French WIM network and objectives

⌘ **170 WIM systems for :**

☑ statistics

⌘ **2 prototypes for pre-screening of overloaded vehicles to:**

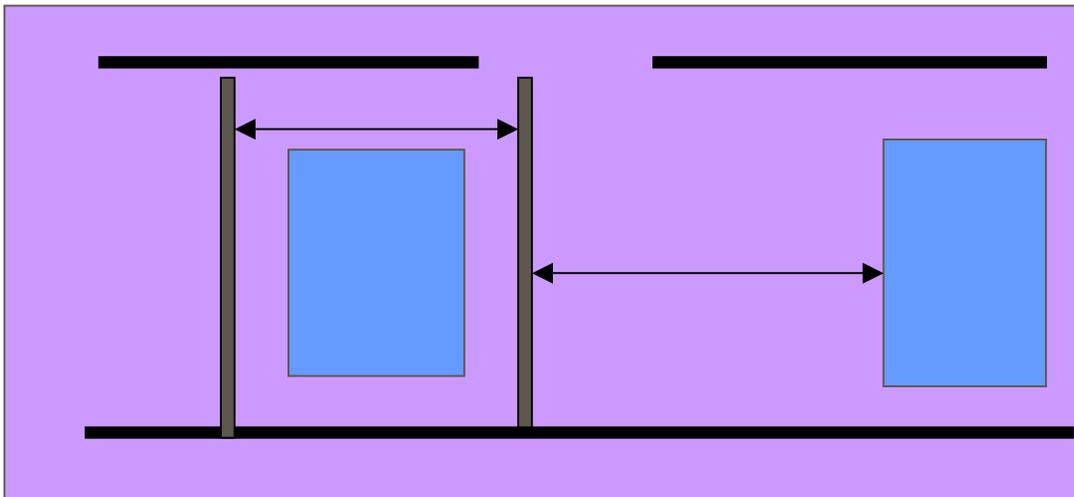
☑ Enforce and charge overloaded trucks

☑ perform preventive controls in companies

☑ optimize the control planning

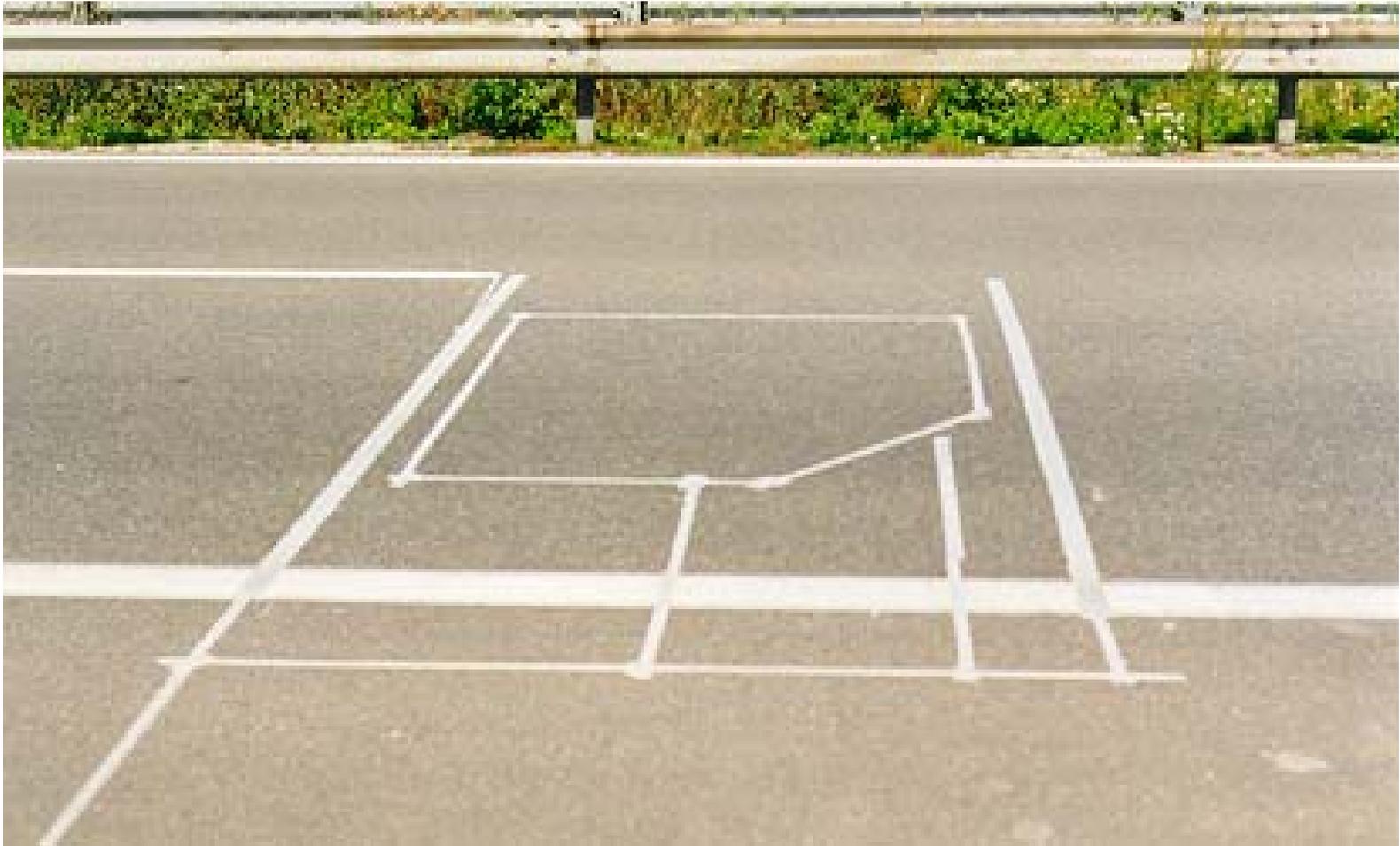
Sensors

- ⌘ 2 piezo-ceramic sensors
- ⌘ 1 inductive loop for detection
- ⌘ 1 inductive loop to turn on the camera





WIM Sensors

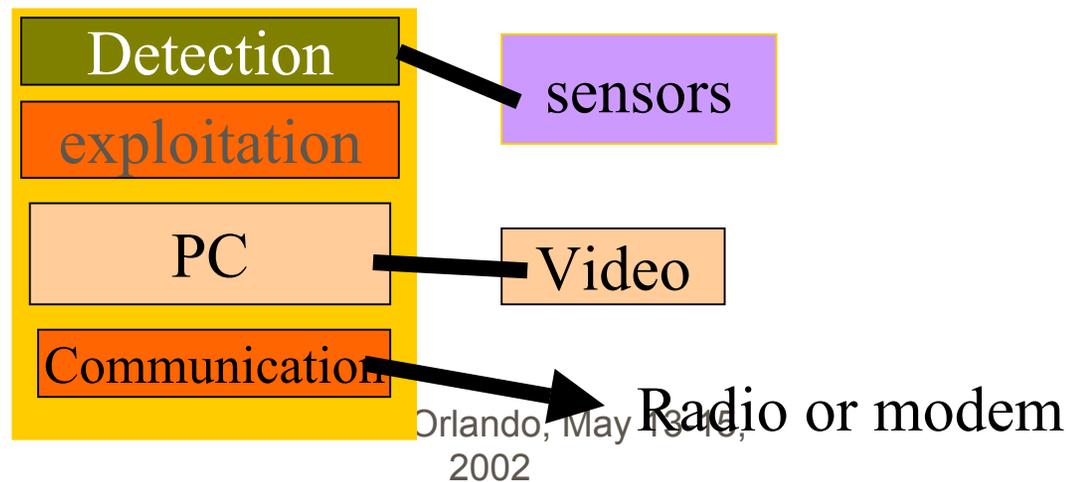


ICWIM 3 - Orlando, May 13-15,
2002



Electronics

- ⌘ Concrete shelter
- ⌘ metal protection cabinet
- ⌘ video recorder with industrial PC
- ⌘ radio or phone communication





Data Storage Capacity

ECM

- ☒ System 4 Mb
- ☒ PC about 6 Gb

STERELA

- ☒ PC about 20 Gb

**Video storage capacity:
ECM and STERELA**
100,000 pictures



Vehicle Classification

22 vehicles types (silhouettes):

- ⌘ 1 for motorbikes
- ⌘ 3 classes for cars
- ⌘ 3 bus types
- ⌘ 15 truck classes



Files storing Statistics

- ⌘ FIME (traffic flow, all vehicles - veh/hr)
- ⌘ FIPL (truck flow - truck/hr)
- ⌘ FIPR (overloaded vehicle/hr)
- ⌘ BS (detailed data per vehicle + name of the video file)
- ⌘ FITM (monthly statistics, per vehicle type)



Video

⌘ ECM

- ☑ monochrome video recorder (768 X 576 pixels)
progressive scan
- ☑ option for OCR

⌘ STERELA

- ☑ digital camera
- ☑ encrypted saved files

⌘ both manufacturers: registration plate recognition system (*planned by Nov. 2002*)



Communication

⌘ ECM

- ☑ network radio transmission system (600 Kb/s)
- ☑ CD-RW drive on the site

⌘ STERELA

- ☑ Modem RTC (56 Kb)
- ☑ network card



Picture recorder and analyser

- ⌘ Lap-top PC with high brightness
- ⌘ password
- ⌘ prescreening threshold by remote control
- ⌘ picture viewer
- ⌘ statistics
- ⌘ pictures and video stored in files



ECM Video

Video Client
Fichier Données 2

Quitter Déconnecter

DATE : 30/11/1999 HEURE : 00:00:10
STATION : 01 VOIE : 00 CAT : 10 VALIDITÉ : 0000 VIOLATION : 00001100
POIDS TOTAL : 41,8T POIDS DES ESSIEUX : 5,4T (S) 12,2T (S) 9,1T (S) 7,4T (S) 7,7T (S)

01:25
00:43
00:36
00:01
Prêt
Prêt

03/09/01 11:12

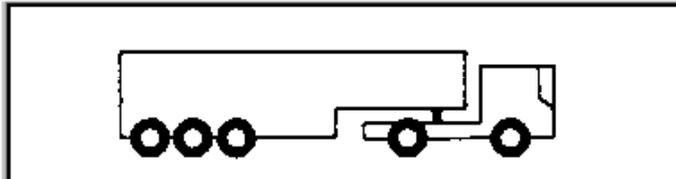
STERELA Video

SASV version 1.1 - Mode session [F2 : Paramètres F3: restitution fichier] -

Visualisation des PHOTOS



Plaque : XXXX HB XX Date: 16/08/01



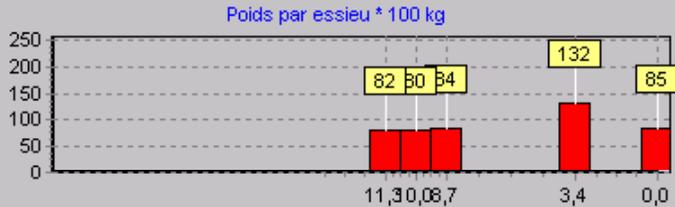
Impression automatique Imprimer 1/135

Voie: 0
 Date du passage: jeu. 16 août 2001
 Heure du passage: 18:15:34
 Vitesse en Km/h: 88
 Longueur en m: 16,0
 Classe: SI 10
 Poids Total en kg: 46600

Essieu 2: PE=13200 KE=1
 Essieu 3: PE=8400 KE=3
 Essieu 4: PE=8000 KE=3
 Essieu 5: PE=8200 KE=3

Seuils de référence:
 Simple: 13000
 Tandem: 0
 Tridem: 24000
 Poids Total: 40000

Poids par essieu * 100 kg



Temps Réel | Filtres | Tolérance | Statistiques | Gestion session

En attente d'un véhicule

Heure d'arrivée prévue: 18:16:22

Pause

07:59:31 Depuis 07:59:30 0 Photos, 0 Manquantes, 0 Eliminées
 07:59:31 Mise à l'heure sur Dac : 237
 07:59:28 Depuis 06:59:30 0 Photos, 0 Manquantes, 0 Eliminées

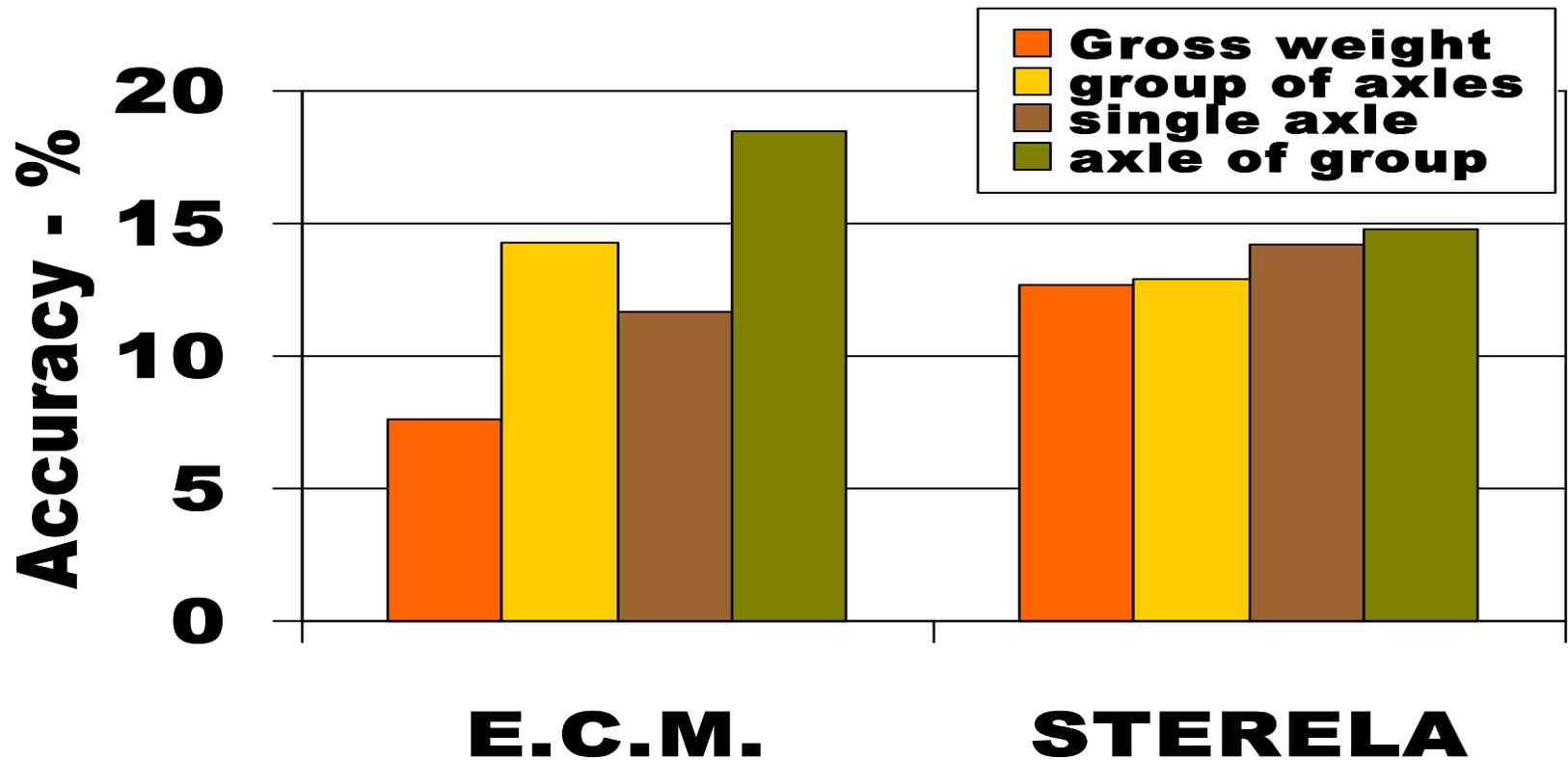


Site characteristics

CRITERIA	RN 83	A 31
Radius of curvature (m)	∞	∞
Longitudinal slope	< 1 %	≤ 2 %
Transverse slope	2.5 %	≤ 3 %
Rutting (mm)	≈ 0	≤ 2
Deflection (1/100 mm)	5	≤ 5
Evenness: APL (SW-MW-LW)	7 - 7 - 7	9 - 9 - 10
Evenness: IRI (m/km)	-	
Road quality (COST 323specs)	good	excellent



Test Condition (R2), Environment I





Overload detection

	All preselected Trucks	Overload > 0%	Overload > 5 %
ECM	76	66	37
%		87 %	49%
STERELA	6	6	5
%		100 %	83 %



Results & Conclusions

⌘ Difficulties encountered to develop WIM + Video

⌘ 1 year to obtain results - ECM recently worked

⌘ **ECM system – RN 83**

⌘ among 76 trucks detected as overloaded by the WIM system:

⌘ 87 % trucks were really overloaded

⌘ 49 % were charged because of more than 5% overload

⌘ 1 axle found with 32 320 kg (heaviest axle weighed in France)

⌘ a few controls in transport companies

⌘ 4 incidents

⌘ **STERELA system – A 31**

⌘ WIM and static weighing during 1 day: 6 trucks stopped – 5 charged – 5 refused to stop



KOREAN EXPERIENCE



Functioning



High Speed WIM



Cameras with OCR



L.S. WIM

First Installation: 1998 / first quarter

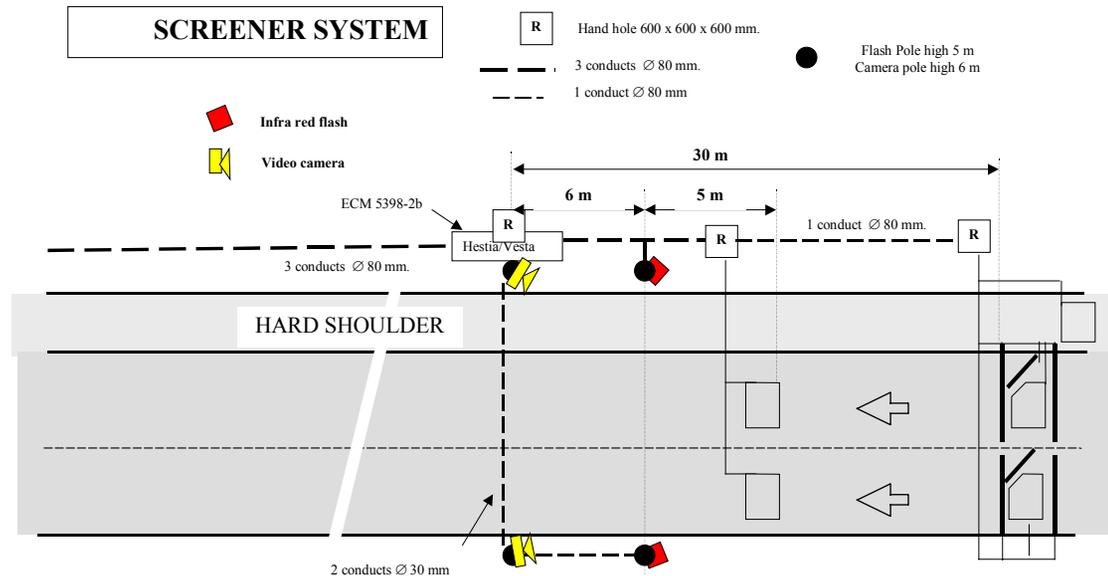
Number of Installations:

- with Cameras and VMS : 4
- without Cameras with VMS : 6

Accuracy: Class C

- for speed between 25 and 90 km/h
- following COST 323 Criteria

ONE SITE WITH OCR + VMS with plate number screening



PROBLEMS ENCOUNTERED:

- NO sensor has been replaced in 4 years except when road was rebuilt
- Korean character recognition (65%)
- Speed transmission is insufficient



EXPERIENCE IN CHINA



High speed WIM



VMS for L.S. WIM



Computer Network



L.S. WIM

ICWIM 3 - Orlando, May 13-15,
2002





EXPERIENCE IN CHINA

ACCURACY:

high speed WIM (trials on 50 vehicles)

- Total weight: $\pm 10\%$ on 90% of the vehicles

- Axles weight: $\pm 15\%$ on 90% of the vehicles

percentage of vehicles preselection in real overloading : 86%

LOW SPEED WIM:

statistic versus dead weight : $\pm 0.5\%$

LS (speed < 15 km/h) versus statistic (30)

- Axle = $\pm 3.9\%$

- Total = $\pm 3.0\%$

FIABILITY:

6 months without problem except:

- Hard disk full up on video-server (1 time)

- VUPS problem on Police Computer

PROFITABILITY:

penalties collected in 5 months: more than US \$ 500,000

investment is about US \$ 300,000