SiWIM®

Bridge Weigh-in-Motion System

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SiWIM history

- 1996: Initiated during the WAVE project
- 1997 and 1998: first prototype used in Luleå as a part of CET
- 1998: first FAD on short slab bridges near Ljubljana
- 1999:
  - first real-time FAD measurements in Falun
  - 6 sites instrumented for the DRSC
  - cooperation with Cestel initiated

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SiWIM history

- 2000 and 2001:
  - SiWIM Version 2:
    - new hardware
    - upgraded software (remote controlled)
  - Measurements for DRSC on 14 additional sites
  - Measurements in Kyrkdal
- 2002:
  - SiWIM Version 3:
    - new hardware and software (in C++)

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SiWIM system

- SiWIM system is composed of:
  - Strain transducers ST 500
  - Axle detectors, if needed
  - Signal Conditioning Unit
  - Processing unit
  - Housing
  - Cabling
  - GSM unit

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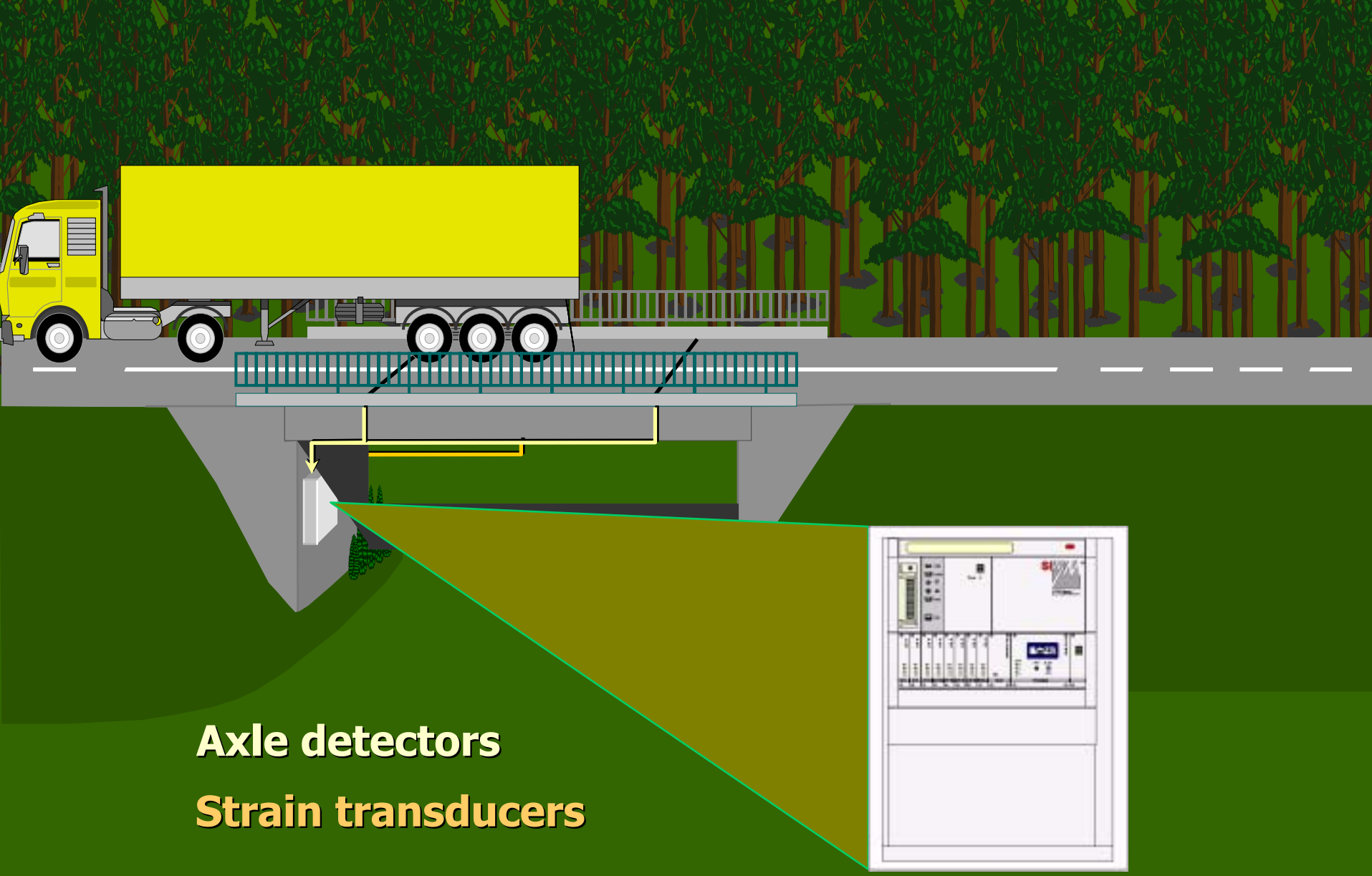
Axle detectors
Strain transducers
B-WIM system

ST500 Strain transducer

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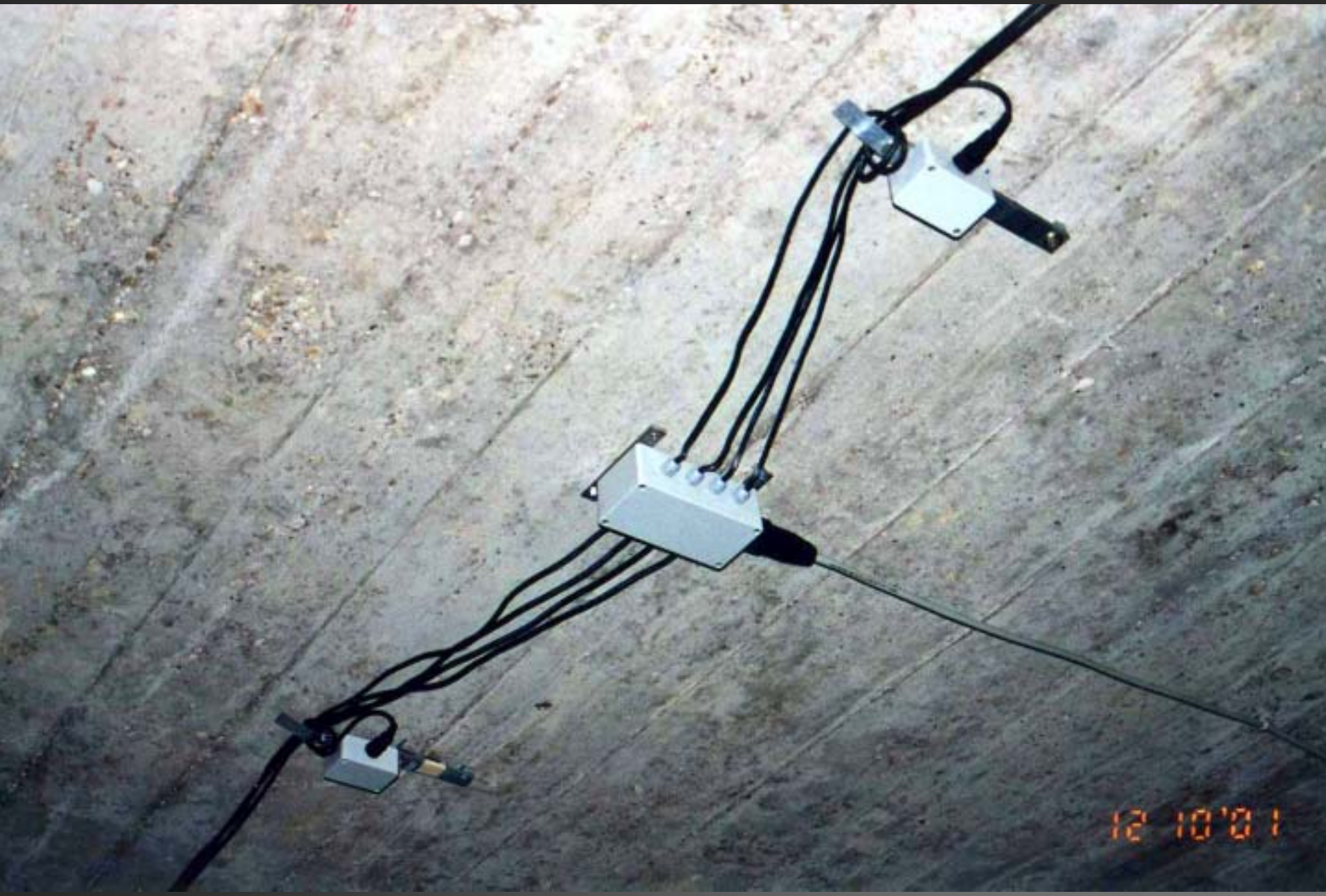
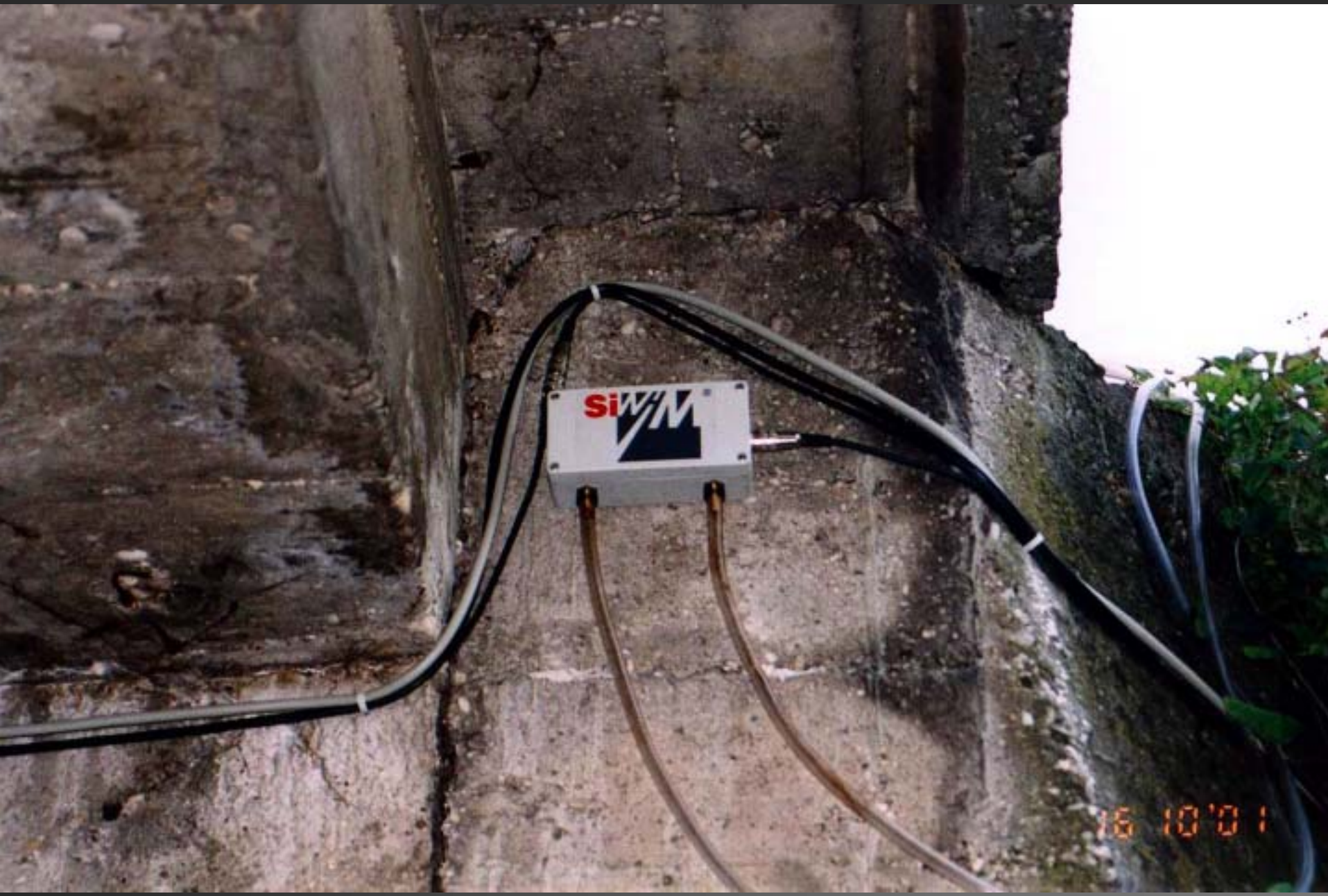
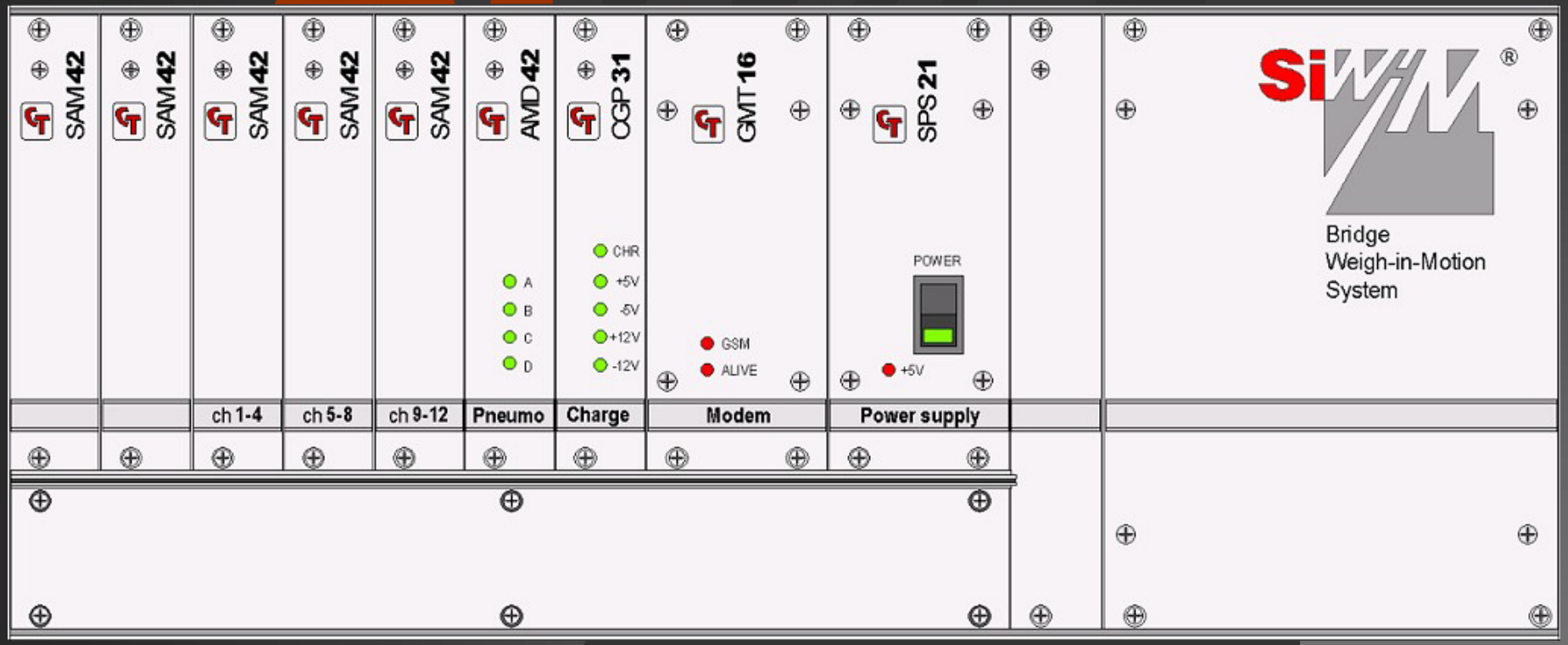

12 10'01

12 10'01


SiWM
16 10'01

BRUMAC



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16 10'01

SAM41
strain
SAM41
strain
PDS41
SRC11
zero
A
B
C
D
A
B
C
D
ch 21 24
ch 17 20
SiWiM
12 10

SiWIM systems

SiWIM P - Portable

- 8 to 16 ST-500
- to 6 AD axle detectors
- 2-hour backup
- 54x43x24 cm (w×h×d)
- weight: 17 kg

SiWIM M - Mobile

- to 24 ST-500
- to 12 axle detectors
- 16-hour backup
- 60x80x30 cm (w×h×d)
- weight: 57 kg

- Accuracy of all systems up to B+(7)
- Wire-less modem 9600bps +external antenna
- TCP/IP 10/100 Mbps network connection
- 16 bit A/D with 1024 sps
- power 12V DC, 25VA

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SiWIM system

- Software:
  - SiWIM-E: Engine
  - SiWIM-F: Front-End (with SiWIM-L: Lingo)
  - SiWIM-D: SiWIM data postprocessing and evaluation

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Selection of bridges

Types of appropriate bridges:

- short slab bridges
- beam/deck bridges
- long-span bridges with cross-elements (orthotropic deck bridges, steel box girder bridges)

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Slab bridges

Span length:

- 3 to 100 ft., optimal 10 to 50 ft

Thickness of the superstructure

- 1 to 2 ft
- soil layer up to 3 ft. (conditionally to 6 ft.)

Boundary conditions

- fixed supported the preferred type of structure

Girder/deck bridges

Steel or concrete

Span length:

- newer: over 50 feet
- older: from few feet

Thickness of the superstructure

- could be well over a 3 feet

C(15)

D+(20)

B(10)

B(10)

C(15)

2,7m
B(10)

D+(20)

B+(7)

C(15)

C(15)

C(15)

B(10)

C(15)

B(10)

SiWIM-F software

- Parameters setting
- Detect infuence line
- Calibrate
- Data transfer
- On site monitoring

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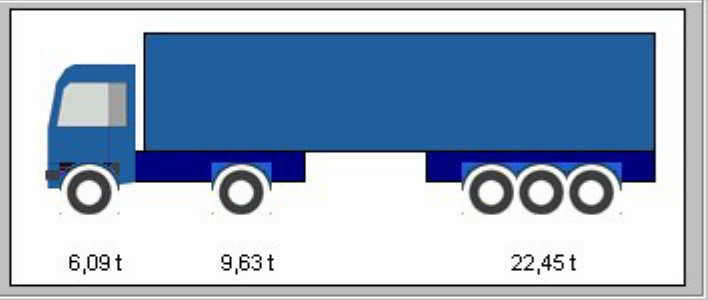
Connect Main Engine Options Configuration Window Help

pt Reload | Calibration Mode | Trucks Cars Calibration Parameters Inf. Lines Diags Monitors

ucks

ate	Time	Ca	Co	L	Cls	Spd	A	GVW	W1	W2	W3	W4	W5	W6	W7	A1	A2	A3	A4	A5	A6
						km/h		t	t	t	t	t	t	t	t	[m]	[m]	[m]	[m]	[m]	[m]
002.03.2:	13:23:13	-	-	2	51	56,4	3	23,40	5,69	7,30	10,41					3,42	1,44				
002.03.2:	13:23:59	-	-	2	51	49,9	3	11,42	4,45	3,31	3,66					3,45	1,46				
002.03.2:	13:35:42	-	-	2	41	41,1	2	10,45	3,18	7,26						6,09					
002.03.2:	13:31:56	-	-	2	51	46,4	3	24,70	5,48	7,86	11,36					3,38	1,49				
002.03.2:	13:17:10	-	-	2	113	42,6	5	37,00	6,52	9,80	7,39	5,43	7,86			3,78	3,15	1,39	1,39		
002.03.2:	13:20:55	-	-	2	113	47,6	5	38,16	6,09	9,63	6,51	6,93	9,01			3,83	6,27	1,40	1,42		

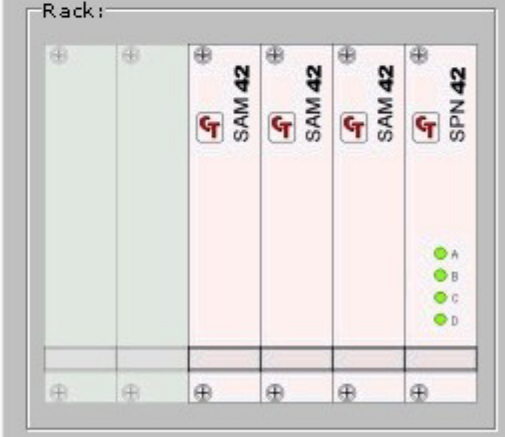
lass: 113
gory: 5
ss Weight: 38,16 t
: 2
d: 47,6 km/h
Axle Distance: 12,91 m
erature:



Fine Tuning | Vehicle detection | Ge

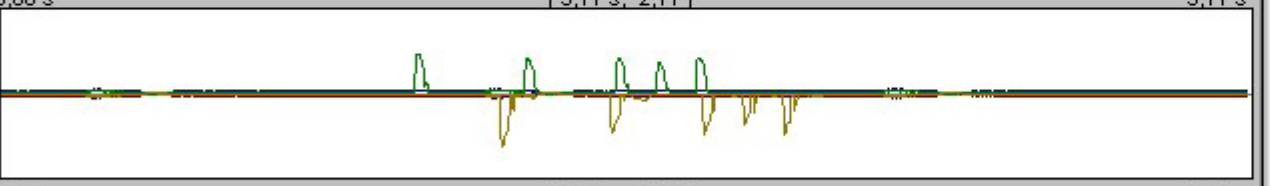
General | Channels | Strain transducers

Rack:

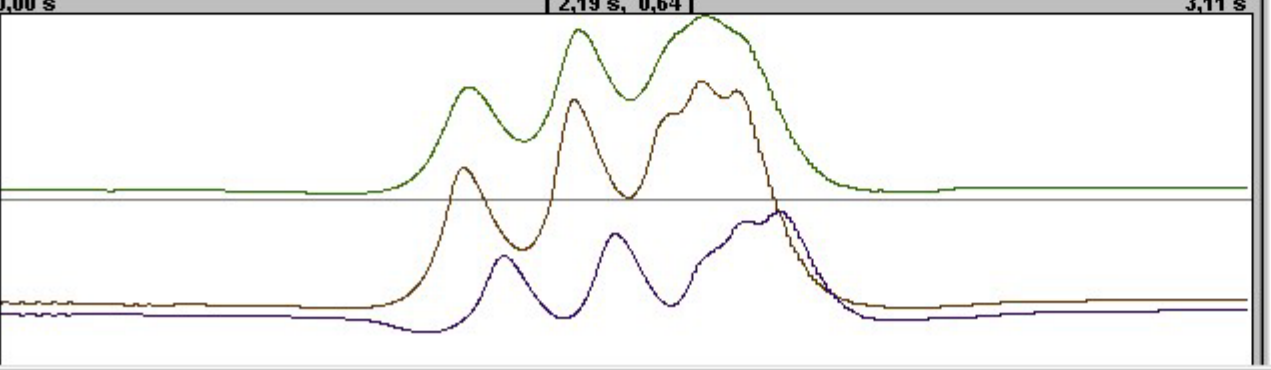


Number of channels: 16

0,00 s [3,11 s, 2,11] 3,11 s



0,00 s [2,19 s, 0,64] 3,11 s



SiWIM-D Data processing software

- Displaying and inspection of data
- Calculation of GVW and axle load histograms
- Overloading module
- Strain inspections
- Bridge load modelling module

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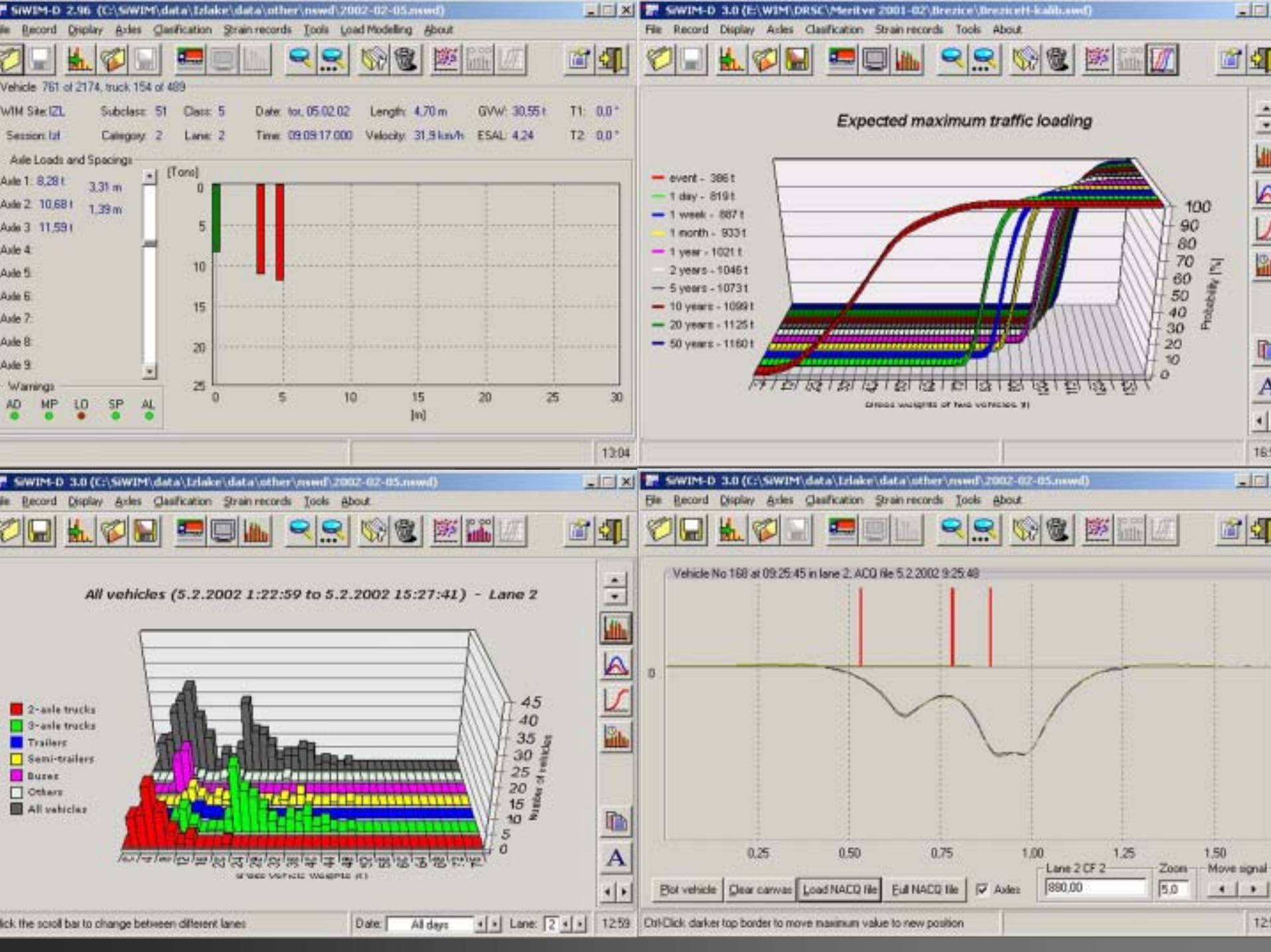
SiWIM-D 2.96 (C:\SiWIM\data\Izlake\data\other\nswd\2002-02-05.nswd)
File Record Display Axles Classification Strain records Tools Load Modelling About
Vehicle 761 of 2174, truck 154 of 489
WIM Site: IZL Subclass: 51 Class: 5 Date: tot, 05.02.02 Length: 4,70 m GVW: 30,55 t T1: 0,0°
Session: Izl Category: 2 Lane: 2 Time: 09:09:17.000 Velocity: 31,9 km/h ESAL: 4,24 T2: 0,0°
Axle Loads and Spacings
Axle 1: 8,28 t 3,31 m
Axle 2: 10,68 t 1,39 m
Axle 3: 11,59 t
Axle 4:
Axle 5:
Axle 6:
Axle 7:
Axle 8:
Axle 9:
Warnings
AD MP LO SP AL
[Tons]
[m]
13:04
SiWIM-D 3.0 (E:\WIM\DRSC\Meritve 2001-02\Brezice\Brezice11-kalib.swd)
File Record Display Axles Classification Strain records Tools About
Expected maximum traffic loading
event - 386 t
1 day - 819 t
1 week - 887 t
1 month - 933 t
1 year - 1021 t
2 years - 1046 t
5 years - 1073 t
10 years - 1099 t
20 years - 1125 t
50 years - 1160 t
Probability [%]
SiWIM-D 3.0 (C:\SiWIM\data\Izlake\data\other\nswd\2002-02-05.nswd)
File Record Display Axles Classification Strain records Tools About
All vehicles (5.2.2002 1:22:59 to 5.2.2002 15:27:41) - Lane 2
2-axle trucks
3-axle trucks
Trailers
Semi-trailers
Buses
Others
All vehicles
Number of vehicles
Click the scroll bar to change between different lanes
Date: All days
Lane: 2
12:59
SiWIM-D 3.0 (E:\SiWIM\data\Izlake\data\other\nswd\2002-02-05.nswd)
File Record Display Axles Classification Strain records Tools About
Vehicle No 168 at 09:25:45 in lane 2, ACQ file 5.2.2002 9:25:49
Plot vehicle
Clear canvas
Load NACQ file
Full NACQ file
Axles
Lane 2 CF 2
880,00
Zoom
5,0
Move signal
Ctrl-Click darker top border to move maximum value to new position

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