MONITORING TEST MEASUREMENTS DATA MANAGEMENTS ASSISTANCE SUPPLY

# ACCELEROMETER MONITORING SYSTEM







### SYSTEM DESCRIPTION

Why Civil and Industrial Structures need Dynamic Instrumentation for Monitoring?

The strength and serviceability of a structure can be considerably reduced by natural or human-made events, ear-thquakes, extreme levels of operation, uncontrolled structural changes and various other external influences.

The Dynamic Instrumentation in addition to a Geotechnical Monitoring System can be a useful tool for the control of any potential problems or hazards, with the result of a better management of the safety issues concerning the structures.

For this purpose, Field has developed an accelerometer system capable of measuring an event of seismic accelerations to which are subjected the monitored structures allowing the interpretation process of any effects on the structures themselves. Analyzing the acquired data by the FIELD system, fundamental features (seismic wave propagation) of a dam may be identified such as the damping within the large dam structure, amplification of the ground motion along the path from the foundation up to the crest, differential motions between structures, natural frequencies, mode shapes, etc.

The monitoring system consists of a network of accelerometric sensors strategically placed on the structure to be monitored and a central system which processes the information and makes it available.



The main benefits are increased security, but in addition to security, there is also a benefit, because the monitoring is used to identify the presence of damage not directly visible, making timely repair operations.

Be constantly updated on the status of a structure to minimize the risks and reduce the need for inspections. This allows you to invest in an optimal way the public and private resources, intervening only where necessary.







### **SOFTWARE and DATA ANALYSIS**

The management and analysis software allows:

- channels configuration;
- to activate and deactivate the registration;
- the configuration of the acquisition times pre and post trigger;
- to visualize in real time the values;
- to do manual registrations.

In addition, it is possible to set up programmable filters to limit the analysis in frequency only to significant spectrums. The user could configure the interesting frequency band and delete all the other components in frequency. These could return values that are altered with respect to the frequencies of the viaduct. It could also be defined how to delete the "unwanted" components in frequency, defining the filter to apply.









The Accelerometer monitoring system completely integrates within WMS Software Platform for the validation, processing, conversion, management and automatic visualization of data.

The signals of the acquired instruments, through F/O - LAN - GPRS - Radio - Satellite connection are sent to a server, integrating them within a SQL type database.

Data are subjected to a first automatic validation to delete potential reading peaks and/or abnormal readings. Then, these are converted in the opportune engineering units. Through an application and a web connection, data are made available for the client, both in graphic and in tabular format (.xlsx). This way, the system could be completely automatic and updated in real time 24h/365 days a year.



## **Services For Geotechnical Engineering**

## ARCHITECTURE

Each station is constituted, mostly by one triaxial (X, Y and Z) bound to a concrete base, the sensors are connected by cable to a central data acquisition, the data collected are stored in a memory, together they can then be downloaded locally or sent via 3G router to a remote control station. The data acquisition units are power supply through electrical connection, or if not possible by means of photovoltaic panels.

Whit Bears 12 Ser	and Galactys Al										-	State of the local division of the local div	Column State
	3			20		0						GA	
	61 - 1 <b>0</b> 00	Trease 10 . Bray	+ 15 +										
i instant	6												
119		Dee	10,000	14m (9,0004	time et. 11.114	144, 90, 91, 814	the states	216-10.0.04	216-10.02354	And MUSICAL	enal inclusion	100 VE 10 E4	THE VERTICAL ZA
on the DATA and	2.*	06/19/2001 12:10/0	-0.1181	1954	-0.063	6.5346	6004	10129	-00e21	0.0421	-0.0563	0.0440	-0.0677
mark 1545-003		06/05/06/1 12/068	417994	14965	-0.1124	0.0788	40112	1.067	0000	00294	-0.097	powet.	-cenn
		0.05042.0308	-0005	1471	-0.0008	64742	-62586	10728	-04905	0.0304	-0.086	0.0422	-0048
	_	16.15(2011 (22)00)	-00436	0.0452	14304	0.0347	60475	10426	-06252	00224	0.3076	0.064	-0.0478
		1001010213 (20040	40024	13541	-0.054	6.25%	4.05.05	1098	-04903	80494	-8342	8/2799	-0.0128
		00/05/202 12:005	4061	2019	-00001	60807	-0.0412	1000	-dentz	01280	-0085	0,2182	-6113
		M-06-067 13100	40422	1.0etf	-0.064	0.016	40140	0.04f	-dife23	pitote	-0.2556	birde.	-0.010
		06/05/2011 18/000	45%1	0.0001	-0.5488	0.049	42576	0.0194	-0.096	0094	-0,2840	0.0495	200472
		06-05-28.3 13:20.00	40183	0.0627	-01285	8.344	4038	00942	-08328	0000	-0.085#	6.2345	(COSHE)
		06/06/08/1 (3/06)	40752	1.0627	-0.076	6.0873	0.0580	nexia.	0.0094	6.029	0.0444	6.75.8	0.0410
		06/03/02 13:00	4.096	0.0945	-6.0107	0.0948	4,8525	6.016	04048	0.04	-6,662	6/577	-0.0466
		06/07/202 24:003	-02546	10015	-6.0180	0.0905	-01429	101142	-08128	0054	-0.0204	00/04	-0.043
		06/55/28/1 (345/42	-0.0809 -	1054	-0.0681	STR16	6.5628	1000	Cather	0.034	0.048	0.7124	-0.017
		Indiac (prototal)	42523	Colors.	-0.0448	6.0008	62118	10679	-04042	5CH2	0.1316	6076	0.0466
		18-1910 (UL) 1430 (U	4003	1.003	-0.0075	64797	-0.0142	0.0142	-04548	0084	-00/08	0.014	-00149
		mmont and	4045	100.0	-0.0044	0.09%	6.06.7	10738	-0.086	0.042	-0.548	0.0477	0.001.0
		18/09/08/3 14/06	4061	1.001	40871	60%	60525	6047	64042	0.024	-0.7568	5.016	-56488
	- 1	100/00/01 14:4002	40125	1.044	-0.2078	1127	40.0708	8477	-04128	0.000	-00850	0.1199	-0.0155
		10.00.00.0 (410.0)	-0.0431	0.0717	-02177	C 2140	4,0400	0.077	dates	0/542	-0.0624	5.0812	-0.0185
		06/05/08/11/5/06/	40414	0.0484	10000	64738	6.0623	0.0679	-04298	aniet.	-0.0969	-0.0154	0.0480
		10-15-24LI (3-10-0	4000	Louis	42287	6.675	40000	12344	-0451	0128	000	0.046	00489
2		10.05 (0.01 (5.010)	core.	0.0641	-0.004	0.0705	0.0855	1000	64518	0.075	0.0794	0.000	-00144
		W15700 (5.000	41794	1.000	-0.0014	0.094	40452	6885	08124	84427	0.04	0.0794	-0.0640
- Laurent	-	merces mere	-0981	1003	<173	1.000	4.09	44944	-(#294	DOM:	-20044	1016	-6419





TECHNICAL CHARACTERISTICS						
Model	ASF 15 ±2g	ASF 15 ±1.7g	ASF 15 ±2gM			
Number of axis	"3 orthogonal axis X,Y,Z (2D or 1D Optional)"					
Technology	Servo accelerometric	Piezo resistive	Mems			
Measuring range	±2g	±1.7g	±2g			
Sensitivity	5.0 V/g	5.0 V/g	5.0 V/g			
Linearity	<±1% FS	±25mg	±2% FS			
Power Supply	13-20 VDC					
Resolution	±100ug	±0.5mg	±1.5mg			
Output		13.5 - 20 Vdc				
Box	Aluminium					
Protection	IP66					
Dimensions	105 x 150 x 95 mm					
Connection	cable					

Note : the maximun range could be able to set until ±4g

## DATALOGGER



TECHNICAL	CHARACTERISTICS
Computer Dual Core 1.8 GHz	<ul> <li>Dual Core Intel 1.8GHz processor</li> <li>Memory DDR3 800MHz 2GB SDRAM</li> <li>8 USB input,</li> <li>3 RS232 input,</li> <li>1 input RS232/422/485,2 input LAN Ethernet</li> <li>3 input SATA 3Gb/s</li> <li>8 I/O digital (4 input/4 output)</li> <li>Power supply 12VDC +/-5% 1.7A</li> </ul>
Acquisition card IO-TECH daqboard 3005usb/3035usb	<ul> <li>16 acquisition channels single ended (3035USB: 64 singles ended channles)</li> <li>24 ports digital input/output</li> <li>Control and acquisition of computer through serial interfaceUSB 2</li> <li>Alimentation 6/16 VDC - 2 W</li> <li>Operating field -30/70°C</li> <li>Acquisition speed 1Ms/channel</li> <li>10 Mohm of input impedence and analogical inputs</li> <li>16 bit resolution</li> <li>Non linearity error +/-2 LSB max</li> <li>Precision +/-0.031% and reading +/- 0.008% f.s.</li> </ul>
Router wireless netbox NB1600	<ul> <li>UMTS/GSM/2G/3G</li> <li>2 Ethernet ports</li> <li>1 USB input</li> <li>1 serial input RS232</li> <li>4 I/O (2 inputs and 2 outputs)</li> <li>Antenna connector SMA female</li> <li>Power supply 12/48V DC 5W</li> <li>Temperature -25°C/70°C</li> </ul>



FIELD S.r.I. Società a Socio Unico soggetta a direzione e coordinamento Sisgeo S.r.I.

Via Provinciale, 44 –24040 Lallio (BG) – Italy – tel.: +39 035/203471; fax:+39 035/203448 e-mail: info@fieldsrl.it - www.fieldsrl.it



