SYSCOM Instruments

Monitoring of controlled demolition, Sesto San Giovanni, Italy

Case study

July 2022

Case study - Controlled demolition monitoring

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Introduction

A symbolic event, coinciding with the start of construction work on the new bio-platform in Sesto San Giovanni, in the north of Italy, in accordance with the new European energy and environmental requirements, was the demolition of the 70 meter high chimney by means of induced collapse using radio-controlled excavators. The event was monitored using a ROCK device from Syscom Instruments for vibration monitoring compliance with the DIN 4150-3 standard (vibration at foundation, industrial building) not to be exceeded.

For more information about the San Giovanni BioPlatform transforming the waste to energy as well as carbon-neutral waste water treatment, refer to the following website: https://www.gruppocap.it/en/development-and-sustainability/stakeholder-engagement/key-projects/sesto-san-giovanni-bioplatform

KEY FACTS

Country:	Italy
Location:	Sesto San Giovanni
Height:	70 m
Diameter:	5.6 m
Weight:	903 ton

Instrumentation

A Syscom ROCK device

Monitoring duration: less than one day, for the controlled demolition induced vibration monitoring according to DIN 4150-3 standard.

The benefit of using the Syscom ROCK is having an entirely cable free device, very quickly installed at relevant locations on site and its unrivalled ease of use. A unique ON/OFF button enables the device to start monitoring all site vibration. The data are automatically transferred then to the Syscom Cloud Software (SCS) without any additional configuration, like SIM cards or APN networks (Access Point Network) setup.

The SCS (https://scs.syscom-instruments.com) will then process and notify the different project stakeholders in a very swift manner of any vibration levels in exceedance of selected alarms.

ROCK autonomous vibration monitoring device

Figure 1: Setup of the ROCK device on location.

Monitoring setup

The monitoring unit was located along the north/west perimeter of the construction site, at the base of the perimeter wall, bordering the production building closest to the fall area, to analyse the vibratory effects due to the planned collapse of the chimney.

The measuring period is from 8h00 to 24h00 on September 22, 2021. The demolition activities started the same day at 22h00 and lasted up to 23h46, time of the collapse

The complete installation of the device on site was performed in less than five minutes and the monitoring system was in operation during the whole controlled demolition, before, during and just after the collapse of the chimney for a complete vibration assessment on site.

In Figure 1, the ROCK is partially burried for a proper ground to internal sensor coupling. This is very relevant when mid to high frequencies are expected with significant PPV amplitudes.

Results

All vibrations are below the trigger level threshold of 1 mm/s for all three axis (X, Y, Z) configured in the ROCK device, except for the collapse. This is shown in Figure 2. The complete collapse of the chimney at 23h46 and the demolition activities are visible, starting at around 22h, with higher ambient vibration recorded.

During the demolition, two events were recorded (one of them is shown in Figure 3). They were generated by the impact of the chimney on the ground. Events are sent automatically to the SCS cloud software and a PDF report is sent by email within one minute after the event to all relevant project stakeholders. Both events were below the threshold of the reference limits of the DIN 4150-3 standard, as shown in Figure 4.

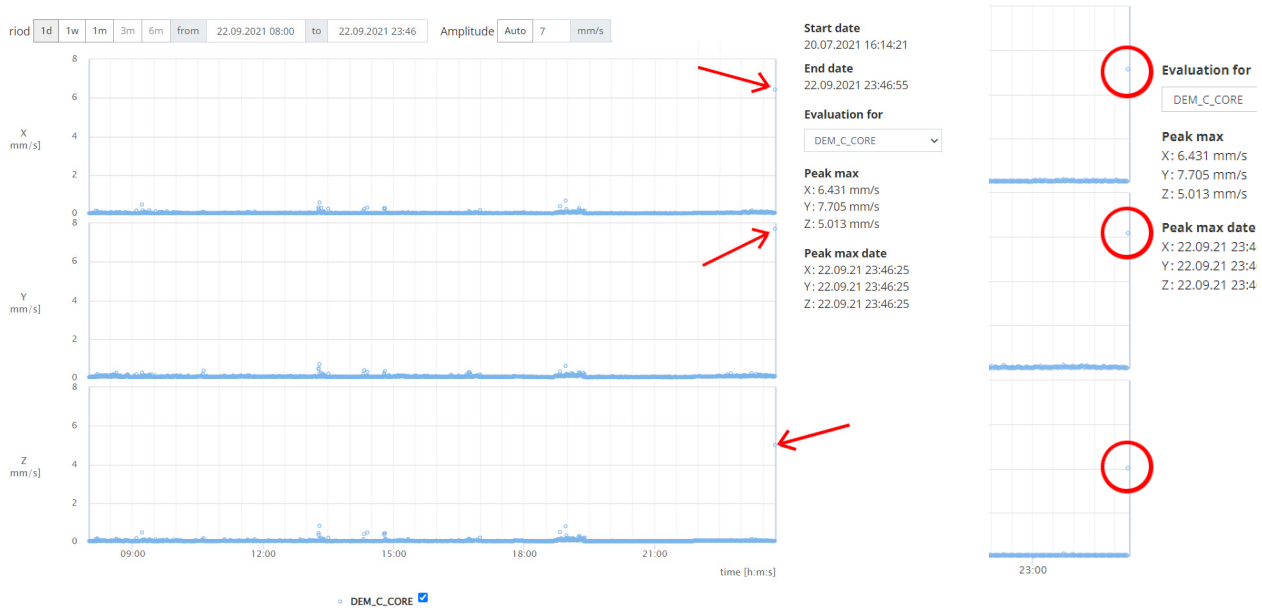

Figure 2: Background monitoring of the whole monitoring period. On the right: zoom on the demolition period with highlight on the event shown in Figure 3 (time history) and in Figure 4 (comparison with the norm).

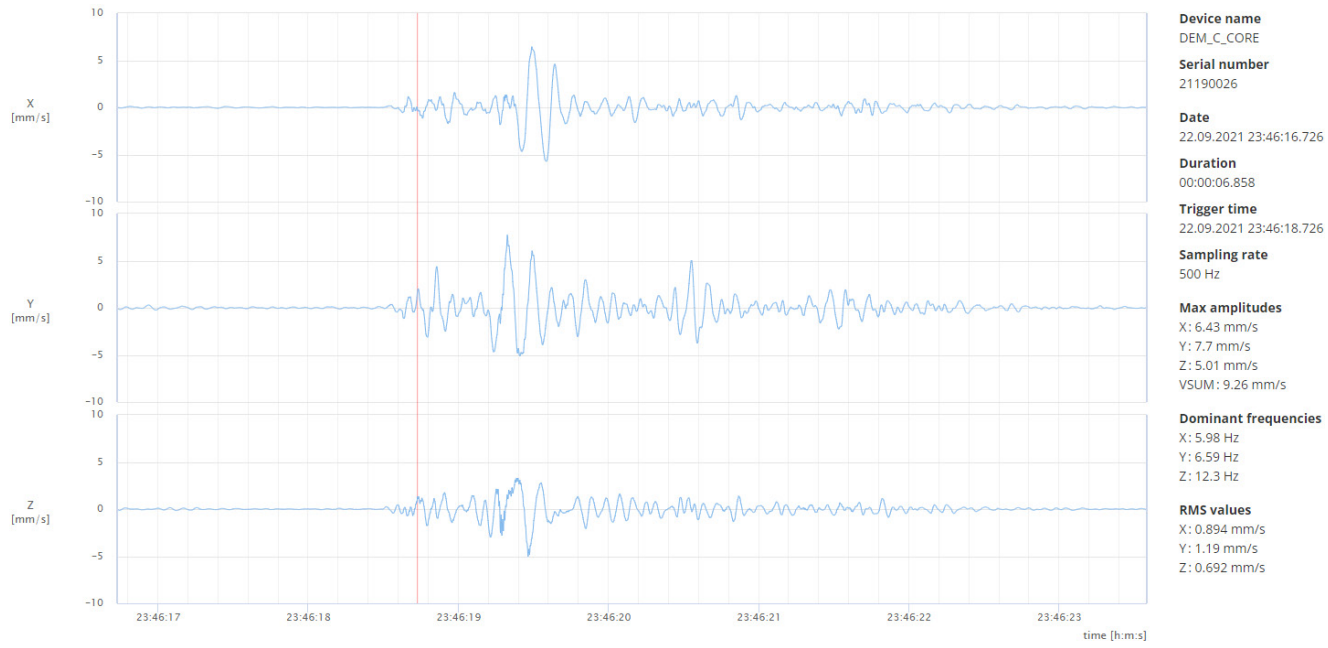

Figure 3: Event generated by the tower collapsing and hitting the ground.
Horizontal XY and vertical Z traces recorded by the ROCK.

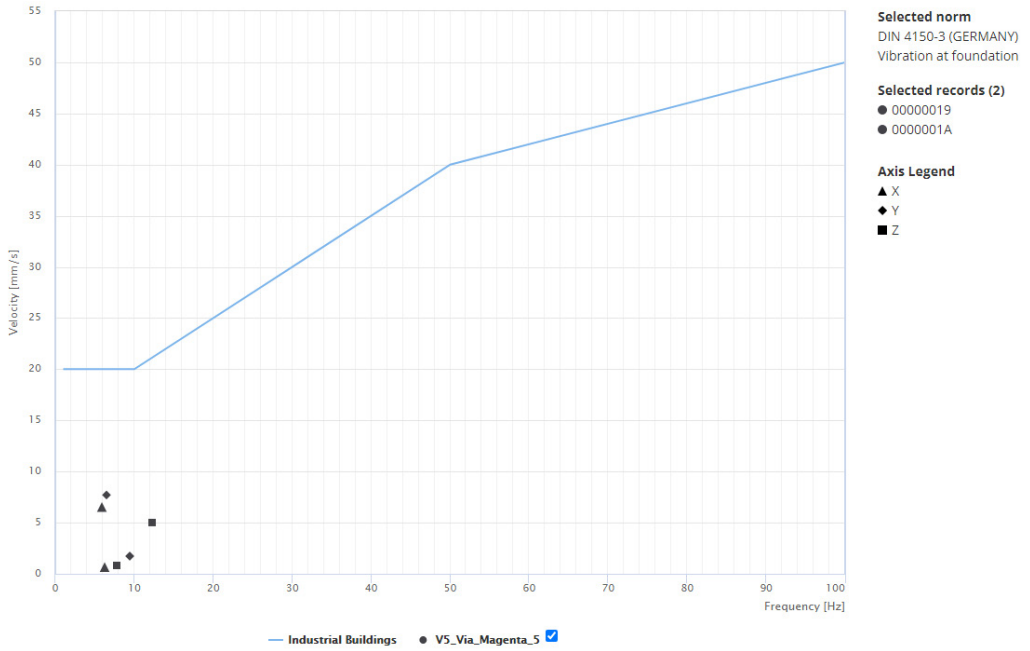

Figure 4: Comparison of the two events recorded values with the DIN 4150-3 limits for industrial buildings, vibration at foundation.

Figure 5: Controlled collapse of the chimney.

Conclusion

The monitoring of the chimney was successfully realized with the ROCK device and data were transmitted automatically to the SCS cloud software. In less than one minute a PDF report was automatically sent by email, including the event time history, the frequency graph and the norm comparison with the DIN 4150-3 graph, for quick exceedance assessment.The vibrations produced during the whole demolition process did not exceed the limits defined by the DIN 4150-3 standard and therefore the demolition was in full compliance to this specific standard.

For more information about the case study and the instruments, please contact Spectra or Syscom Instruments at the contact details below:

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About Syscom

SYSCOM Instruments is part of Terra Insights platform of trusted monitoring technology brands. Terra Insights is the industry's first, end-to-end sensor to cloud data delivery platform that supports proactive, risk-informed decision making and monitoring. SYSCOM Instruments SA is a leading supplier of vibration and seismic monitoring equipment for the civil engineering and safety markets, in particular for nuclear power plants and LNG plants. The reputation of SYSCOM Instruments SA is based on the reliability of its products, resulting from a meticulous control of all aspects of design and production.

https://terrainsights.com/

We are grateful to our partners at Spectra for allowing us to write this case study.

https://www.spectra.it/