



Q&A - MISSION EARTH FIRST - Webinar 4: Demonstrating of Underground Spaces - March 3, 2021

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No.	Question	Answer
1	Is there a bar?	Well, in Hagerbach is a Restaurant and Kantine for employees, workers, seminar participants, ... But we also have a mobile bar, so that we can locate it to almost every point desired throughout the gallery ,,-)
2	Why was it established/ built in the first place?	The purpose - as the name says - was testing : industry partners of Mr. Rudolf Amberg asked for a dedicated Test Environment to make 1:1 research & development of Underground Construction Technologies.
3	Why chose this lab to be underground? whats the profit to be in the tunnel for the lab?	The Lab-activity in the gallery startet quite early, as the R&D activities asked for reliable confirmation of innovation achievements. To have a lab in place was beneficial and in particular after it got accreditation according ISO 17025 in the early 90ties. Until know the stable solid and climate conditions in the mountain are of advantage.
4	Very interesting and various offers you have underground. Fascinating are the test facilities	Thank you - we like to push boundaries and test fascinating ideas.
5	Great location!	Thank you.
6	Is there a benefit for the testing lab beeing underground?	see the answer to question 3
7	What temperature is it inside	In the gallery network we ave stable 15°C.
8	What are the most common uses in the gallery	Hard to say - as we always adapted to our partner needs (blasting, drilling, fire testing, health and safety trainigs, sprayed concrete advancements, ..., events and celebrations)
9	Has it free access to the public (restaurant, visitors...)	We have a public zone (restaurant, lab, seminar area) and a restricted zone (construction site).
10	How do you operate with respect to international clients? Can you test according to other than swiss standards?	Our construction lab covers over 150 standard test methods. Based on the equipment we can adapt also to standard code requirements other than used in Switzerland. However, this is the exception.
11	How is it financed? Only private partners?	Yes, Hagerbach Test Gallery Ltd is a private company and 100% financed by its own activites.
12	How international is the activity of the Lab shown in the tour?	The Hagerbach Test Gallery has clients and visitors from all regions of the world. Typically 75% is from Europe and 25% outside Europe.
13	Do you research human perception of underground?	Research is done in partnership with universities and industry. Human perception was recently followed by international experts. However, at an early stage also authority had a look into this topic.
14	Fascinating space. Who "owns" the mountain that the gallery is situated in?	The mountain belongs to the state. The excavated cavities are in our property and responsibility.
15	Great idea to make it Online! It offers new ways to reach people around the world!	Thank you. Join the HAGERBACH NXT 50 FESTIVAL, too! Safe the date: June 18th, 2021
16	Is it possible to organize events?	Normally yes. Currently we face some COVID19 restrictions and events are at least until April not possible.
17	Is there a possibility of accommodation? what about the Mars Hotel?	Currently at Hagerbach we don't offer accomodation inside the mountain. Guest typically stay in Hotels nearby. Based on the joint activites with MISSION EARTH FIRST and the input from ETH students of A.Cornaro, the idea to implement a Crazy Mars Hotel was launched. This concept is currently further developed to become part of our prototype offer.
18	Are there any experimentation on how human can live underground on the long term?	To our knowledge there are a view, however, there are still many aspects to have a closer look at.
19	Tell something about the ventilation.	Hagerbach Test Gallery is a network of tunnels, galleries, caverns, ... and has meanwhile around 5 km total length. With three openings to the outside at different level, we mainly work without forced ventilation - but with natural ventilation generated by differences in Temperature and Pressure.
20	Can you produce food underground.	Yes, this is possible. A consortium of the association SCAUT (Swiss Center of Applied Underground Technolgies) is working on that theme. As presented in an earlier Webinar with MISSION EARTH FIRST; the underground green farm in Hagerbach is a prototype of an Aquaponic system technology, using artificial light for the plants, using Nitrate enriched water from Fish production to fertilize the plants. All in a closed cycle to reduce waste to a minimum.
21	What is the geology?	Our site has different geological layers. We are close to the UNESCO World Heritage Geotectonic Arena SARDONA, where you can see the different layers. The rock is silicious limestone of different compressive strength (200-300 MPa, depending on amount of SiO2) and shale-type, weak material (aprox. 50 MPa).
22	Could you comment interesting facts about the geology in which the gallery was constructed?	The layers we have are inclined and well visible inside the Gallery. This was one of the arguments to start the activities here, because industry could benefit from a broad range of testing conditions.
23	Concrete specimens are cast insde the test gallery or only tested? Where are the mixers located?	Both, our lab technicians serve construction sites throughout the region. Inside the Gallery, however, we have our own Batching plant with 10 aggregate silos. Thus, we can produce on purpose all types of concrete recepies. The PLC is modern and the mixer is equiped with proper dosing means, eg. for admixtures or fibers.
24	We cannot use cement on Moon, but we also cannot use cement on earth anymore because of its CO2 emission. Can we build underground without cement? What is role of VSH in decarbonizing underground construction?	Alternative binders are also developed and tested together with our partners. In partcular to make a clever use of locally available raw material will be crucial for success to construct on Moon or Mars. El.g biological binders or bacteria based reactions are current topics in research.
25	Fantastic idea for wintersports!	Yes, and we are convinced a sustainable and benficial investment into the future.
26	Will there be an ice skating rink?	This is still a topic of the feasibility study. Various activities are together with nearby schools and training camps. The concept of CAMPUS OSTSCHWEIZ is very much holisitc and looking for intergal solutions.
27	Superb ideas	Thank you!
28	What kind of snow sports?	Currently three activities are under evaluation for the Underground Snow-Hall: Downhill, Biathlon, Bob.
29	Facilities for surfers	Why not? However, watersports we currently don't have in focus.
30	So, if you are able to build this indoor snow arena, we in the Nordics will have to fear a fierce future Swiss competition again. Look forward to it.	We love the Scandinavian Vikings!
31	Does this underground space serve as shelter for disasters? If yes, how many people can be sheltered for how long?	No, that is not the purpose of our facility and we are not prepared for that use.