CONCEPT AND BREADBOARD OF THE PLANETARY BOREHOLE-WALL IMAGER. A. Kereszturi[1], L. Duvet[4], Gy. Grof[2], A. Gyenis[3], T. Gyenis[2], B. Kovacs[2], Gy. Maros[5] [1]Research Centre for Astronomy and Earth Sciences, Hungary; [2]Budapest University of Technology and Economics, Hungary; [3]Kolorprint LP. Hungary; [4]European Space Agency, ESTEC, [5]Mining and Geological Survey of Hungary. (e-mail: kereszturi.akos@csfk.mta.hu).

Introduction: Planetary surface exploration is effectively supported by laboratory and field tests on the Earth, where concepts and versions of various instruments could be tested. Below the concept and design of a borehole-wall imager (BHWI) probe is presented to support the testing and further development of the drilling and sampling facility of the ExoMars (EXM) rover of ESA to be launched in 2020 [1].

Based on the experiences of some of the authors [2] in drilled core scanning, a partly "inverse" method of boreholewall analysis is being developed to help the interpretation of EXM drilling on Mars. The BHWI aim is to support research work and testing some aspects of the drill based sample acquisition and sample analysis at Earth based Mars analogue site with the specific aims: 1. provide a general overview of the borehole-wall appearance, 2. support the connection of the original location of the acquired samples and the later laboratory based sample analysis.

This work contains some technical aspects of the development are presented toward the building of the breadboard including design aspects too.

Concept: Three main specific goals of the development: 1. Support the understanding of methodological issues regarding the drill and the drill based sample acquisition using Earth based analogue tests and partly laboratory tests by providing information on the borehole structure, internal appearance, target material/structural characteristics. 2. Linking samples' and borehole-wall's characteristics together with inferred geological context. 3. Support the target identification for drills by providing linked information of borehole characteristics, acquired sample characteristics, Earth based analogue tests regarding methodological issues.

Methods: The development supported by background knowledge in Earth and planetary sciences, currently available low cost optical detectors, and also Solidworks 2016 software for technical engineering visualization and planning of piece parts.

Design elements: optical components: detector: 1 MP CMOS detector with 1600x1200 pixel resolution and 24 bit true colour with physical CCD chip size of 2.4x1.6 mm; the objective and mirror support to project the borehoe-wall image onto the detector; electronic components are to drive and adjust the movement and harmonized image recording; mechanical components (Fig.1.) to move the system by a metal stripe or telescopic boom (for vertical movement) and a small sized fixed motor at its bottom (for horizontal movement), keep its ideal position and shield against falling grains inside the borehole (camera house, Fig.2.); data transfer and recording happens through an USB cable onto a laptop with linking the auxiliary parameters to the individual images, specific software will be used to support the mosaicking, image detorsion, identification of geological properties, bedding, grain size and other spatial sedimentary characteristics.

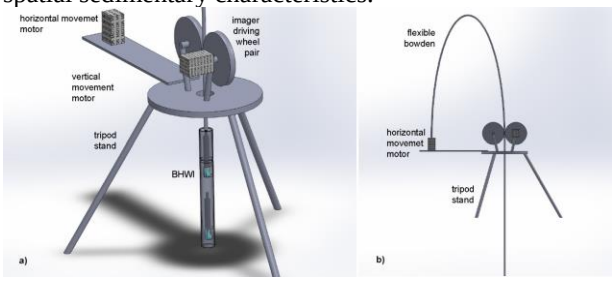

Figure 1. Two views of the surface stand presenting the main components of the system. The stand is about 30 cm high and 50 cm diameter

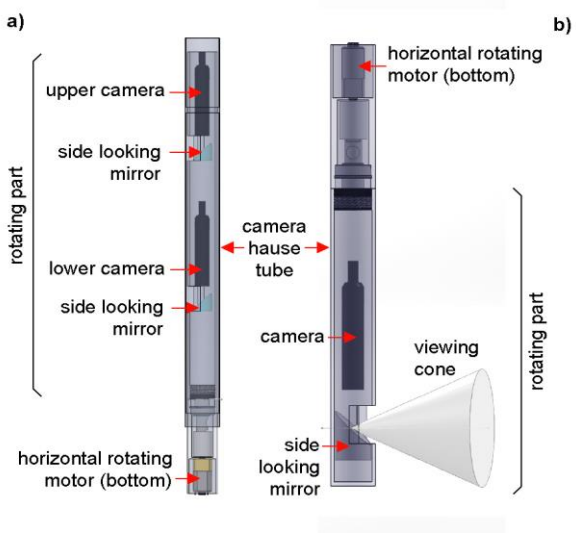

Figure 2. Structural overview of the two cameras (a) and one cameras (b) containing design.

Results: The implementation and first test results will be presented at the meeting, including the realization and the laboratory based performance on test targets of the BHWI's first version.

References: [1] Vago et al. 2015 *Solar System Research* 49, 518-528. [2] Maros Gy., Pásztor Sz. 2001. *European Geologists* 12, 40–43.

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