

Hand-Operated Fully-Reproducible Static Blade Core Opening Bench



Technical centre for instrumentation and fieldwork- PINTE



Raphaël Gallet & Fabien Arnaud
EDYTEM - Environment Dynamics and Territories of the Mountains

The EDYTEM Manual Core Opening Bench is a manually operated tool designed for opening soft sediment cores. It was developed to ensure clean and precise cuts without contamination from plastic debris

Specifications

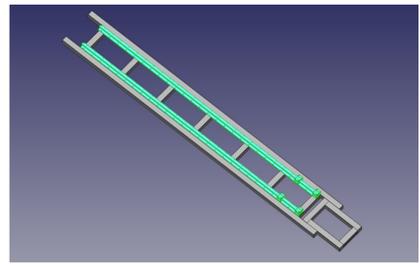
PVC Liners :
- lengths of up to 160 cm,
- Diameters : 63 et 90 mm
- Liners walls thickness: 2,1 à 2,3 mm

Force :
Torque of 65 N/m required to rotate the crank and cut both sides of the plastic tubes.

An example of a carrot-opening bench, which is often used.

Plastic residues are produced during the production process and can contaminate the sample.

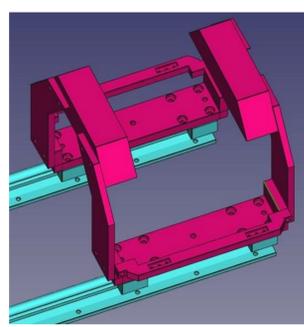
Using vibrating blades greatly reduces this issue, though it does not eliminate it entirely.



The frame is constructed from 40x40 mm aluminium slot profiles featuring B8-type 8 mm channels, which are assembled using dedicated screwed T-nuts. Aluminium brackets were used to increase rigidity at each junction.

The guiding system uses a commercial model SBR20x2000 mm linear rail shaft

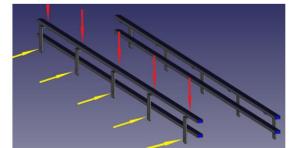
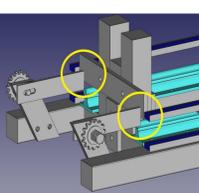
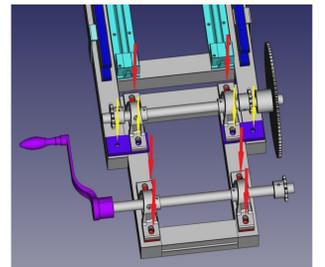
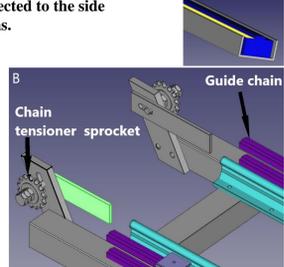
Frame and translation guiding system



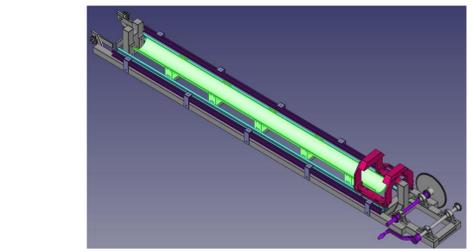
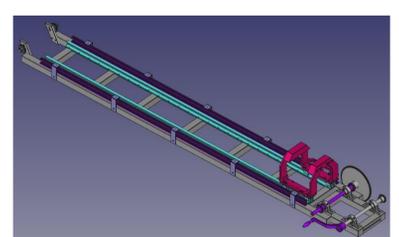
The tool carriage sled is an assembly of 18 machined parts bolted together. It is directly connected to the side chains.

Tool carrier sled

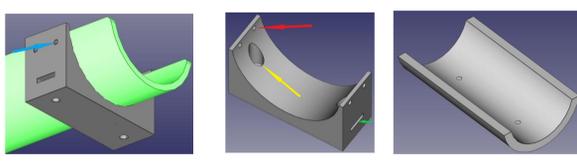
The sprockets are mounted on two 20 mm diameter shafts. One shaft has a 21-tooth sprocket and a manual crank, and the other has a 76-tooth sprocket which provides a mechanical advantage that multiplies the operator's input by approximately 3.6.



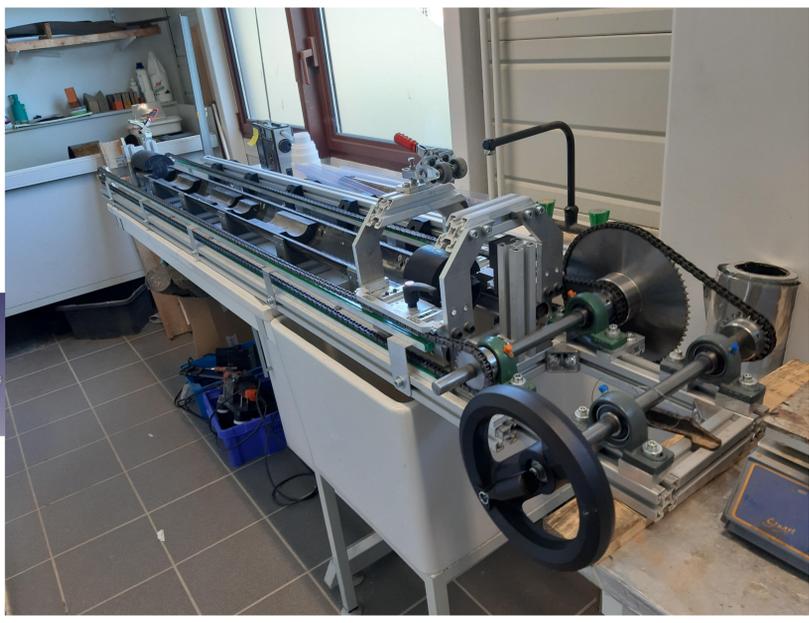
Chain drive system for the cradle and cutting tools



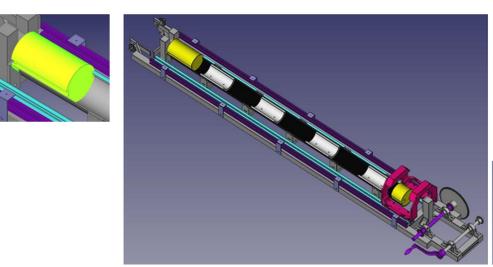
110 mm pressure HDPE half pipe, as support chosen for its rigidity



Photos on the left and centre: half-tube support, made from PLA using a 3D printer. On the right, an example of an adapter wedge for a 90 mm core.

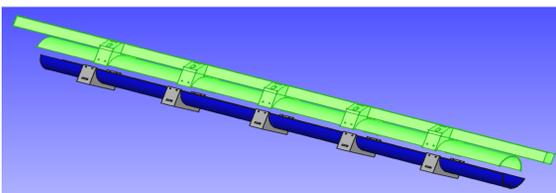


The bench in Edytem sedimentology laboratory.

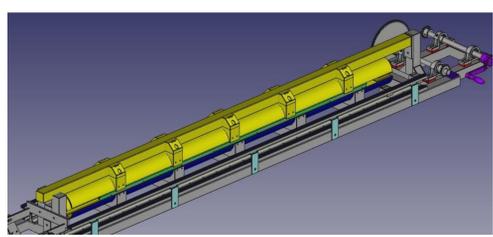


View with adapter blocks and front and rear stops.

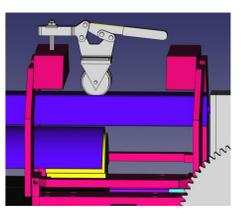
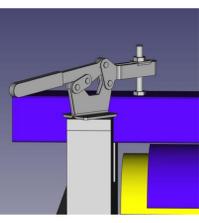
This view shows the slots in the front and rear stops, which are necessary for the passage of cutting tools. The stops also support the upper bracket, completing the core clamping assembly.



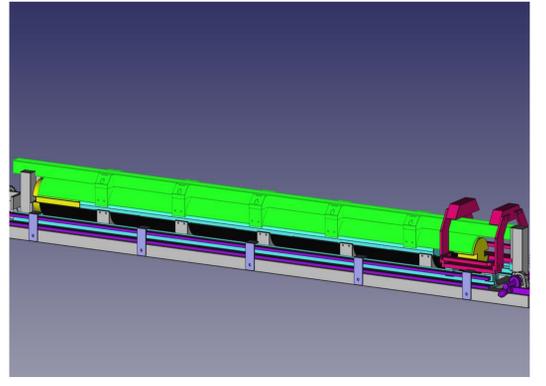
Upper and lower brackets



This is a half-tube support made from PLA using a 3D printer. It is attached directly to a Type B 40x40 tube (the same type that was used to construct the frame).



In order to clamp the carrot in the upper and lower supports, pressure must be applied to the front of the upper support bar and to the cradle in a fixed and movable manner, in order to accompany the translation of the cutting tools.



Core clamping



Remember to adjust the cutting tools according to the diameters using the specially developed template.

All the data required for self-construction, along with a construction and adjustment manual, is available at the address below. Your feedback is crucial in helping me to improve this prototype.

<https://data.indores.fr/dataset.xhtml?persistentId=doi:10.48579/PRO/AFXQRN>