CONSISTENCY TEST FOR 3D - PRINTED MORTAR

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INTRODUCTION

What is 3D printing construction ?

- Uses **3D printing technologies** to fabricate buildings or components.

What is 3D printing material (mortar) ?

- A **specially mixed** designed to **flow easily** through printing **nozzles**.

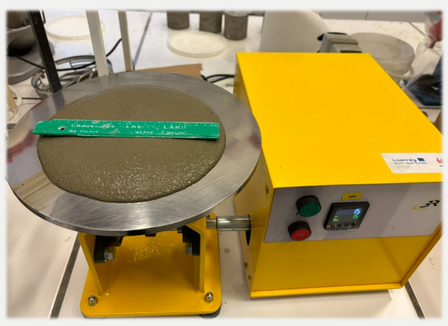
PROBLEMS

- **HOW CAN THE MORTAR'S FLOWABILITY BE CONTROLLED DURING PRINTING ?**
- **HOW CAN MORTAR BLOCKAGES IN THE PIPE BE PREVENTED ?**
  - **Extrudability**: the ability to form a **continuous filament**
  - **Pumpability**: the capacity to be **transported** through a pipe
  - **Buildability**: the capability to overlay **multiple layers** without collapsing

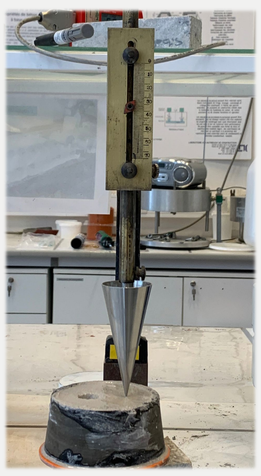
CONSISTENCY TEST

5 TEST FOR THE CONSISTENCY OF THE MATERIAL

Flow table



Fall - cone



V - funnel

Pistol

Rheometer

CONCLUSION

- **Many tests** can evaluate **the consistency** of 3D-printed mortar.
- **Each test** measures a **specific characteristic** of mortar.
- **The best** test for 3D-printed mortar should **show changes over time**.
- A **rheometer** is **crucial** for this technology.

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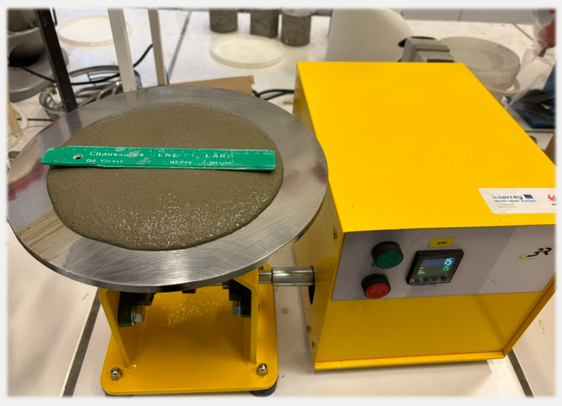
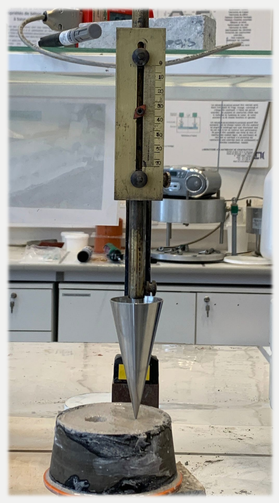
FLOW TABLE



- **EN 13395-1: 2002**
- Measure the **sample diameter** (cm) after raising the table **15 times**.
- To evaluate: **pumpability**

FALL CONE



- **BS 1377-2:1990**
- Measure **cone penetration** inside the sample
- To evaluate: **pumpability**

V - FUNNEL

- **EN 12350-9:2010**
- Measure **the flow time**
- To evaluate: **pumpability**

RHEOMETER

- **Standard**: NONE
- Measure **viscosity, yield stress.**
- To evaluate **rheological parameter.**

PISTOL

- **Standard**: NONE
- Print several layers
- To evaluate: **extrudability, buildability**

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