

METAL FLOWERS — Deployable Geo-Seed Sculptures (M)

Version: 0.1

Domain: MATERIALS | Safety Tier: LOW

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What it does (6th-grade):

Geometrically precise deployable 'petal' structure that opens/closes to protect a seed capsule and act as a micro-habitat marker.

Rules / Assumptions:

- Mark I is a passive mechanical sculpture + seed capsule holder (no bioengineering).
- Acts as a protective casing + marker; seeding is conventional (real seeds).

System Overview

Modules:

- PETAL_MECHANISM: Hinged petals with cam ring actuator
- SEED_CAPSULE: Protected seed container with drainage

Materials (top picks):

- 6061-T6 Aluminum — petals + core hub
- Stainless Steel 304 — hinge pins
- TPU (Thermoplastic Polyurethane) — gaskets

Tools:

- Laser Cutter: Cut petals from sheet stock
- CNC Mill: Machine core hub and cam ring
- Torque Wrench Set: consistent assembly torque

Testing + Common Failures

Test Plan:

- Cycle test open/close
- Dust ingress test
- Rain spray test
- UV exposure test (accelerated if possible)

Failure Modes + Fixes:

- Hinge wear (sev: MED)
Cause: friction + grit
Fix: bushings + seals
- Corrosion (sev: LOW)
Cause: environment
Fix: anodize + stainless pins