

Patented



GRAM

Gradel **R**obotic **A**dditive **M**anufacturing

- ✓ enables to build extremely light and sustainable 3D structures
- ✓ recyclable materials in combination with a simulation driven process technology powered by AI



How GRAM works



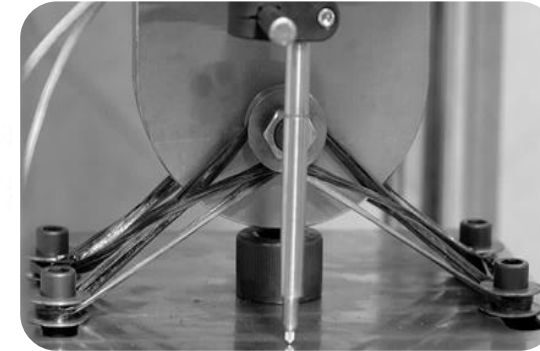
**PRIMARY
DESIGN**



**TOPOLOGY
OPTIMIZATION**



**WEIGHT SAVINGS
UP TO 70%**



188 g TOTAL MASS
9300 kg Breaking Load



PRINCIPLE

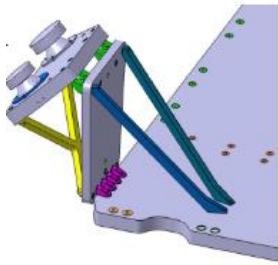



Form connection by winding around pins, bushes = 5 x stronger

Using strength conform off the shelves
Materials become ultra lightweight structures
using 80% less resources



GRAM is the lightest way of building components.

TMTC Antenna bracket in comparison to other manufacturing processes:

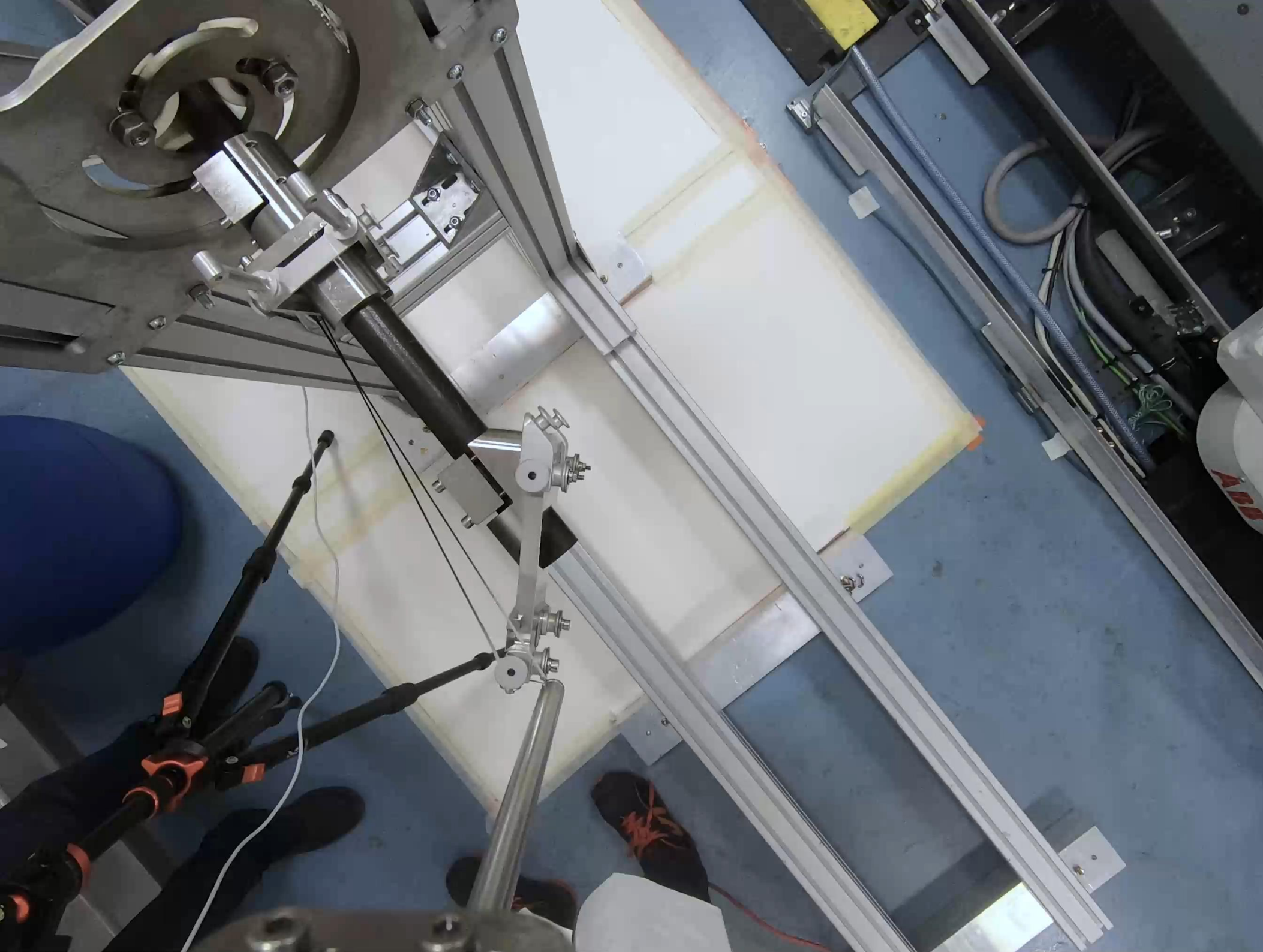
Different Technologies	Historical metal solution	Optimized by standard engineering	3D Print Titanium	GRAM
Different Designs				
Mass saving	Reference	30%	40%	71%
Customer benefit relative to Total Cost of Ownership (TCO)	Reference	+22.5%	-40.5%	+60%

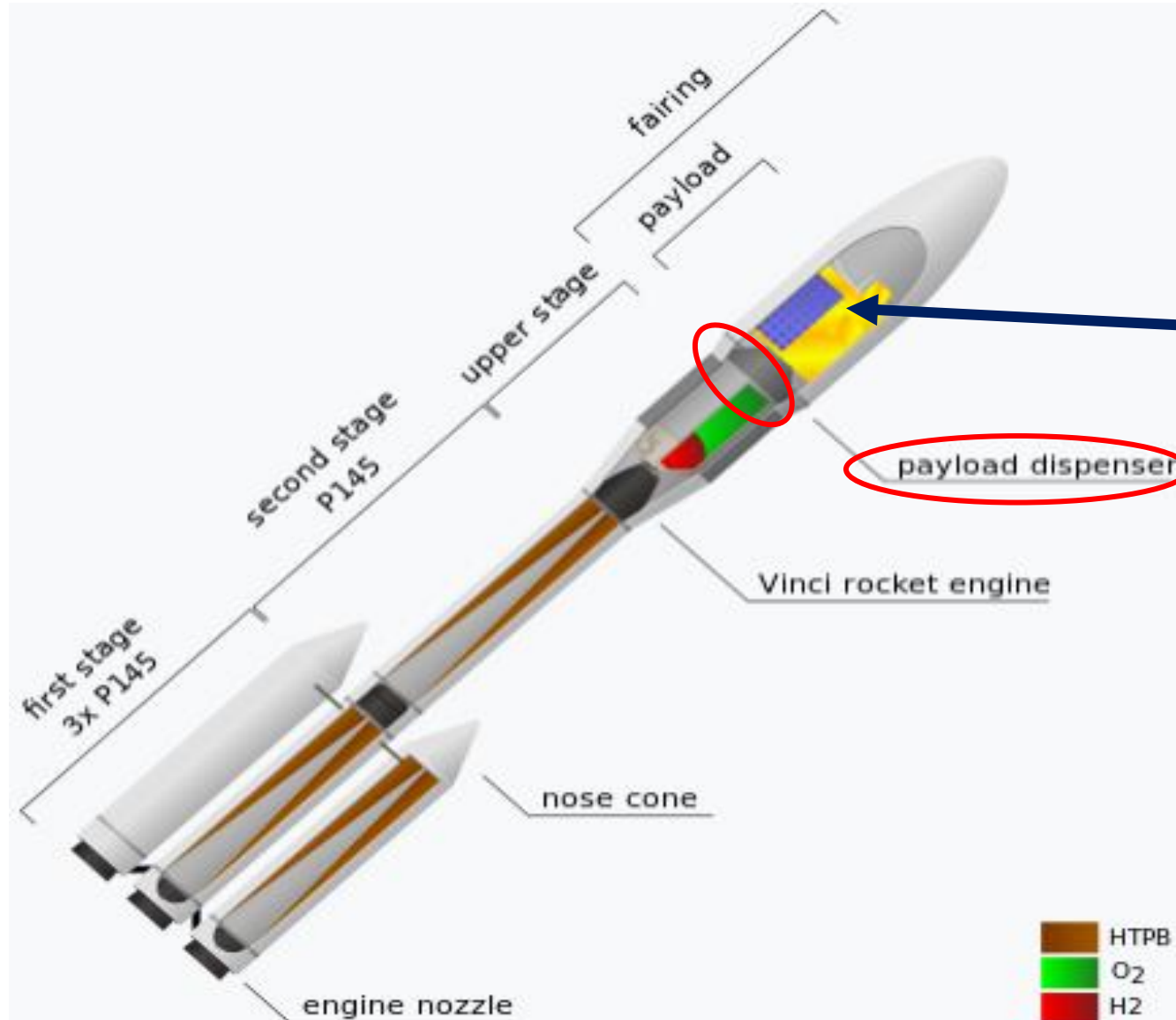
Qualified in collaboration with

ThalesAlenia
A Thales / Finmeccanica Company *Space*

and





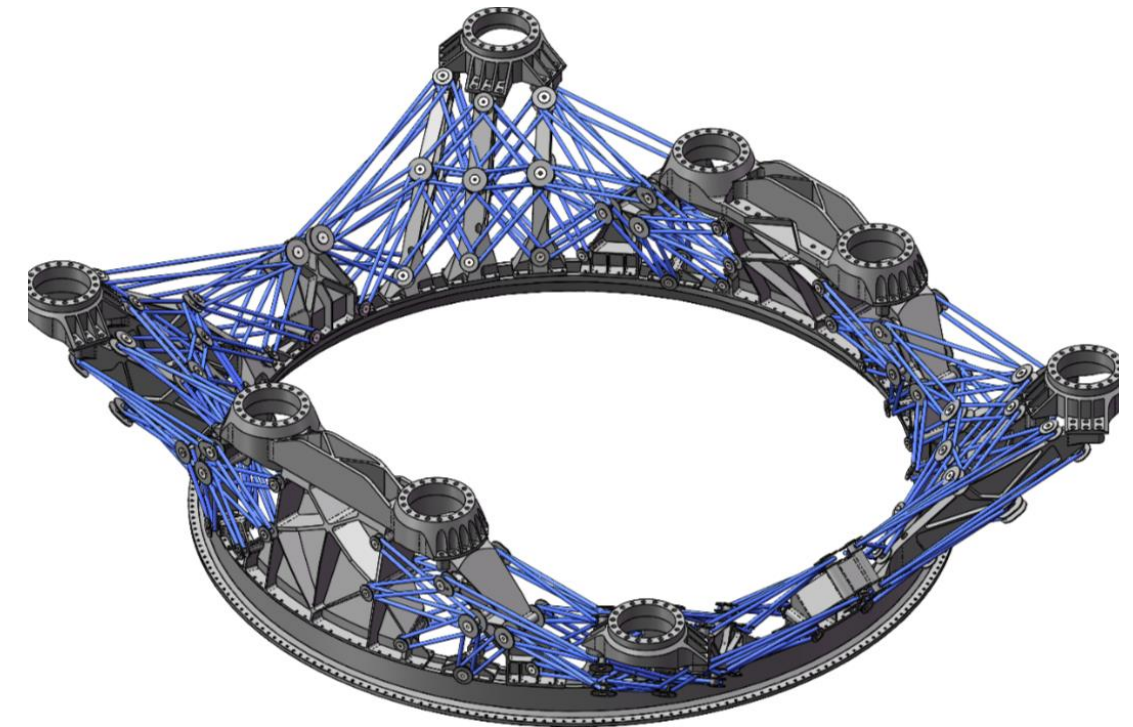


Double dispenser for supporting two satellites on the launcher:

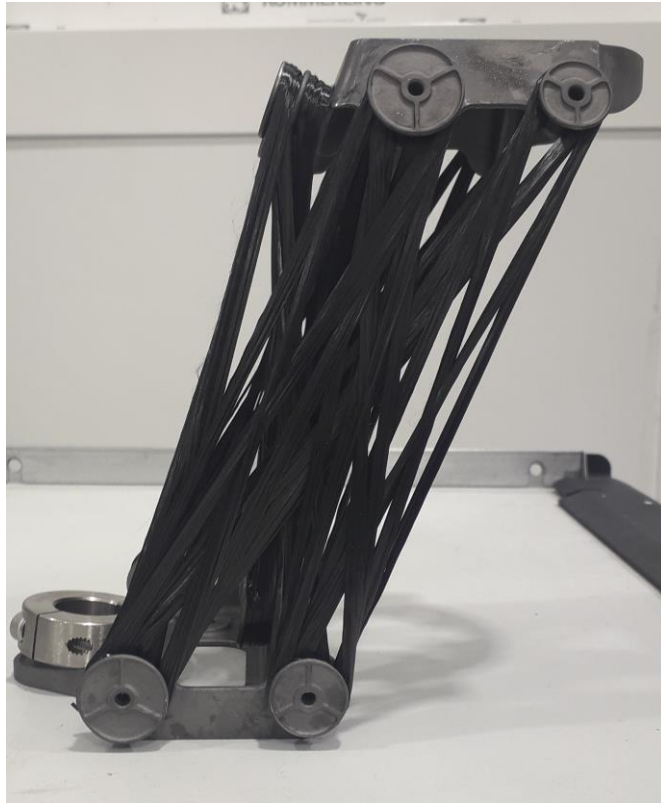
Dimensions: Ø3500 x 800 mm

Payload: 2 satellites with a total weight of 6400 kg

Target on weight reduction: 50%



GRAM double dispenser



Backpack structure for satellite reflector:

Dimensions: 300 x 140 x 140 mm

Payload: robotic arm

Target on weight reduction: 40%

Replacement of titanium (= critical material)

Prediction for ultimate compression load in the FEA-model: 1,050 kg

Tested ultimate breaking load : 1,117 kg

Delta: + 6%



Reaction Wheel Support Structure:

Dimensions: 350 x 350 x 150 mm

Payload: reaction wheel

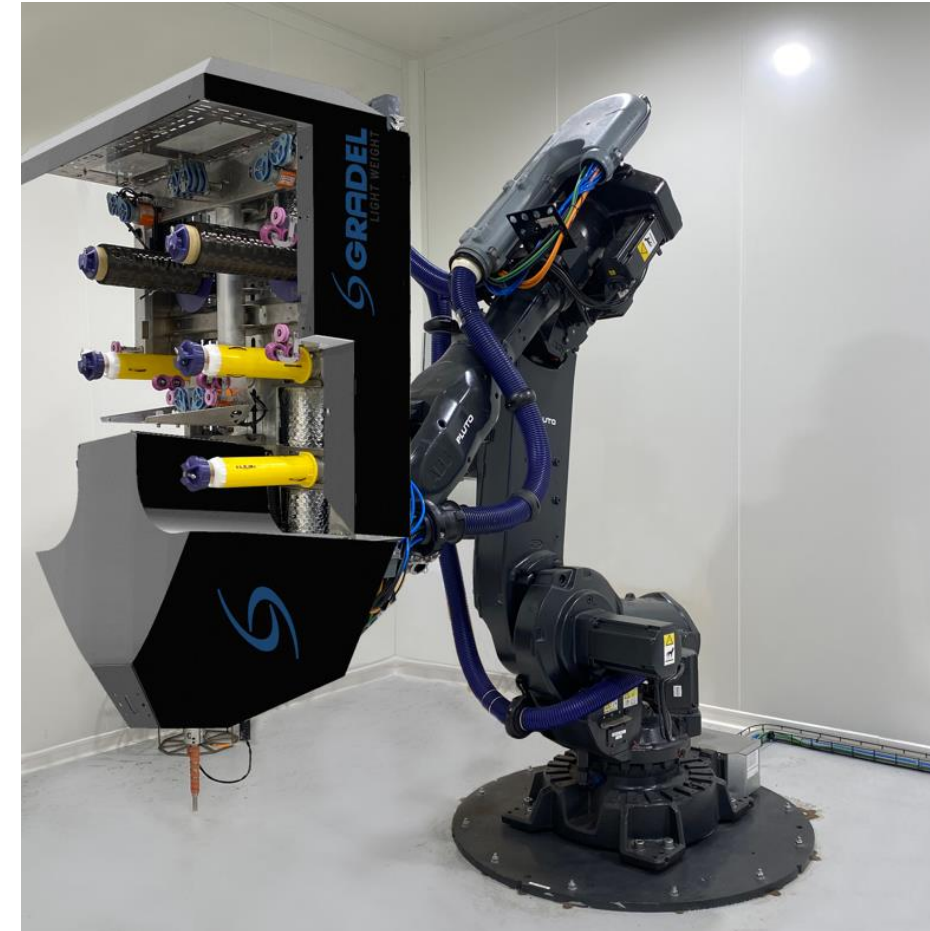
Target on weight reduction: 20%

Eigen-frequency requirement = 140 Hz

Proof load test successful



Low-cost winding equipment for R&D
and non aerospace applications



Aerospace qualified
production equipment

GRAM

LOOKING FOR US PARTNERS TO SCALE IN THE US MARKET

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