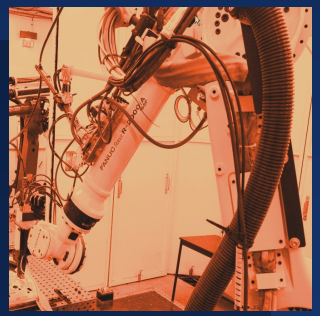
INSTITUT MAUPERTUIS PRODUCTION INNOVATION

3D vision for robotized grinding

Innovating engineering projects

RFID technologies

Robotic Process Automation



Welding, cutting, laser cladding

Robotic Friction Stir Welding

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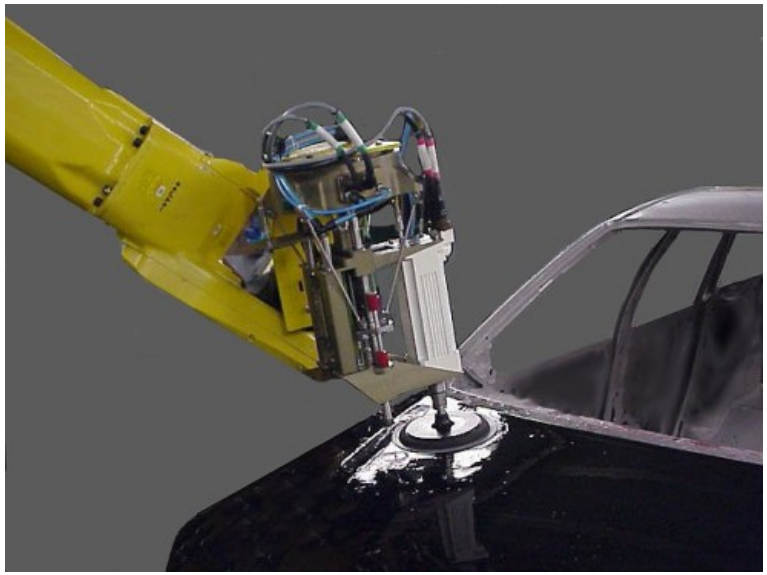
in INNOVATIONS PRODUCTION

Goals

Design a fully automated robotized grinding application



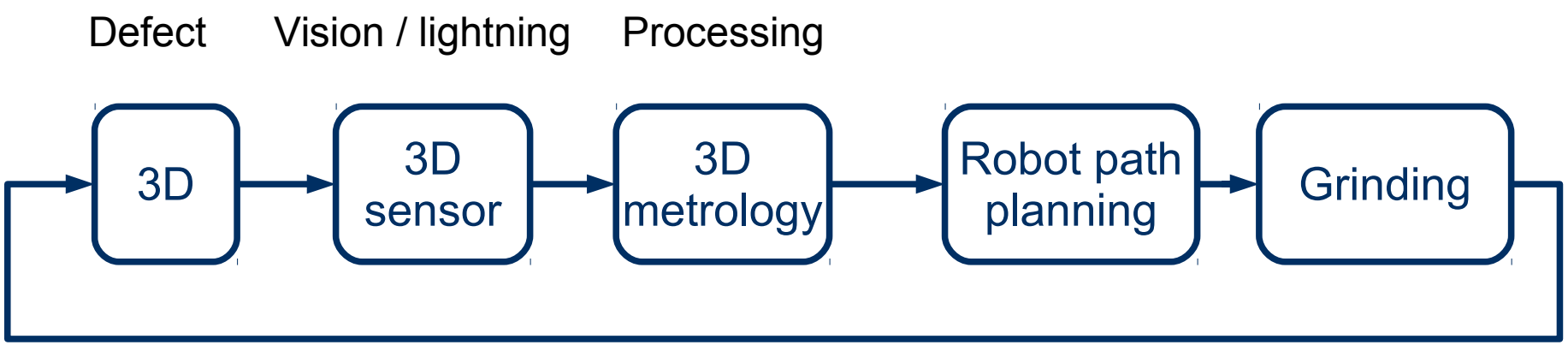
- Functions :
  - F1 : Being able to locate the part (different shapes, only coarse location is known, small batches)
  - F2 : Ensure a constant material removal rate (CAM)
  - F3 : Being able to respect the manufacturer's specifications (dimensions, manage tool wear)

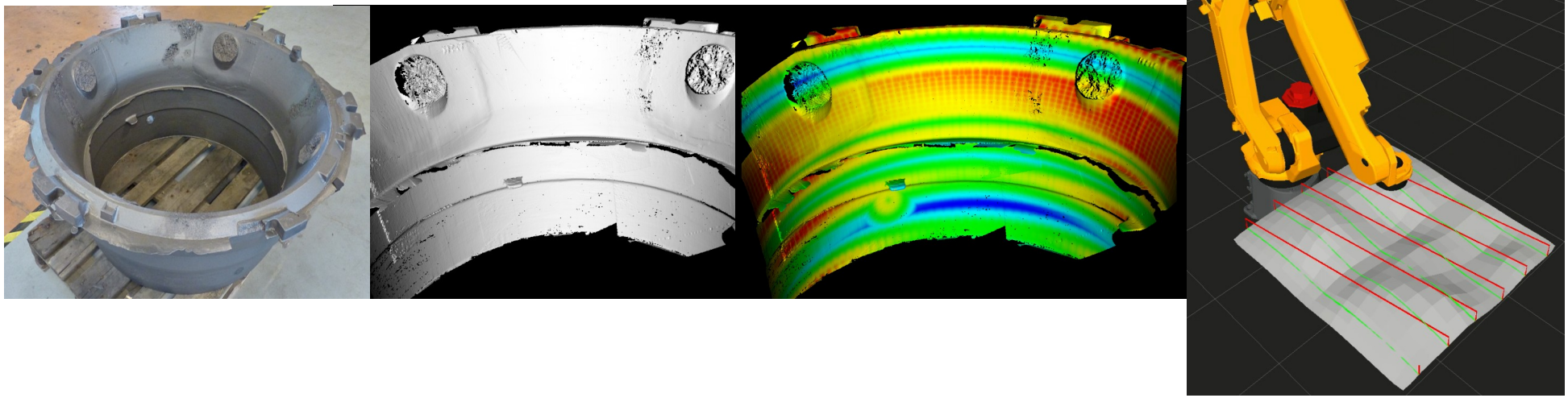
Goals

- Automatically grind defects on a mechanical part thanks to:
  - A robot
  - 3D vision

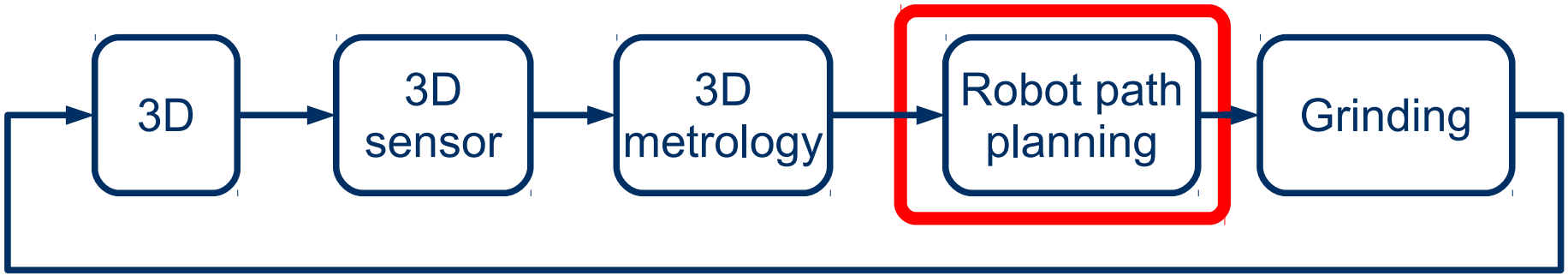
- Defects types :
  - Shocks, deformations, welding spatters, weld bead …
  - Surface roughness

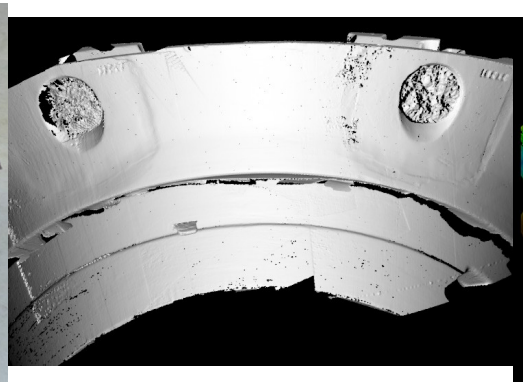
Numerical blocks

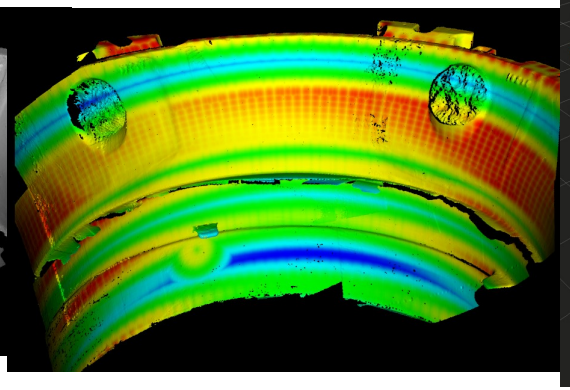


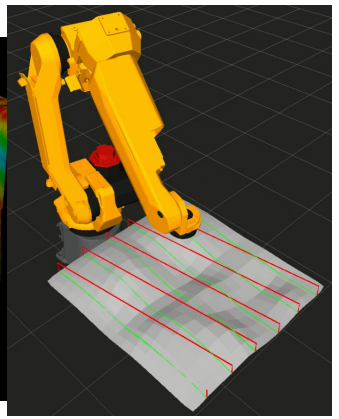


Automatic path planning



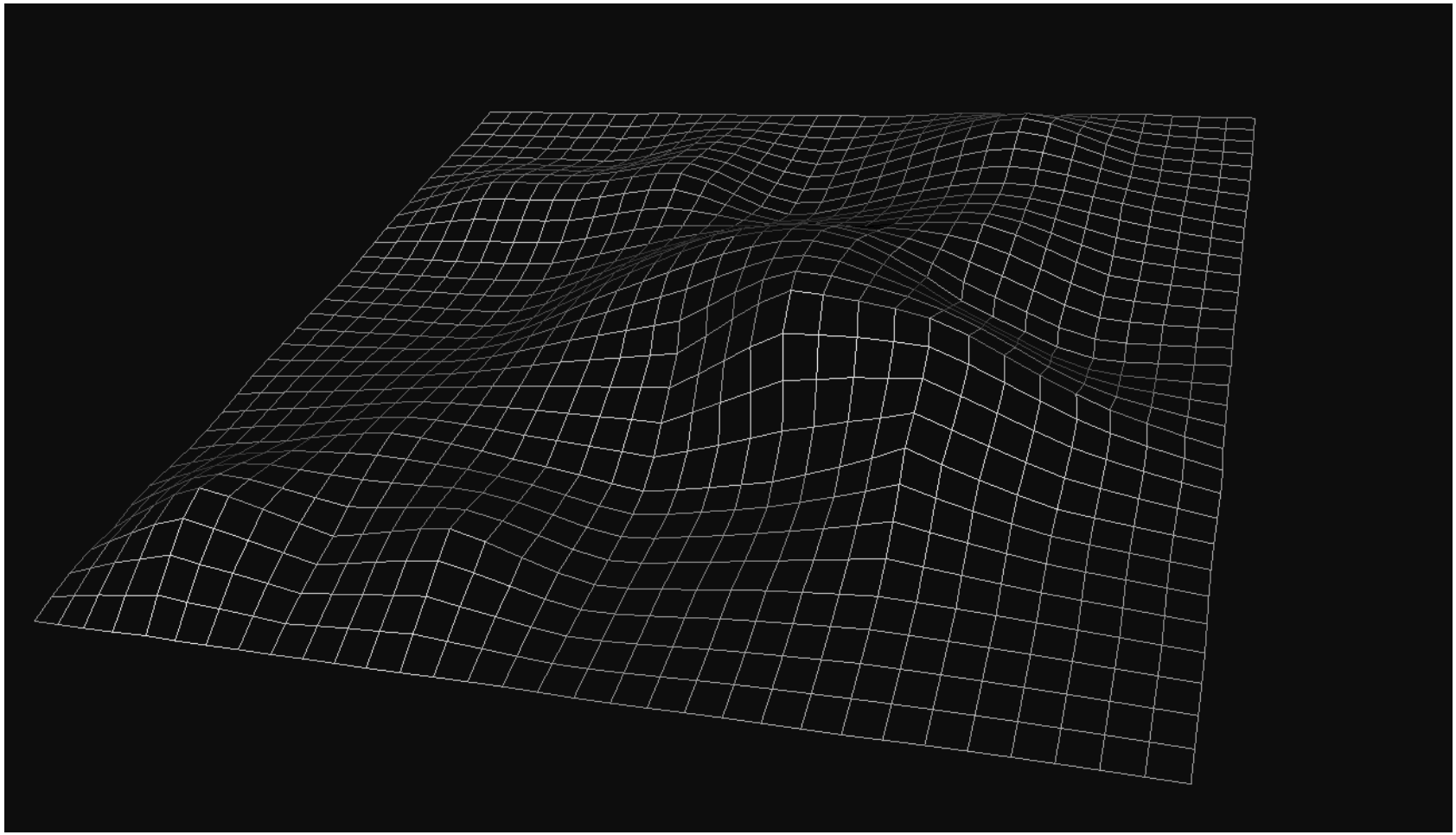






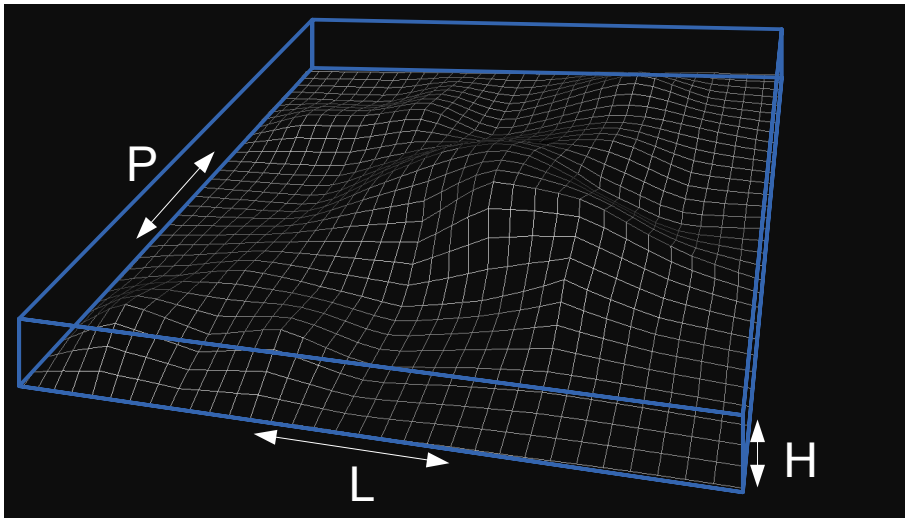
CAD model

- 3D mesh (points and faces) : PLY file

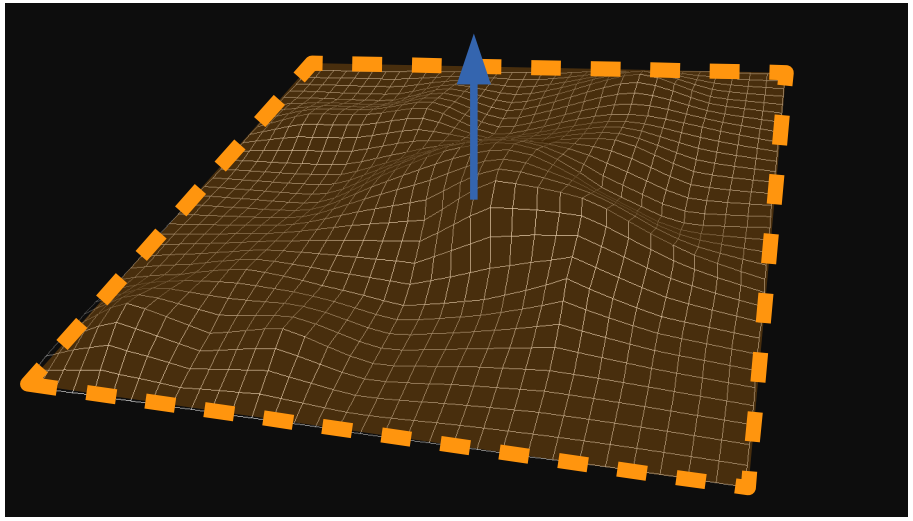


Plan segmentation

- RANSAC (RANdom Sample Consensus)
- Threshold and mesh sizing



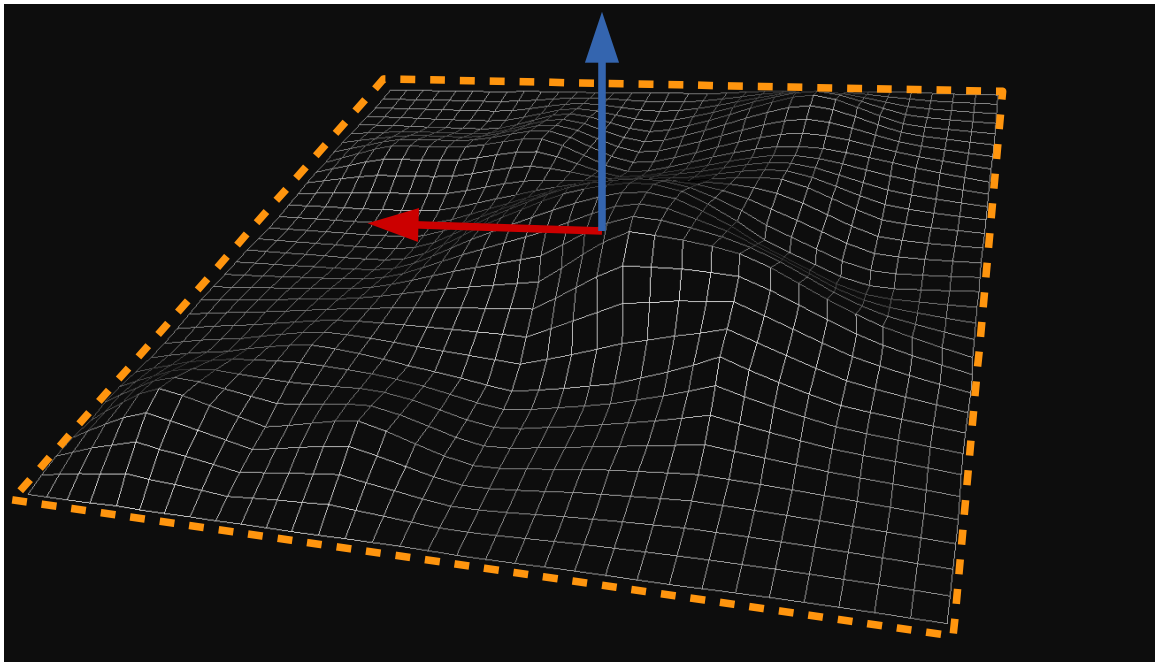
Threshold equal to
max length of mesh sides



Segmented plan and mesh normal

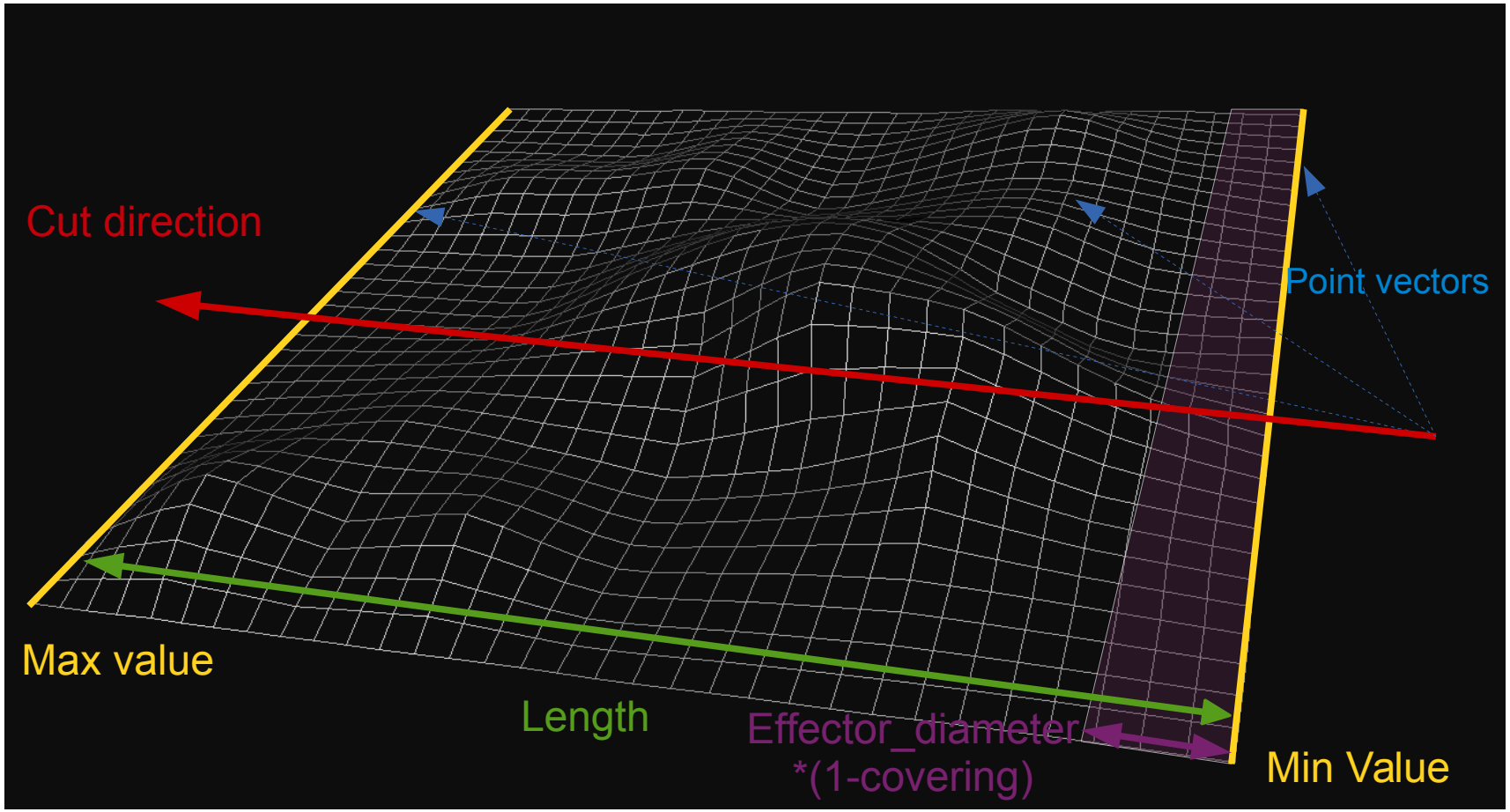
Cut direction

- Cut direction is a vector belong to the segmented plan

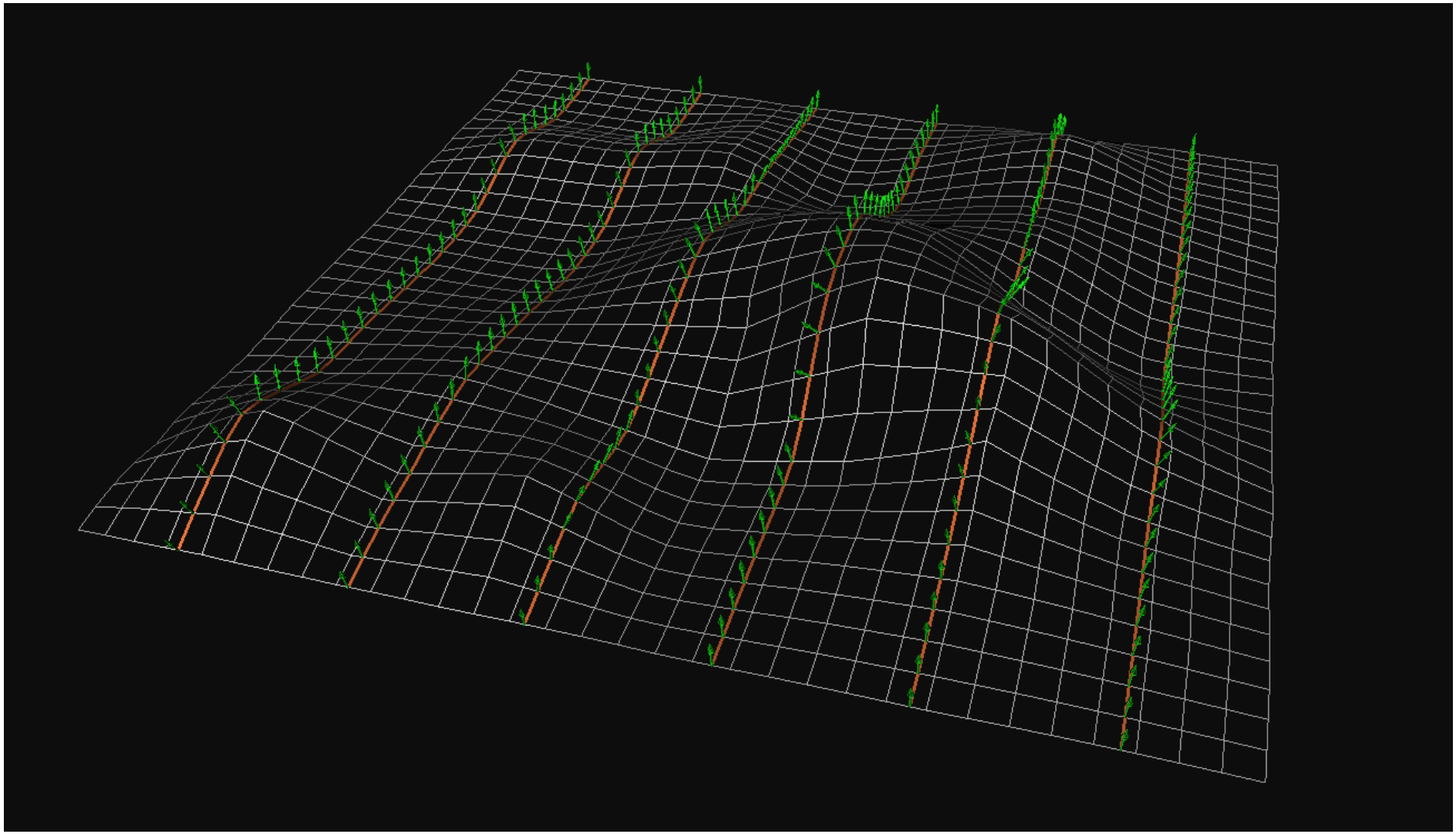


Number of slices expected

$$Number\ of\ slices = \frac{Length}{effector\ diameter * (1 - covering)}$$

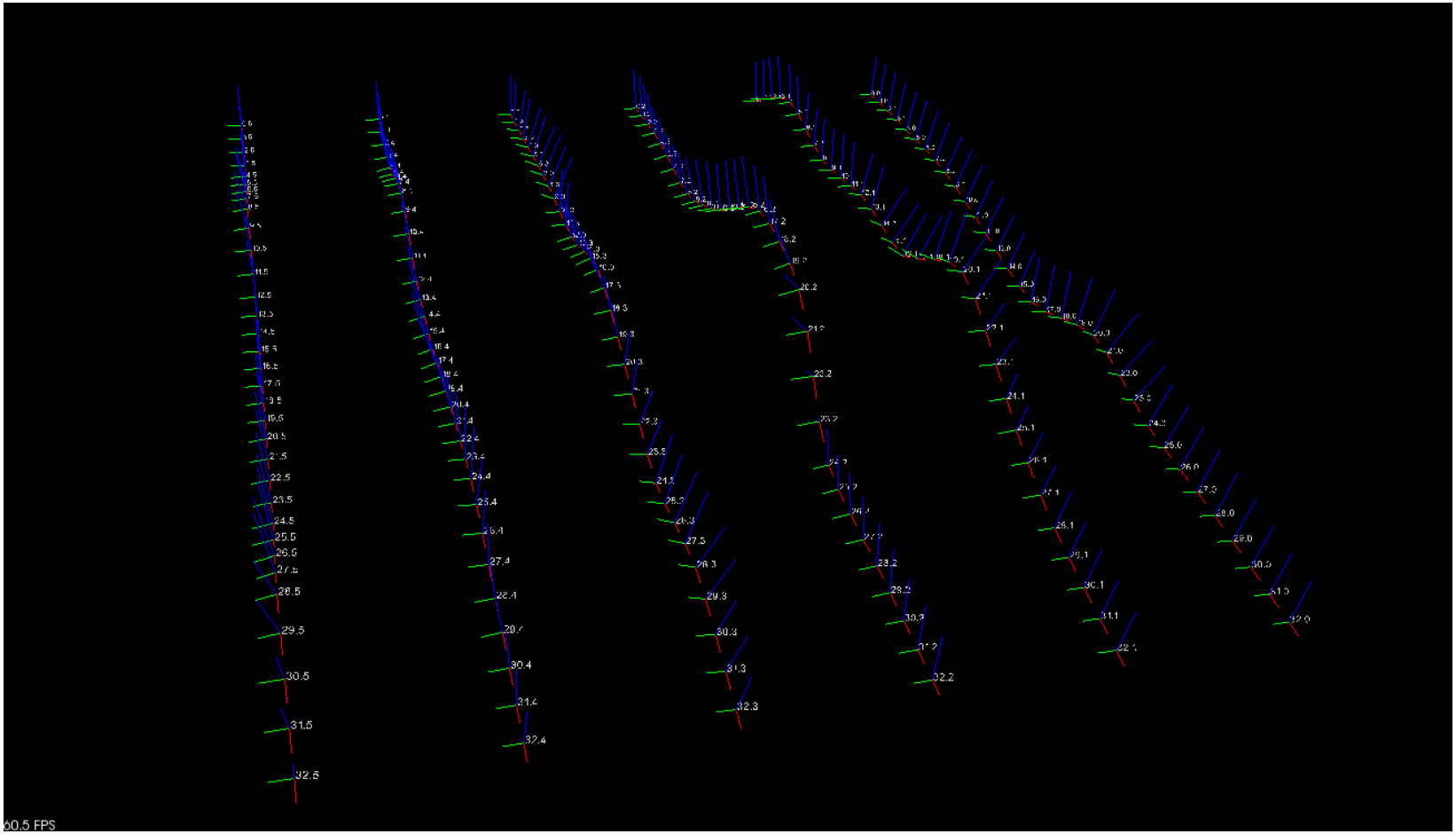


Cutting and local normals



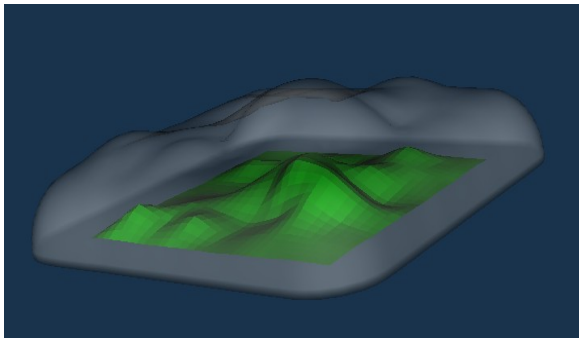
Robot poses

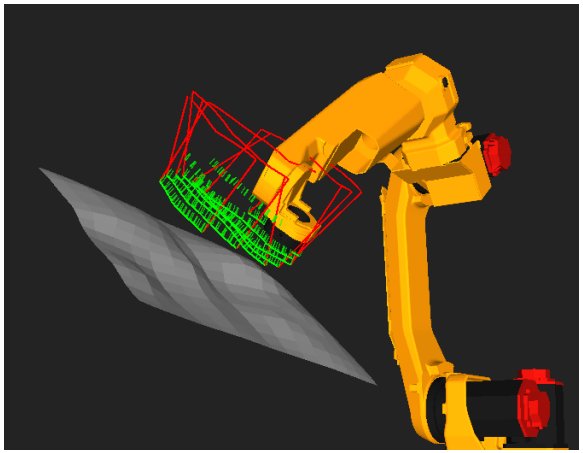
- Pose robot : position + rotation (yaW,Pitch,Roll)

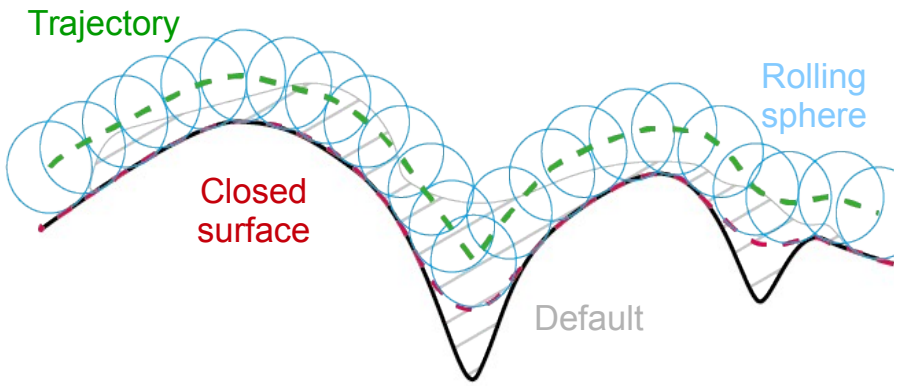


Dilation

- Dilation process is using for extrications and passe principle.







Institut Maupertuis

The Institut Maupertuis is a technological research center in production and mechatronics. The institute guides companies into products and production tools innovation by making skills, production tools and methods available to them.

Innovative engineering projects
Guidance into collaborative technical focused projects : research of industrial or academical partners, seeking for funding, project management.

Neutral technological consulting
Consulting on production technologies and industrial applications : RFID, automation, monitoring, sensors ...

Consulting in processes automation
Technical and economical feasibility studies, prototypes. National expert for the RobotStart PME program

Expertise in laser processes
Industrial consulting, tests on laser platform, qualification, prototypes : Welding, cutting, cladding, 3D cutting, polishing, surface finishing.

Friction Stir Welding
Expertise in robotic FSW assembly

L'association s'inscrit dans la politique régionale de soutien à la recherche appliquée et à l'innovation. Son pilotage est assuré par des personnalités industrielles locales en partenariat avec l'UIMM Bretagne et le CETIM. L'association est soutenue et subventionnée par l'Union Européenne (Fonds FEDER), la Région Bretagne, le Conseil Général d'Ille et Vilaine et Rennes Métropole. L'Europe s'engage en Bretagne avec le Fonds Européen de Développement Régional.

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