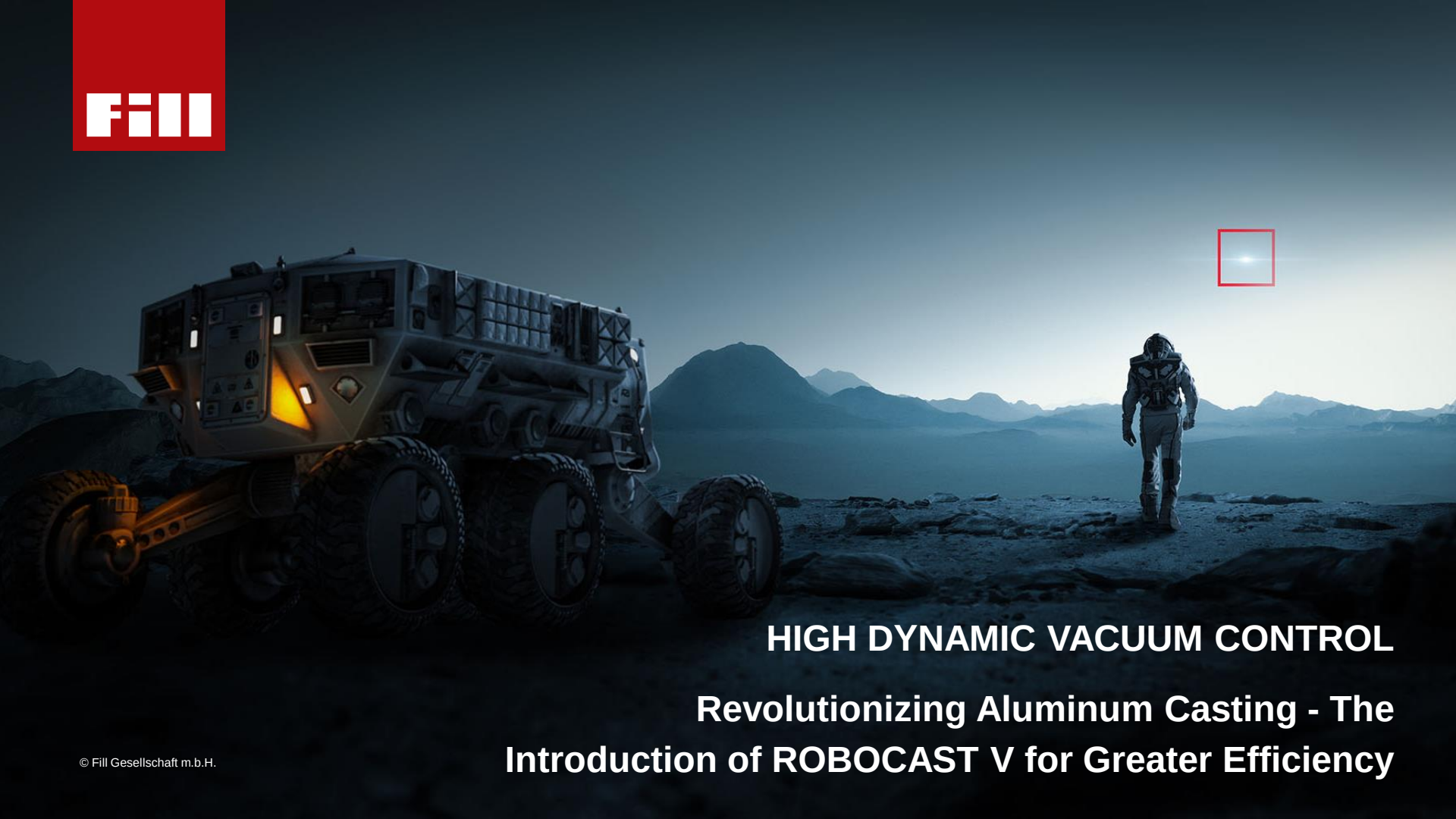


HIGH DYNAMIC VACUUM CONTROL

Revolutionizing Aluminum Casting - The Introduction of ROBOCAST V for Greater Efficiency

FILL your future

- Founded 1966
- 1000 employees
- 210 million Euros in annual sales
- Competence Centers
  - Automotive
  - Aerospace
  - Sports
  - Construction and housing
  - Renewable energies
  - Specialist machine engineering

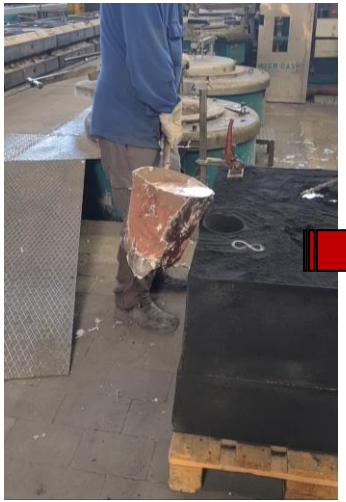
Competence Center Foundry Technology

- Simulations
- Core automation
- Casting plants
- Cooling plants
- De-coring plants
- Raw part machining plants
- Automation solutions
- Customized special solutions
- Offline programming
- Cybernetics

…for aluminum and iron casting

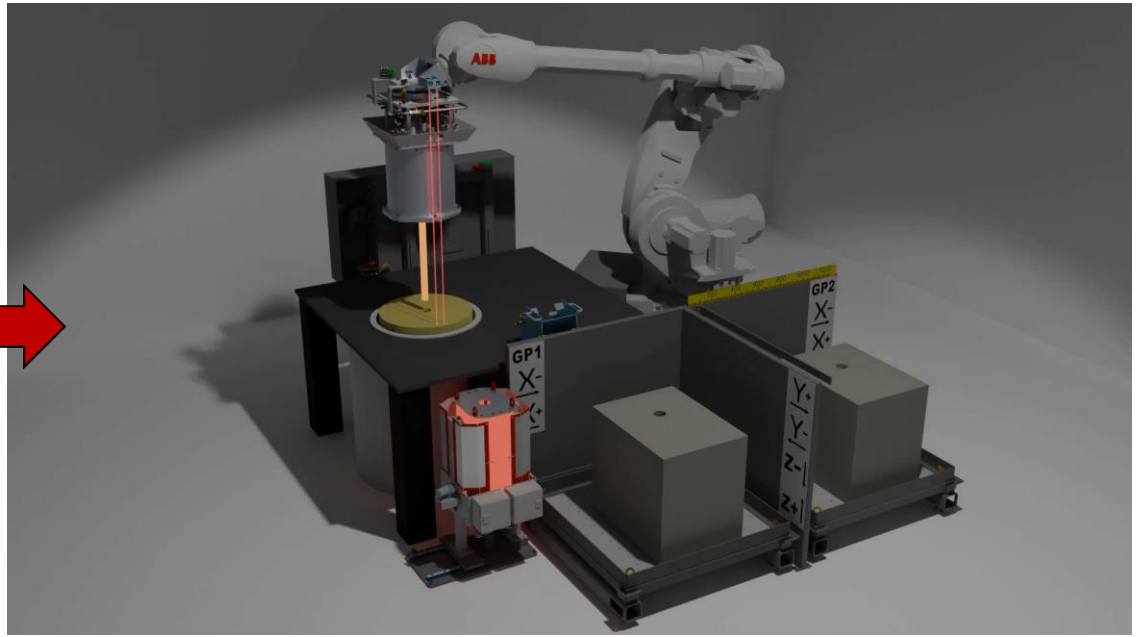
ROBOCAST V – DEVELOPMENT'S MOTIVATION

Manual Pouring

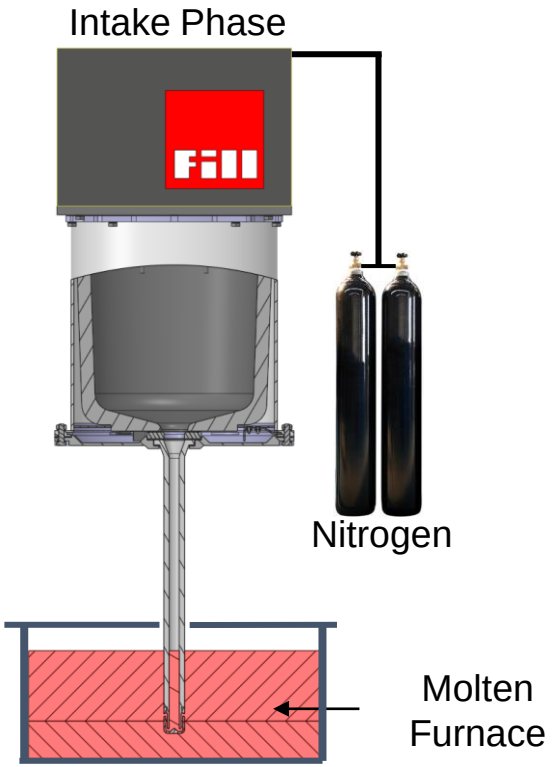


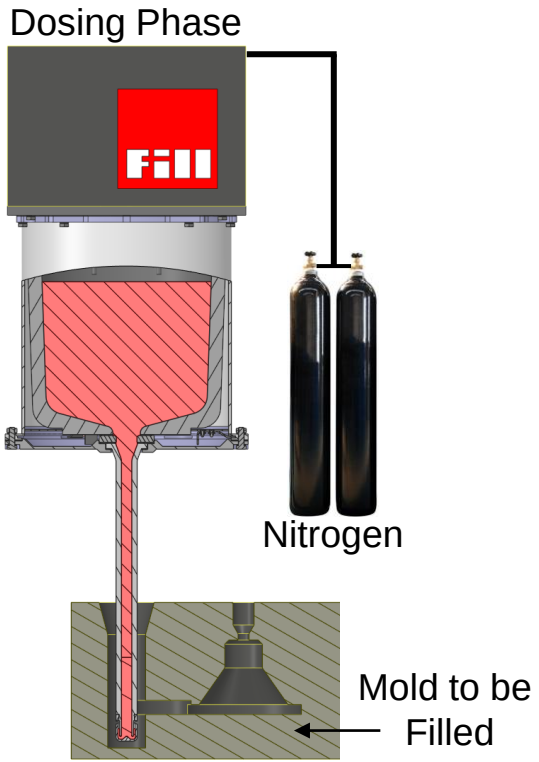
Automated Pouring

ROBOCAST V



ROBOCAST V – DESCRIBED PROCESS



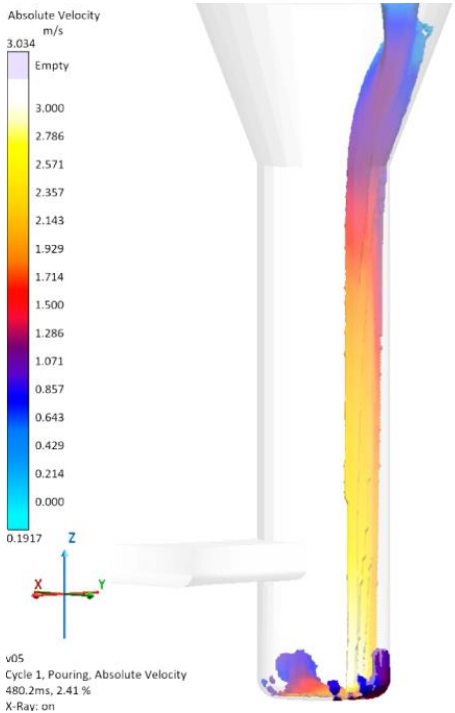


System advantages:

- <u>Intake Phase</u>
  - Controllable intake
  - Reduction of oxide due to inert operating gas
  - No external filling ladle
  - High thermal isolated reservoir

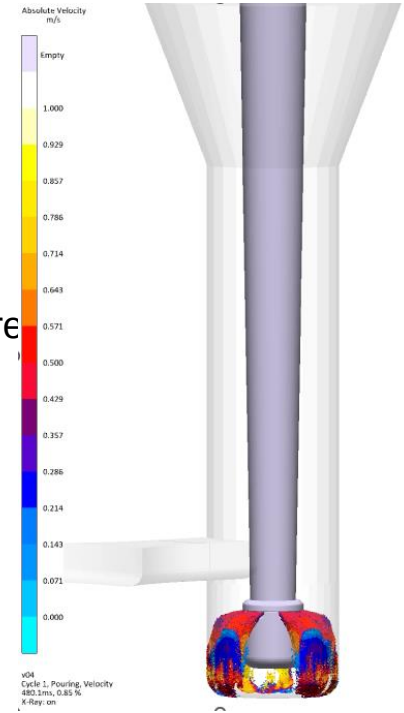
- <u>Dosing Phase</u>
  - Laminar flow into the gates
  - Filling quantity parametrizable
  - No drop of molten aluminum

ROBOCAST V – DOSING PROCESS



Manual Pouring

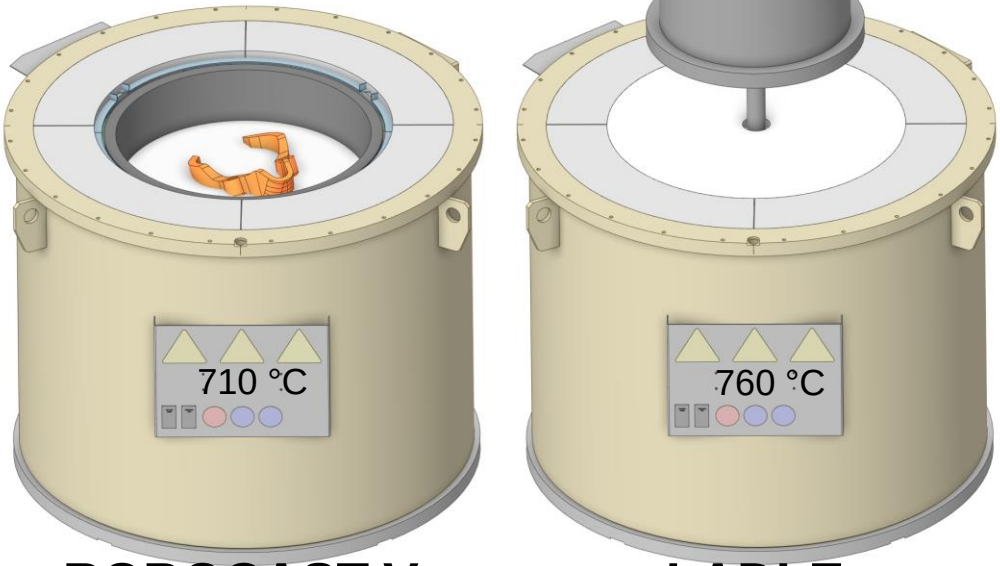
- Waterfall effect
- High turbulence before gates
- High temperature loss
- Not controllable pouring
- Poor process consistency



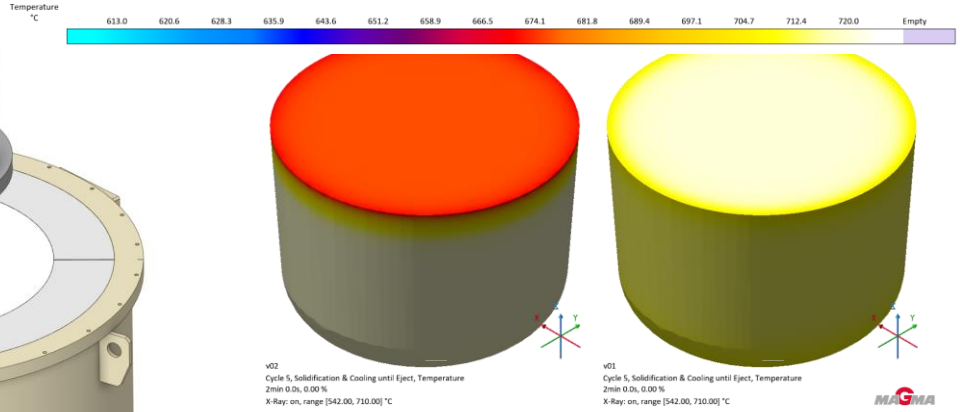
ROBOCAST V Pouring

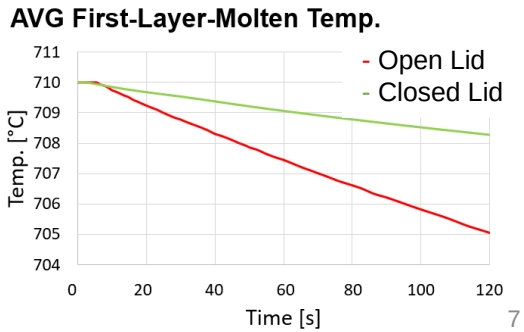
- No waterfall effect
- Calm free surface before gates
- Minimizes temperature loss
- Controllable pouring
- High process consistency

Evolution in energy efficiency and operator comfort

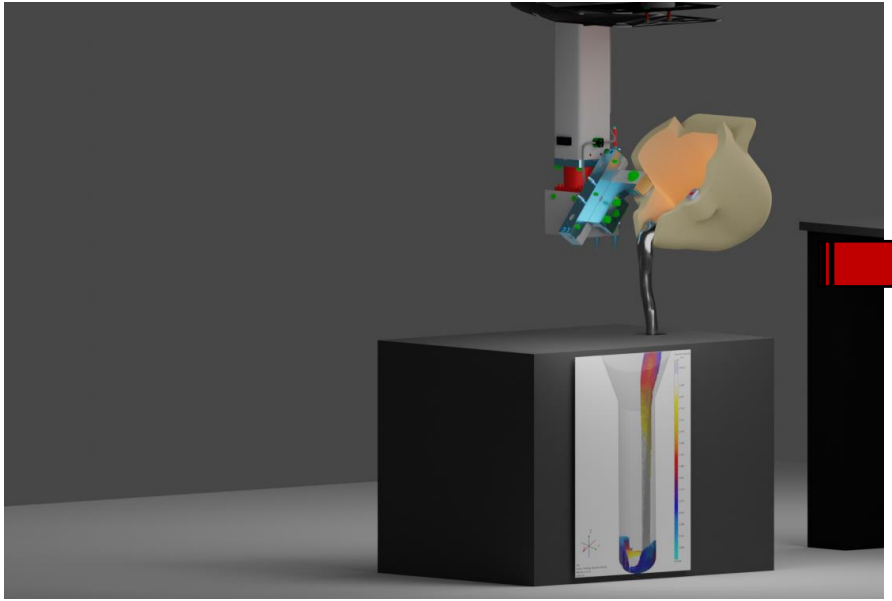


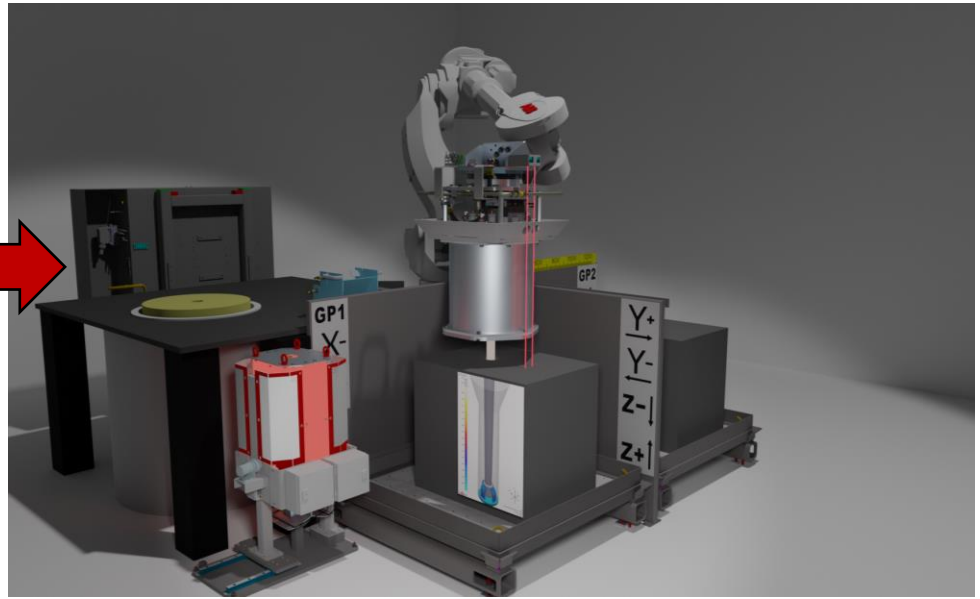
ROBOCAST V **LADLE**





FILL GOAL



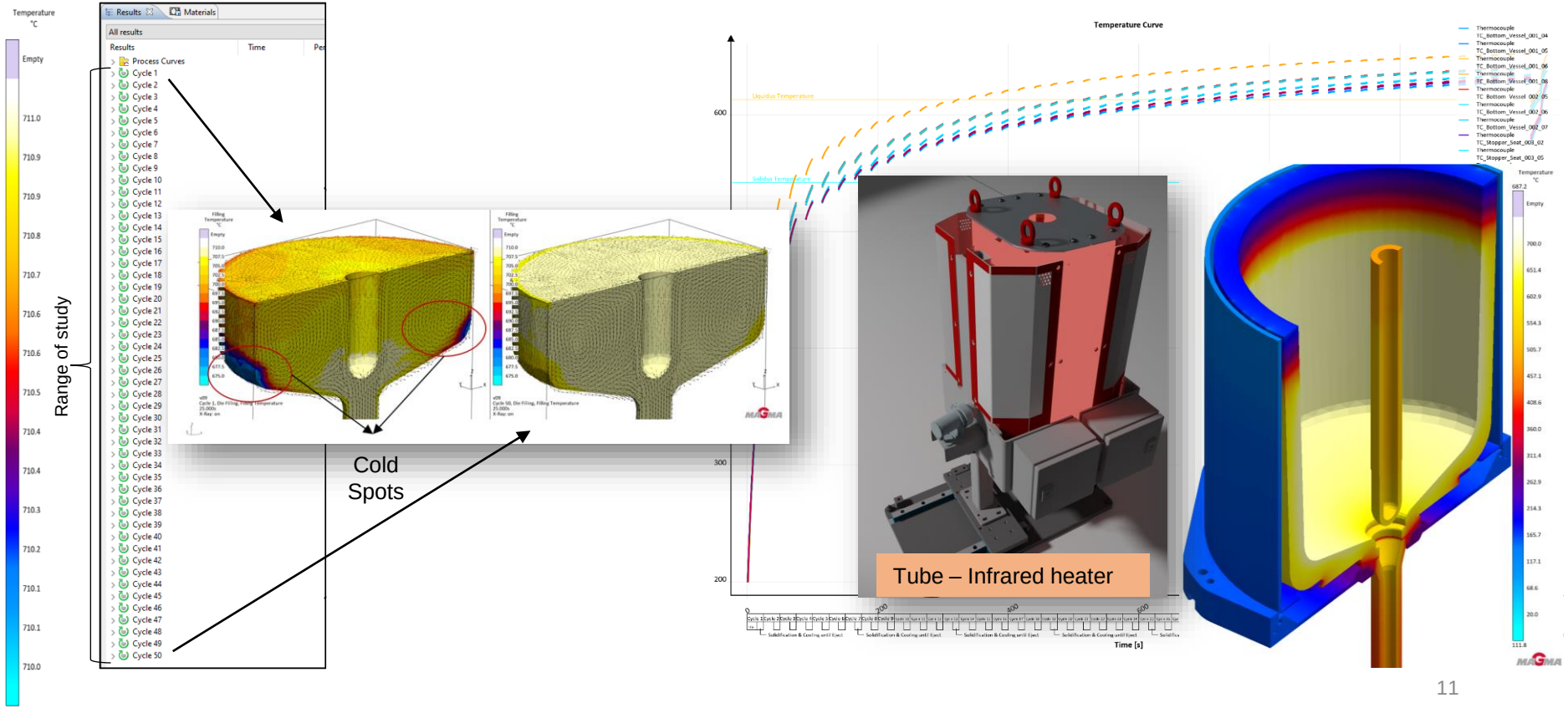


The goal for of the company Fill is to replace conventional pouring method of aluminum alloy with the ROBOCAST V.

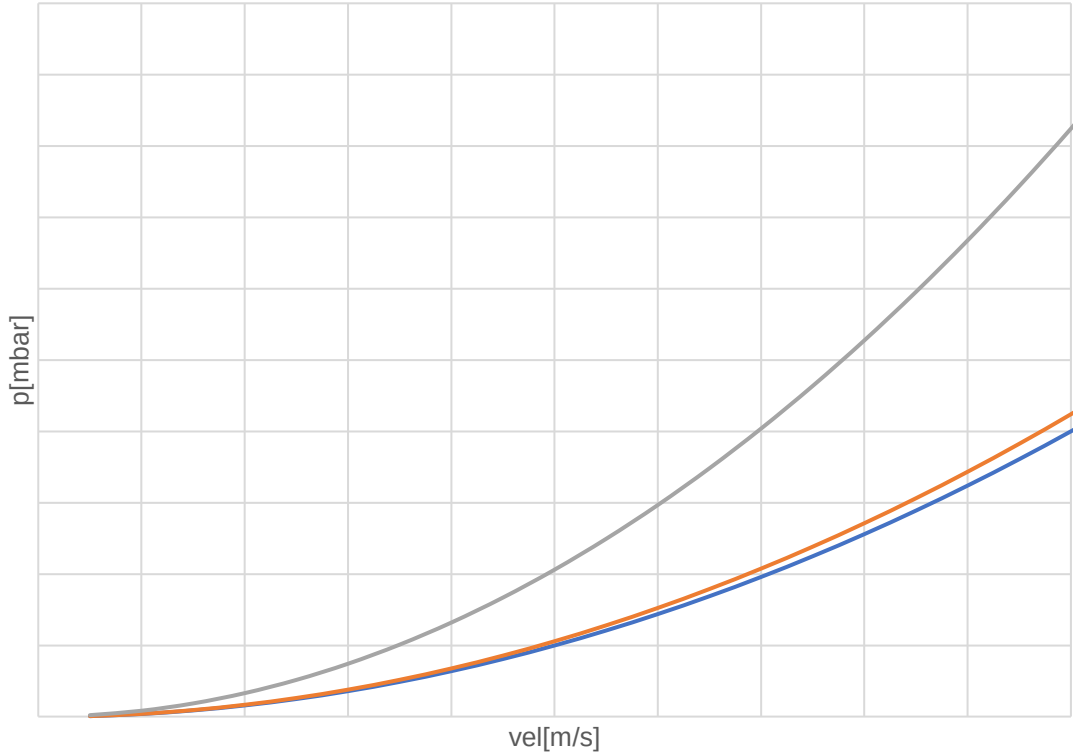
USE OF MAGMASOFT IN THE DEVELOPMENT PROCESS.

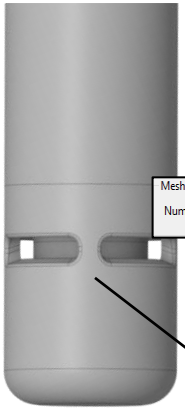

OPTIMIZING THE INTAKE
PROCESS OF MOLTEN
ALUMINUM.

IDEAL COMPONENTS TEMPERATURE – WARM UP PROCESS



INTAKE PROCESS – SIMPLIFY MESHING





Options

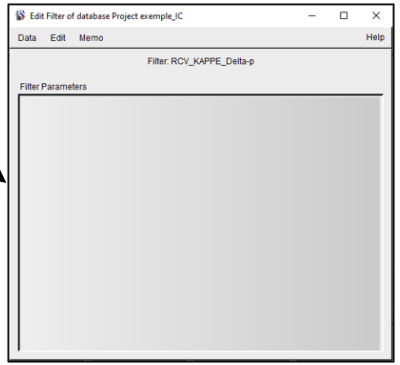
☑ Mesh for solver 5

☐ Generate core

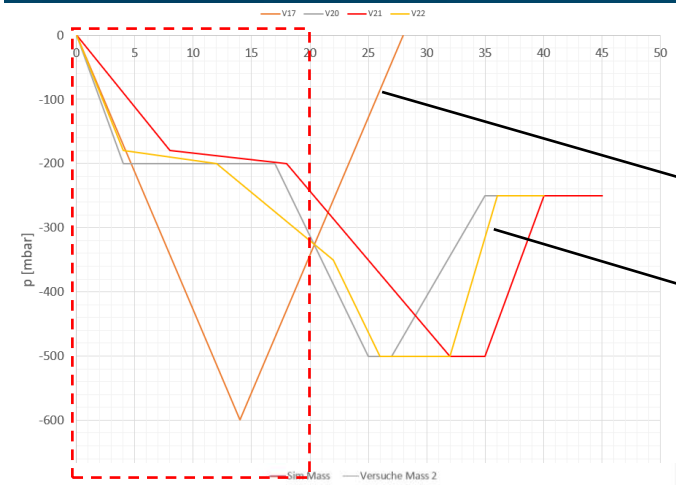
Mesh Size

Number of cartesian cells: 31,127,947

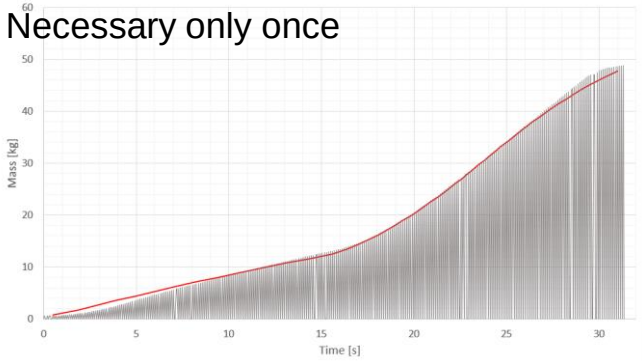
Number of cartesian cavity cells: 21,676,858

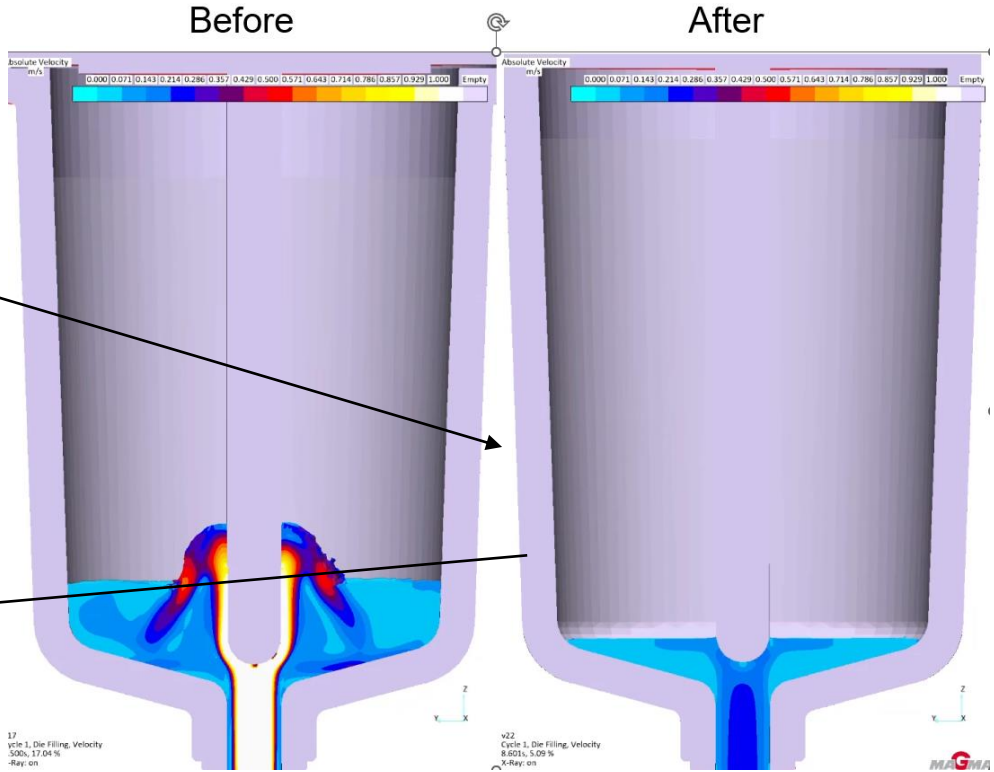


INTAKE PRESSURE CURVE – RESORVOIR FILLING

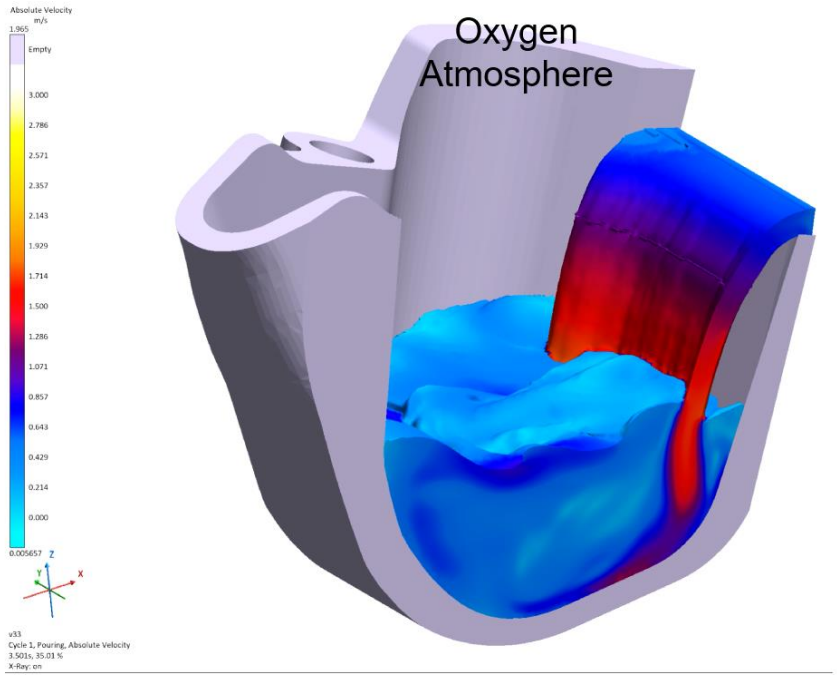


Necessary only once

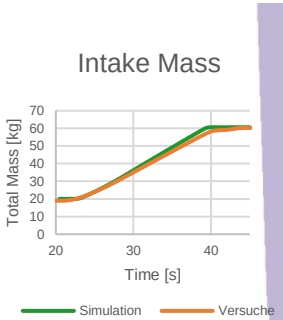


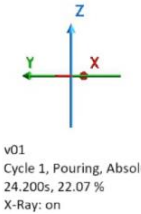


END RESULTS – COMPARISON WITH CASTING LADLE FILLING

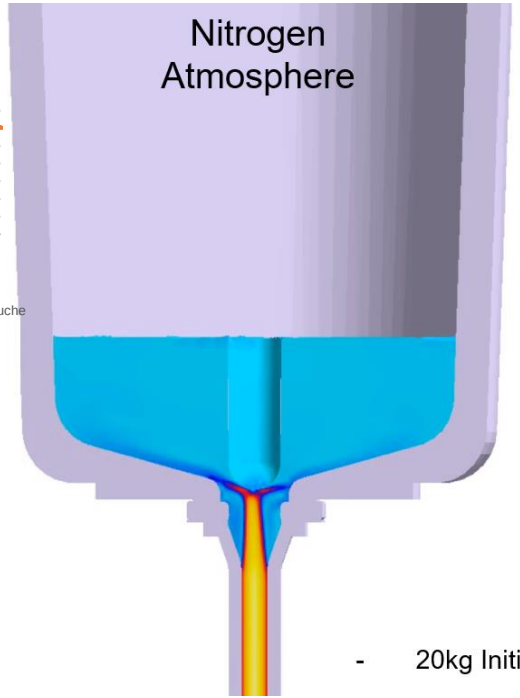


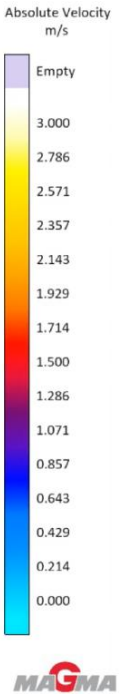
Oxygen Atmosphere



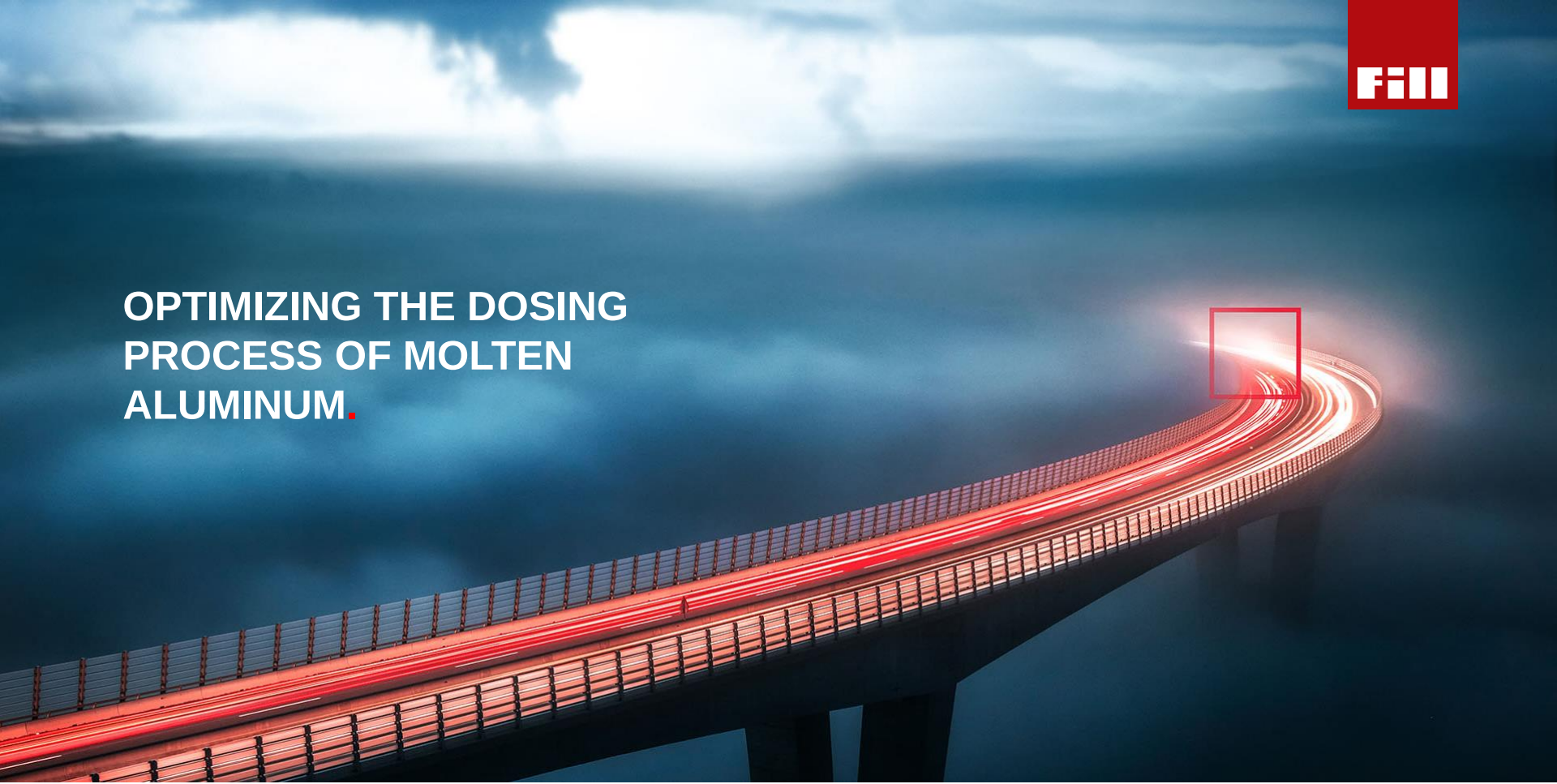


Nitrogen Atmosphere

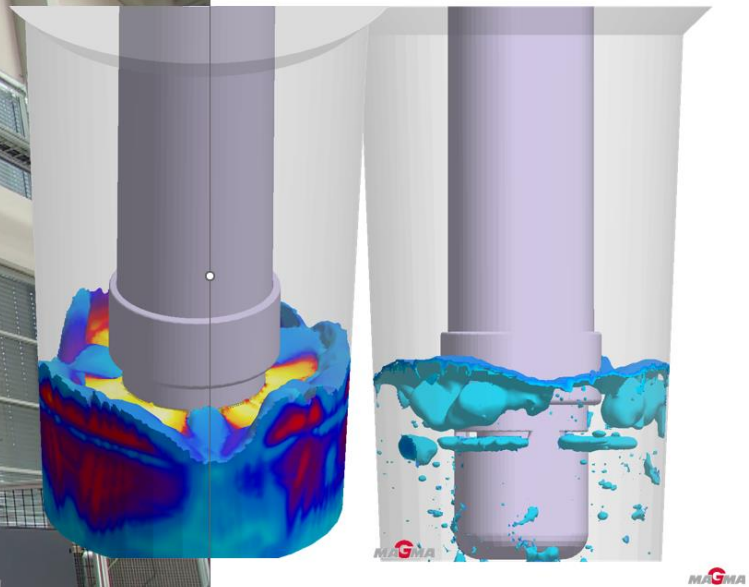




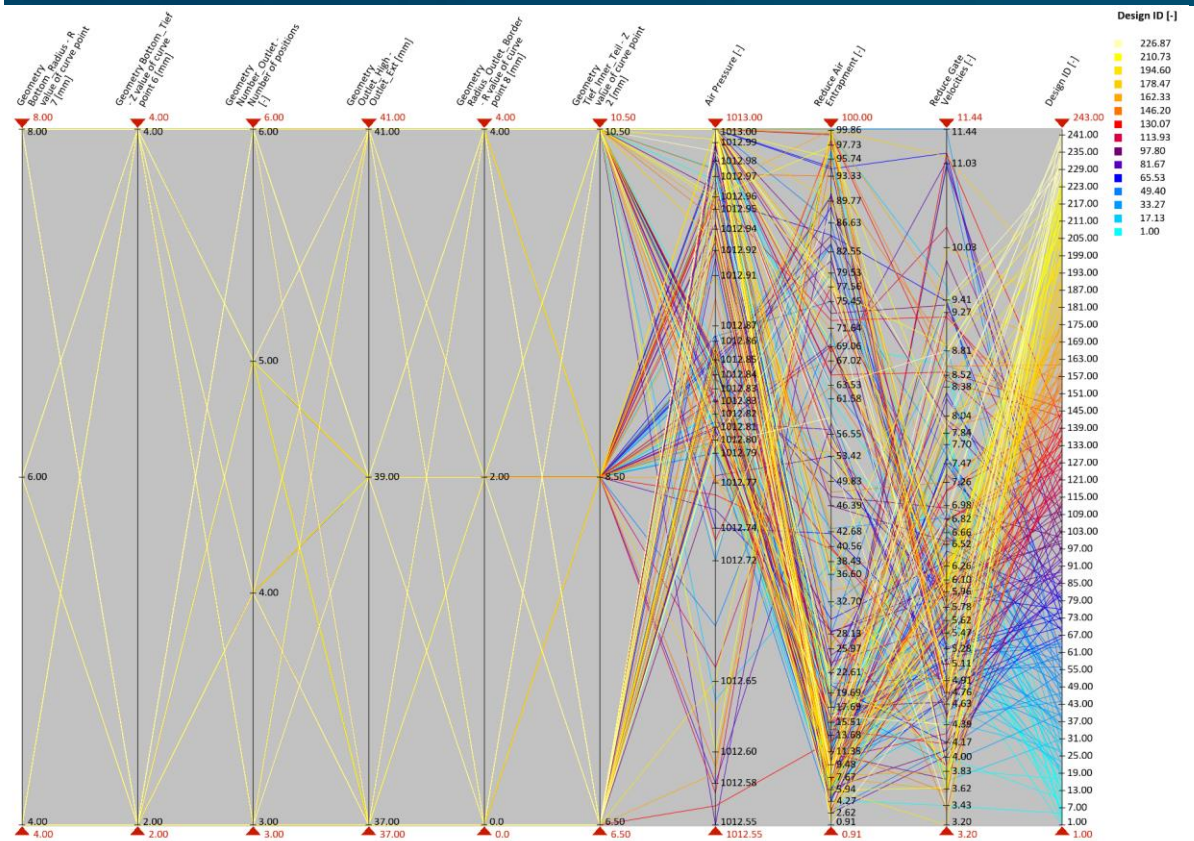
- 20kg Initial Volume

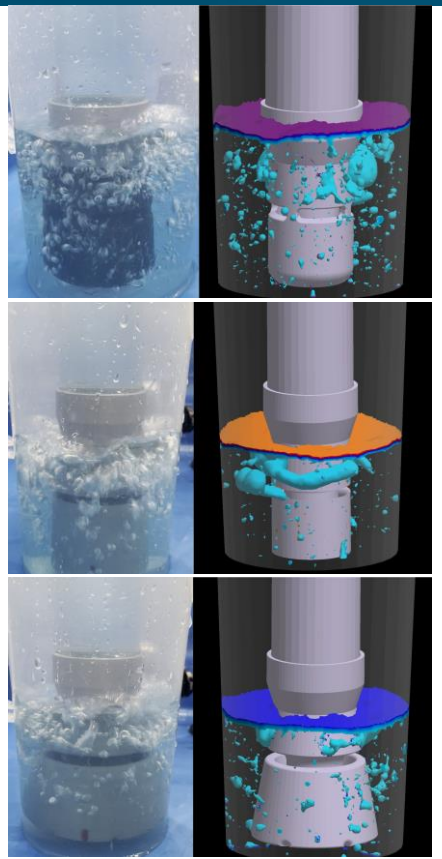

OPTIMIZING THE DOSING
PROCESS OF MOLTEN
ALUMINUM.

FIRST TUBE GEOMETRY

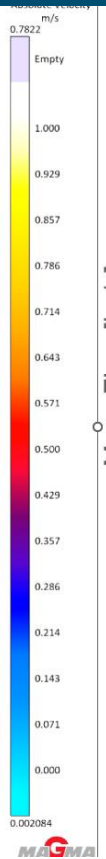


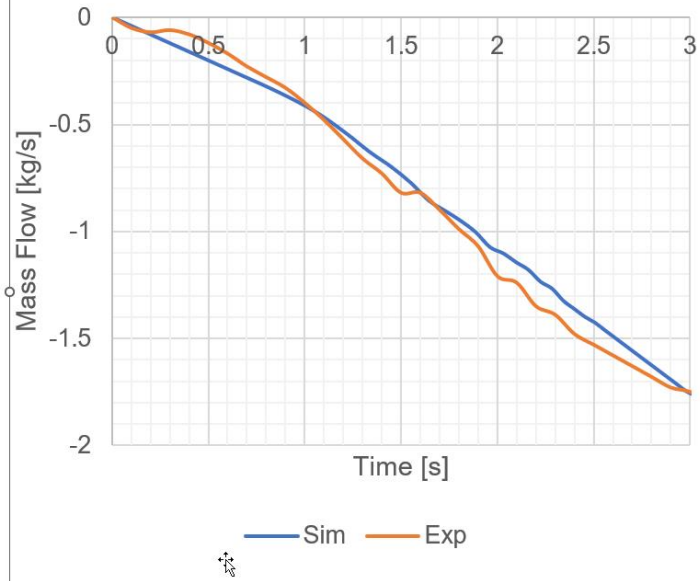
OPTIMIZATION MAGMA® Autonomous Eng.





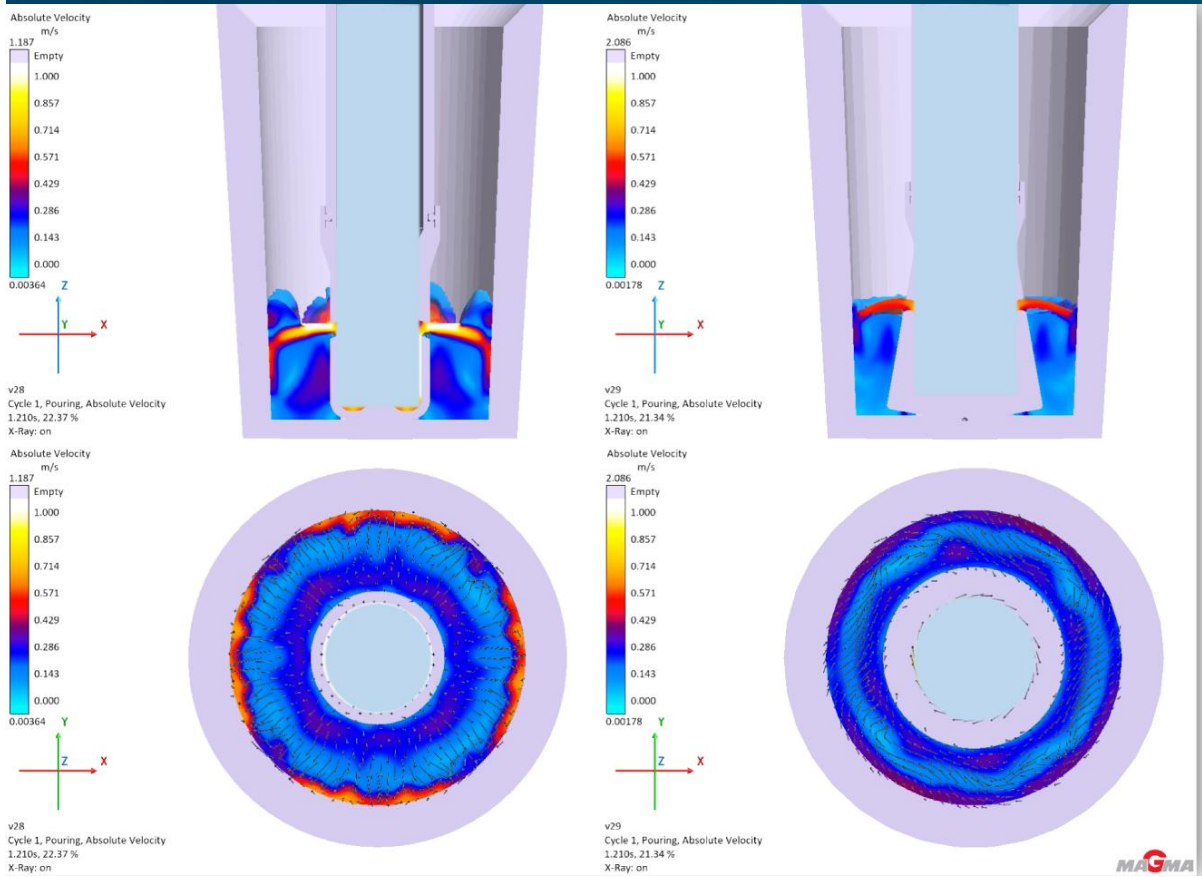
INITIAL DOSING PROCESS – Restrict customer geometry

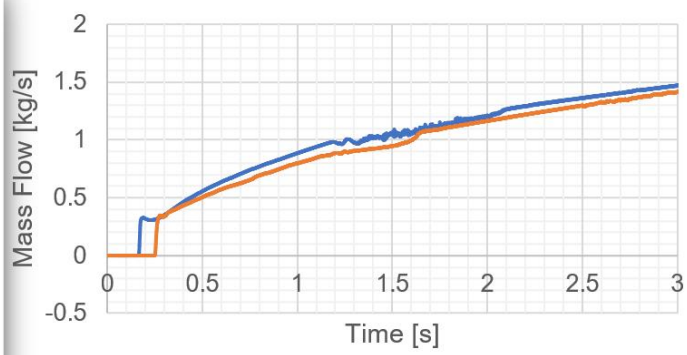


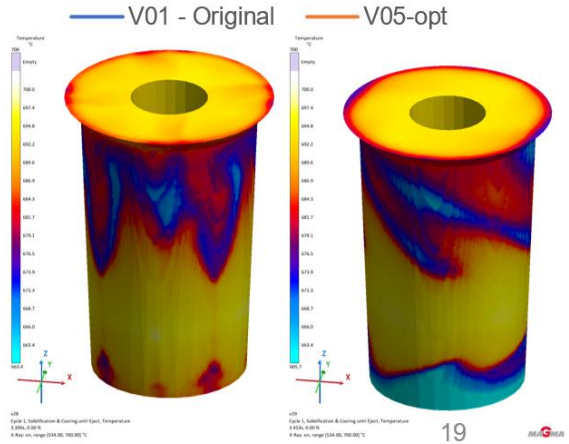


v03
Cycle 1, Pouring, Absolute Velocity
700.0ms, 9.03 %
X-Ray: on

FURTHER OPTIMIZATION FOR FILLING TUBE CAP

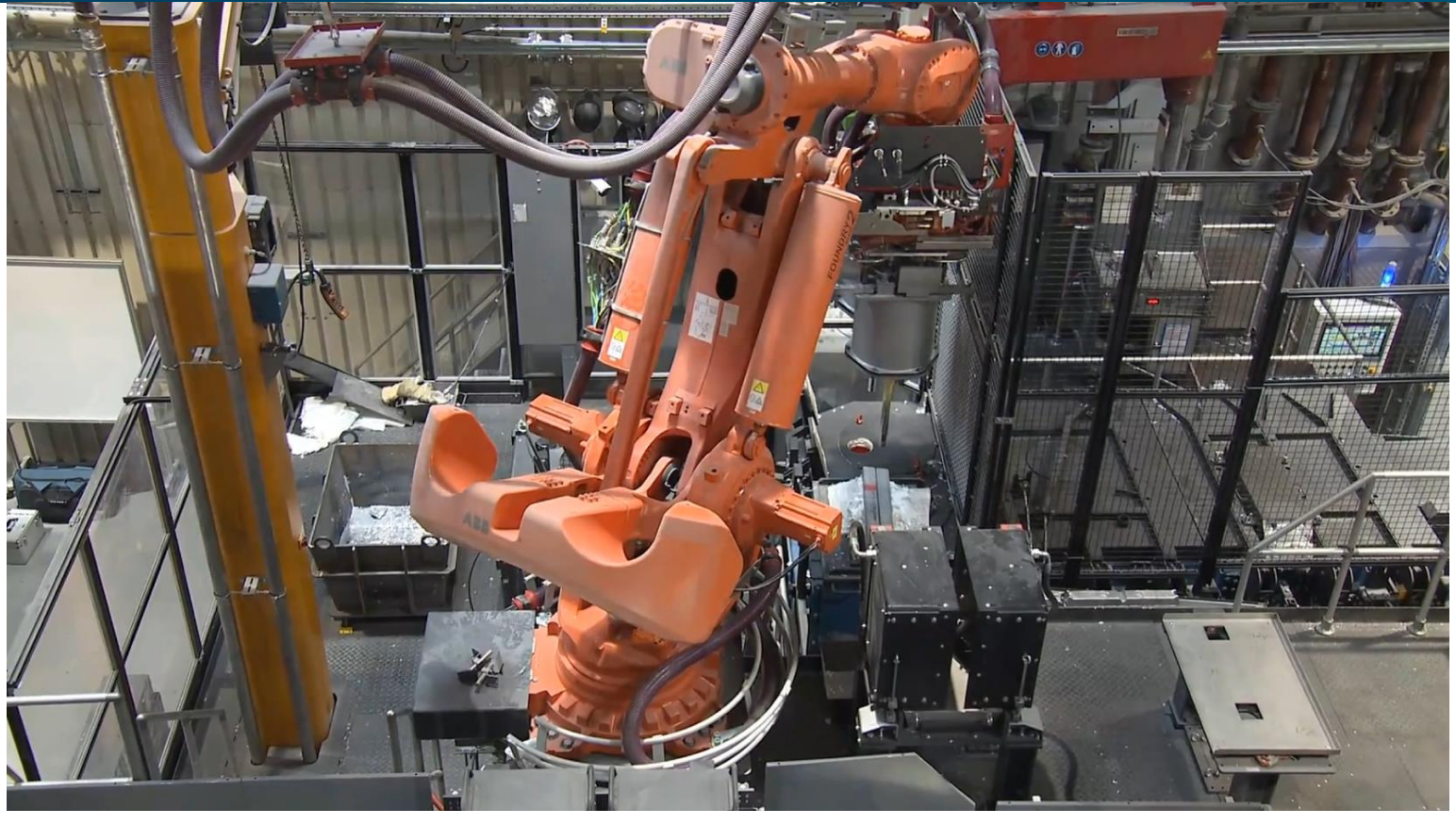




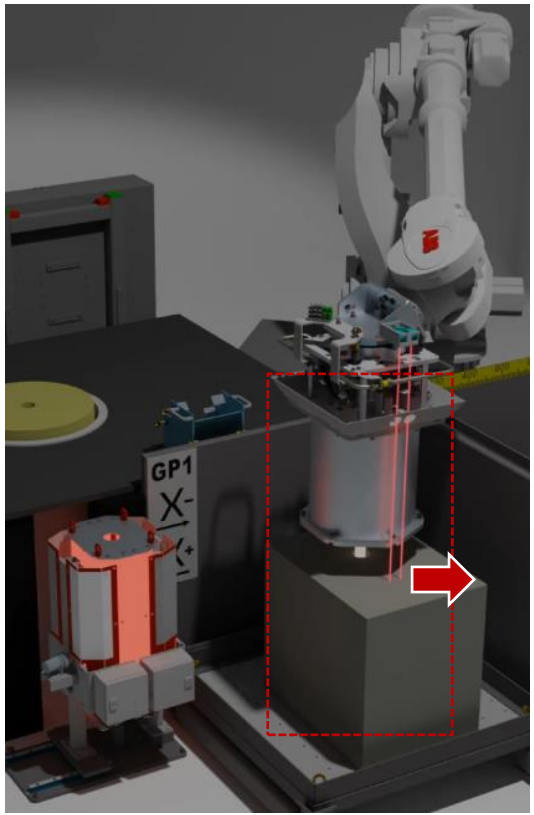


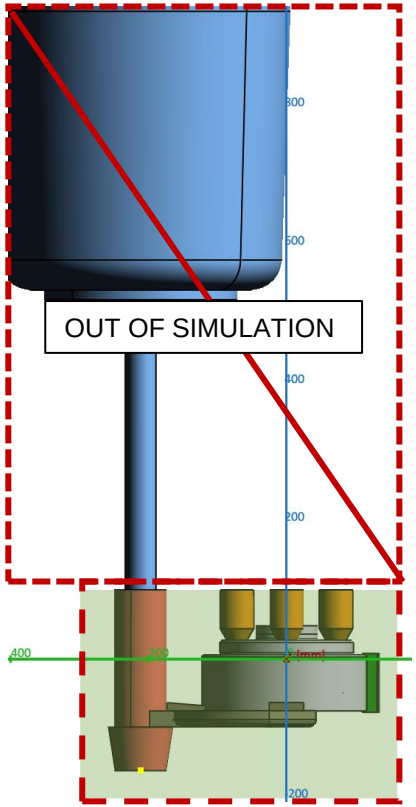
PROCESS SIMULATION WITH ROBOCAST V.

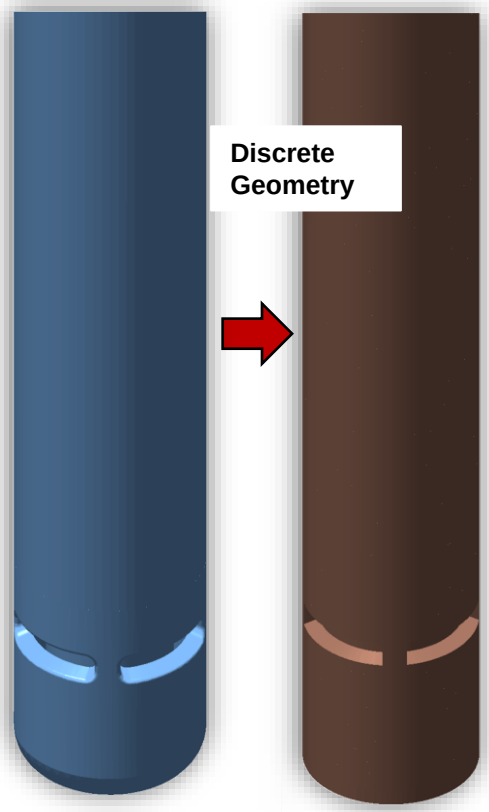
VIDEO ROBOCAST V – OPERATIONAL

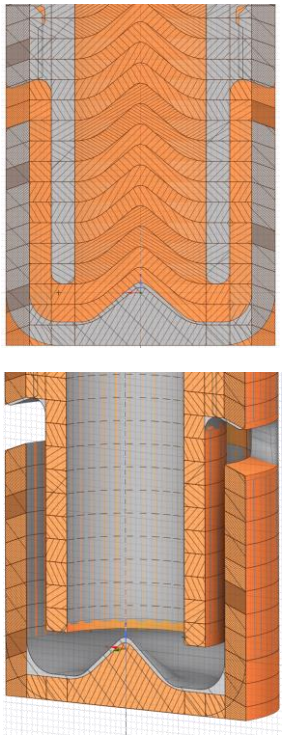


SIMULATION METHODS – ROBOCAST V

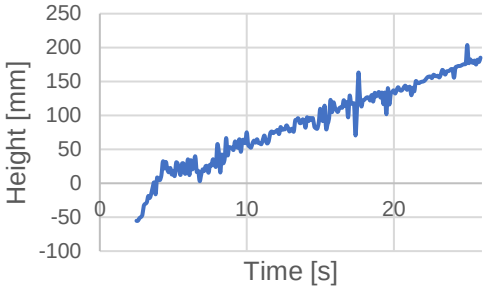


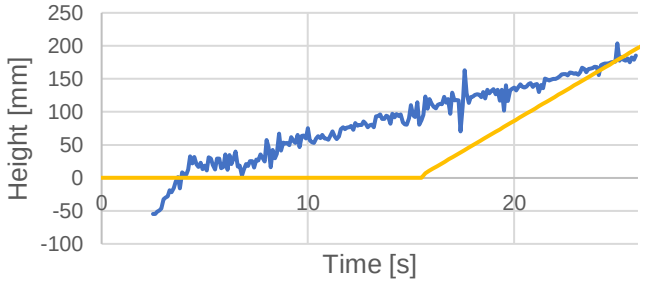


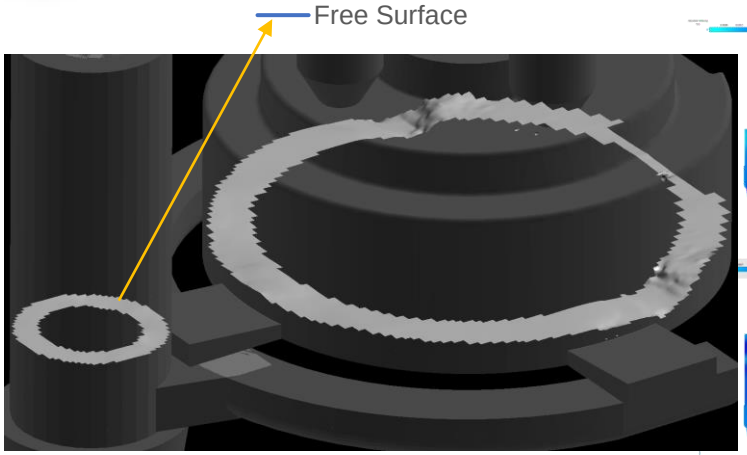


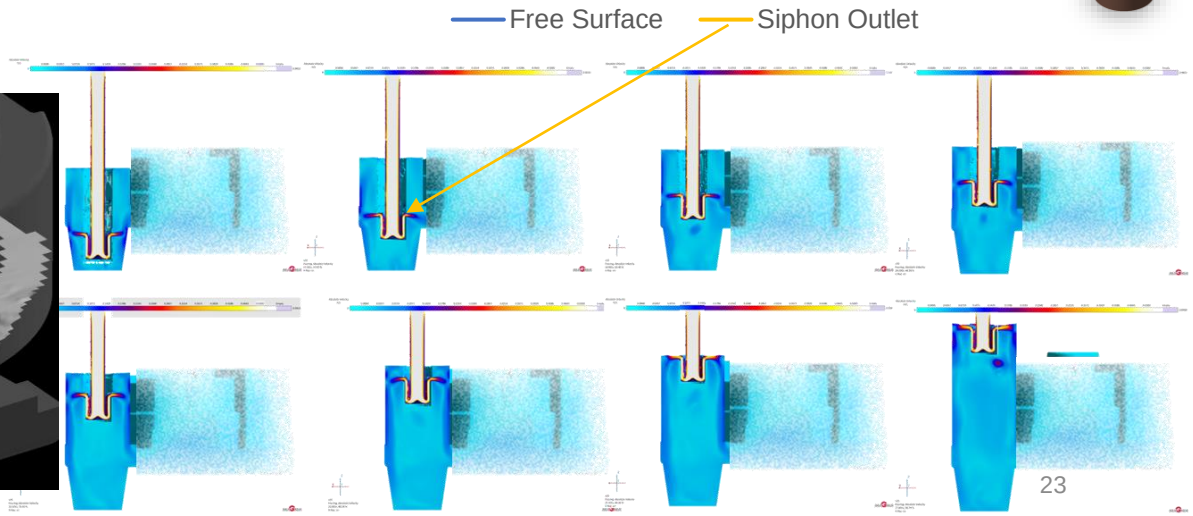


SETUP FOR FILTER CONTROL MAGMASOFT®



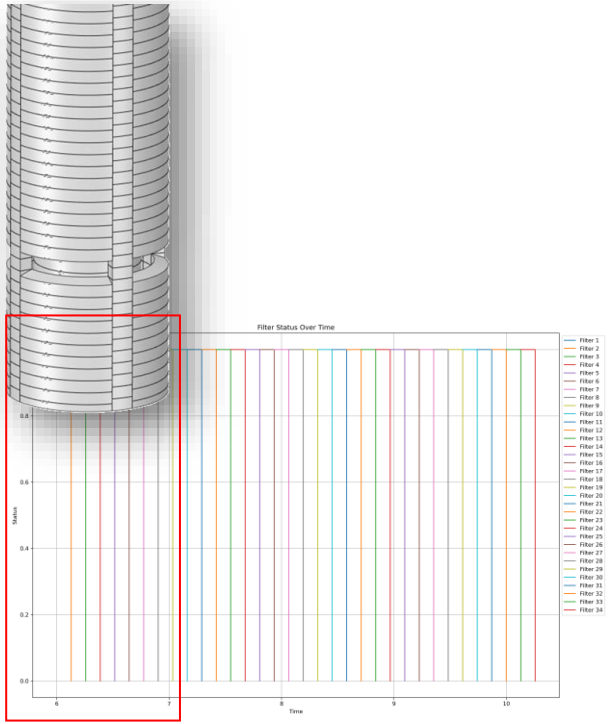


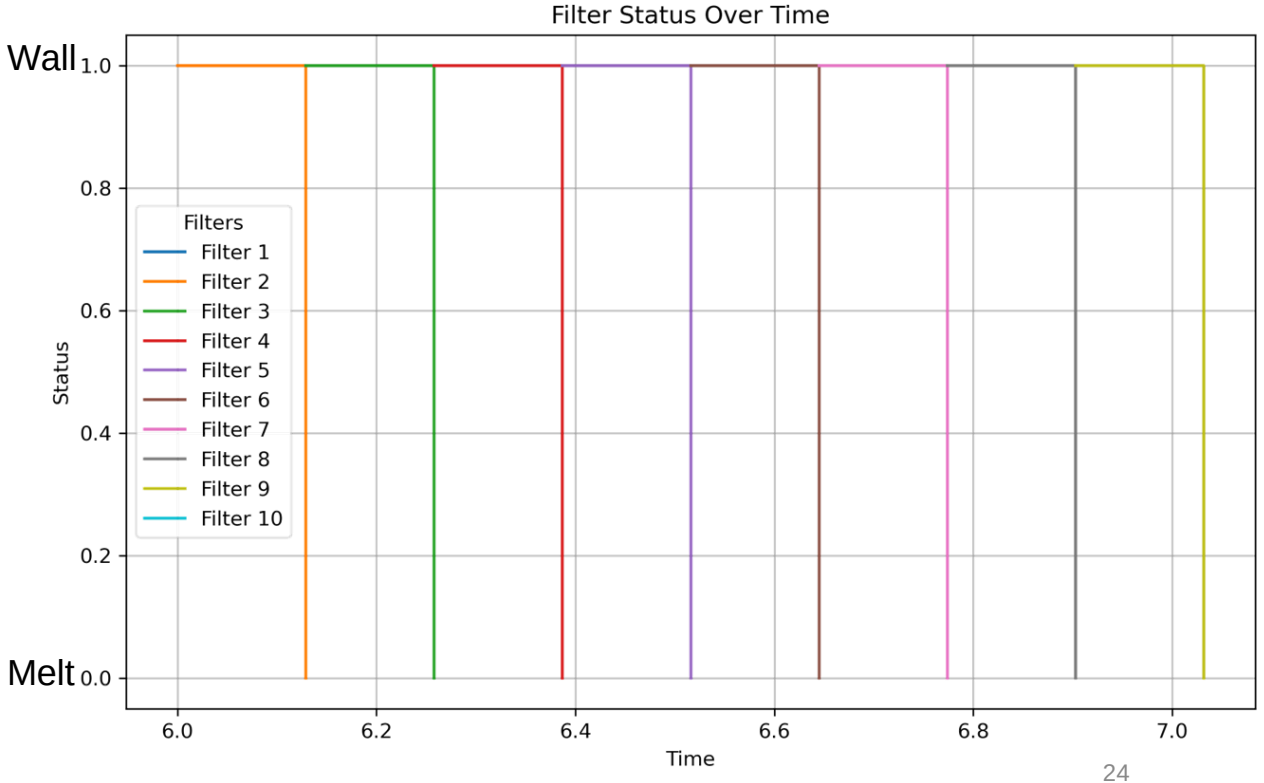




CONVENTIONAL FILTER CONTROL (Filter.ctrl)

Filter ON/OFF $\Delta p = \begin{matrix} 1 \\ 0 \end{matrix} \} \Delta p$

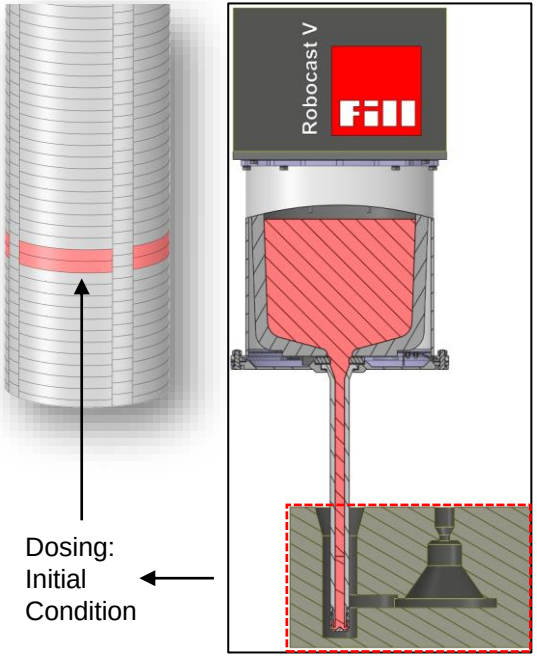


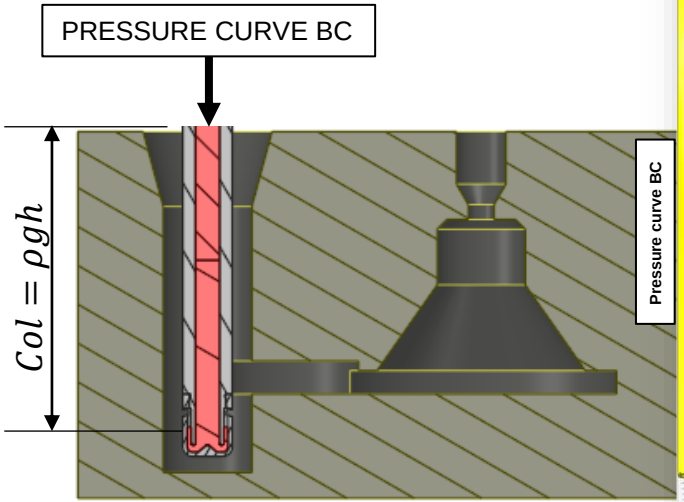


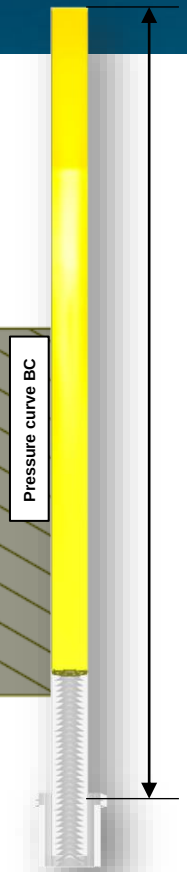
CONVENTIONAL FILTER CONTROL (Filter.ctrl)

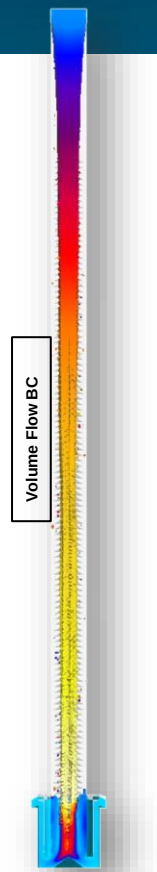
Filter ON/OFF

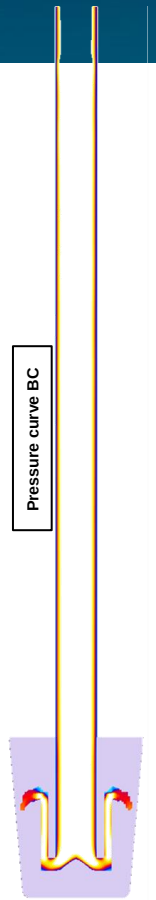
$$\Delta p = \begin{matrix} 1 \\ 0 \end{matrix} \} \Delta p$$

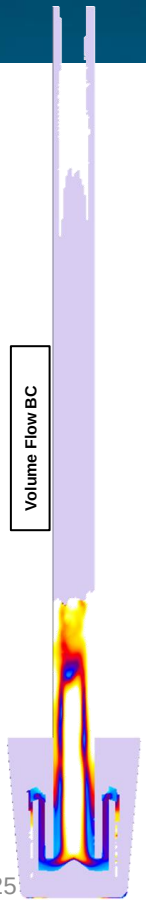




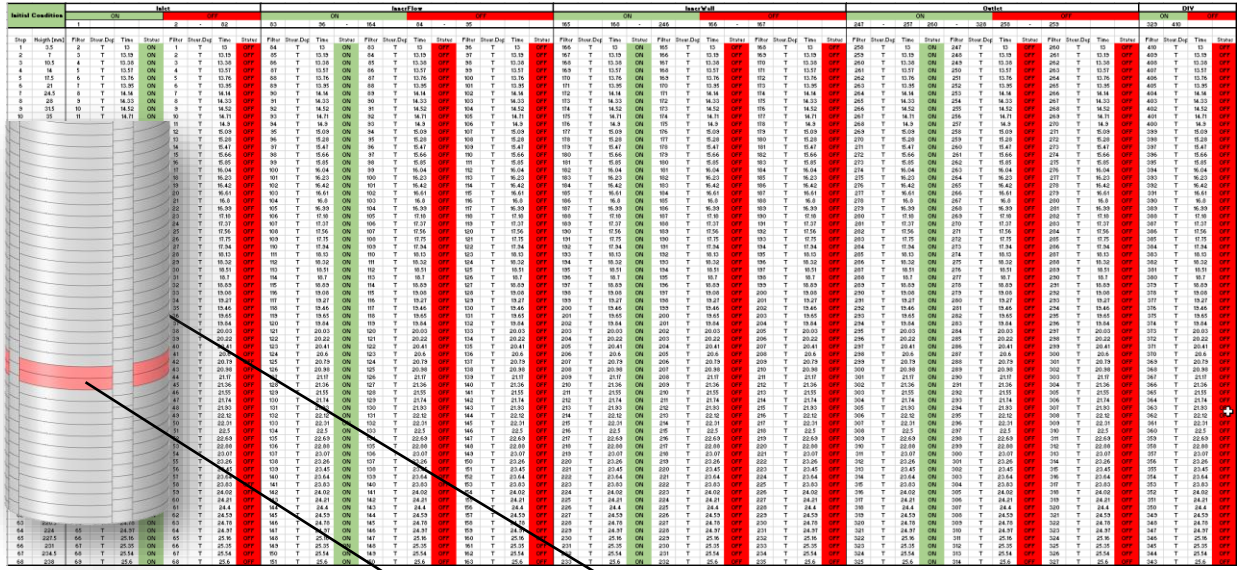








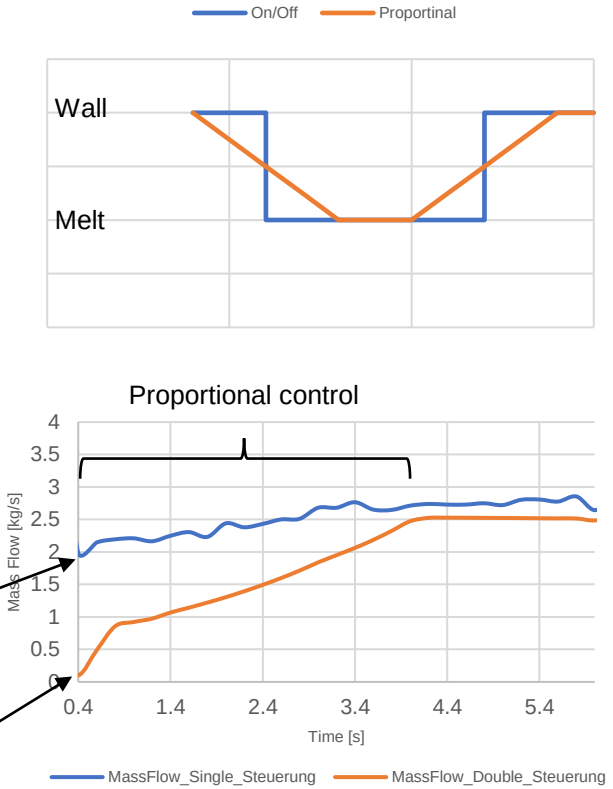
IMPROVING CONVENTIONAL FILTER CONTROL



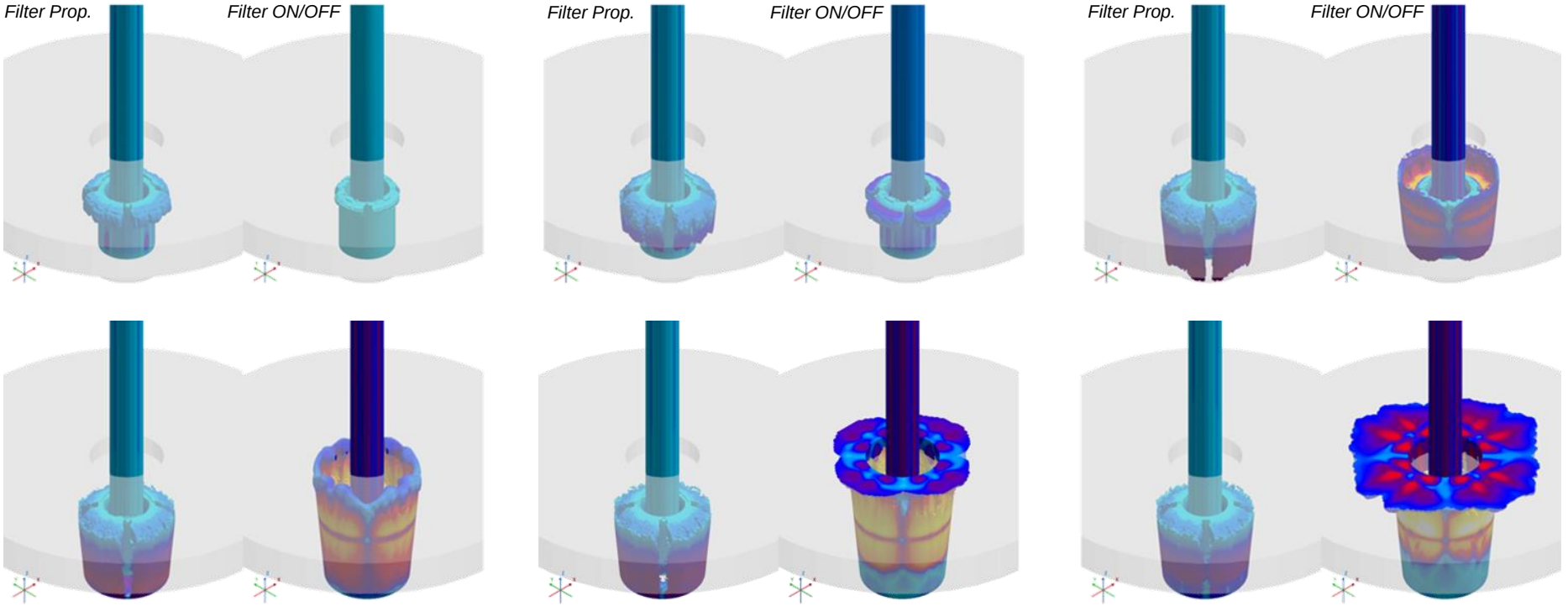
Discrete Tube Geometry
By: Edmundo Oliveira 637 ID's

Filter ON/OFF $\Delta p = \begin{matrix}1\\0\end{matrix}\} \Delta p$

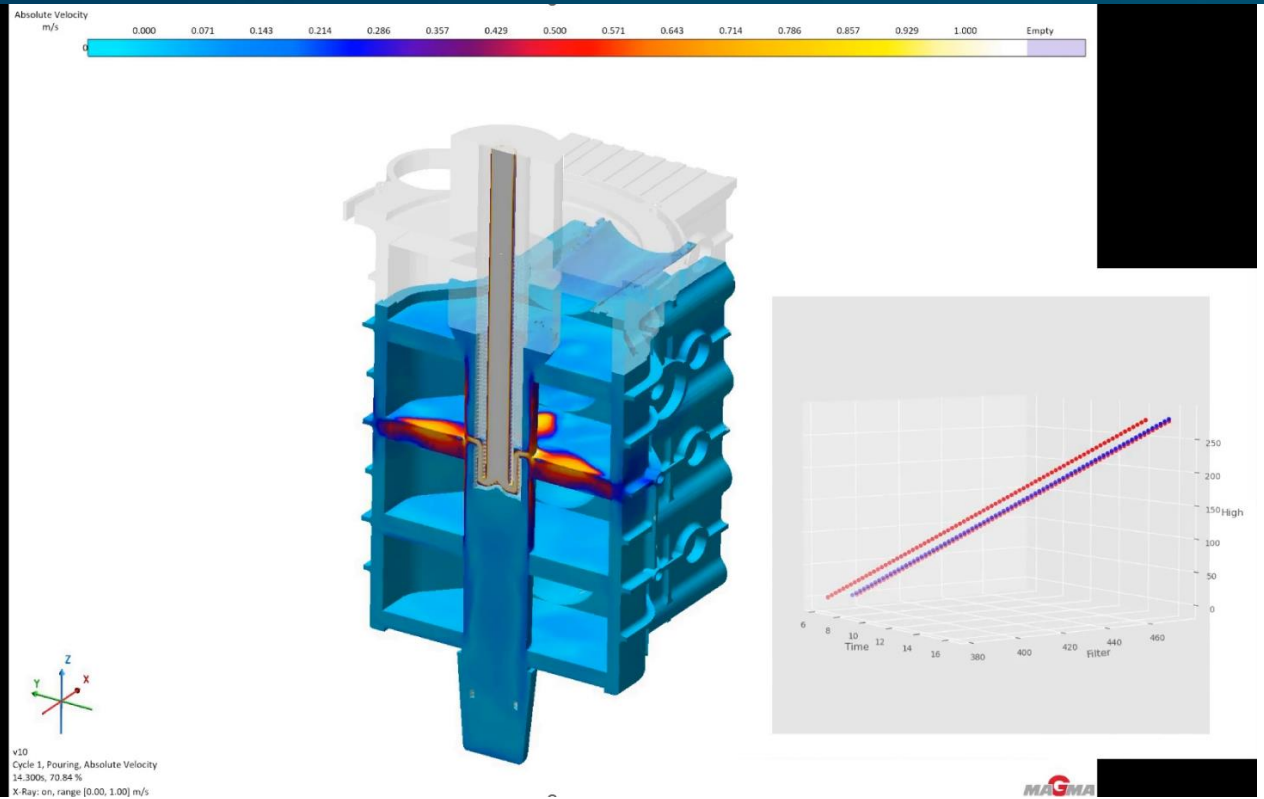
Filter Proportional $\Delta p = K_1 v + K_2 v^2$

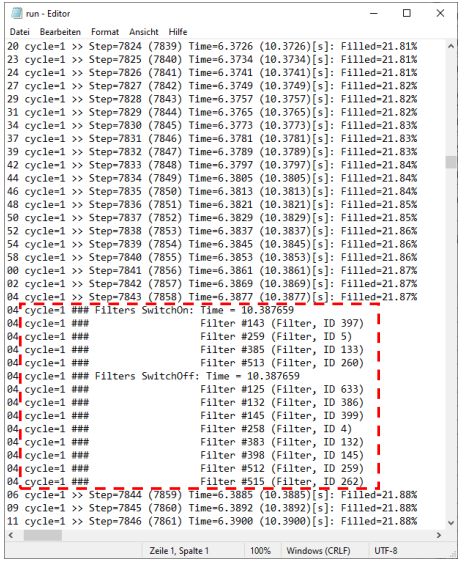


PROPORTIONAL FILTER vs CONV. FILTER

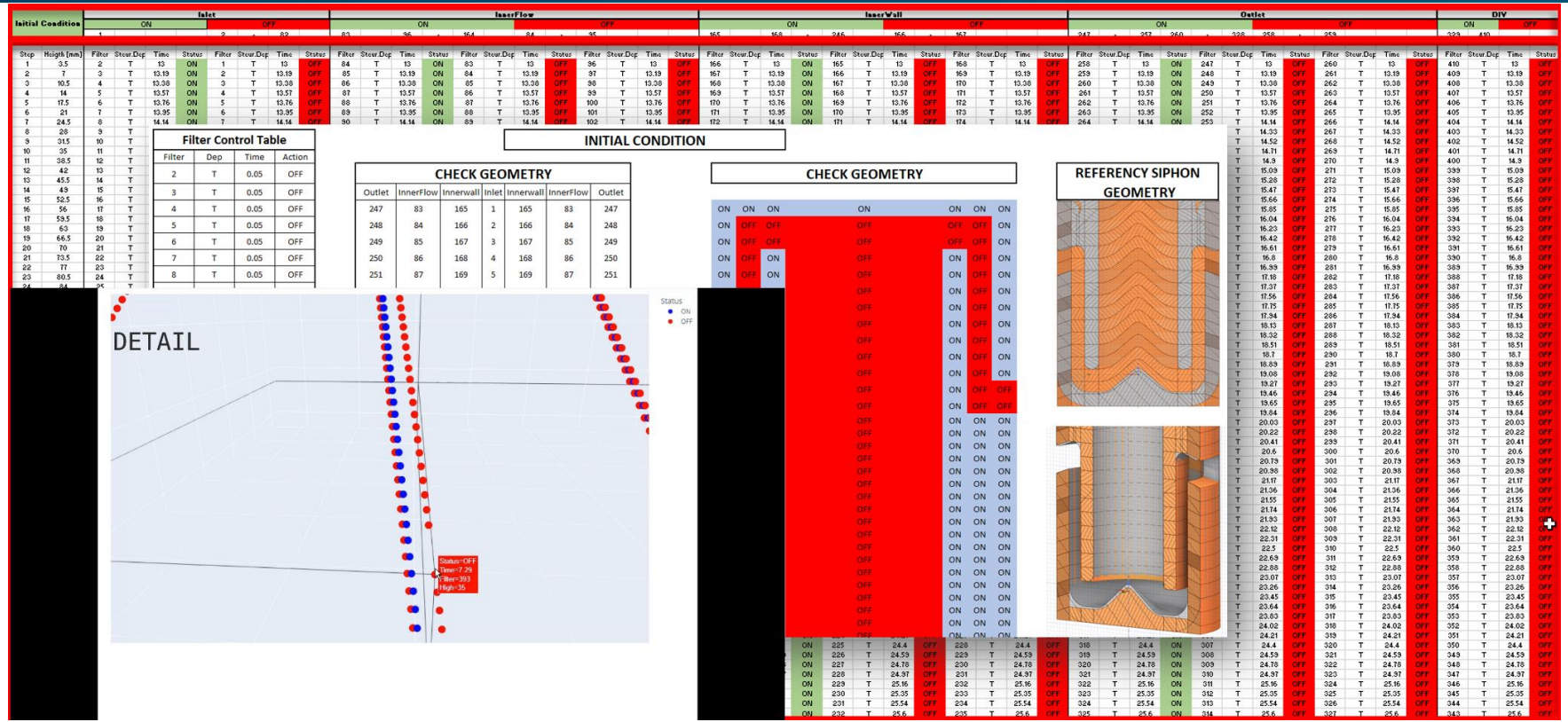


FILLING SIMULATION



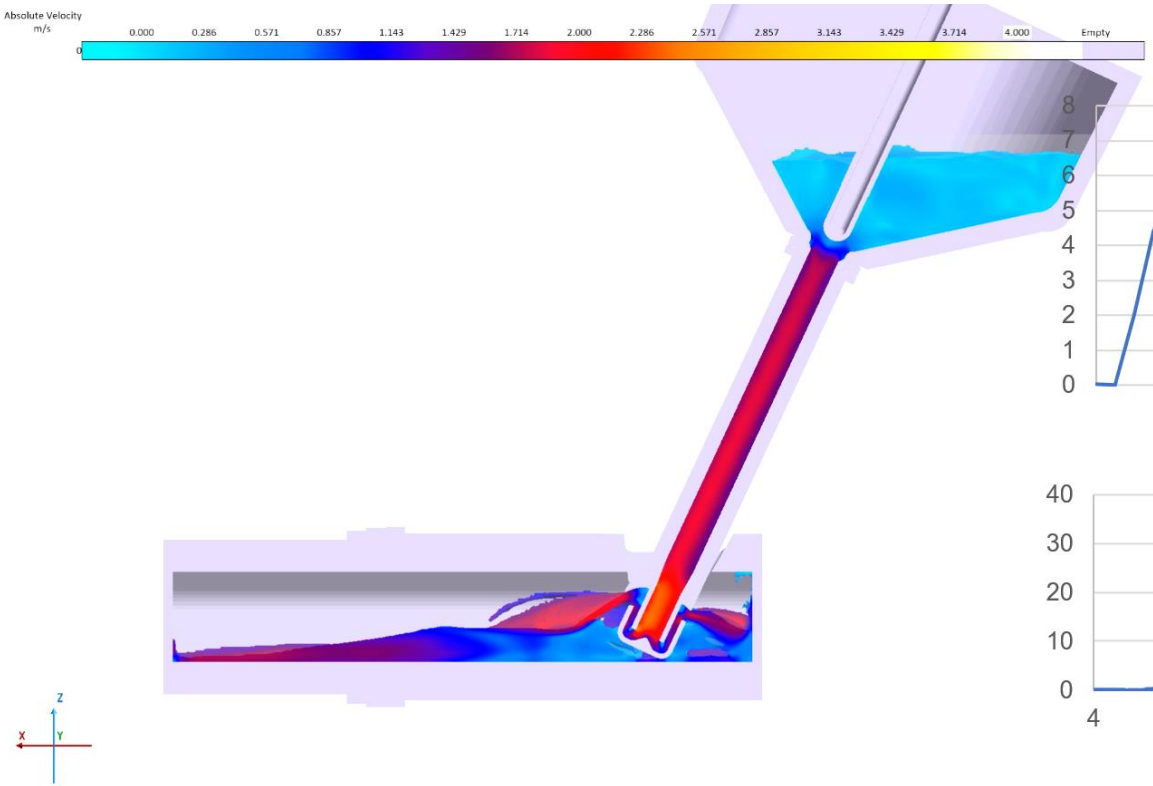


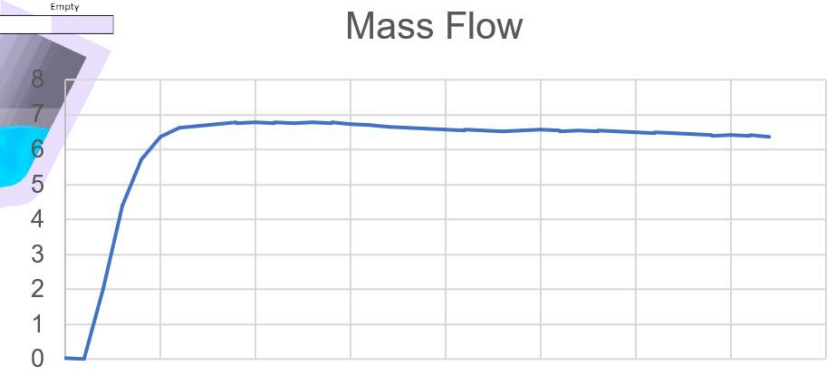
Control Filter Validation

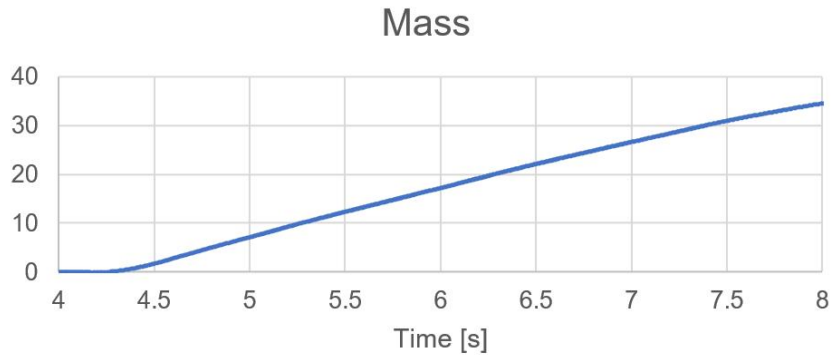



PRODUCT MARKETING.

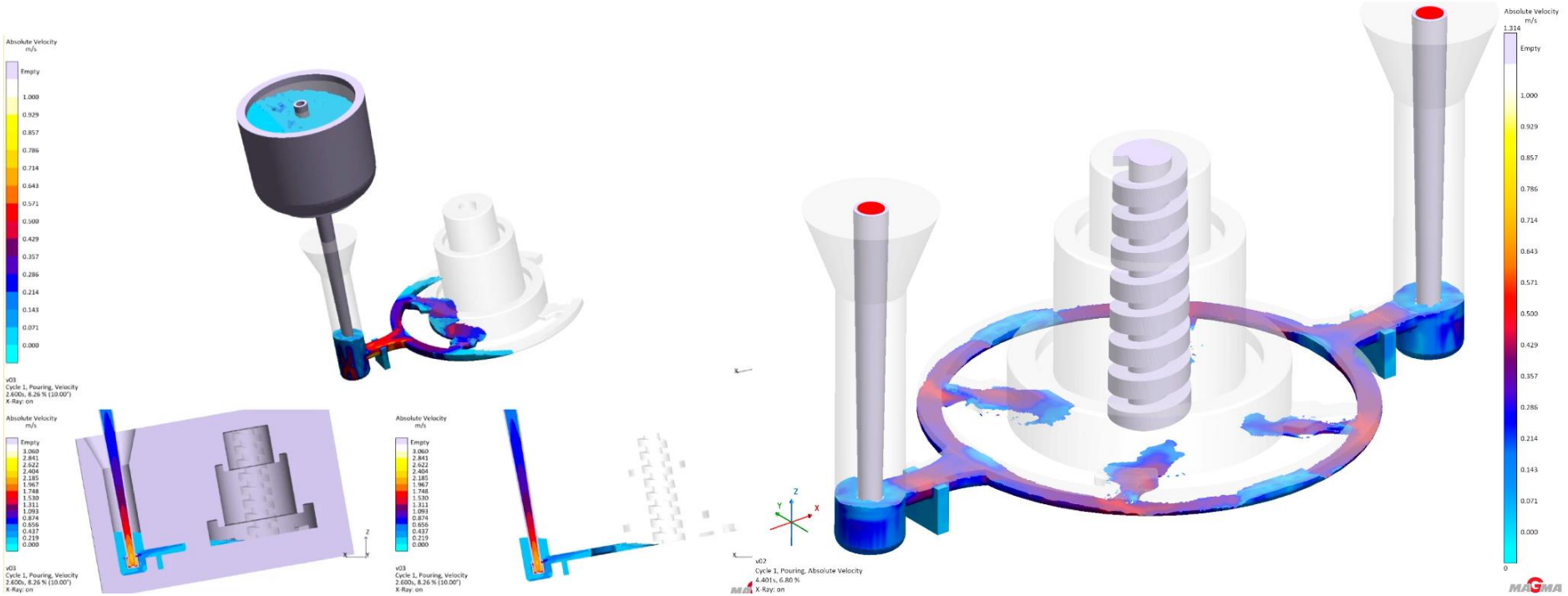
SHOT-SLEEV FILLING





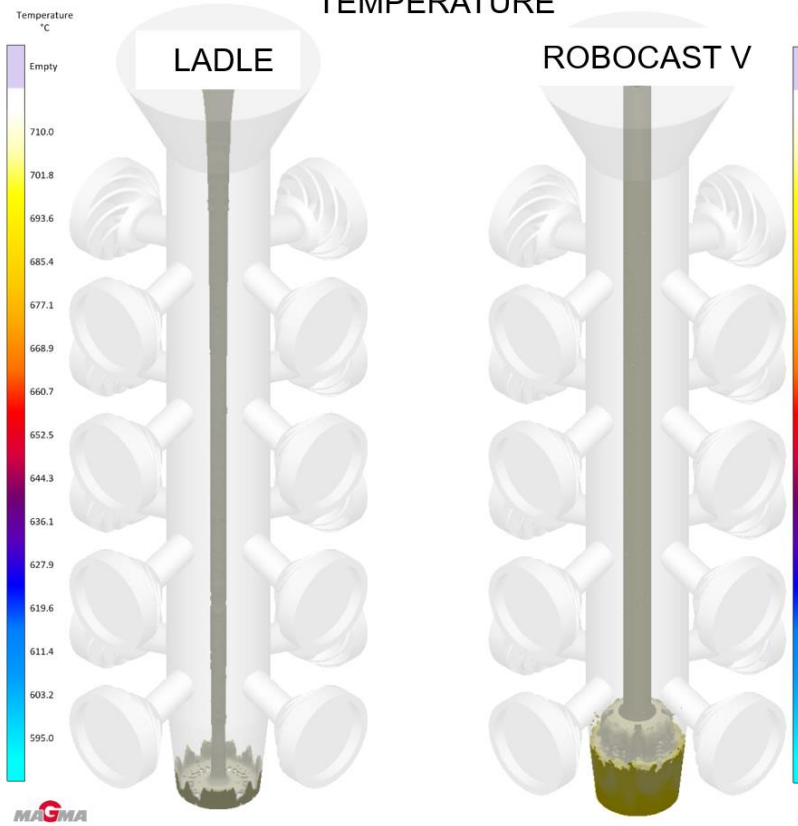


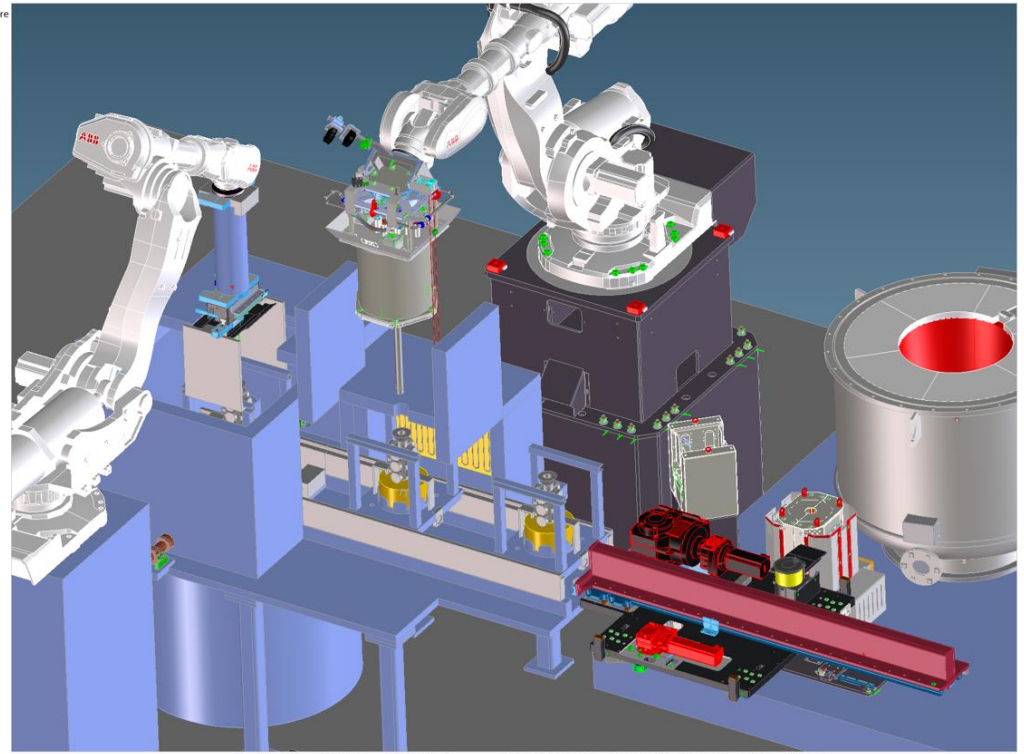
TILT-CASTING & Multi Injection Points



INVESTMENT CASTING

TEMPERATURE





CASTING CELL – CONCEPT FROM FILL

If you are seeking the best solution, shape your future with Fill.

Edmundo Oliveira
15.09.2024

CONTACT INFORMATION

Edmundo Oliveira
Wissenschaftliche Mitarbeiter / Research Engineer F&E / R&D

edmundo.oliveira@fill.co.at
www.fill.co.at

Norman Präkelt
Produktmanagement / Product Manager KCG / CCF

norman.praekelt@fill.co.at
www.fill.co.at