



expanding **human possibility**®

Inline conveyor belt Digital Twin

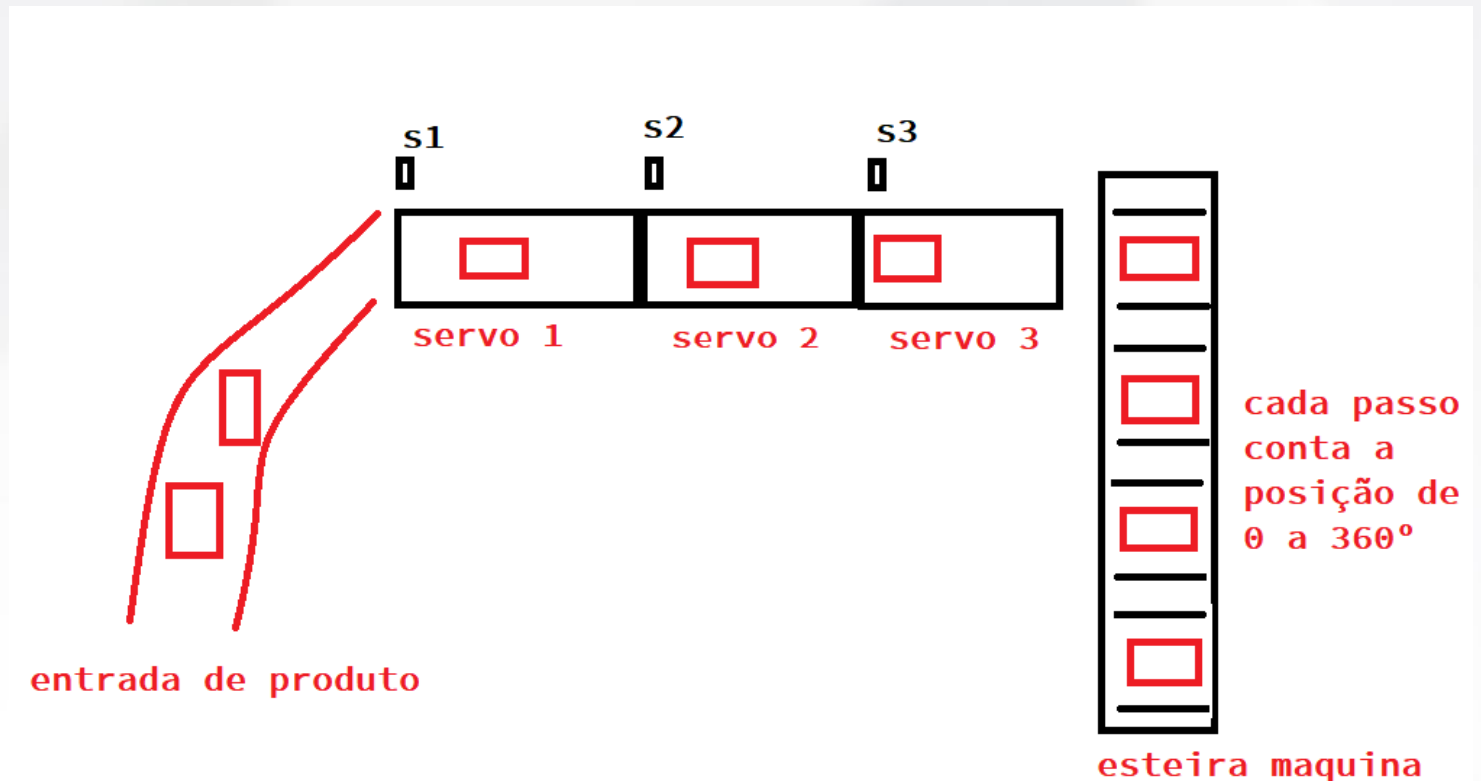
FERNANDO ROSSI • OEM SOLUTION CONSULTANT - (GOTC) • FEV•23



PUBLIC

What is the solution needed by the OEM?

- Synchronism between tree conveyor belt, to delivery the product in the right position for a flighted conveyor belt on the next machine.
- 120 packages for minute delivered
- Know if Rockwell had a solution already used for this kind of application.
- Project already in development.



Overview

Smart Belt example code is a code example of standalone machine (unit) that is performing operation know as Smart Belt – adjusting the product distance (pitch between products on set of conveyors).



Smart Belt operation:

- Product is coming with random gaps
- At the end of unit there is an axis that determines the pitch of products.
- On Smart Belt section product end is sensed and timestamp captured. This timestamp is converted to the virtual axis position in order to calculate the position difference from desired position for each product.
- When position is captured, new correction is calculated for each product using `AOI_CalcCorrectionDistance`
- Correction is performed as a PCAM index executed on top of the MAG running the base speed.

Add-on Instruction

- Studio 5000
 - Using principle of the GOTC Sebastian Hoos Application to test and proof of concept.
 - Made changes based on application requirement. Sebastian app are all conveyors in the same direction.
 - Add product size to calculate target position to match the right target position and not just adjust pitch.
 - This AOI is used in each Belt for individual correction (Inline concept)



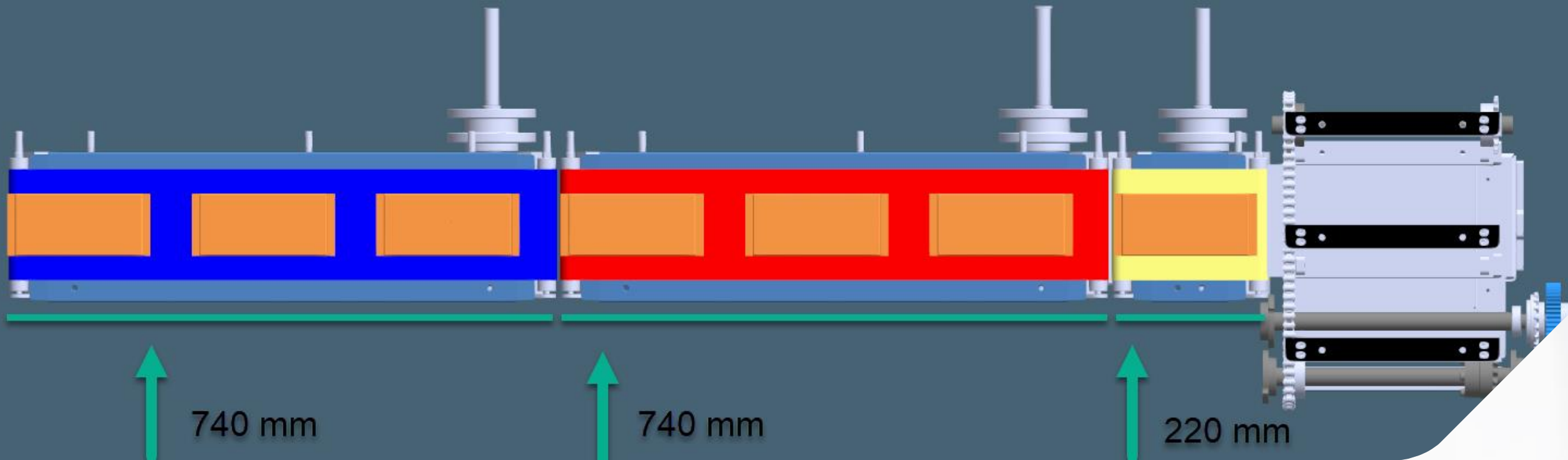
AOI_CalcCorrectionDistance		
AOI_CalcCorrectionDistance	stCalcCorectionDistanceAOI	...
Inp_RegistrationPosition	RegistrationMasterPosition	
		110.083
Inp_SensorOffset_mm		0
Inp_TargetPosition	ProduktTargetPosition	
		120
Inp_Unwind		360
Inp_Unwind_mm		420
Inp_ProductSize_mm		200
Inp_CorrectionDividor		1
Inp_MaxPositiveCorrection_mm		66
Inp_MaxNegativeCorrection_mm		66
Out_CorrectionDistance_mm	CorrectionSlaveScale	
		-11.569824



Digital Twin – Emulate 3D

- Great opportunity to show OEM the power and benefits using a digital twin.
- Provide solution before the machine is ready to try-out.
- Find issues and challenges of the solution provided.
- GOTC Ricardo Araujo help to assembly the project provided by the OEM and E3D.





OEM Project Specs

3 product on Belt?

CONVEYOR BELT 1 – WIDTH 740 mm

CENVEYOR BELT 2 – WIDTH 740 mm

CONVEYOR BELT 3 – WIDHT 220 mm

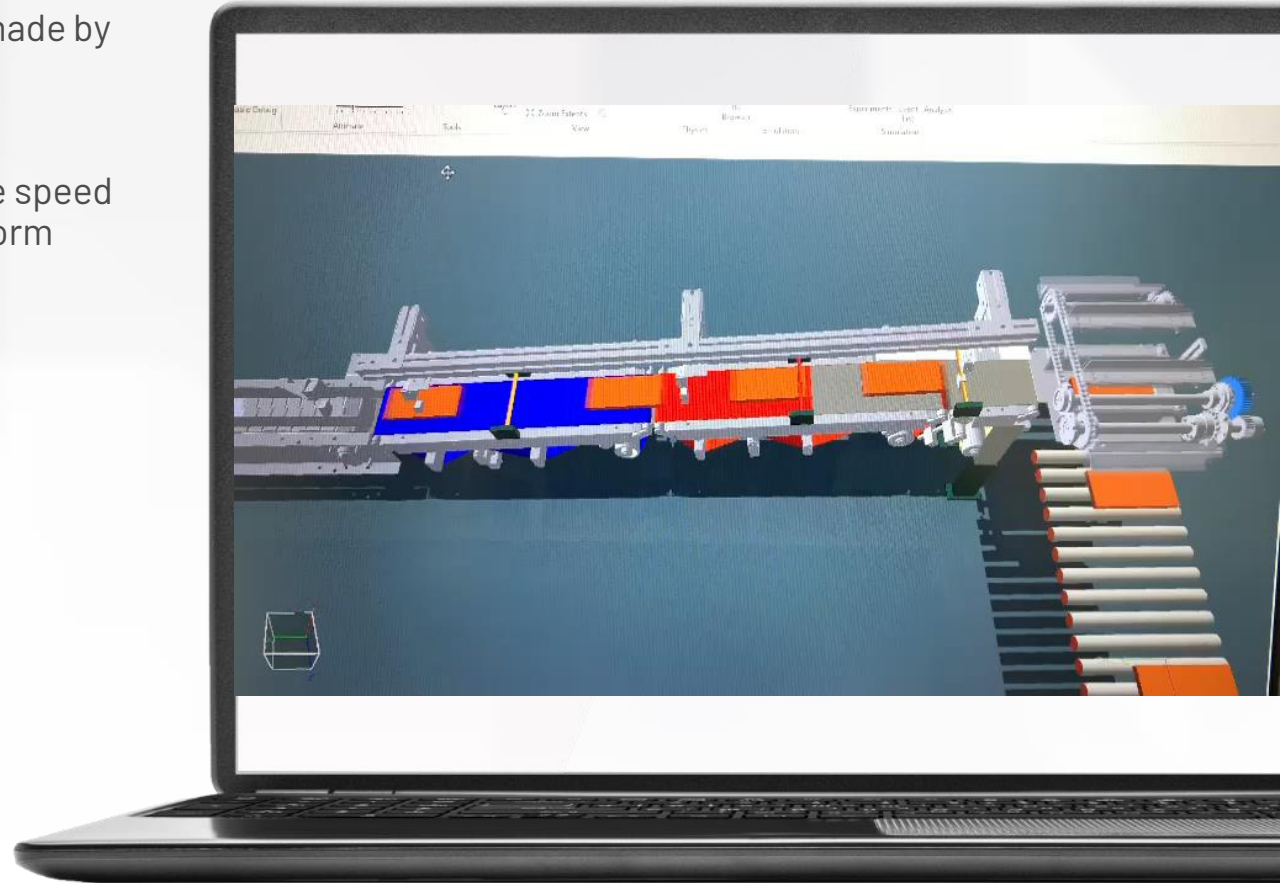
PRODUCT: 200mm (W) x 94 mm (H) x 20 mm (D)

FLIGHT CONVEYOR GAP – 154 mm

Try-out on E3D

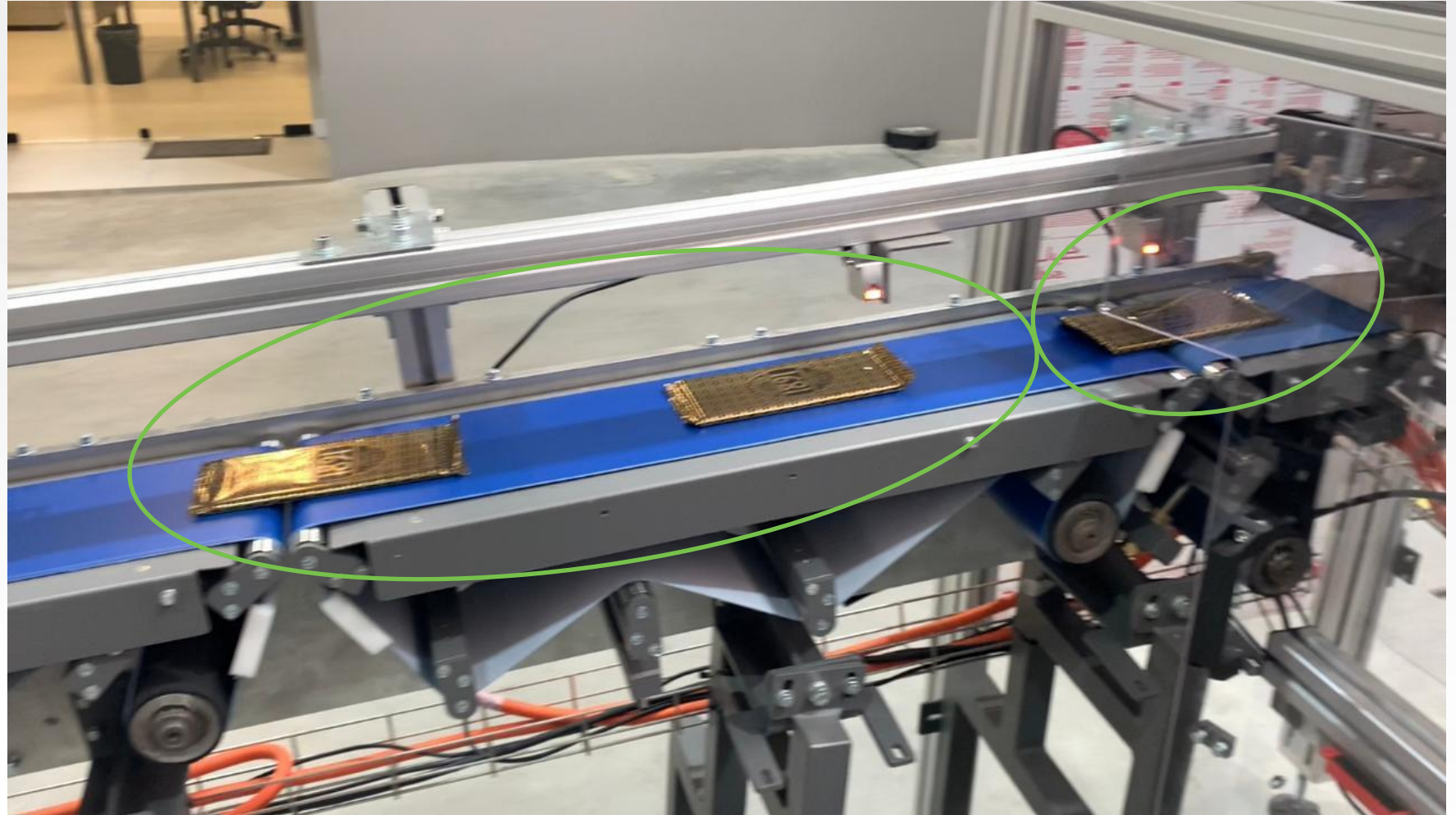


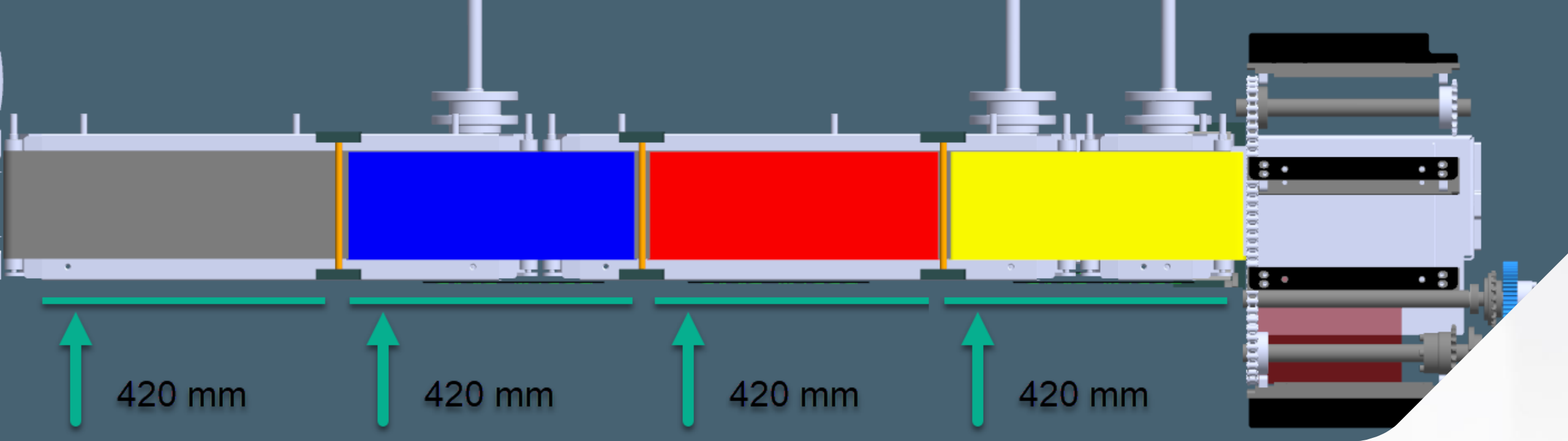
- When have more than one product on each conveyor, the correction made by the controller, give to another product the same correction.
- Last conveyor was to sort to provide enough correction.
- To Perform the correction in one product only above the conveyor, the speed of the mechanic provided do not comply with the motion need to perform right correction.



OEM try-out result

- Can't get the result needed.
- Two Packages on the conveyor belt.
- Last Belt was too short to give the right motion control correction.
- Package collision.





Propose a new Project Specs base on E3D

CONVEYOR BELT 0 – WIDTH 420 mm (without Motion – Only 525 FC)

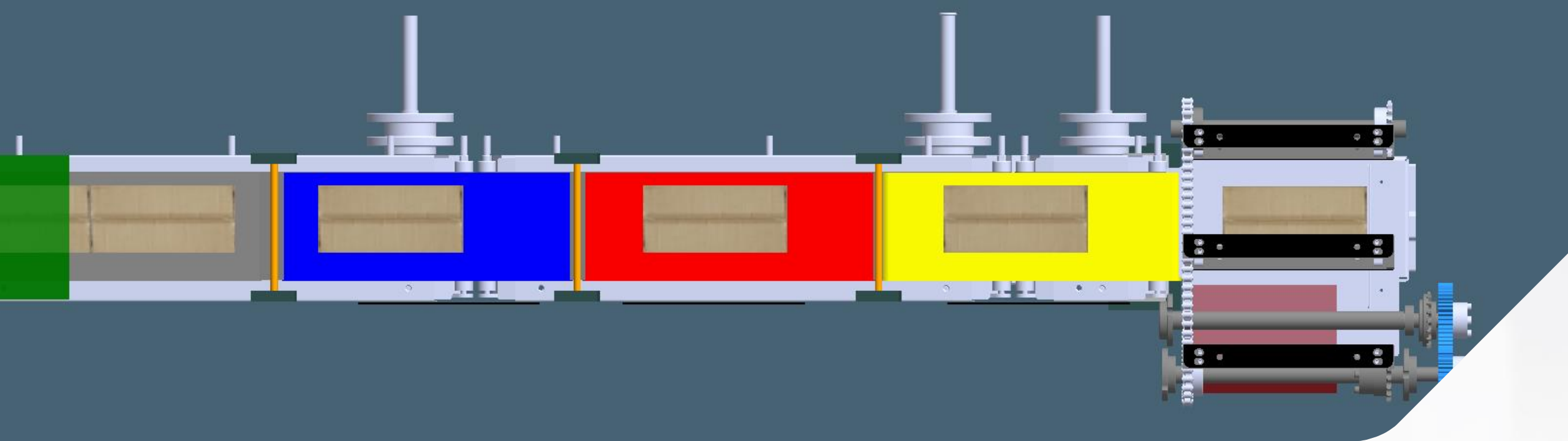
CENVEYOR BELT 1 – WIDTH 420 mm

CONVEYOR BELT 2 – WIDHT 420 mm

CONVEYOR BELT 3 – WIDHT 420 mm

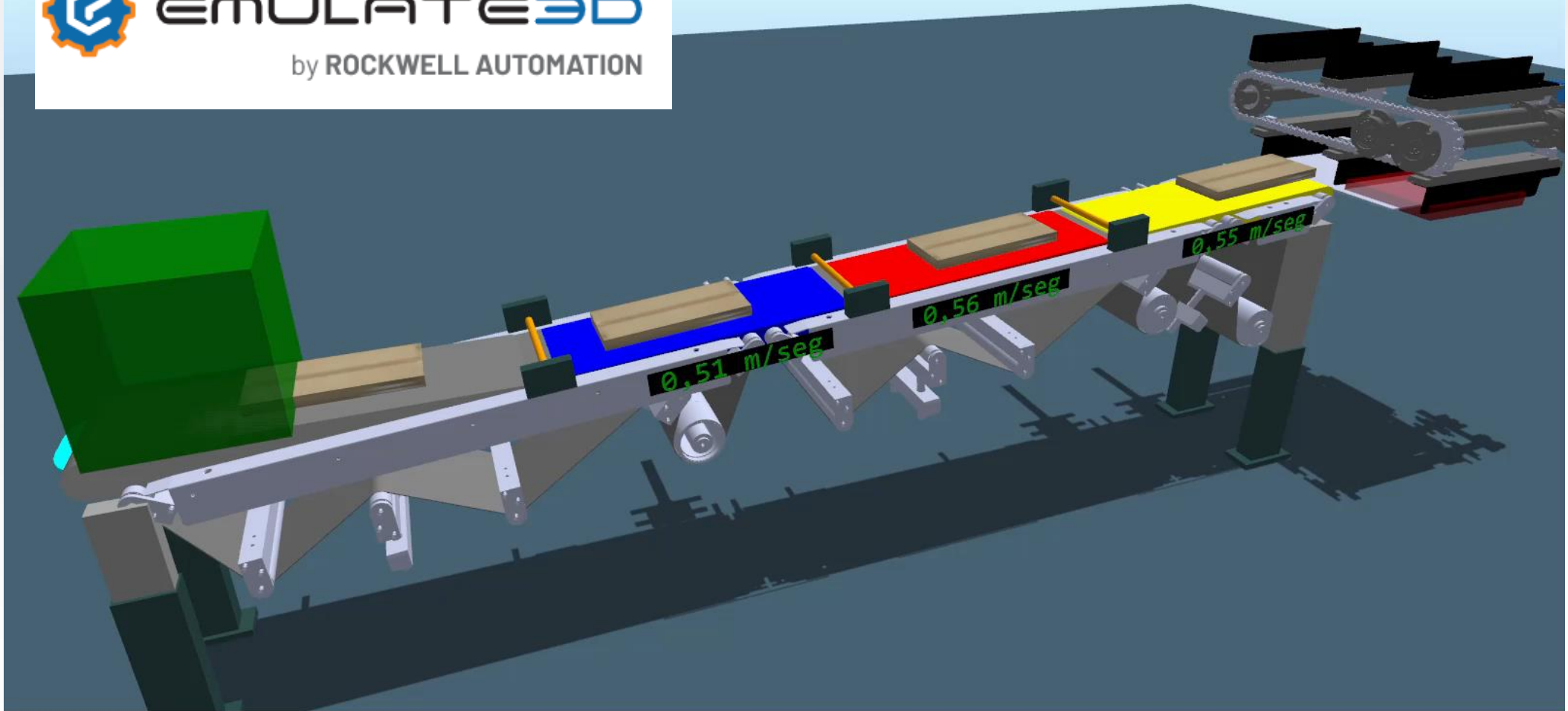
PRODUCT: 200mm (W) x 94 mm (H) x 20 mm (D)

FLIGHT CONVEYOR GAP – 154 mm

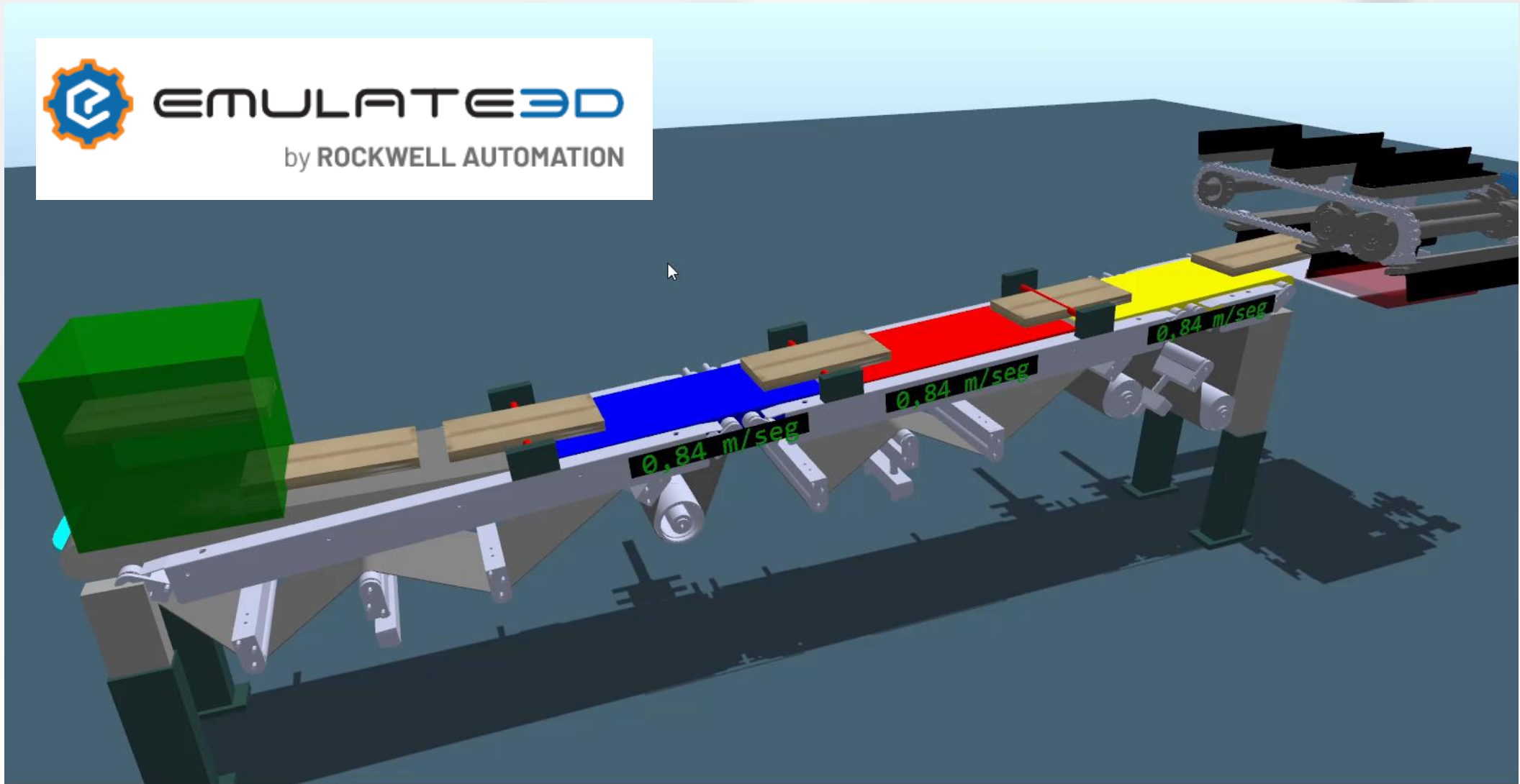


**Only one product correction
for each Conveyor Belt**

E3D – using 60 PPM



E3D – using 120 PPM



Final Result based on E3D – OEM





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