NDSU | COMPUTER SCIENCE

CSCI 445 Capstone 2022

Automated CNC Program Selection

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Sponsor: Marvin

MARVIN

Project Description – What?

- Our goal was to develop a solution to automate the selection and output of CNC programs for Marvin's new CNC machines.
- Automating program selection creates the ability for incoming data to be automatically processed without the need for manual entry.
- The CNC machines can be run using a single push of a button using these two factors.

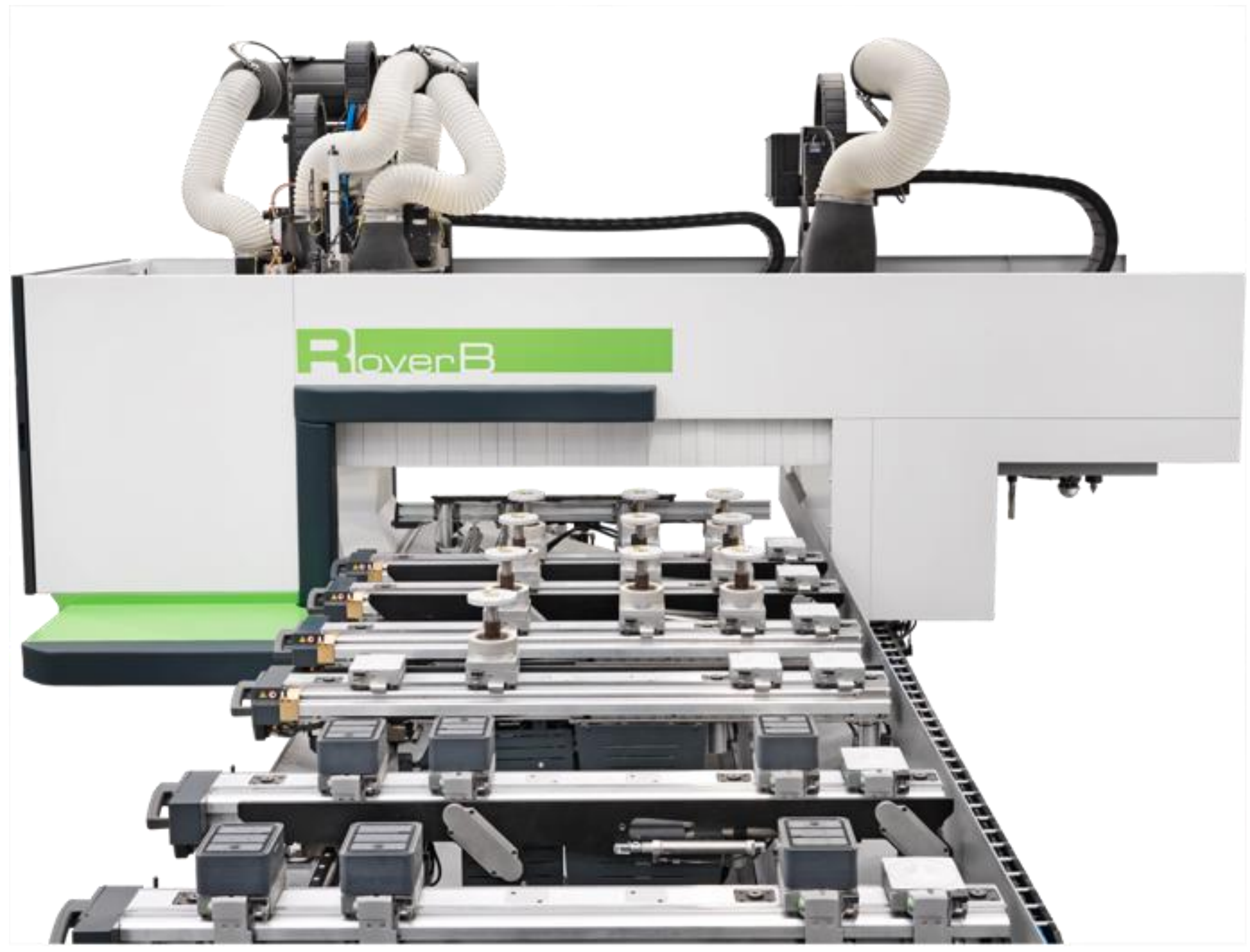


Figure 1: Biesse Rover B, the target CNC machine being developed for.

Why?

- Reduce operator error by eliminating incorrect program selection.
- Save time, money, and materials by massively reducing chance of error.
- Automation increases the efficiency of the CNC machine themselves, faster output.

Current Process:

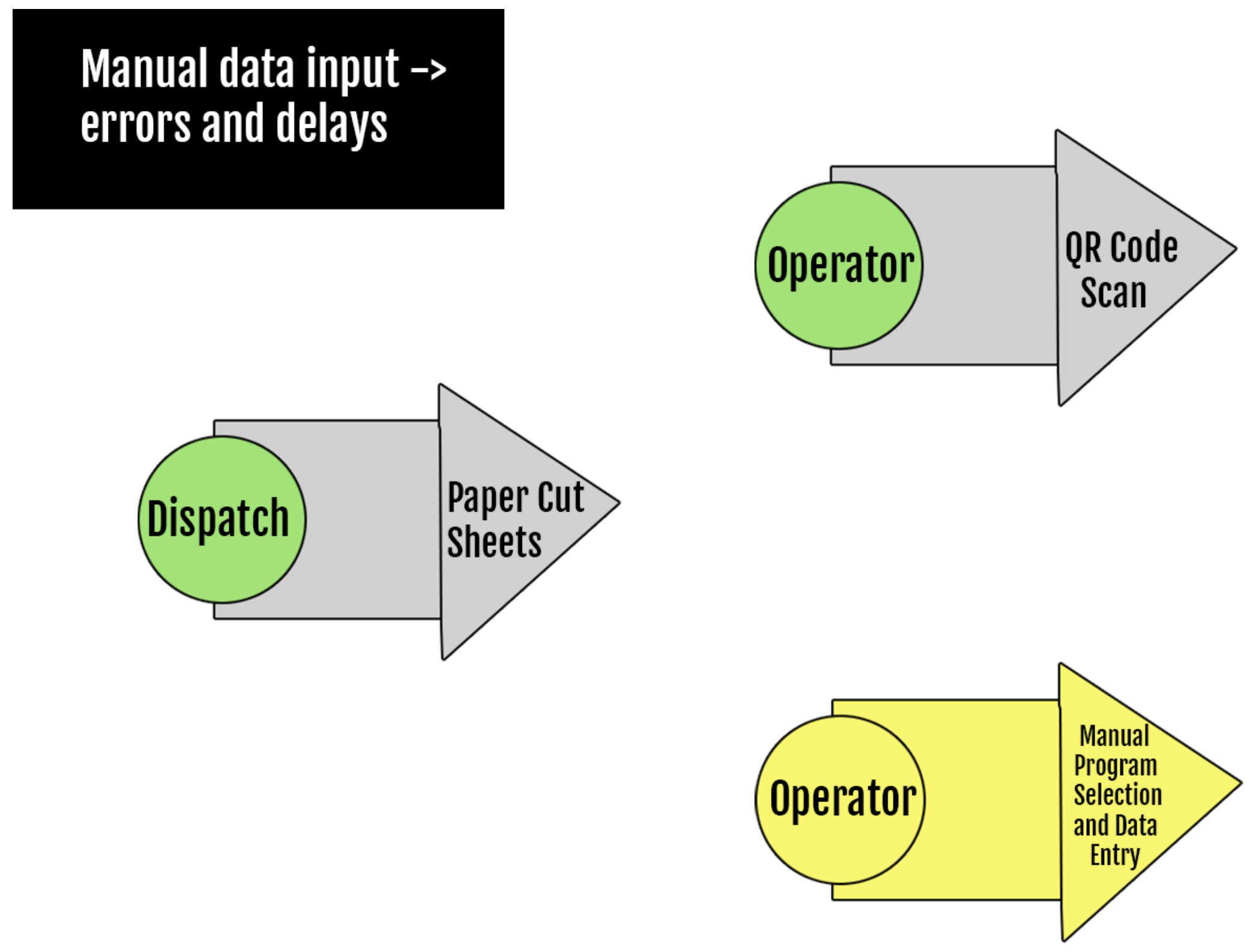

Manual data input -> errors and delays
Operator
QR Code Scan
Dispatch
Paper Cut Sheets
CNC Machine
Product Fab
Operator
Manual Program Selection and Data Entry

Figure 2: Marvin's current process for fabricating products. Includes operators manually selecting programs to run for the CNC machine

After Automation:

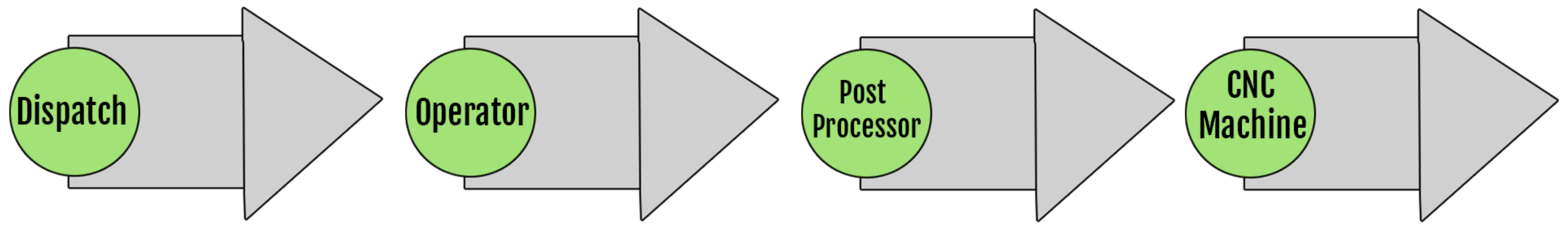
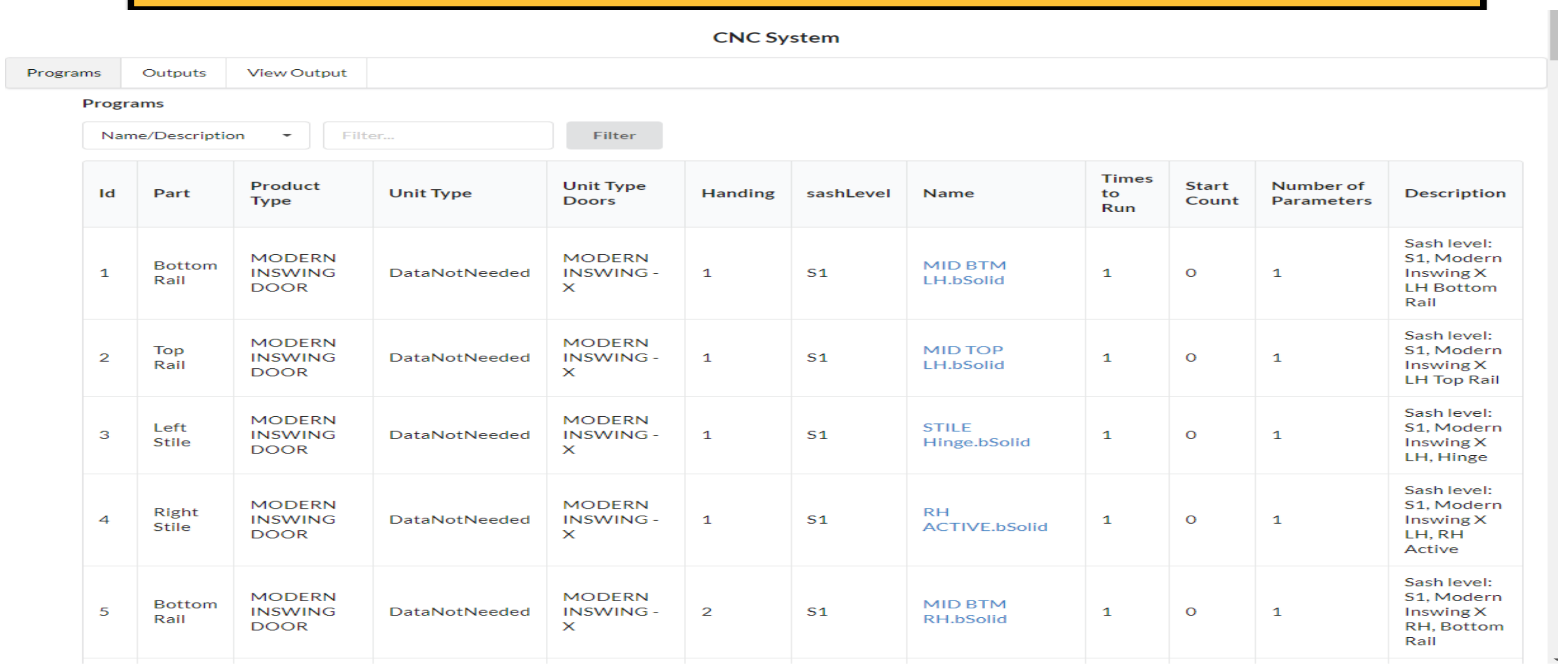


Figure 3: Marvin's new process using the developed automated selection. Operators no longer select a program and output is automatically created ready for the CNC machine to read.

Database Visualization


CNC System

Programs

Id	Part	Product Type	Unit Type	Unit Type Doors	Handing	sashLevel	Name	Times to Run	Start Count	Number of Parameters	Description
1	Bottom Rail	MODERN INSWING DOOR	DataNotNeeded	MODERN INSWING - X	1	S1	MID BTM LH.bSolid	1	0	1	Sash level: S1, Modern Inswing X LH Bottom Rail
2	Top Rail	MODERN INSWING DOOR	DataNotNeeded	MODERN INSWING - X	1	S1	MID TOP LH.bSolid	1	0	1	Sash level: S1, Modern Inswing X LH Top Rail
3	Left Stile	MODERN INSWING DOOR	DataNotNeeded	MODERN INSWING - X	1	S1	STILE Hinge.bSolid	1	0	1	Sash level: S1, Modern Inswing X LH, Hinge
4	Right Stile	MODERN INSWING DOOR	DataNotNeeded	MODERN INSWING - X	1	S1	RH ACTIVE.bSolid	1	0	1	Sash level: S1, Modern Inswing X LH, RH Active
5	Bottom Rail	MODERN INSWING DOOR	DataNotNeeded	MODERN INSWING - X	2	S1	MID BTM RH.bSolid	1	0	1	Sash level: S1, Modern Inswing X RH, Bottom Rail

Figure 4: Front end showing the program storing format.

Technologies Used

- MVC Architecture Back-End
- C#
- React
- Electron Front-End
- Microsoft SQL Server Management Studio
- .NET Core, Server/API Routing
- API Development with Postman

Our Program – How?

Back-End:
Our back-end uses the .NET MVC Framework which connects our database to our front-end. It can process the data as we need before it is sent using a RESTful API.

Front-End:
Our React based front-end uses Semantic UI elements to display the data from the database. It also allows for operators to view, update, and delete programs.

Acknowledgements

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