

### CHALLENGE

1. Analysis of huge volume of data and a highly unbalanced data set
2. Debugging and testing of various supervised learning and unsupervised learning models
3. Model optimization for anomaly detection

### PARTNER

**ArcelorMittal  
Dofasco**



A pioneer in the advanced manufacturing of steel. Known as the best supplier in Canada for producing steel and for being the frontrunners every year in North America for delivering a variety of high-quality steel products.

### TEAM

VLADIMIR MAHALEC, Ph.D.  
KEVIN MEYER, M.A.Sc.  
HARSH DEVANG SHAH, B.Sc.  
LEI ZHANG, B.Sc.

### MILESTONES & OUTCOME

1. Anomaly detection of **Hot Rolling Mill** data set: Supervised model and unsupervised model can perform anomaly detection relatively well, among which the autoencoder model can efficiently and accurately detect outliers.
2. Anomaly detection of **Continuous Galvanizing Line (CGL)** data set: Supervised model and unsupervised model can detect anomaly data points 1 & 2.

### VALUE

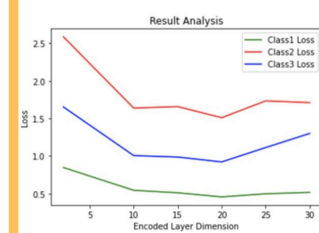
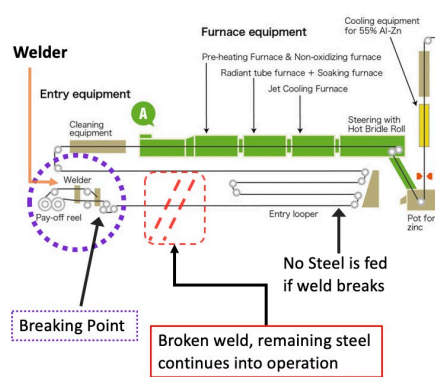
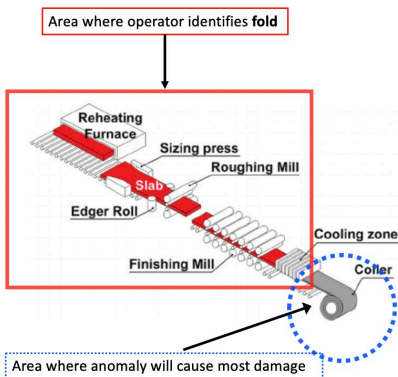
1. Avoid economic losses: **\$300K to \$1M per defect**
2. Avoid repair time: 3 to 5 days of no production
3. Avoid delivery and manufacturing delays

### NEXT STEPS

1. Try diversified model combinations and increase model complexity.
2. Improve the efficiency and success rate of anomaly detection in Hot Rolling Mill data set
3. Successfully detect more complex anomaly data points in the Continuous Galvanizing Line (CGL) data set

### STUDENT REFLECTION

1. Application of machine learning and artificial intelligence model customization
2. Experience in processing industrial data
3. Design Thinking project improvements



Summary of Dataset 2 classification

0	4530 No Anomaly	0 Nothing
1	1 Anomaly 3	2 Anomaly 1 & 2
	0 Predicted 1	

# Instructions for Completing the Project Summary Template

- Click inside the text boxes to add text content
- Do not change the text colours; the colours have been chosen to reflect McMaster University branding
- Do not change the text size; the text size will auto-adjust
- Include partner representatives, faculty-leads and students in the TEAM, e.g.
  - Crosby Davidson, Director of Operations, Wessuc Inc.
  - Dr. Tom Wanyama, Assistant Professor, McMaster University
  - Aswin Cmohan, M. Eng. Manufacturing
  - Anirudh Vijayameenakshi, M. Eng. Manufacturing
- Use a “first name” “last name” format for Names

- To insert a logo/photo:

- Click on the picture icon and insert the picture
- Click on “Picture Format”
- Click on “Crop” drop-down menu
- Click on “Fit”



within the picture box,

