

Daniel Evans - Presentation

by Daniel Evans

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TATA STEEL – ECCS 4 COIL CENTRING ON PAY OFF REELS

Daniel Evans

INTRODUCTION

- ▶ ECCS No.4 is one of the many lines that make up the Packaging Recycling department based at TATA Steel's Trostre Works
 - ▶ ECCS is an acronym for Electrolytic chrome coated steel
 - ▶ Applies a layer of chrome thinner than a micron to the strip electrolytically
 - ▶ ECCS have excellent adhesive properties
 - ▶ ECCS 4 consists of two payoff reels and two tension reels which allows the process section to run at a constant speed.
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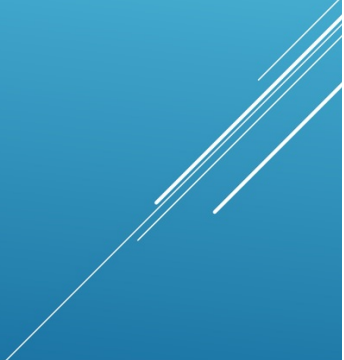
NATURE OF THE PROBLEM

- ▶ Operator error / No position feedback
- ▶ Coils not centred on the reel
- ▶ Damage the strip
- ▶ Damage components on the line
- ▶ Cause downtime/scrap and could lead to deadlines being missed, therefore costing the company money and damage its reputation with valuable customers.

PAY OFF REELS



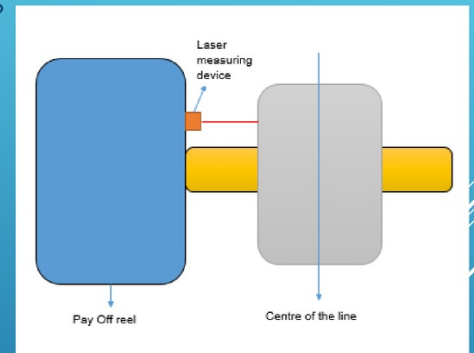
SPECIFICATION

- ▶ Budget £3000
 - ▶ Time scale- 9 Months
 - ▶ Use existing GEM 80 on line
 - ▶ Operator must be able to load coil onto pay off reel safely
 - ▶ Operator must be able to see coil position feedback from operating station (i.e must have feedback to know when coil is centred)
 - ▶ If coil is not centred then the line must not be able to run
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POSSIBLE SOLUTION 1

- Possible solution 1- Mount a laser measuring device on the pay off reels outer casing, when the operator enters the coil data the PLC programme will need to calculate half of the width and then take it away from the centre point of the line. This will ensure it's loaded exactly centre. If the coil is not centred then the PLC will not allow the line to run. This solution will only work in manual control

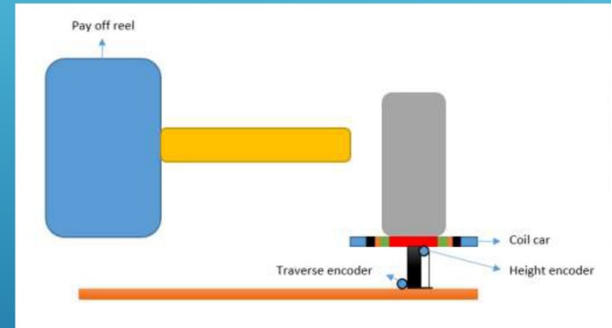
$$\text{Coil Centred position} = \text{Distance to centre of the line} - \frac{\text{Coil width}}{2}$$



POSSIBLE SOLUTION 2

- Possible solution 2- The coil car is responsible for putting the coil onto the pay off reel. This solution involves putting two encoders on the coil car. One will be used for height position, and the other one for traverse position. This solution will work by setting a home position for the coil car. The operators will then load the coil onto the coil car using the marks on the coil car to ensure it's exactly centre. The PLC will then use the coil's diameter to calculate the required height of the coil car, it will then raise until it reaches the required height position, using the height encoder as feedback.

As the coil has been loaded onto the coil car exactly centre, the coil will be loaded onto the pay off reel until the traverse encoder reaches a fixed value in the PLC. At this point the mandrel will expand and the coil car will return back to its home position. This solution will have both automatic and manual control.



CHOSEN OPTION

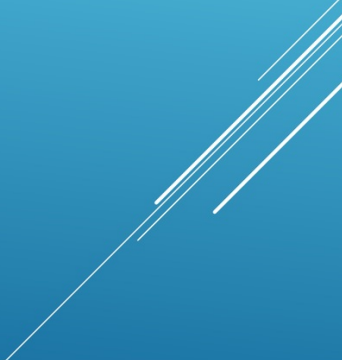
► Solution 1- Laser feedback

Advantages	Disadvantages
Low cost	Not as accurate
Not much structural work required	Feedback not as quick however still adequate for application
Should be able to meet project deadline and budget	Production will have to load coils manually

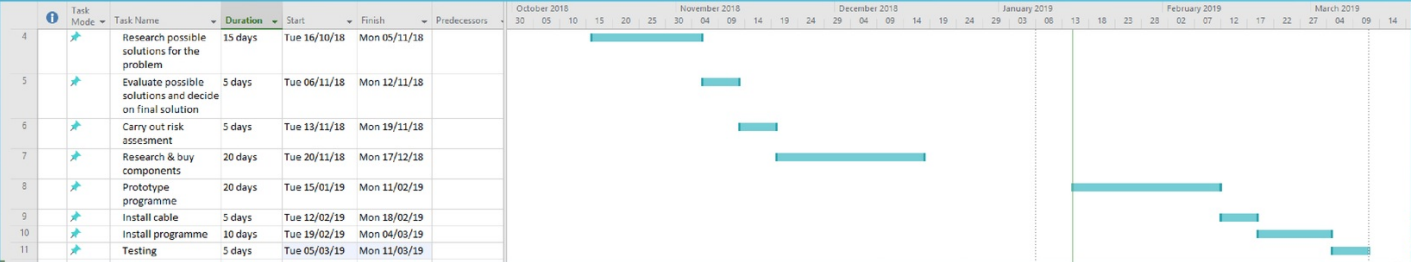
► Solution 2- Encoder feedback

Advantages	Disadvantages
Extremely accurate	High cost
Very quick feedback	Structural work required in order to install encoders
Production will be able to load coils completely in automatic	May require to increase deadline and budget

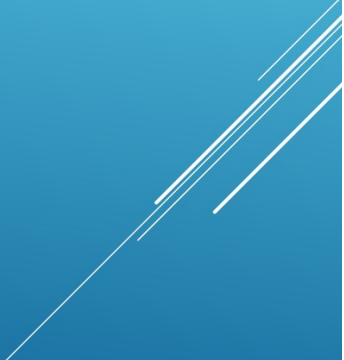
METHODS USED TO DESIGN, BUILD AND TEST THE PROJECT

- ▶ The programme will be designed using ladder language using a GEM 80 PLC. The GEM 80 PLC will be a stand alone unit not connected to the line
 - ▶ In order to test the programme and theory, a test rig will be set up in order to simulate a coil being loaded
 - ▶ If the theory works and the programme performs as expected, the project can go ahead and it will be implemented to the line. It will be implemented to 1 pay off reel before ensuring production are happy with the new coil centring method.
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CONTINGENCIES

- ▶ During planned maintenance
 - ▶ Line stops
 - ▶ Mentor will be present
 - ▶ Permits
 - ▶ Functional testing
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FINAL TESTING

- ▶ Final testing will be carried out at a suitable time
- ▶ Electrical MSE/TME
- ▶ Production team leader
- ▶ Select a coil
- ▶ Physically mark where the coil should be on the pay off reel
- ▶ Mark where the coil should be on the pay off reel (physically or with a laser)
- ▶ Allow the sequence to be carried out
- ▶ Fault find if required
- ▶ If working as expected, repeat process with a coil with a different width
- ▶ Continue doing this until MSE/TME and production team leader are confident with the process
- ▶ Note: permits will be required to enter the line

ANY QUESTIONS?



FINAL GRADE

GENERAL COMMENTS

61 /100

Instructor

PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5

PAGE 6

PAGE 7

PAGE 8

PAGE 9

PAGE 10

PAGE 11

PAGE 12

PAGE 13

GRADING FORM: CSG-RUBIC

DANIEL EVANS

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RESEARCH-INFORMED LITERATURE

 Back ground investigation is evident and has been explained clearly. 6.5/10 Research literature of possible solutions is limited. 5.5/10 12/20

KNOWLEDGE AND UNDERSTANDING

 Problem definition is clear and a good understanding of the problem is demonstrated. 3.5/5 Project constraints and codes of practice were explained and are part of company policy. 3/5 Environmental and sustainability limitations were discussed and referred to in questioning section. 2.5/5 Functional design was explained but some points were unclear, however the block diagrams on the slides were very informative.3/5 Response to questioning showed an understanding, however there were some technical points that were not clearly explained. 6/10 18/30

ANALYSIS

 Problem definition from an analysis perspective was good and testing procedures were explained. 3.5/5
Functional design specification with regards to the analysis were explained, but there were some technical points which were unclear. 6/10 Justification of final solution was clear and comparison with solutions was carried out. The alternative solution was technically weak for this project. 2.5/5

12/20

PRACTICAL APPLICATION AND DEP.

 Design specification practically was explained fairly well with some technical points missing. 3/5 Critical choice and justification of final solution was achieved using comparison of solution alternatives. However the alternative solution was a little weak technically. 6/10 Project planning was good and using appropriate methods. 4/5

13/20

SKILLS FOR PROFESSIONAL PRAC.

 Quality of presentation slides was good. 3/5 Quality of deliver was good overall. 3/5

6/10