T Level Technical Qualification in Maintenance, Installation and Repair for Engineering and Manufacturing (8730-12)

8730-033 Employer-Set Project Exemplar – E Grade

Summer 2025

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Introduction

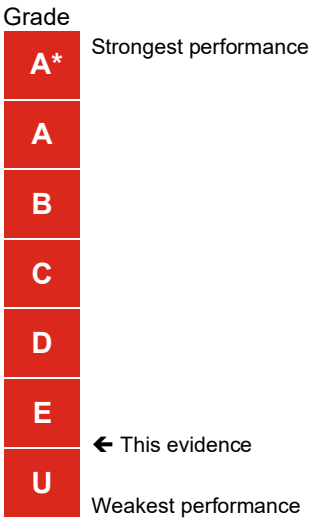
Summer 2025 Results

This document is aimed at providers and learners to help understand the standard that was required in the summer 2025 assessment series to achieve an E grade for the 8730-033 Maintenance, Installation and Repair for Engineering and Manufacturing Employer-Set Project (ESP).

Providers and learners may wish to use it to benchmark the performance in formative assessment against this to help understand a potential grade that may be achieved if a learner was to attempt the next summative assessment series.

The Employer-Set Project is graded A* to E and Unclassified.

The exemplar evidence provided for the E grade displays the holistic standard required across the tasks to achieve the E grade boundary for the summer 2025 series. A slightly weaker performance would have resulted in an Unclassified (U) result being issued.



The Employer-Set Project brief and tasks can be downloaded from here.

Important things to note:

- We discussed the approach to standard setting/maintaining with Ofqual and the other awarding organisations before awarding this year. As in 2024, we have agreed to take account of the newness of T Level qualifications in how we award, to recognise that students and teachers are less familiar with the assessments in the first years of awards, whilst also recognising the standards required for these qualifications (https://www.gov.uk/government/publications/ofqual-guide-for-schools-and-colleges-2025/ofqual-guide-for-schools-and-colleges-2025#grading). Ofqual guide for schools and colleges 2025
- The exemplar evidence presented, as a whole, was sufficient to achieve the E grade. However, performance across the tasks may vary (i.e. some tasks completed to a higher/lower standard than an E grade).

Marking of this Employer-Set Project is by task and Assessment Objective, below is a summary of these along with the mark achieved by the evidence presented and the maximum mark available for each aspect.

Task	Assessment Objectives	Mark achieved	Max mark available
Task 1 Research	- AO1 Plan their approach to meeting the project brief - AO2a Apply core knowledge - AO3 Select relevant techniques and resources to meet the brief	3	9
	- AO2b Application of core skills	2	6
Task 2 Report	- AO1 Plan their approach to meeting the project brief - AO3 Select relevant techniques and resources to meet the brief	1	6
	- AO2a Apply core knowledge	2	6
	- AO2b Application of core skills	2	6
	- AO5a Realise a project outcome – was the right outcome achieved - AO5b Review how well the outcome meets the brief, how well the brief was met, the quality of the outcome in relation to the brief	2	6
Task 3 Plan	- AO1 Plan their approach to meeting the project brief - AO3 Select relevant techniques and resources to meet the brief	1	6
	- AO2a Apply core knowledge	2	6
	- AO2b Application of core skills	1	6
Task 4 Present	- AO1 Plan their approach to meeting the project brief - AO3 Select relevant techniques and resources to meet the brief	3	6
	- AO2a Apply core knowledge	2	6

	- AO2b Application of core skills	2	6
	- AO5a Realise a project outcome – was the right outcome achieved - AO5b Review how well the outcome meets the brief, how well the brief was met, the quality of the outcome in relation to the brief	2	6
Maths	- AO4a Use of Maths skills	2	3
English	- AO4b Use of English skills	2	3
Digital skills	- AO4c Use of Digital skills	2	3

What evidence was being assessed for the Maths, English and Digital skills:

Maths:

- Research Notes - calculations relating to costings (and consideration of estimations) (Task 1)
- Tolerances and dimensions on diagrams (Task 2)
- Calculations of estimated cost of replacement and installation (Task 2)
- Calculation of the total length of the conveyor belt to be used on the conveyor system and how long it will take to the package to travel the entire belt at the maximum speed of 3.05 meters per minute (Task 2)
- Calculation of cost, timescales and critical path within the planning chart (Task 3)
- Any calculations within the supporting statement (Task 3)

English:

- Research Notes (Task 1)
- Report (Task 2)
- Supporting statement for the plan of work (Task 3)
- Presentation delivery (orally) and materials to support presentation (e.g. slides etc) (Task 4)

Digital:

- Types of sources used for Research (Task 1)
- Report and drawing (Task 2)
- Presentation of the planning chart (Task 3)
- Presentation materials (slides, handouts, notes etc) (Task 4)

Task 1 Research

Assessment number (eg 1234-033)	8730-033
Assessment title	Employer-Set Project

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	1
Evidence title / description	**Evidence expected for marking:** Research notes List of sources/references **Evidence submitted for marking:** Research notes
Date submitted by candidate	DD/MM/YY

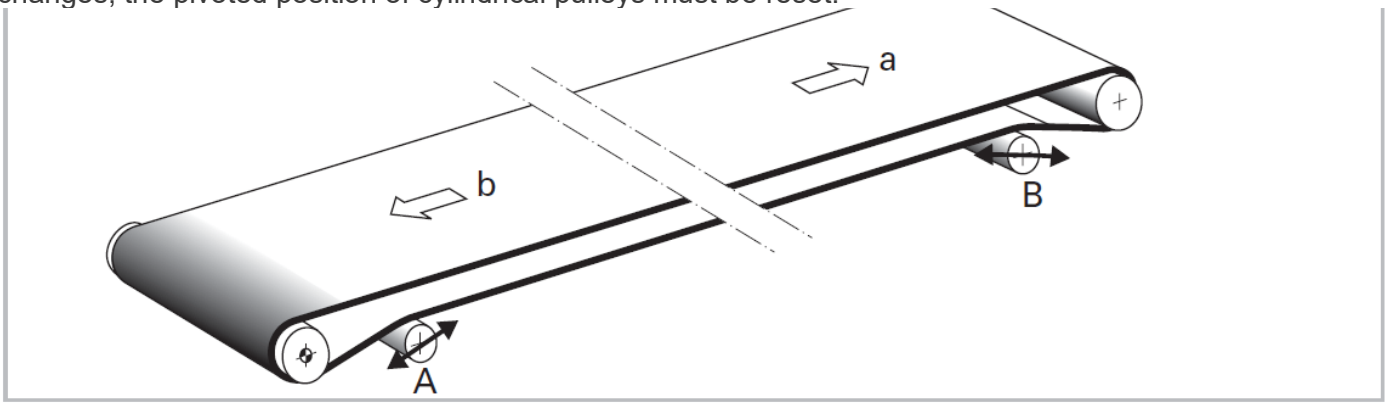
Introduction

With being a food company Eastchester delights needs a more efficient conveyor belt that can be quick strong and cause as little downtime as possible. This is because their money is going into a completely new shipping area which needs to be in a good working condition so it can successfully meet their needs and stay within their budget.

Flat belt conveyors:

The flat belt conveyor is a suitable choice for Eastchester delights as they are the most common and supported by pulleys or rollers. This allows it to be continuous which can help food products to be taken off it or placed on making it easier for a production line to be established. They are versatile and cost effective and suitable for food companies. However, they are not ideal for carrying fragile objects.

When installing this belt, it must have +/- 3mm of tolerance with its width and +/- 8mm of tolerance with the length on the ends. To keep the belt tension as low as possible, the pivoting movement should, wherever possible, be perpendicular to the median line of the arc of contact (plane A ↔ B). The centre distance between the end pulley and guiding pulley should be at least twice the diameter of the larger pulley. Unlike cylindrical-conical pulleys, adjustable cylindrical rollers are not self-tracking. This means when belt running direction changes, the pivoted position of cylindrical pulleys must be reset.



As seen on (https://accurateindustrial.com/resources/articles/3-basic-conveyor-belt-tracking-rules-to-follow/)

As Eastchester delights deal with all sizes and weights of food the power needed to supply the belt is unknown as the tension cannot be worked out.

This type of conveyor belt is very compatible with a PLC which allows it be linked to the factory and easily controlled

The price for a single flat belt conveyor with the length of 34 m is on average £22501.88.

To remove the belt, it would cost a total of £500-£2000 however, if it was more complex it can easily exceed £5000. When removing the belt, the cost of tools would be needed as there are lots in use for example: Belt cutters, wrenches, pliers, jacks and potentially specialised belt lifters or skivers. This may potentially cost and extra £200-£500 depending on if the tools are already there or not.

To install the belt, it would cost a total of £25-£50 per foot so £2775-£5550. When installing the belt tools like wrenches, socket set, belt tension gauge, a pry bar, belt cutting tool or

knife and a measuring tape. May not ne there and purchasing them may cost and extra £200-£500.

If they were to go with all the expensive options, it would only cost £33051.88 leaving £6948.12 of the budget.

Overall, the flat belt is great as it is price effective, it can fit inside the factory and will not need much more attention than any other belt would.

Modular belt conveyors

The modular belt conveyor is also a good choice for Eastchester delights as it has easy cleaning making it easier to remove and food or food stains of it at the end of a shift this helps to keep all products clean and sanitized. It is also very quick to repair which allows for production downtime to be limited preventing the loss of money during the workday. Furthermore, it is very versatile when it comes to handling various materials and shapes. Those made of plastic are immune to tears, wears and harsh environments.

When installing this belt, it will have the same tolerances as the flat belt conveyor which are +/- 3mm width and +/-8mm length at the ends. However.

Length Tolerances:

E/A and elastic line belts: Forbo specifies a tolerance of ±0.3% for belt lengths between 300 and 5000mm, and ±0.5% for lengths between 5000 and 15000mm.

P line belts: Forbo specifies a tolerance of ±0.5% for belt lengths between 300 and 5000mm, and ±1.0% for lengths between 5000 and 15000mm.

Truly endless types: Forbo indicates a tolerance of ±0.5% for lengths between 500 and 1000mm, and ±1.0% for lengths between 1000 and 5000mm.

Width Tolerances:

E/A and elastic line belts: Forbo specifies a tolerance of 10-120mm ± 0.2 / - 0.3mm, and ±1.5mm for widths between 120-500mm.

P line belts: Forbo specifies a tolerance of 10-50mm -1.0mm, and ±1.5mm for widths between 50-120mm.

Truly endless types: Forbo specifies a tolerance of 20-50mm ± 1.0mm, and ±1.5mm for widths between 50-100mm.

Forbo - 6c8f7c3c-de51-4e9a-ac23-53d6d8ee9953 (forbo.com)

When installing these key features should be kept in mind Setting points for a modular conveyor belt involves determining the correct placement of key components like the drive unit, idlers, and transfer points. For reversing operation, the drive unit should be positioned in the middle, allowing for sag on both sides for proper belt tension. Transfer points need careful design to minimize spillage and wear, often involving chutes and skirtboards. Also, the belt tension should be adjusted to allow for proper deflection. The use of a PLC is necessary, and a modular belt is compatible with one allowing all workers to easily control the speed and direction of the belt.

The power needed to run this belt is unknown as the tension cannot be worked out as there is no weigh on it as it can manage multiple sizes and shapes.

An average modular belt cost varies depending on where it is bought from, how long and wide it needs to be and how much weight it needs to hold. But for one with the length needed it would be ranging from £20000-£30000.

To remove the belt would cost £500-£3000.

To install the belt would cost £11,400.

Going with the correct numbers to stay under the budget it would be suitable to install this conveyor including all the tools and other resources required.

Conclusion

Overall, I believe that the modular belt conveyor is a better belt to install as it is much more versatile with all kinds of objects moving on top of it. It works extremely well with a PLC and is easy to clean and fix minimizing production downtime. This will help Eastchester delights to possibly take on more customers and make more money. The flat belt conveyor is cheaper and more common meaning more people will understand how it works and will be able to fix it. But it is not as easy to clean and can be damaged a lot easier.

Belt type	Pros	Cons
Flat belt	• Versatility and Suitability • Simple and easy to use. • Low Maintenance • Smooth operation • Durability • Cost- effectiveness • Flexibility • Cleanliness • Constant speed	• Slippage and creep • Limited incline ability • Belt damage and stretching • Difficulty cleaning • Noise and vibration • Open design • Limited features

	• Suitable for most situations	
Modular	• Versatile and adaptable • Easy to maintain. • Handles various product types. • High hygiene standards • Customizable • Durability	• Cost • Speed limitations • Noise • Cleaning difficulties • Fixed pitch • Limited features

Task 2 Report

Assessment number (eg 1234-033)	8730-033
Assessment title	Employer-Set Project

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	2
Evidence title / description	**Evidence expected for marking:** Written report (typically 2000 words) Annotated drawing(s) (typically one side of A3) **Evidence submitted for marking:** Written report Annotated drawing(s)
Date submitted by candidate	DD/MM/YY

Belt choice reasoning

After doing my research I have found two possible choices for the conveyor belt. One being a modular conveyor belt and the other being a flat belt conveyor.

The modular belt conveyor is a good choice as it has easy cleaning making it easier to remove food or food stains of it at the end of a shift, this helps to keep all products sanitized to prevent cross contamination. It is also very quick to repair which allows for production downtime to be limited preventing the loss of money during the workday. Furthermore, it is very versatile when it comes to handling various materials and shapes. Those made of plastic are immune to tears, wears and harsh environment. It is highly durable giving it a long time for it to be used and can be customized to meet bends or be certain colours for certain types of items. However, it is much more expensive to purchase as it would cost around about £20000-£30000 this is because of the size we need which is 34m in length. To install the belt, it would cost from around £11000-£12000 as the tools to install it such as wrenches, socket sets, belt tension gauge, a pry bar, belt cutting tool or knife and a measuring tape. This would cost an extra £200-£500 depending on how much needs buying. Additional PPE may also need purchasing further stretching the budget. The speed limitations for this belt can vary leaving workers unsure of what speeds it can reach to help with fast loading. It is also very noisy meaning all workers who operate near the belt will need to wear ear defenders most of the day as it also has a fixed pitch which can lead to a series of headaches and nausea. It will also need cleaning regularly as it has high hygiene standards. This will reduce loading efficiency as breaks will be needed to thoroughly clean it.

The flat belt conveyor is a more suitable choice as it is the most common and is supported pulleys or rollers. This allows it to be continuous which can help food products to be taken off it or placed on making it easier for a production line to be established. They are versatile and cost effective and suitable for food companies. They are Simple and easy to use and can be used via a PLC which is what Eastchester Delights have set as a requirement, this will increase production flow allowing more items to be sent through the production line meaning more products can be shipped out. It has very smooth operation rarely jamming or slowing down not causing workers to have to be involved. It also has low maintenance meaning it does not need fixing much and can work for long periods of time boosting production flow. It is very cost effective; it would cost £22501.88 to buy a new flat belt conveyor with the desired length of 34m. To install this, it would cost between £25-£50 per foot and with our length it would be around £2775-£5550. Additionally, the cost of tools like as wrenches, socket sets, belt tension gauge, a pry bar, belt cutting tool or knife and a measuring tape would be an additional £200-£500 including new PPE. This would only cost £33051.88 leaving £6948.12 left of the £40000 budget. Furthermore, it has very good flexibility meaning it can be made to turn left or right at certain points or can have split offs providing two different routes, if needed, creating a more efficient workplace. It can keep a constant speed up and will be able to reach the required 3.05 meters a minute. Additionally, it is suitable for most situations meaning there will be a low chance of an interruption preventing

maintenance time. It is also very clean meaning it will not pick up much dirt or dust whilst it is in operation. However, it is very difficult to clean so when it does need cleaning it will take quite a lot of time slowing down production. Although very durable, once damaged it can be partly difficult to fix depending on the rare damage done to it. Sometimes, the belt may slip or slowly creep of the conveyor track calling for it to be re-adjusted which may cause some downtime but can be recoverable as it is not hard to fix. It has a very open design which can cause health and safety risks which can cause entanglement or entrapment within the open system. It has only limited features which does not affect its use but, it has a limited incline ability meaning it may be slow to get to an incline or it cannot have a very high incline level. Furthermore, it is very noisy and can vibrate quite a bit, leading to hearing damage so ear defenders must be worn.

Overall, I have chosen the flat belt conveyor as it seems very suitable for this company and its factory. Although the modular belt is suitable, the flat belt has more pros then cons and is a lot cheaper which may help the company in the long run. This is why it is much more suitable than the modular belt.

Requirements

- The flat belt conveyor perfectly meets all requirements set by Eastchester delights. For example, it can be cut and measured to 34 meters long with a +/- 8mm tolerance and cut to 60-100cm wide with a +/- 3mm tolerance.
- Its speed hit the required speed of 3.05 meters a minute per 0.051 meters per second.
- It is PLC programmable.
- Has an emergency stop button and an overload protection system.
- It is compatible with relevant food safety regulations as it stays clean in use for long periods of time.
- It has a quick release belt tension system and a variable frequency drive allowing the speeds to be changed.
- It stays within the budget leaving £6948.12 remaining which can be spent on labour and costs for workers installing the machine.

Removal and installation requirements

To remove the belt, it would cost a total of £500-£2000 however, if it was more complex it can easily exceed £5000. When removing the belt, the cost of tools would be needed as there are lots in use for example: Belt cutters, wrenches, pliers, jacks and potentially specialised belt lifters or skivers. This may potentially cost and extra £200-£500 depending on if the tools are already there or not.

To install the belt, it would cost a total of £25-£50 per foot so £2775-£5550. When installing the belt tools like wrenches, socket set, belt tension gauge, a pry bar, belt cutting tool or knife and a measuring tape. May not ne there and purchasing them may cost and extra £200-£500.

The cost of the actual belt itself would be £22501.88 with the length of the full belt being 34 m long.

The overall cost amounts to £33051.88 if they were to choose all top of the range options leaving £6948.12 to be spent on any pay for workers installing the belt and any tools or spare parts like nuts bolts and wires they may need.

Dimensions of the belt system

The required length given by Eastchester Delights is 34m long and 60-100cm wide. For this to fit in a room 18m wide 12m long and 12m tall the belt would have to be rotary meaning it goes underneath and comes back up for new items to be placed onto it. It would have to be 15.5 meters long for it to be able to fit as it is half of 34 and minus the arc on the edges where the belt continues and comes back around to the top. The belt would have to be placed in parallel to the 18m long wall so it can fit properly.

Calculations for time taken for a package to move across the belt at 0.051m/s

Travelling across a length of 15.5 meters at 0.051m/s.

S=D/T

0.051=15.5/?

? =0.051/15.5

? = 300 seconds

This is an estimation as no weight has been given as they are all different weights and shapes meaning the tension and friction of the flat belt will change every time.

Estimate cost of installation and cost of replacement

To install the belt, it would cost a total of £25-£50 per foot so £2775-£5550. When installing the belt tools like wrenches, socket set, belt tension gauge, a pry bar, belt cutting tool or knife and a measuring tape. May not ne there and purchasing them may cost and extra £200-£500.

The price for a single flat belt conveyor with the length of 34 m is on average £22501.88.

Additional costs like labour and safety would range from £1000-£3000.

This brings the overall cost (if the highest prices are chosen) £31551.88 this is without the removal of the previous belt leaving £8448.12. This allows other purchases to be made within the factory or further equipment to be bought.

Monitoring system

This belt conveyor is PLC compatible. This means the workers will be able to control the conveyor belt from a distance, they may also be able to check if certain commands do not proceed because of an error with the signal connection or if there is something mechanically wrong with the belt.

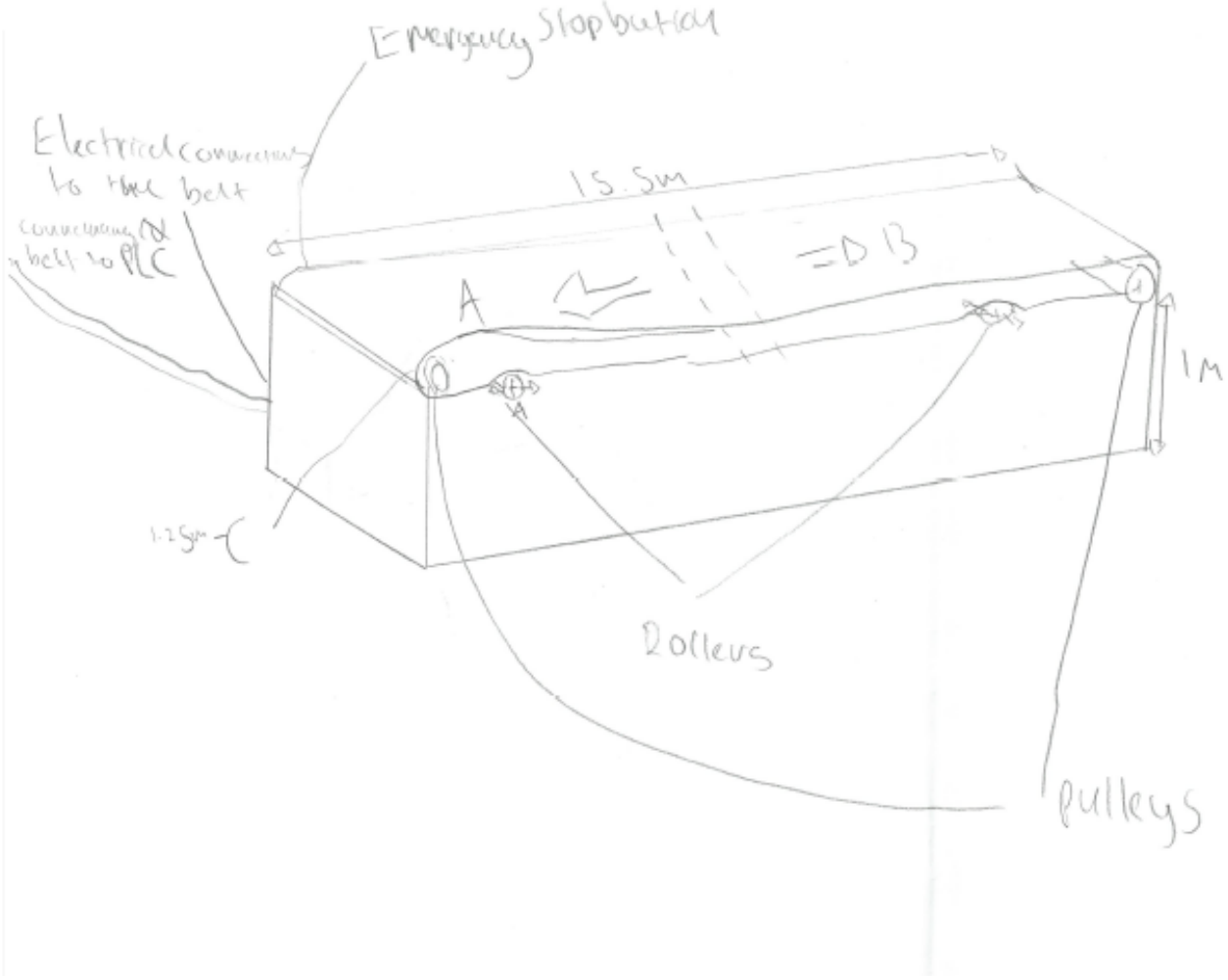
At the beginning and end of every shift the belt should be shut off and thoroughly checked by 2-3 workers to ensure nothing is wrong with the belt before it goes into operation. This prevents major damage being done to the belt creating less downtime for workers. After each check if any thing is spotted it must be fixed and checked three times before production begins again.

Risk assessment – Low=L M=medium H=high LxL=L LxM=M LxH= M MxM=M MxH=H HxH=H

Hazard	Risk	Chance of risk	Severity of injury	Overall risk	Prevention
Entanglement	Tangled hair injured head and neck	L	M	M	Tie hair up and pin loose clothing
Entrapment	Trapped finger or limp	M	M	M	Keep fingers away whilst in operati
Flying projectile	Debris in eye	L	H	M	Wear eye protection
Sharp objects and tools	Cuts or gashes	M	M	M	Wear gloves and keep fingers awa from sharp blades
Loud Noise	Short- and Long-term ear damage	L	H	M	Wear ear defenders

Part B drawing

To keep the belt tension as low as possible, the pivoting movement should, wherever possible, be perpendicular to the median line of the arc of contact (plane A ↔ B). The centre distance between the end pulley and guiding pulley should be at least twice the diameter of the larger pulley. Unlike cylindrical-conical pulleys, adjustable cylindrical rollers are not self-tracking. This means when belt running direction changes, the pivoted position of cylindrical pulleys must be reset.


Emergency Stop button
Electrical connections to the belt
connecting belt to PLC
15.5m
A
B
1M
1.25m
Rollers
Pulleys

Task 3 Plan

Assessment number (eg 1234-033)	8730-033
Assessment title	Employer-Set Project

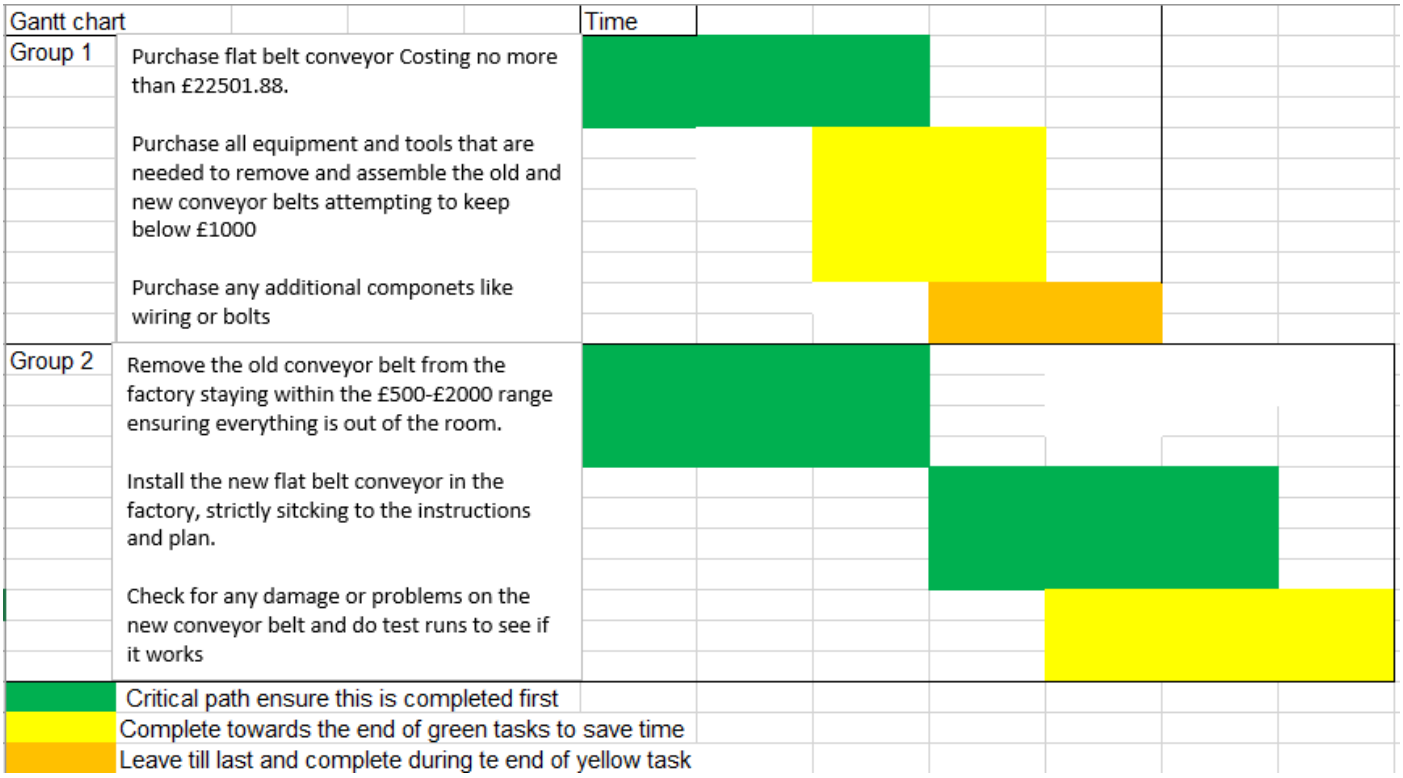
Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	3
Evidence title / description	**Evidence expected for marking:** Planning chart (typically one side of A3) Support statement (typically 1000 words) **Evidence submitted for marking:** Planning chart Support statement
Date submitted by candidate	DD/MM/YY

Plan:

Purchasing



Roles and responsibilities

For the tasks I have split them into two groups.

For group 1 they are tasked with the first important task finding and purchasing the Flat belt conveyor. They must not exceed the maximum of £22501.88 whilst purchasing. This is because there are other areas within this process which also need money to purchase items and pay for parts. Task 2 is only a yellow task as it is still important but does not have to be done immediately, I have done this as they need to see which tools are need after purchasing the flat belt conveyor. Task 3 is orange as it is still important but is not very vital as it is for the purchasing of spares or small items like wires or bolts. It will be completed after most tools have been purchased but more may need to be bought depending on what extra resources are needed.

This system allows for maximum efficiency during this project keep all members of group 1 on track to meet their deadline.

For group 2, they will begin their first task at the same time as group 1. This allows them to remove all parts from the old conveyor belt and completely take it out of the factory in

time for the new flat belt conveyor to arrive. Task 1 is critical for the project as the factory needs to be completely empty for the new belt to be fitted in, whilst completing this task they must attempt to stay within their price range of £500-£2000. Task 2 will take place as soon as the new belt arrives, this allows it to be up and running as soon as possible. Task 2 is also a green task is it is extremely critical for the project as it needs to have the belt up and running with no distractions. It is important to note that whilst installing the flat belt conveyor they must stay withing their budget of £2775-£5550, if they do not, they may not be able to purchase any additional or spare parts. Task 3 is a yellow task as although it is important it can begin towards the end of the belt being built together as certain parts of the belt will need testing before another part is added. This prevents employees having to de-assemble the belt whilst maintaining it thus saving production time.

Health and safety considerations

Whilst both groups complete their tasks, they must be aware of health and safety issues whilst they are working. Group 1 have far less issues to concern as they will be purchasing most resources from a computer in an office so they may need to take a 10-minute break per hour to maintain circulation and rest their eyes. However, group 2 will have to complete a risk assessment as the environment they will be working in is far more dangerous as they will be dealing with live wires and turning motors which could seriously harm them.

Specialist tools and resources

Whilst completing this project a list of special tools will be purchased and used:

- Belt cutters, wrenches, pliers, jacks and potentially specialised belt lifters or skivers.
- Wrenches, socket set, belt tension gauge, a pry bar, belt cutting tool or knife and a measuring tape.

Additional resources purchased may be PPE (eye protection and ear protection) or materials like bolts and wires.

Cost considerations and implications

Through out the entire project the £40000 budget will be mentioned and brought to the attention of both groups. This is because all purchases effect the budget. But with finding an average with the highest prices for each item, £6948.12 will be left for both groups to slightly push into whilst purchasing their products. This allows them to be able to purchase better tools or extra resources.

Conclusion

By setting out the tasks like this and using a Gantt chart I believe the employees working on this task will easily be able to follow time stamps and instructions of how to complete their work. This will be most effective as it ensures they all keep on track whilst watching the budget and completing any extra steps or problems that may occur.

Teams	Task	Time Limit
Purchasing team 1	Find suitable length and price flat belt conveyor costing no more than £22501.88	6 hours
Purchasing team 2	Purchase all tools and equipment needed aim to keep below £1000	3 hours
Purchasing team 3	Purchase all components needed as spares or to use first	3 hours

Teams	Task	Time Limit
Removal team	Remove all parts from the old belt conveyor and stay within the price range of £500-£2000	2 days
Installation team	Install the new conveyor belt following steps and enusring everything is correct and properly connected to the PLC	5 days
Commisiong/testing team	Run multiple tests on the new belt conveyor ensuring it has no faults and is working at 100%	5 hours

Task 4 Present

Assessment number (eg 1234-033)	8730-033
Assessment title	Employer-Set Project

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	4
Evidence title / description	**Evidence expected for marking:** Presentation materials Video recording of presentation Presentation Q&A Record **Evidence submitted for marking:** Presentation materials Video recording of presentation Presentation Q&A Record
Date submitted by candidate	DD/MM/YY

Eastchester Delights Belt Conveyor

Why should Eastchester delights hire PEMIR to install their new belt conveyor?

Eastchester delights are a small-scale food distribution company in the UK who are requiring help to research and install a new belt conveyor in their factory.

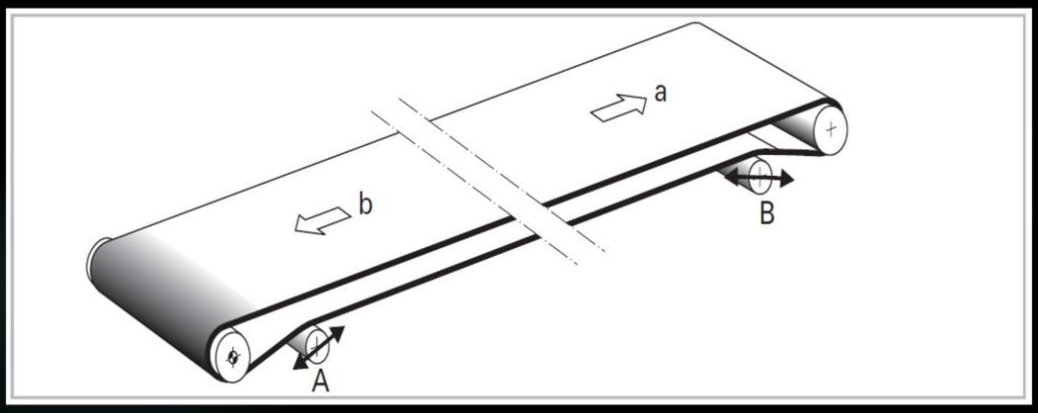
Precision Engineering for Maintenance, Installation and Repair Ltd (PEMIR Ltd.) have high expertise in:

- Installations and relocations.
- Troubleshooting and repairs.
- Remote monitoring and diagnostics

We have been able to use these skills and find the perfect flat belt conveyor to suit your needs and meet all requirements you have set whilst staying under the budget.

Flat Belt conveyor justification

- It is the most common type, so it is easy to operate.
- It can use pulleys or rollers which allows it to be continuous, this helps with keeping production at a very steady pace.
- They are versatile, cost effective and suitable for food companies.
- It has very smooth operation and does not require much maintenance meaning it can operate for long periods of time without jamming or slowing down production.
- It is very flexible meaning it can be made to curve left or right with no issues.
- It stays very clean.
- It is suitable for most situations causing no down time throughout operating hours.



How does the flat belt conveyor meet the set requirements?

- Firstly, the conveyor can be perfectly adjusted to meet all size requirements. This because it can be cut to any desired length (34m long and 60-100cm wide) and has a suitable tolerance (+/-8mm long and +/-3mm wide).
- The flat belt conveyor can reach the speed required which is 3.05 meters per minute (0.051 per second) this speed can be held at a constant rate by the conveyor for hours at a time as it is so highly durable.
- It is PLC programmable meaning employees can control the belt without being close to it creating a safer work environment.
- Additionally, it comes with an emergency stop button, this provides safety to the employees and warehouse in the event of the belt drastically failing and becoming dangerous to others.
- It further comes with an overload protection system, meaning it will shut down if it becomes too dangerous saving others and the factory.
- It is compatible with the food safety regulations. This means it is permitted to operate with food products, it is also very easy to clean at the end of each shift, and it stays clean for long durations of time.
- It comes with a quick release belt tension system and a variable frequency drive allowing the speeds to be changed. This can help with production as it can be slowed to carefully place items onto the belt to prevent any damages to packaging.

Operation and placement of the belt

To keep the belt tension as low as possible, the pivoting movement should, wherever possible, be perpendicular to the median line of the arc of contact (plane A ↔ B). The centre distance between the end pulley and guiding pulley should be at least twice the diameter of the larger pulley. Unlike cylindrical-conical pulleys, adjustable cylindrical rollers are not self-tracking. This means when belt running direction changes, the pivoted position of cylindrical pulleys must be reset.

As the room the belt is going to be placed in is 18m wide, 12 m long and 12m tall the belt will need to be under 18m in length. I have chosen 15.5 meters for my length as it will be able to fit perfectly inside of the factory whilst leaving room for employees to be able to work around it without being in a confined space. This may also allow more products to be placed in waiting areas to be placed onto the belt.

Monitoring and maintenance of the belt conveyor system

- The belt will be monitored very carefully by employees.
- The PLC will be able to check if there are any issues with the motor inside of the belt and if the variable frequency drive has any issues which may affect the speed of the belt which can slow down production if it is not up to speed.
- Physical checks must be made before and after every shift ensuring every component is thoroughly checked over and tested before the production line begins. This prevents any unnecessary damage to be caused and keeps all employees around the belt conveyor safe.
- A lock out tag out system will be used whilst the belt is being inspected. This is to prevent the belt from being activated whilst an employee may be on top or underneath the belt as when activated they may be caught in any systems working at the time.
- Routine cleaning of the belt will take place before and after every shift. This is to ensure the belt is up to the food regulations it must follow preventing any contamination of the products on the belt.

Health and safety considerations

Whilst completing this procedure, multiple health and safety issues may occur. This is why all employees on this project have all been given the correct safety training, PPE and completed a risk assessment of the removal and installation of the flat belt conveyor system.

Throughout the process all employees not properly trained will be ensured to avoid the site at all costs to prevent any injuries from occurring.

Hazard	Risk	Chance of risk	Severity of injury	Overall risk	Prevention
Entanglement	Tangled hair injured head and neck	L	M	M	Tie hair up and pin loose clothing
Entrapment	Trapped finger or limp	M	M	M	Keep fingers away whilst in operation
Flying projectile	Debris in eye	L	H	M	Wear eye protection
Sharp objects and tools	Cuts or gashes	M	M	M	Wear gloves and keep fingers away from sharp blades
Loud Noise	Short- and Long-term ear damage	L	H	M	Wear ear defenders

Risk assessment –
Low=L
M=medium
H=high LxL=L
LxM=M LxH= M
MxM=M MxH=H
HxH=H

PPE and Training

All employees on this task will be properly trained on how to use each tool and piece of equipment which may be used. They will all be provided with different types of PPE including:

- Light eye protection (safety glasses)
- Gloves
- Ear defenders
- Hard hats
- Masks (in the event of any dusty areas being found)
- Steel toe caps boots

If the employee has long hair, they will tie it up and pin any loose clothing to prevent entanglement. They will all be given breaks scattered throughout the day to prevent over exhaustion.
Each employee will be briefed on the dangers that could possibly occur and how to act in the event the situations do occur.

Budget and estimate costs

The budget given is £40,000 and through careful research there is a possible way to keep within the budget and be left with £6948.12.

To remove the belt, it would cost a total of £500-£2000 however, if it was more complex it can easily exceed £5000. When removing the belt, the cost of tools would be needed as there are lots in use for example: Belt cutters, wrenches, pliers, jacks and potentially specialised belt lifters or skivers. This may potentially cost and extra £200-£500 depending on if the tools are already there or not.

To install the belt, it would cost a total of £25-£50 per foot so £2775-£5550. When installing the belt tools like wrenches, socket set, belt tension gauge, a pry bar, belt cutting tool or knife and a measuring tape. May not ne there and purchasing them may cost and extra £200-£500.

The cost of the actual belt itself would be £22501.88 with the length of the full belt being 34 m long.

The overall cost amounts to £33051.88 if they were to choose all top of the range options leaving £6948.12 to be spent on any pay for workers installing the belt and any tools or spare parts like nuts bolts and wires they may need.

Planning of the project

For the project plan I used a Gantt chart as I believe the employees working on this task will easily be able to follow time stamps and instructions of how to complete their work. This will be most effective as it ensures they all keep on track whilst watching the budget and completing any extra steps or problems that may occur.

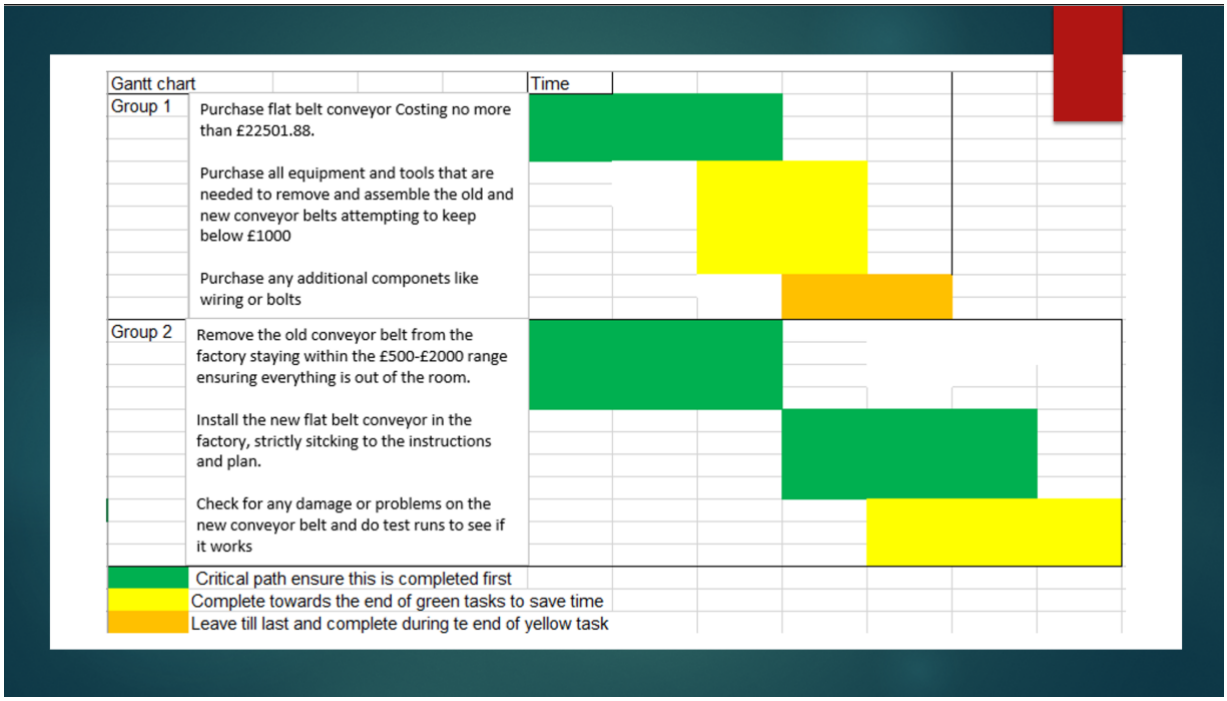
Group 1

For group 1 they are tasked with the first important task finding and purchasing the Flat belt conveyor. They must not exceed the maximum of £22501.88 whilst purchasing. This is because there are other areas within this process which also need money to purchase items and pay for parts. Task 2 is only a yellow task as it is still important but does not have to be done immediately, I have done this as they need to see which tools are need after purchasing the flat belt conveyor. Task 3 is orange as it is still important but is not very vital as it is for the purchasing of spares or small items like wires or bolts. It will be completed after most tools have been purchased but more may need to be bought depending on what extra resources are needed.

This system allows for maximum efficiency during this project keep all members of group 1 on track to meet their deadline.

Group 2

For group 2, they will begin their first task at the same time as group 1. This allows them to remove all parts from the old conveyor belt and completely take it out of the factory in time for the new flat belt conveyor to arrive. Task 1 is critical for the project as the factory needs to be completely empty for the new belt to be fitted in, whilst completing this task they must attempt to stay within their price range of £500-£2000. Task 2 will take place as soon as the new belt arrives, this allows it to be up and running as soon as possible. Task 2 is also a green task is it is extremely critical for the project as it needs to have the belt up and running with no distractions. It is important to note that whilst installing the flat belt conveyor they must stay withing their budget of £2775-£5550, if they do not, they may not be able to purchase any additional or spare parts. Task 3 is a yellow task as although it is important it can begin towards the end of the belt being built together as certain parts of the belt will need testing before another part is added. This prevents employees having to de-assemble the belt whilst maintaining it thus saving production time.



Challenges Faced

The first Major challenge I faced was budget worries. This is because the original belt picked was too expensive to be able remove the old and install it whilst also paying for tools, PPE and resources.

To overcome this challenge, I did more research on which belt could be better fitted for the requirements set and the company itself.

The second challenge I faced was creating the Plan for the project as certain parts of the operation could not begin until other parts had ended.

To counteract this problem, I sorted each step into a Gantt chart and distributed the workload between two groups to speed up the project.

Changes to be made for future projects

If I was to complete this project again I would:

- Create a more detailed drawing of the belt conveyor in the factory.
- I would do more research to find other options to make the most of the budget as possible so the company can have the best opportunites it can.

Any questions?

Employer-Set Project – Presentation Q & A Record (Task 4)

8730-12 T Level Technical Qualification in Maintenance, Installation and Repair for Engineering and Manufacturing

8730-033 Employer-Set Project (Summer 2025)

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234
Date	DD/MM/YY

Provider name	<provider name>
City & Guilds Provider No.	999999a

Record observation notes below to inform external marking. **Notes must be detailed, accurate and differentiating.**

Tutor questions to candidate	Candidate responses
How did you research your project for prices?	Websites to determine average prices
What was biggest risk to budget?	Conveyor prices and the length of belt was biggest cost
How could you reduce costs?	Source tools first and research prices to leave budget

Tutor signature	Date
	DD/MM/YY

If completing electronically, double click next to the 'X' to add an electronic signature once the record is **finalised**.

Get in touch

The City & Guilds Quality team are here to answer any queries you may have regarding your T Level Technical Qualification delivery.

Should you require assistance, please contact us using the details below:

Monday - Friday | 08:30 - 17:00 GMT

T: 0300 303 53 52

E: **technicals.quality@cityandguilds.com**

W: **http://www.cityandguilds.com/tlevels**

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