IAgrE Student Awards

NOMINATION SUMMARY

Student Project Award*
Safety Award*
***please delete as appropriate:**

PROPOSER: (usually Course Director/Head of Department)

Name: Rhys James

Position: Level 3 Course Director

University/College: ColegSirGar, Gelli Aur Campus, Home Farm, Golden Grove, Camarthen SA32 8NJ

Contact details:	**Tel:01554748583**	**Email: rhys.james@colegsirgar.ac.uk**

DETAILS OF NOMINATION:

Name of Student/Group of Students: Rhys Jones

Personal contact details (i.e not college) to enable us to contact the student(s) once their course has ended:

Cilmery Farm, Cilmery, Builth Wells, Powys LD2 3LG	07377360837	**Email: jonesrhys003@gmail.com**

Name of course studied: Level 3 City and Guilds Extended Diploma in Land based Technology

Period studied	**From: September 2024**	**To: July 2026**

Qualification to be gained:
180 Credit extended diploma

Project Title: Combining a post knocker and quick fencer mounted on a front end loader to improve tasks efficiently whilst fencing

Details of material submitted with nomination: (Project/Exec Summary/videos etc)

Powerpoint presentation

SIGNED BY PROPOSER: DR James	**DATE SUBMITTED:** 18/09/26

If you wish to provide any additional information to support this nomination, please do so in a covering letter. When complete, return this form, together with the supporting documents, to

The Secretariat, IAgrE, The Bullock Building (Bldg 53), University Way, Cranfield, Bedford MK43 0GH
secretary@iagre.org

NB All work submitted is treated with complete Confidentiality; no part of the paper will be published by IAgrE except for the Title and Name of the winner in each category.

Final Presentation

By Rhys Jones

Background



- My name is Rhys Jones and I live on a 500-acre beef and sheep farm near Builth Wells in Mid Wales.
- I attended Ysgol Calon Cymru before starting college at Gelli Aur in 2024 to further my education in agriculture.
- When I'm not at college, I spend most of my time helping on the family farm, where I'm involved in the day-to-day running of our livestock enterprise.
- Alongside this, I also work part-time at Ffynnon Tractors, which gives me valuable hands-on experience and helps me to deepen my knowledge of the agricultural machinery industry.

Aims

The aim of my project is to improve the health and safety of a task by mechanising the process so that the operator no longer has to enter a danger zone. This can significantly reduce the risk of injury to the operator. This is important because many manual tasks expose workers to hazards such as moving machinery, heavy materials and unsafe working environments. By mechanising the task, the operator can remain at a safer distance while still maintaining control of the process, helping to minimise the likelihood of accidents and injuries. Another aim of the project is to make the job easier and more efficient to carry out. Mechanising the task reduces the need for manual labour, as the operator can control the process from inside the machine rather than completing the work by hand or relying on assistance from another worker. This can also improve productivity, as machinery is often able to complete tasks more quickly, consistently and efficiently than manual methods. Overall, the project focuses on creating a safer, more efficient and more practical way of completing the task while reducing risks to operators and improving productivity.

Research





I carried out my research by:

- Attending agricultural shows such as Lamma, the Royal Welsh Show and Winter Fair to research existing agricultural machinery already available on the market.
- Conducting online research and reading farming magazines such as Farmers Guardian to research new designs and gather inspiration for my project.
- Looked at current at farm machinery on my farm for product ideas and spoke to farmers about existing safety concerns.
- Spoke to peers and work colleagues for ideas of products that could be innovated to improve use or safety.

Initial Design Concepts

My first concept was to convert a small rear-discharge spreader into a feed wagon that could be used in small, narrow passageways where larger feed wagons or straw blowers could not fit down safely. This would allow feed to be distributed in areas that are too tight or restricted for conventional feeding equipment. My second concept involves modifying a standard cattle crush by making the back gate adjustable. When unlocked, the back gate can slide forward or backward to suit the size of the animal. Once than animal is in position and the gate is closed, it would lock securely in place, providing a safer and more adaptable system when handling livestock of different sizes. My third concept would be to mount a Quickfencer on the post knocker. This would make rolling out and tensioning netting quicker and easier during fencing work. Although machines that combine these tasks are already on the market, my idea differs by mounting the Quickfencer on the side frame of the post knocker, allowing both operations to be carried out efficiently without interfering with the main function of the machine. My last concept was a hydraulic, adjustable silage blade pusher which is designed to push feed such as silage up in front of livestock like sheep and cattle. While many existing silage pushers are made from tyres that pushed the feed forward, there are some blade-style versions available which I believe they do a better job especially on uneven ground. My design would improve this concept by incorporating a hydraulic ram system that allows the operator to adjust the pitch of the blade and the side that the blade is pushing up at the flick of a switch.







Weighting

Feed Wagon Conversion

title	score
Cost	4
Commercial value	2
Ease of making	4
Safety	3
profitability	4

Average 3.4

Adjustable Cattle Crush

title	score
cost	7
Commercial value	5
Ease of making	6
Safety	2
profitability	4

Average 4.8

Quickfencer Post Knocker

title	score
cost	6
Commercial value	`6
Ease of making	5
Safety	9
profitability	8

Average 6.8

Silage Pusher

title	score
cost	5
Commercial value	5
Ease of making	7
Safety	7
profitability	4

Average 5.6

Proposed Concept





My proposed concept would be my third idea. This concept would involve mounting a Quickfencer onto the side of a front-loader mounted post knocker. This design would make the fencing process easier and more efficient for the operator. It would also remove the need for a second person to bring another machine with the supplies needed for fencing. By having both the Quickfencer and post knocker mounted on the front loader, the operator could pull a trailer behind the tractor carrying all of the fencing materials such as posts, netting and tools. This would eliminate the need for a additional machine or person, making the job quicker and more cost effective. Also, having both systems on the same machine would reduce the time spent moving equipment between jobs and improve overall efficiency when installing fencing. It would also make the process safer and more convenient, as the operator can carry out multiple tasks from one machine without needing extra equipment on site.

Justification of the Proposed Idea

My justification for making my project comes from my own experience of living and working on a 500-acre mixed sheep and beef farm where all of the fencing work is currently done by two people. Currently all of the netting and barbed wire is rolled out by hand and then tensioned using the monkey pullers. This process is not only physically demanding but also slow and inefficient. By building a Quickfencer system, both the netting and the barbed wire could be unrolled and tensioned mechanically. This would reduce the physical strain on the operator while also making the fencing process quicker and more efficient. It would also improve safety by reducing manual handling and the risk of injury when tensioning wire. In addition, many farms now have less workers available, so a machine that allows one person to carry out fencing work more easily would be a major benefit. Overall, this system would save time, reduce labour requirements and make fencing work more efficient on farms and contracting businesses.



7 responses

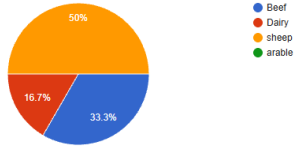
Link to Sheets

Summary | Question | Individual

What type of farm do you run/work on

Copy chart

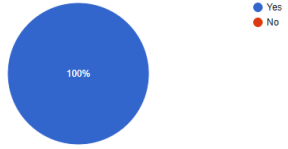
6 responses



Do you do your own fencing

Copy chart

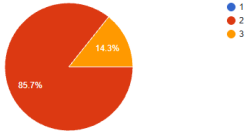
7 responses



How many people does it usually take you to do your fencing

Copy chart

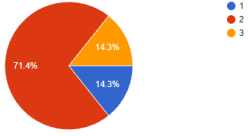
7 responses



How many machines does it usually take to do your fencing

Copy chart

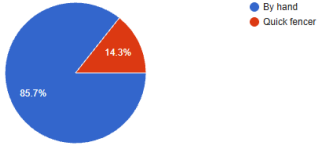
7 responses



How do you roll out netting or wire

Copy chart

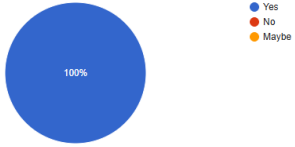
7 responses



Would a quick fencer speed up your fencing

Copy chart

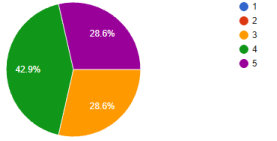
7 responses



How many times do you travel across the field on average to put up a fence.

Copy chart

7 responses



How many percent of the time it takes you to put up a fence is unrolling the wire

7 responses

- quite a bit
- 70
- 20%
- 25
- 20
- 14
- 10%

What's on the Market





Before designing my project concept, I carried out market research to identify whether any similar products already existed. However, I was unable to find any product that matched my concept exactly. I therefore researched related equipment currently available on the market. I looked at existing Quickfencer systems and found that they are typically mounted either directly onto a tractor's front loader or onto the tractor's three-point linkage at either the front or rear. I then researched post knockers available for tractors and found that these were also generally mounted either to the front loader or the three-point linkage. However, I could not find an example where these two systems had been combined into a single attachment on a tractor. I also investigated purpose-built fencing machines, such as the Protech Evo, which combine a post knocker and Quickfencer system on a tracked platform. While these machines offer a highly capable all-in-one solution, they are often difficult to justify financially for many farmers, and the high purchase cost may also make them unsuitable for smaller fencing contractors. This research highlighted a gap in the market for a more affordable and practical solution that combines these functions while utilising machinery that many users already own. By mounting a Quickfencer onto the side frame of a tractor-mounted post knocker, both operations could be carried out using a single machine without affecting the primary function of the post knocker. This would reduce the need to change equipment during fencing work and improve the overall efficiency of the operation. The concept could also provide health and safety benefits by reducing manual handling and limiting the amount of time operators spend outside the tractor during fencing tasks. In addition, using equipment that many farmers and contractors already own could make the system more cost-effective and accessible than investing in a dedicated specialist machine. Overall, the concept aims to provide a practical, efficient, and economically viable solution for fencing operations.

Target Market

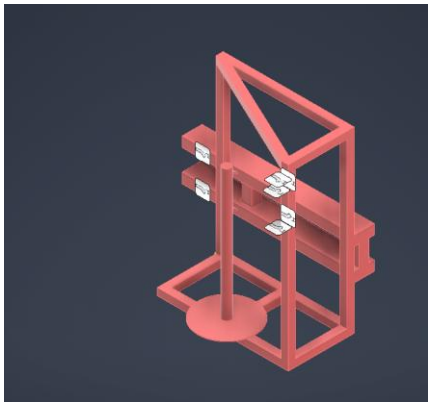
For this product, I believe there would be a large target market due to the increasing popularity of Quickfencer products and rising labour costs within the agricultural industry. This would make the product appealing to farmers carrying out their own fence repairs and construction, as it would allow work to be completed more efficiently while reducing labour requirements. The product would also appeal to fencing contractors, as combining multiple operations into one machine could reduce labour, fuel usage, and operating costs by reducing the need for additional equipment and machine changes. With the current high cost of diesel, these savings could be significant over time. By allowing multiple stages of fencing work to be completed without changing machines or attachments, operators could reduce downtime and improve productivity. In addition, because the concept is designed to fit equipment that many users already own, it could provide a more affordable and practical alternative to dedicated specialist fencing machines. Overall, the product has the potential to provide a practical, efficient, and cost-effective solution for both farmers and fencing contractors.





Different Designs

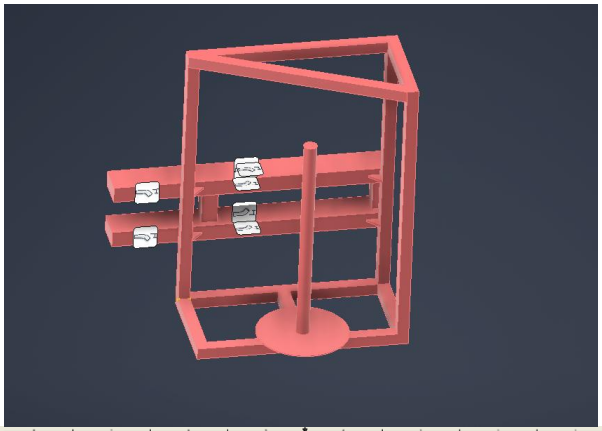


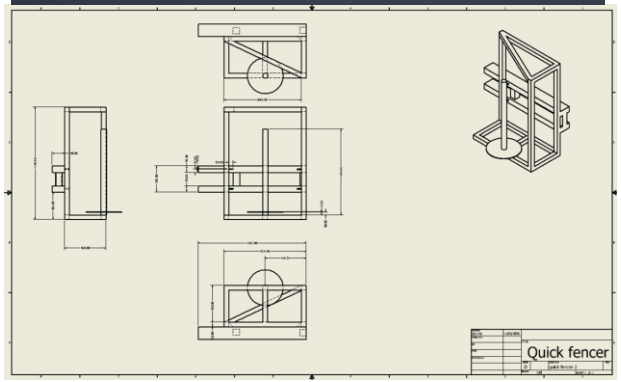


My first design was smaller than my final design; however, after stress testing the initial concept, I realised it would be too weak. I also found that because the two back supports extended all the way across the rear of the frame, it would be difficult to clamp the netting effectively.

For my second design, I moved the clamping area forward so that the supports would not interfere with the clamping process. I then added a brace running from the clamping point to the opposite corner to strengthen and stiffen the entire machine. This modification helps prevent the frame from bending under the strain created when tensioning the netting.

Chosen Design





My final design uses a rotating tube and plate system that allows the roll of netting to spin freely as it is dispensed. The netting feeds forward over the front upright section of the box frame and then runs down the side of the machine in a controlled path. When tensioning is required, a C-channel clamp is positioned over the box with the netting sandwiched between the two components. Three securing pins are then inserted, followed by three wedges being driven in to firmly lock the netting in place. Once secured, the tractor can move forward, applying tension to the netting in a controlled and consistent manner.

Calculations

As CAD had done most of the force calculations that would happen when tensioning the netting and with 1500kg of stress being put on the tensioning area, it would only move 0.39mm.

Bending moment of the 70x140 box section

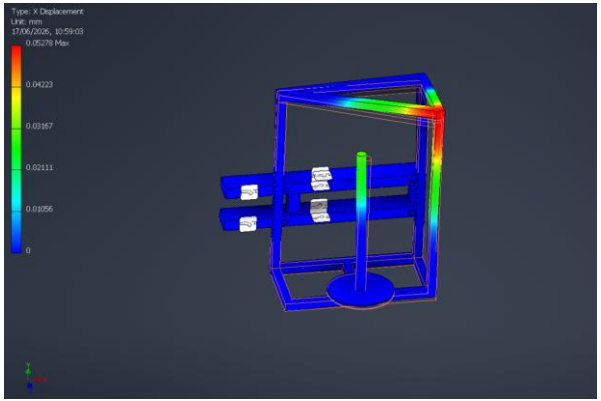
Bending moment: M = F x D = 15,000 N x 0.6m = 9,000 Nm

Section modulus (Zx) for 70 x 140 x 5 mm: approximately 91,000 mm3

Bending stress: $\sigma = \frac{m}{Zx} = \frac{9{,}000{,}000\ N.\ mm}{91{,}000\ mm3} = 98.9\ MPa$

Dynamic force: F dynamic = 50kg x 9,81 m/s2 x 4.0 = 1,962 N (acting sideways and downwards





Risk assessment

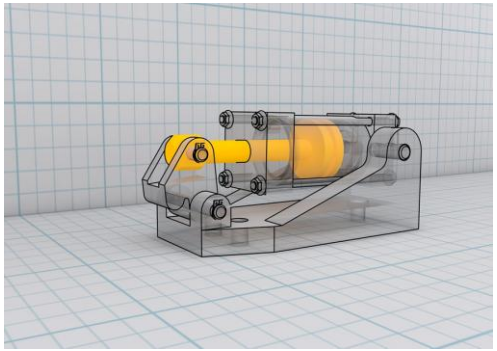
Hazard	Person(s) at Risk	Existing Controls	Likelihood	Severity	Total	High/Med/Low	Any additional control measures required.
Fire and burns	Myself and others working in the area	Wear the correct PPE like welding gloves and flame resistant overalls and use tongs to pick up hot pieces of metal. The area needs to be clear of flammable materials. Ensure there are fire extinguishers placed in the welding area. Make sure tanks that contain flammable materials are drained.	2	3	6	med	First aid kits should be in close proximity to the welding bays
Explosions	Myself and others working in the area	Inspect ant gas cylinders before welding for cracks and damage and there are no leaks on regulators or pipework. empty gas cylinder to be stored in locked cage when not in use	2	3	6	med	
Dust & Fumes	Myself and others working in the area	Local exhaust ventilation (LEV) should be on when welding to extract harmful gases or weld in a well ventilated area. Don't be positioned in the welding fumes. If welding in confined spaces wear an air fed mask and work according to time exposure limits.	2	3	6	med	Ensure Lev's are regularly inspected
Slips, Trips & Falls	Myself and others working in the area	Ensure a clean working environment with the leads neatly wrapped up and put signage down to warn others of welding in the vicinity.	2	2	4	low	
Crushes & Knocks	Myself and others working in the area	Make sure machinery is immobilised and securely supported before work begins. Use the necessary guards on machinery. Use vice and clamps to secure work pieces and be aware of moving parts.	2	3	6	med	
Cuts & Splinters	Wear the correct PPE like welding gloves	Wear the correct PPE like welding gloves, avoid running bear skin on materials and use a grinder and flap disk to remove sharp edges.	2	2	4	low	
Lifting & Straining	Wear the correct PPE like welding gloves	Work according to Loler and manual handling regulations(25kg for men and 16kg for women) and use proper lifting techniques	2	2	4	low	Make sure all lifting equipment is regularly tested and is up to standards.
Chemicals & Poisons	Wear the correct PPE like welding gloves	Weld using Levs and wear the correct PPE like gloves and work in accordance to COSHH and make sure all contaminants are removed from steel before welding	2	3	6	med	
Vehicle Parts, Machinery & Vehicles	Wear the correct PPE like welding gloves	Make sure machinery is immobilised and securely supported before work begins. Use the necessary guards on machinery.	2	3	6	med	
Sparks and flames	Wear the correct PPE like welding gloves	Wear the correct PPE like welding gloves and flame resistant overalls. Use the correct positioning to angle sparks from yourself and others. Make sure correct fire extinguishers are located around the workshop and fire blankets and make sure all flammable objects are removed from the area	2	3	6	med	
Noise Exposure	Wear the correct PPE like welding gloves	Wear correct PPE like ear defenders for anything over 80 decibels	2	2	4	low	
Eye Damage	Wear the correct PPE like welding gloves	Wear correct PPE like grinding goggles for any preparations and welding masks for welding with auto darkenting or if a manual maks make sure the correct shade of lens fitted. and brazing goggles for brazing and plasma cutting. Make sure uv curtains are shut around the welding bay to prevent others from being affected.	2	2	4	low	
High Pressure	Wear the correct PPE like welding gloves	Make sure gas lines are regularly checked for damage. Make sure any pressure is released from systems before welding in them or near them	2	2	4	low	
High and low temperatures	Wear the correct PPE like welding gloves	Wear the correct PPE like welding gloves and flame resistant overalls and use tongs to pick up hot pieces of metal. And use a cinching bucket if necessary. Be aware of visual indicators as some metals like aluminium can look cold but can actually be very hot.	2	3	6	med	
Waste Disposal & Environmental Control	Wear the correct PPE like welding gloves	Make sure any scrap metal is disposed of properly in a skip to be collected by a license holder.	2	2	4	low	

Timeline

Date	Work
September	Research ideas
October	Research ideas
November	Create initial ideas presentation
December	Present initial ideas presentation
January	Decide on concept
February	Create and present proposed project idea presentation
March	Draw, research and create cad models
April	Make CAD models
May	Create project
June	Present project

Methodology

I began by brainstorming several different ideas that I had in my head of things I could make. After narrowing these down to 4 ideas, I made a weighting table to evaluate each idea against different criteria such as cost, commercial value, ease of making, safety and profitability. The idea with the highest overall score was the Quickfencer concept. I then carried out research into similar products to help inform my design. I then produced an initial sketch of my design on paper before transferring it into CAD software, where I refined the model and ensured it was produced to the correct dimensions. Next, I identified the materials I required to make my project and recorded them in a spreadsheet to help manage costs and organisation. Finally, I began manufacturing my project in the workshop, aiming to produce it to the highest possible standard. I planned the order of manufacture and followed health and safety procedures. During the making process, I checked measurements carefully to maintain accuracy and made adjustments where necessary to improve the quality of the final product. After completing the project, I evaluated how well it met the original specification and identified possible improvements for the future.





Fabrication and Manufacturing



Finished Design





Testing

To test my project, I first attached the post knocker to the tractor. I then slid the Quickfencer into the side of the post knocker and secured it using the locking bolts to ensure it remained in place during operation. Next, I located an area on the college farm where fencing work was taking place. I loaded a roll of netting onto the Quickfencer and pulled out enough netting to staple it to the starting post. Once secured, I drove the tractor forward, allowing the netting to unroll over a distance of approximately 40 metres. After passing the end post, I stopped and attached the tensioning mechanism, which clamped onto the netting. I then slowly drove forward until the netting reached the required tension. Once the netting was fully tensioned, I got out, secured it in place, cut off the excess netting and removed the tensioning mechanism. During the test, the Quickfencer operated effectively and allowed the netting to be rolled out and tensioned efficiently. The locking mechanism held securely throughout the process and there were no issues with movement during operation.

Costings

Material	Cost
Steel	£100
Mig wire and gas	£30
Grinding/cutting discs	£12
Paint	£20
Total	£162

Possible Improvements





One potential improvement would be to incorporate detachable castor wheels into the base frame of the Quickfencer. This would allow the unit to be easily manoeuvred when not attached to the tractor, improving handling during installation, removal and storage. The addition of castors would reduce manual lifting requirements and improve overall usability when positioning the equipment.

In addition, the upper brace could be repositioned further rearward to improve accessibility when loading rolls of netting onto the spindle assembly. This modification would increase the clearance around the loading area, making roll installation easier and reducing the risk of interference during fitting. It would also allow the system to accommodate larger diameter rolls, increasing the continuous run length of netting that can be dispensed. This would reduce the frequency of roll changes, minimise downtime and improve efficiency during fencing operations.

Skills I Learnt

Throughout the build process of this project, I developed several new practical and technical skills. One of the key skills I gained was the ability to design components using CAD software and then transfer these designs to a CNC plasma cutting table. This allowed parts to be cut accurately, consistently and with a high-quality finish.

I also improved my fabrication and assembly skills, particularly in ensuring that square frames were accurately aligned during welding. This was achieved by using right-angle welding magnets to hold components in position, as well as measuring diagonally from corner to corner to confirm that the frame was perfectly square. These techniques improved both the accuracy and overall quality of the finished structure.





Testimonial

After using the product/ initial testing, this has removed the need for a second tractor at the site making the task more efficient, freeing up the second tractor for other tasks. It took a few attempts to master the most efficient way to use the product. As it is mounted on a loader, this offers greater versatility than originally thought.

Vote of Thanks

I would like to thank all of the college lecturers for providing access to the workshop facilities and equipment at Gelli Aur, and for allowing me to complete my project on site. I would also like to thank them for their ongoing support and guidance throughout the project, including offering advice and assistance whenever it was required, which helped contribute to the successful development of my work.

In addition, I would like to thank my classmates for their feedback and suggestions during the development of my project. Their input helped me to identify improvements and refine my design.





Questions

Are there any questions?