



Industrial
Cadets

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Industrial Cadets

Platinum Leader Award

Portfolio of Evidence

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Role Title: Mechanical Design Intern

Area: Engineering

Manager Signed: *D.A. Martin*

Duration of placement:

From: 21 August 2017

To: 17 August 2018

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Introduction

Graduation as an Industrial Cadet at the Platinum Level requires evidence that the skills and competencies and programme components illustrated in the Platinum Framework have been satisfied. This logbook/portfolio records the relevant achievements. Figures have been provided within the main body (where relevant) to assist with the description, the remainder of the supporting material can be found within Appendix A.

The "[Criteria and Evidence Log](#)" summarises which sections contain evidence of which competencies.

Criteria and Evidence Log

Programme Components Activity Undertaken to Gain evidence	Career Motivation and Awareness	Creativity and Innovation	Communication and Collaboration	Teamwork	Organisation and Planning	Critical Thinking and Problem Solving	Digital Skills	Personal and Interpersonal Development	Leadership skills	Commercial awareness	Decision Making	Professional conduct
Evidence 1								X		X		X
Evidence 2	X		X	X	X		X	X			X	X
Evidence 3		X	X			X	X			X	X	
Evidence 4			X		X		X					X
Evidence 7			X		X							
Evidence 8			X		X		X	X				X
Evidence 9			X	X	X	X	X	X				
Evidence 10	X	X	X			X	X	X			X	
Additional platinum 'leader' award requirements												
Evidence 5 (Volunteering/external communication)			X	X								X
Evidence 6 (School engagement)			X	X					X			X

Overview of Placement Company

Siemens Intelligent Traffic Systems is a subdivision of Siemens Mobility which focuses on above-ground traffic management solutions.

Products and services for traffic management range from the very familiar Red-Amber-Green signals found at road crossings and large junctions to Traffic Information (TI) and Variable Message Signs (VMS) found on motorways. Accompanying the roadside signals are controller cabinets which provide granular control of the signals based on the junction design. The controllers can detect and report faults within the system and are able to process feedback information to adapt the signal timings to the traffic flow. Feedback systems range from underground detectors, to sensors mounted above signal heads, to push button units which are operated by pedestrians. Surveying and junction design services are provided to determine the optimal timing and placement of signals to manage traffic flow, reduce congestion and improve safety for both drivers and pedestrians.

The portfolio also includes enforcement and tolling products, utilising automatic number plate recognition (ANPR) technology to monitor traffic violations and congestion. In addition, Siemens installs and supports electric vehicle charging infrastructure across the UK.

Placement Job Title and Description of General Duties during Placement

Role: Mechanical Design Intern

Primary responsibilities of the role:

- Mechanical design of components, turning concepts into cost-effective designs for manufacture
- Supporting and updating existing designs to customer specification
- Creating "kits" of parts for internal assembly lines and for field engineers who install products on site
- Preparing CAD models (using Autodesk Inventor and Solid Edge), producing dimensioned drawings, assembly drawings, installation drawings and preparing Bills-of-Materials (BOMs) using SAP¹
- Adhering to Product Data Management (PDM) systems in-place which are used to maintain documents in accordance with ISO 9001 (Quality Management) i.e. revision control and traceability
- Updating and reworking legacy AutoCAD drawings
- Supplier liaison to source suitable components and arrange for samples

¹ SAP – is a tailored software program which provides a series of tools for managing business operations across Siemens globally.

Evidence 1

Event: Supplier Site Visits – Wenda Electronics and Engineering & RJW Sheet Metal Ltd

Date: 21/03/2018 (Wenda) & 07/06/2018 (RJW)

Duration: 3 hours & 4 hours respectively

Summary of the Activity Undertaken:

On the 21st of March, I and 2 members of my team visited a supplier, who manufactures sheet metal parts (we design) to gain a better understanding of how their business operates and what machinery, jigs and tools they have at their disposal.

At Wenda, I observed punching and bending presses used to cut and bend sheet metal. They had a grinding and deburring machine which is used to remove swarf and other chips in the metal caused during machining while giving it a grained finish in a predetermined direction. The grained finish is a simple way to hide surface defects like scratches and improve the aesthetics of the part. The grinding and deburring machine works by passing abrasive paper over the surface of the part.

The supplier recently acquired a CNC (Computer Numerical Control) Turret Punch Press which uses a hydraulic press to cut shapes into sheet metal. The CNC turret allows for large jobs to be automated. A typical CNC turret punch has a choice of up to 60 tools in a "turret" that can be rotated to bring any tool to the punching position. High quality machines can punch shapes, tap holes (give a hole a thread), bend/fold the sheet and stack finished parts. The technician demonstrated how the program is written to tell the on-board computer the dimensions and position parts on the sheet to reduce waste. The software plans what tools are required and in what sequence for maximum efficiency and to limit the movement of parts on the bed.

On the 7th of June, I and my supervisor visited RJW who are another sheet metal manufacturer. Like Wenda, RJW possess various presses, mills, grinders, PEM sertes, vibratory rumblers etc. They also have two CNC Turret Punch Presses one of which can laser cut.

Skills and Competencies Covered:

Commercial Awareness

Commercial awareness, at this stage of my development, is primarily about understanding different industry sectors, the function of different job roles, different manufacturing techniques and cost drivers. The visit was insightful as I observed how sheet metal is machined and finished at different production scales.

Understanding both companies' capabilities and internal processes made it easier to communicate with them by phone and email.

Understanding the different machining processes and their limitations will help to inform my future designs and I can identify areas where I can make my designs simpler (lean design). As I am now more familiar with

the machinery, I can design components which require fewer steps and processes which will reduce the overall cost of a part. Over the year, I have come to learn the cost of manufacturing a part is primarily a combination of the material cost, which fluctuates, and the time cost (technicians' hourly rate). More steps and processes during manufacture will result in more planning and setup time being required to produce the part efficiently and with consistency.

Professional Conduct

I conducted myself professionally adhering to the workplace safety rules.

Personal and Interpersonal Development

The visit to the suppliers was my first experiences in a professional metal working facility and observing industrial equipment, designed for large scale manufacturing, in operation. It was the first time interacting with a manufacturer or supplier in person. I gained a better understanding of the supplier's business operations and their procedures to manufacture parts quickly and accurately.

It became clearer why the cost of parts typically reduces depending on the volume of the order as quantity of parts, is a factor in deciding how much of the process is automated. For low volumes, manual involvement can be cheaper than spending time writing a program and occupying the CNC Turret Punch Press, which may delay manufacturing more profitable orders being completed. The contribution of the "time cost" during manufacture was something that many textbooks and university lectures did not emphasise but became clearer by working with the manufacturers over various project.

During the visit, I asked questions regarding different processes and machinery while observing members of my team do the same. Being able to interact with suppliers and manufacturers is a valuable skill which I believe will prove to be vital during my engineering career.

Evidence 2

Project: Plus+

Duration: November 2017 – June 2018

Summary of the Activities Undertaken:

The Plus+ project is a redesign of the current traffic management system. Typically, there are many individual connections between traffic signals (e.g. a Red-Amber-Green traffic light) and the controller cabinet. Within the new system, the individual signals have a dedicated processing unit rather than relying entirely on the controller cabinet (distributed intelligence). The improvements to the system make installation and maintenance easier. Much of the install preparation can be done comfortably off-site, saving time and resources which would otherwise be spent on providing alternative roadside traffic management while the products are installed. Failsafe's within the system mean faults are isolated without affecting the entire system resulting in higher intersection up-time and reduced disruption to road users. Many of the core products are hot-swappable allowing for quick replacement and re-calibration to get the system synchronised.

For 8 months, I modelled and assembled various 3D CAD models, created dimensioned drawing and assembly drawings, which show how products are put together part by part. In addition, I prepared installation drawings which instruct field engineers on how to install products on site. Alongside this, I created over 60 BOMs (Bill-of-Materials²) relating to the various products. On occasion, I would communicate with suppliers to arrange for samples of components and request further information about products.

Areas of the project I worked on are traffic signals and some of the installation drawings for fitting components and cabling within the controller cabinet.

Skills and Competencies Covered:

Career Motivation and Awareness

Over the course of the project I have observed the product development stages involved with bringing a new product to market, from planning and concept stage, to testing, to finalising the documentation describing the assembly and installation of products. My responsibilities during the internship align with that of a product engineer (or design engineer) and as such I have a deeper understanding of a role of that nature, the skills required and how my technical knowledge may be utilised. It has reinforced my decision to continue in a design and product development role moving forward. By working with colleagues within my direct team and the wider engineering department I was able to observe the job functions of other roles, roles such as a hardware engineer, a lead product engineer and a project manager.

² A bill of materials is a list of the raw materials, parts, intermediate assemblies and the quantities of each needed to manufacture the end product.

Communication and Collaboration

My primary tasks on the project were to formally document, within drawings, product assemblies and procedures which had been finalised following various tests and trials. When preparing cable assembly drawings, I would often talk to the relevant hardware (electronic) engineers regarding topics such as pin numbering (i.e. what wire should be inserted into which pin on the connector depending on the circuit board layout), wire colours and sizes (gauges) and the treatment of wire ends. Often, I would discuss assembly procedures with the production technical support personnel within operations to ensure they had the correct tools and were happy for a certain product or assembly procedure to enter the production workflow. This stage is often crucial as the time required to build an assembly adds to the overall cost and is a factor that is often closely controlled. The fallout of a difficult assembly is increased cost to the overall product and that the production team being less productive as tasks are taking longer.

Communication with suppliers was common throughout, to get clarification and more information on various products when the datasheets were lacking. I would arrange for samples to be delivered for testing purposes and to get hands-on with the products before going through the processes of introducing the new part to the database using SAP. Finally, as all drawings went through an approval process I worked closely with my supervisor who checked drawings for errors. I then adjusted my drawings based on the feedback received.

Evidence of interaction between me and colleagues/suppliers through email is presented within [Appendix A, Evidence 2, Communication and Collaboration](#).

Teamwork

3 out of the 4 members of my direct team (within Mechanical) were working on the project alongside many hardware engineers, software engineers and operations personnel. The workload for the project was divided and distributed making each member responsible for a particular area. For example, one member of my team worked primarily on the controller cabinet related tasks while I worked on traffic signals. We would share CAD models (as applicable) and complete each other's tasks when one went on holiday. An example of this is when one member of my team took 2 weeks of leave, he left me a pack with instructions on what new drawings and BOMs needed creating, which drawings needed editing and what those changes were. This work was completed before I took leave the following week. Within [Appendix A, Evidence 2, Teamwork](#), there is a similar example of when I handed over some incomplete work before going on holiday.

In addition, we had weekly team meetings (every Tuesday) to discuss our workload for the week. It would also be an opportunity to discuss ideas on areas of the project that were being held up.

Organisation and Planning

To manage the project and track the progress of our individual assignments within the team, we used an Excel spreadsheet. Within this spreadsheet we recorded our tasks, the actions required to complete said task, the part numbers associated, who was responsible and the status of various components of that task. For example, if a new part is designed then a drawing is required and a part number must be allocated from the register and introduced into the SAP system. When the drawing was completed or in progress the spreadsheet was updated, this allowed our lead engineer to observe progress and report to the project managers and stakeholders on the progress. A snapshot of this tracker can be seen in [Appendix A, Evidence 2, Organisation and Planning \(Project Management/Action Planning\)](#). Throughout the project I updated the tracking sheet with the necessary information on products I was responsible for.

Alongside the Plus+ project, I was working on various other projects such as designing components for the autonomous Greenpower kit car ([Evidence 3](#)), creating the annual pub quiz trophy ([Evidence 9](#)), working to resolve slug ingress issues within cabinets and creating a kit which would provide European mains sockets to some controllers ([Evidence 4](#)). I would manage my time and alternate between working on two to three projects, this was so I could utilise my time when I was held up on a project by situations such as waiting for samples or a response from another colleague/stakeholder.

Digital Skills

Throughout the project I have used Autodesk Inventor 2016 to model, assemble and create drawings (evidence of which can be found in [Appendix A, Evidence 2, Digital Skills](#)). In addition, I have utilised Microsoft Office programs such as Word and Outlook.

I used Meridian, a program which is used to store drawings and manage their life cycle providing easy revision control of documents (this is part of the quality control management workflow relating to ISO 9001). I have used SAP regularly to create, edit and view BOMs. The 3D models were stored on a server (the Vault), this provided the ability to revert to older designs, undo changes and “check” files in and out to prevent multiple people from editing a model at the same time.

Personal and Interpersonal Development

From start of the project (and placement) I was confident in my technical ability to design and create 3D models, but I lacked the practical knowhow of manufacturing techniques. A specific area I was lacking in knowledge was the various processes that can be applied to sheet metal to cut and bend the sheet. Over time, I improved my communication through assembly and technical drawings, improved my understanding of manufacturing components from sheet metal and the primary cost drivers to manufacture.

Other areas I was able to gain a deeper understanding of included methods of electrically earthing components and how cable looms are prepared. A cable loom describes an assembly consisting of wires with connectors and/or crimp terminals. As I became more familiar with the products and my colleagues, I was able to approach them and have more technical conversations and ask relevant questions to complete my tasks.

I learnt to use features within Microsoft Outlook to set reminders, book meeting rooms, populate my calendar and create to-do lists. This improved my workflow and kept information in a single location. I improved my phone manner and my ability to have technical conversations verbally with less reliance on visual aids

Decision Making

While preparing installation and assembly drawings, I had to choose which views and orientations of the product assembly best illustrated the instructions, especially as good drawings have limited text on them. I decided how many steps to break the process into and what annotations and notes should go on the drawings to aid the illustrations. When showing cabling routes within the cabinet on drawings, often to decide the best route I used a mock-up of the cable loom or some string (cut to the appropriate length) to trial the different possible routes on a cabinet. I would then decide the most efficient route and what points to cable tie for good cable management.

Professional Conduct

While interacting with colleagues and suppliers I conducted myself professionally by introducing myself and clearly describing my needs and what information I required. It was important to ensure the language used was easy to understand and was not misunderstood. I attended meetings and completed my deadlines on time. My emails contained the company footer and I answered phone calls by presenting my name and the name of the business. Prior to being able to enter and work within the lab, I attended a toolbox talk which covered health and safety topics such as first aid, identifying dangerous situations and PPE (Personal Protective Equipment) use. I was guided through the lab risk assessment form and shown the risks and how to avoid them.

Evidence 3

Project: Greenpower Steering and Brake Mount

Duration: August 2017 – March 2018

Summary of the Activities Undertaken:

Greenpower is a racing competition where people between the ages of 9-25 build single-seater electric racing cars to compete at various venues. The objective is to produce an energy efficient car by taking into consideration factors such as weight and aerodynamics. Siemens is attempting to convert the Greenpower kit car into an autonomous vehicle.

My task was to design a steering mount to attach a servo motor to the chassis of the car. The purpose of the motor was to operate the steering based on a pre-programmed route. Initially, the motor shown in Figure 1 was to be used for steering which led to the first design (see [Appendix A, Evidence 3, Initial Steering Mount](#)) while an identical motor would operate the brakes. However, this motor lacked the torque needed for steering and failed during operation. A more powerful motor was acquired (Figure 2), and another mount was designed. Alongside the mount, additional components were designed to push and pull the steering link forcing the wheels to turn.

In addition, a separate mounting plate was designed to attach a brake lever from a bicycle to the car which would be operated by the servo motor shown in Figure 1 to give the autonomous car braking functionality.

I modelled the components in Solid Edge. Once I had modelled the components they were assembled into the 3D CAD assembly to test the fit. The drawings were produced, and the parts were manufactured and fitted to the car.



Figure 1 Servo motor used for automated braking system

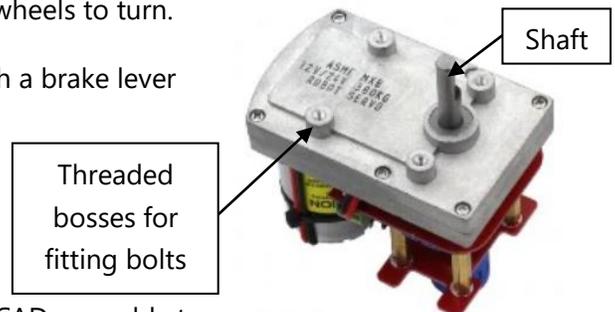


Figure 2 Servo motor used for automated steering system

Skills and Competencies covered:

Creativity and Innovation

The designs for the steering and brake mounting components were sketched before modelling. When designing the steering mount (which would hold the motor) it was important consider the angularity at the

front of the chassis (Figure 3) so that the steering link which pushes and pulls the steering arm was horizontal.

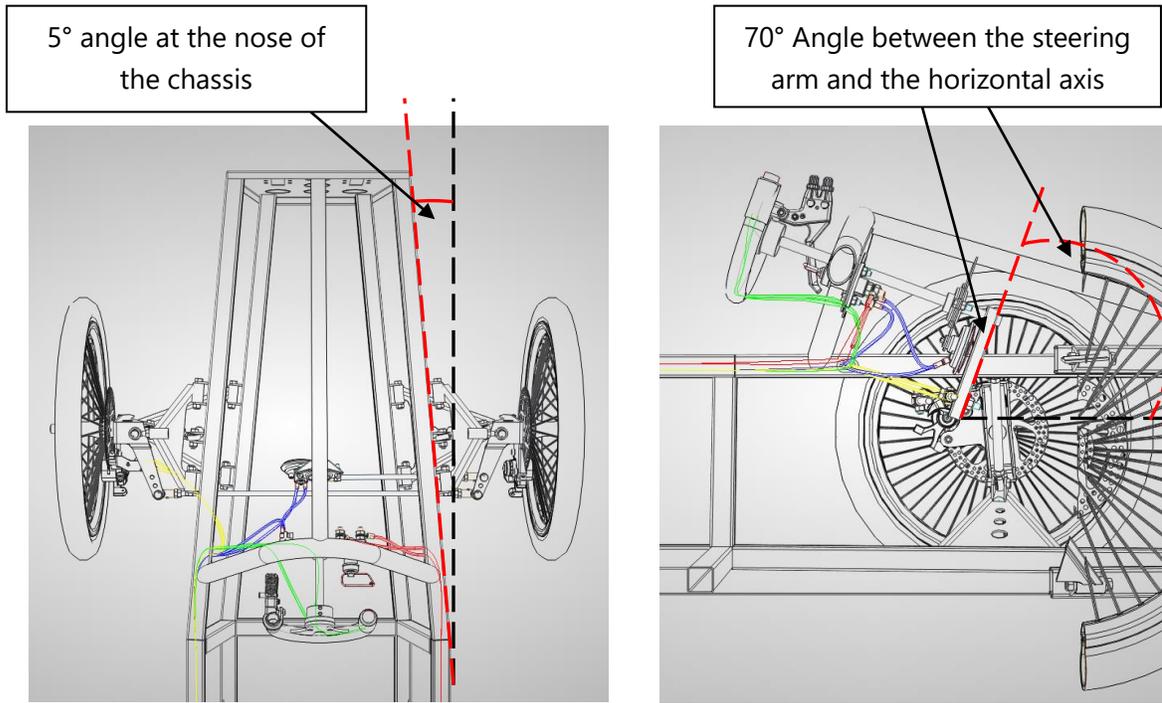


Figure 3 Angularity at the nose of the chassis (left), angle of steering arm (right-section view)

Correcting for the angles was important to achieve the maximum pushing and pulling force in the desired direction, making use of all the power within the motor.

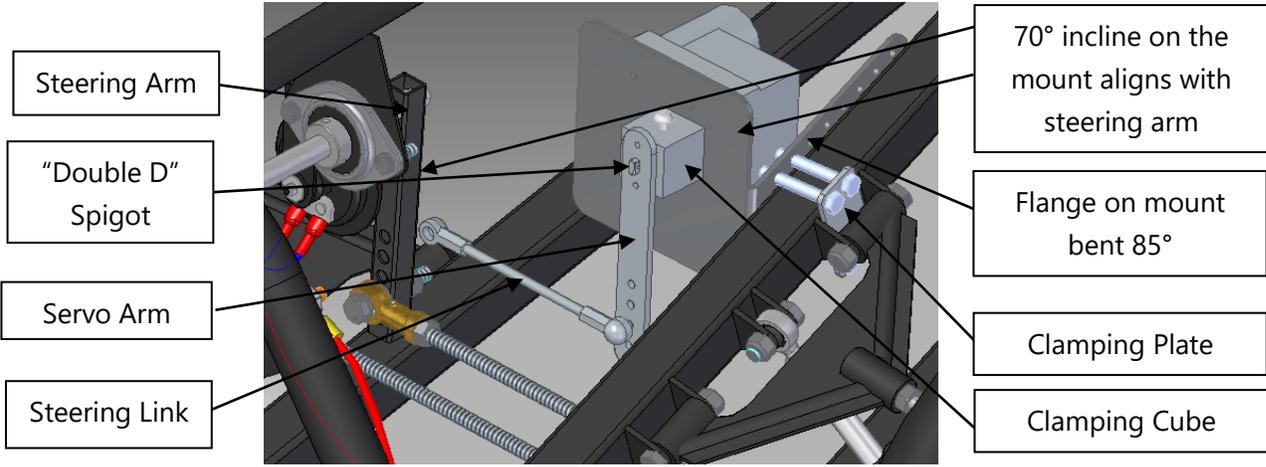


Figure 4 Steering components assembled within the model

The clamping cube (reference Figure 4) attaches to the shaft on the motor (reference Figure 2). A single M5 bolt is used to clamp the cube to the shaft to simplify assembly. The cube had a 2mm hole on the "double D" spigot to allow the servo arm to be held using only an R-clip making it easy to disengage. As a failsafe,

two M3 threaded holes were added to the cube so the servo arm could be fixed onto the cube if the R-clip was insufficient. As a result, the servo arm has two 3.5mm (clearance) holes near the “double D” spigot to allow the M3 bolt through. The servo arm was designed with some adjustability in mind, the threaded hole pattern along the bottom give some flexibility on the vertical alignment of the steering link. Images of the manufactured components can be found in [Appendix A, Evidence 3, Creativity and Innovation](#).

The mount for the brake was mechanically simpler; a steel plate was designed to hold the stem of a unicycle (using U-bolts) and the servo motor. The stem would hold the brake lever and would be mounted to the chassis (see [Appendix A, Evidence 3, Creativity and Innovation](#)).

Communication and Collaboration

I collaborated with my line manger during the design of the components for the steering system (see [Appendix A, Evidence 3, Communication and Collaboration](#)). While modelling the components and during the drawing review I communicated with my line manager and supervisor on best practices when detailing the drawings as the components were to be manufactured to specific tolerances³. Through my 3D model I was able to demonstrate how the components fit together within the car and gained feedback. I communicated with the manufacturer to obtain quotes and request purchase orders.

Digital Skills

I demonstrated I can quickly learn to use alternative 3D modelling software as I used Solid Edge for this project. Typically, we use Autodesk Inventor for day-to-day project work. See [Appendix A, Evidence 3, Digital Skills \(Using Solid Edge\)](#).

Critical Thinking and Problem Solving

The primary challenges faced during the design of the steering components were the angularity at the front of the chassis. The bend of the flange by 85° (Refer to Figure 4) ensured the steering link was square to the steering arm. The position of the motor on the mount itself was another challenge, the motor had to be a certain height to allow the servo arm to be longer giving it more leverage and reducing the stresses within the motor drive. The motor had to be far away enough from the chassis to allow the control arm to swing back and forth without coming into contact with the chassis. However, making the position of the motor too high and/or further away from the chassis would have resulted in more flexing of the mount. The flex would then affect the angularity of the steering link. The 3D model allowed me to tweak the design to find the most suitable position for the motor.

The challenging aspect of the design was achieving a compact design and ensuring the position of the components could be adjusted to calibrate the brake lever to the desired pre-tension. Therefore, the plate was designed without pre-drilled holes for the U-bolts to hold the stem, this allowed the position of the stem and brake lever to tested before finalising their position. As hydraulic brakes were being used instead of mechanical (cable) brakes the brake cable length was a fixed length and could not be changed. As a result,

³ Dimensional Tolerance – the acceptable deviation from the dimensions outlined on the drawing.

the position of the brake lever would have to be closer to the rear tyres – an area of the car with limited space for mounting additional components.

In addition, the position of the micro-switch, to activate the brake light required some adjustability to tune its sensitivity to being actuated by the arm of the motor. A series of holes were placed either side of the motor to provide flexibility when positioning a microswitch.

Decision Making

Throughout the process there were various design decisions that were made as detailed within “Critical Thinking and Problem Solving”. Other decisions included the type and size of fixing based on what was readily available to reduce cost, the tolerance of certain dimensions was chosen to achieve tightly fitting parts and reduce the free movement within the assembly. While designing the mounting plate for the braking system, I opted to model the plate using cardboard to verify the 3D model as I made approximations while modelling as accurate 3D models would be time consuming to create.

Commercial Awareness

Following a design review with my supervisor and line manager, the design was simplified as the quoted cost for manufacturing the components had been high. The design was altered to reduce the number of components (by merging two of the parts) and this also led to simpler components too, so fewer processes would be required during manufacturing. This reduced the overall cost from £395.21 to £267.61 (see [Appendix A, Evidence 3, Commercial Awareness](#) for the quotes).

I used the purchasing tools to request purchase orders and ensured I informed the relevant stockholder of the goods being received so they could complete a Goods Received Note (GRN).

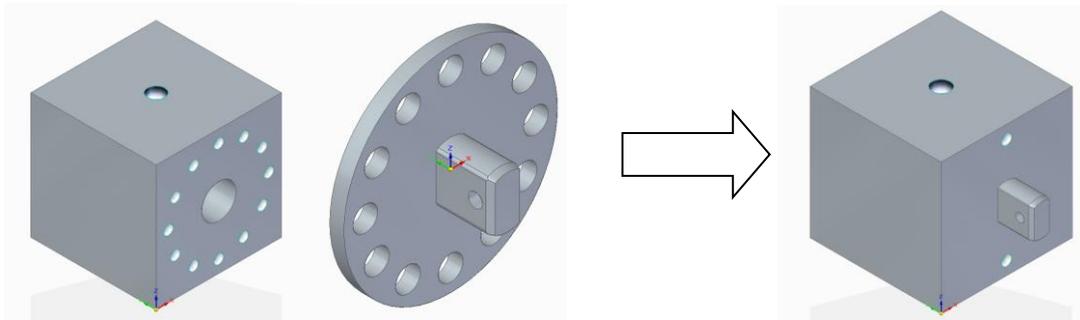


Figure 5 Merging two parts to reduce cost

Evidence 4

Project: ST750 (T400S) LV European Maintenance Socket

Duration: February 2018 – July 2018

Summary of the Activities Undertaken:

The addition of European mains sockets was requested by a customer to a particular range of the traffic controllers. Traffic controllers are normally supplied with sockets to match plugs used in the UK.

For the first stage of the project I was required to investigate what products would be affected if we were to re-work the existing BOMs and implement the European options directly into the standard build as a new variant of the controller. This option would require replicating and editing existing BOMs, creating new BOMs and assembly drawings. Following my review, it was determined that this method would have been labour intensive, so it was decided that I would create a kit of parts to fit alongside the existing assembly. For the European controllers, this kit would be wired to the mains power instead of the UK sockets. The UK sockets will be blanked over using a metal plate to cover the UK sockets.

For the second stage of the project I created the BOMs and drawings for the kit. The kit consisted of a mounting panel which would hold a socket box which would provide Schuko sockets. The kit supplies the necessary cabling to feed into the mains power coming into the controller cabinet and to earth the mounting panel.

Skills and Competencies covered:

Communication and Collaboration

To complete the project, I had to communicate clearly with the supplier to obtain samples of the sockets, face plate and back box. The sockets provided initially required crimped wires to retain the wire in the socket, this would result in higher manual labour costs as more work as required to prepare the cables. Following my conversation with the supplier, they were able to recommend more suitable sockets which used screw terminals to fit the wires. Refer to [Appendix A, Evidence 4, Communication and Collaboration](#) to view email interactions with the supplier.

Organisation and Planning

I was managing my time between multiple projects as described in Evidence 2 under "Organisation and Planning". I prioritised my tasks based the deadlines for each project and whether a delay in a particular project prevented other colleagues progressing with their work.

Digital Skills

I used Autodesk Inventor to create models and drawings. Microsoft Excel was utilised to draft and compare BOMs. I also re-worked an AutoCAD drawing and imported it into my drawing which was used to demonstrate how to install the assembly into the controller cabinet (refer to [Appendix A, Evidence 4, Digital Skills](#)).

Professional Conduct

While interacting with colleagues and suppliers I conducted myself professionally by introducing myself and clearly describing my needs and what information I required. I identified which colleagues were affected by the changes being introduced and updated them on the progress of the project.

Evidence 5

Event: Greenpower – Dunsfold Heat (STEM Volunteering)

Role: Marshal

Date: 10/09/17

Duration: 7 hours

Summary of the Activity Undertaken:

Greenpower is a racing competition where people between the ages of 9-25 build single-seater electric racing cars to compete at various venues. The objective is to produce an energy efficient car by taking into consideration factors such as weight and aerodynamics.

On the day, I volunteered to be a Marshal and assisted in running the event alongside a Siemens graduate and other volunteers. I was a scrutineer and conducted car inspections during the morning. As a scrutineer, I inspected cars to ensure they adhered to the regulations and were safe to compete. A blank inspection form is shown in [Appendix A, Evidence 5, Greenpower Scrutineering Checklist](#).

For the remainder of the day, I monitored the pit lane ensuring competitors were following the safety rules.

Skills and Competencies covered:

Communication and Collaboration

While inspecting the cars, I would communicate with the car owners as I completed the checklist. On occasion, I provided feedback on various aspects of the car especially when a regulation was not met advising on how it could be fixed.

Teamwork

I was volunteering within a team of volunteer marshals. I conducted the car inspections with a team member; we shared the responsibilities of checking through the checklist and physically taking measurements from the cars.

Professional Conduct

I arrived at the event on time and followed the site safety instructions. While interacting with the competitors, who were primarily children, I monitored my tone and was mindful of the safeguarding guidance I had received from previous experience volunteering with children.

Pictures are provided in [Appendix A, Evidence, Teamwork, Communication and Collaboration](#).

Evidence 6

Event: Gadget Factory (School Engagement)

Date: 22/06/2018

Duration: 8 hours

Summary of the Activity Undertaken:

I and 3 other volunteers from Siemens helped the Gadget Factory staff run workshops at Bournemouth University. Gadget Factory is a workshop created and delivered by Edinburgh International Science Festival and supported by Siemens. The purpose of the workshops was to build an LED badge that has eyes that flash. There were three choices for the children to build; snail, stegosaurus or fish. I assisted and monitored the children while they soldered components to the circuit board ensuring they were working safely. By the end of the day, we had taught 74 school children (over the course of 6 sessions) how to solder components onto a circuit board to build and complete their badges. Pictures are provided in [Appendix A, Evidence 6](#).

Skills and Competencies covered:

Communication and Collaboration

I communicated with the children, instructing them on what they needed to do and answering questions they had. Providing clear instructions was important as many had not soldered before and they had a limited time to complete the task especially as the aim was for the children to complete the task independently.

Teamwork

I volunteered alongside a member of the Gadget Factory staff, by working in pairs we took it in turns to deliver the instructions while the other paid closer attention to the children's technique and ensuring they were working safely.

Leadership Skills

I assisted in leading the workshop, ensuring I delivered instructions clearly, provided encouragement and praised good work. Towards the end of the session the children tested the badges with a battery. At this point, I and other volunteers would have to find the faults on any badges which were not working. The issue was typically resolved by tidying up the soldered joints.

Professional Conduct

I arrived at the event on time and followed the safety instruction throughout the day. While interacting with the children, I was enthusiastic and patient while being mindful of the safeguarding guidance I had received from previous experience volunteering with children. We were all DBS (Disclosure and Barring Service) checked and were given a health and safety briefing at the start of the day.

Evidence 7

Event: Year in Industry (6 Month Review)

Date: 01/05/2018

Duration: 1 hour

Summary of the Activity Undertaken:

My 6-month review was conducted by my line manager in the presence of my mentor from the EDT (Engineering Development Trust). Prior to the meeting I had completed the student review form, reflecting on my experience to date and the competencies I believe I had developed and improved (self-evaluation). My line manager completed the supervisor section of the review where I was assessed against various core competencies.

During the meeting, my mentor and I discussed my line manager's comments within the review form and any areas I could improve upon. My line manager then discussed my performance with my mentor which included discussions about submitting evidence for the Industrial Cadet.

The completed self-evaluation and supervisor review can be found in [Appendix A, Evidence 7](#).

Skills and Competencies covered:

Communication and Collaboration

My line manager, mentor and I discussed my performance over the first 6 months of the internship and I listened to the feedback received. The primary area for improvement was on document format and structure especially with installation instructions in a report format. With this format, the instructions are more descriptive and make use of images. This differs from installation and assembly drawings which tend to be more illustrative as the 3D models and views can be manipulated to create various viewpoint.

Organisation and Planning

I arranged the meeting time and date following discussions with my line manager and mentor. I then booked the meeting room.

Evidence 8

Event: Project Review Presentation (University Tutor Visit)

Date: 05/06/2018

Duration: 2 hours

Summary of the Activity Undertaken:

My internship with Siemens is a recognised part of my engineering degree course in mechanical engineering and as such various pieces of coursework are required to be completed. On the day, my university tutor visited the Siemens site and I delivered a presentation summarising one of the projects I had worked on. The project I chose to discuss was Plus+ (Evidence 2). I presented to my university tutor, line manager and supervisor.

Following the presentation, I gave a tour of the production facility.

Skills and Competencies covered:

Communication and Collaboration

I delivered a PowerPoint presentation (refer to [Appendix A, Evidence 8](#)). I ensured the presentation was structured with a logical order. The presentation began with an overview of the responsibility of my role within the mechanical/drawing office team, followed by a summary of the workflow of the department. Describing the workflow was important to effectively communicate the administrative aspects that are associated with preparing drawing etc. I then introduced the project I assisted on and what areas I contributed to; followed by feedback I had received from my supervisor before taking questions.

I understood that my university tutor did not have a technical background so the information presented was more illustrative.

Organisation and Planning

The time, date and location of the meeting were arranged by me following conversations with my line manager and university tutor.

Digital Skills

The presentation was created using Microsoft Office PowerPoint 2007.

Personal and Interpersonal Development

Through this exercise, I was able to practise and develop my verbal and non-verbal communication skills. Non-verbal elements of the presentation that I was able to practise include my body language, tone of voice and controlling the pace of the presentation.

While preparing the presentation I asked my supervisor for feedback on areas I could improve upon and anything I was doing well. The feedback was included within the slides (refer to [Appendix A, Evidence 8](#)) and has been extracted below:

"An area of improvement, and one that will develop naturally with experience, is determining the relevant stakeholders and which questions to ask to get the most from the dialogue.

A suggested tactic would be to note the salient points on a piece of paper beforehand and having those as a reference, so they are not forgotten. Another useful tactic with complicated or involved dialogue is to repeat received answers in summary form to ensure that they are completely understood. "

- Michael Silvey (Supervisor)

I found my supervisors feedback to be accurate and relevant to improving how I complete my work. He also suggested methods that I could use to improve, which I implemented with immediate effect.

Professional Conduct

I had to ensure the presentation did not contain sensitive information that should not be presented to external visitors. I requested my line manager and supervisor check a draft of the presentation beforehand. I also created the presentation using one of the company templates. In addition, I asked for permission to conduct the tour from the relevant stakeholders.

Evidence 9

Event: Poole Site Charity Quiz Trophy

Duration: March 2018 – April 2018

Summary of the Activity Undertaken:

An annual pub quiz is organised and held at our Siemens site. Teams of Employees enter the competition with the hope of winning the trophy while any proceeds are given to charity.

I was asked to assist in creating the trophy for this year's competition, which was held on the 19th of April. Typically, the trophy is designed to be a miniature version of a Siemens project and the product this year was a miniature version of a Siecore II camera. Siecore II is an Automatic Number Plate Recognition (ANPR) camera capable of observing three lanes of traffic. The camera can be used for tolling, monitoring low emission zones and for civil enforcement to monitor and record instances of dangerous driving. It was brought to market in 2018.

I reworked the CAD model a team member had prepared for a previous project. I hollowed out the model to provide space for the electronics, created slots on the inside in the front and rear position for the transparent Perspex and rear cover. I then used the on-site Makerbot 3D printer to print the camera housing.

I programmed the Arduino Micro which controlled the LEDs (Light-Emitting-Diodes) on the camera. The code allowed the LEDs to be in two states – an always "on" state or a "blinking" state. I tested the code using breadboard, the Arduino Micro and two LEDs.

Skills and Competencies covered:

Communication, Collaboration and Teamwork

The trophy was completed with assistance from a graduate hardware engineer, a senior hardware engineer and colleagues within the technical support team within production. The technical support team had the base machined, applied the stickers and eventually assemble the final trophy.

The hardware engineer designed the circuitry and soldered the components and wires onto some stripboard which would go into the body of the camera. The graduate hardware engineer assisted me with testing using breadboard and debugging the electronics on the stripboard. A team effort resulted in a working trophy ready for the competition.

Organisation and Planning

At the time, I was working on multiple projects alongside the trophy. I had to allocate time to learning to code, writing and testing the code. As the 3D print would take a combined 36 hours I set it up to work overnight and planned in a buffer to allow for another run if there were issues with the print. Planning was crucial as the date of the competition was fixed and fast approaching.

Critical Thinking and Problem Solving

Initially the plan was for the LEDs to have four modes. The four modes were an always on mode and three different patterns of flashing lights.

The code worked when testing with the breadboard but not when the Arduino was fitted to the stripboard. At this time only two of the four modes programmed into the Arduino worked. The graduate hardware engineer assisted with finding the fault on the stripboard using a multimeter. A fault with the wiring had caused one of the switches to always be on (live) affecting the "if", "and", "or else" statements within the code. This resulted in the conditions for two of the modes never being achievable. As a solution, the working switch remained while the other switch was rewired to act as a simple on/off switch. The code was adjusted to provide two modes; an always on and a constant paced blink.

Digital Skills

I used Autodesk Inventor to rework the 3D CAD model (refer to [Appendix A, Evidence 9, CAD Model](#)). The Arduino code (refer to [Appendix A, Evidence 9, Arduino Code](#)) was written within the accompanying Arduino software

Personal and Interpersonal Development

I coded my first Arduino by working on this project. It was interesting to think about the logic behind the code and what I wished the code to achieve.

Pictures of the final product can be found in [Appendix A, Evidence 9, Photographs](#).

Evidence 10

Project: RAG Node Connector Release Tool

Duration: July 2018 – August 2018

Problem:

The traffic signals being released as part of the Plus+ project ([Evidence 2](#)) contain a module within the body. On the module there are a row of connectors positions closely together (Figure 6). Each of these connectors corresponds to a LED light module (i.e. Red/Amber/Green) and on occasion will need to be disconnected if the light module needs replacing.

The connectors are difficult to remove by hand due to a lack of space within the signal body especially with the presence of cables. There is added difficulty as the work is conducted on top of ladders often in challenging weather conditions.

I was asked to design a tool which would aid field engineers with removing the connectors.

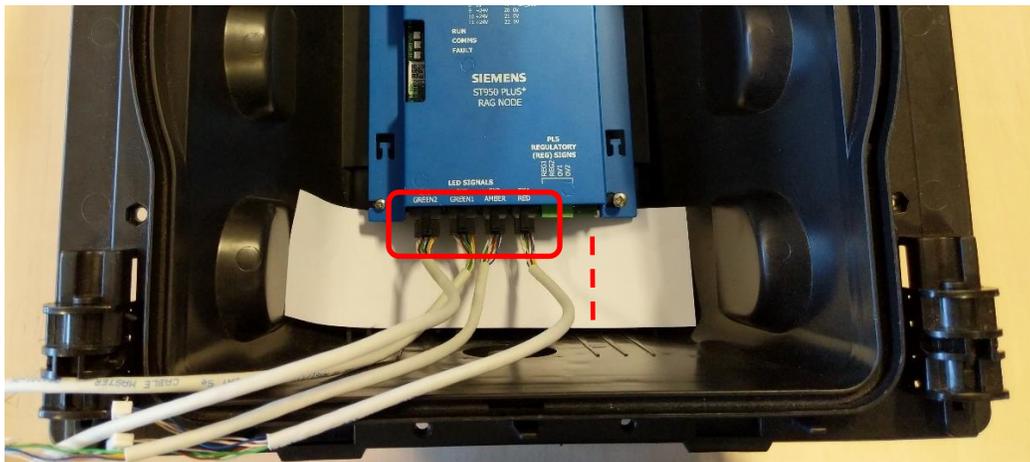


Figure 6 Row of connectors within the signal body (circled), dashed line represent acceptable length of concept 1 to allow enough space to pull the connector out

Summary of the Activities Undertaken:

I began the task by researching existing tools which are used to grip onto objects. This led me to the design of two concepts. Concept 1 effectively mimicked a pair of tweezers or a wheel nut removal tool (Figure 7) which is often supplied with cars. Concept 2 was a grabbing tool which grabbed the connector and was operated using a handle.



Figure 7 Wheel nut removal tool supplied with a Volkswagen

The iterative process of developing concept 1 and concept 2 is covered under “Creativity and Innovation”. Ultimately concept 2 was chosen as the better solution as it was cheaper to manufacture and more comfortable to use.

A working prototype was manufactured from stainless steel.

Skills and Competencies covered:

Career Motivation

The satisfaction gained from designing from scratch, sourcing additional components and achieving a working prototype has reinforced my desire to continue my development as a product engineer and continue design work.

Creativity and Innovation

The different iterations of concept 1 are shown in [Appendix A, Evidence 10, Creativity and Innovation](#). The tool was designed to grab hold of the connector while pushing the release latch down (Figure 8) before the operator pulled the connector out of the socket. The benefit of this design was it could be manufactured as a single part. The designs were 3D printed to better understand the ergonomics and practicality. Upon testing it became clear that such a small tool was troublesome to operate and position correctly onto the connector. Often the tool would slip during operation as the tabs on the connector were so small making it difficult to grip onto.

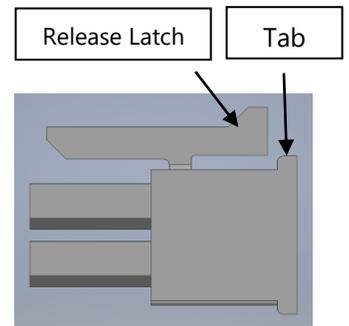


Figure 8 Side view of connector (3D model)

Concept 2 sat flush with the side of the connector during operation making it easy to position (see [Appendix A, Evidence 10, Creativity and Innovation](#)). Flanges engaged the bottom and top of the connector when the handle was squeezed. Two slots were used to allow the sliding motion and shoulder screws were used to reduce friction during sliding. In addition, a tab was added to the tool to allow the operators second hand to be used to slide the tool back open removing the need for a spring which would add cost. The disadvantages were the tool required assembly (additional cost) and operating the tool required both hands however this tool was easier to position and hold. Concept 2 was 3D printed and assembled using sample shoulder screws provided by one of our suppliers.

Communication and Collaboration

I discussed both concepts with my supervisor and line manger while testing and they suggested some changes I could make to better engage the release latch. In addition, I contacted our supplier to enquire about what shoulder screws they had in stock or could source. The supplier was prompt in sending different samples for testing.

Critical Thinking and Problem Solving

The primary challenge when designing concept 1 was ensuring the tool was short enough in length to provide enough space for pulling the connector out of its socket without making contact with the bottom of the body (refer to Figure 6 – dashed line). As the tool was to be manufactured from sheet metal, the bend allowance⁴ which adds some length due to stretching was a limiting factor. It is also difficult to produce small bends accurately especially on small parts without preparing jigs (increased cost). Injection moulding a plastic tool would overcome these challenges but result in a higher initial tooling cost. As the 3D printed models showed the tools was difficult to use, its development was put on hold.

The challenging aspect of designing concept 2 was fitting the tool in-between the limited space between adjacent connectors. The compromise if that was not possible was to remove every connector in the row starting from the left when one needed to be accessed. This was complicated by the presence of two variant of connector (a 6-way and an 8-way connector which was wider) which required the rectangle cut-out (Figure 9) which engaged the release latch further out. This increased the width of the flanges to accommodate both connector types. A thinner sheet of stainless steel was used to remedy this along with tweaking the dimensions of the upper flange.

This later concept 2 worked well, and I progressed this one to having two samples manufactured, which allowed me to demonstrate its full functionality to a representative of the engineers who would need to use the tool, this review concluded that it was an excellent aid to their activities and made the overall activity easier.

Digital Skills

The models and drawings were created using Autodesk Inventor (see [Appendix A, Evidence 10, Digital Skills](#)).

Decision Making

The 3D printed prototypes demonstrated the practicality of both concepts. It became clear that concept 2 was easier to use and so I decided to put the development of concept 1 on hold and focus on concept 2 which ultimately worked. Concept 2 was easier to manufacture, and further steps could be taken to simplify its assembly.

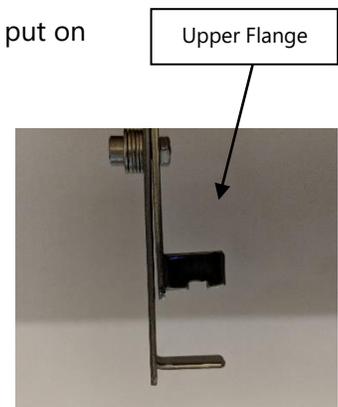


Figure 9 Rectangle cut-out at the base of the tool for engaging the release latch (Concept 2)

⁴ Bend allowance is the length of the arc produced during bending.

Personal Development

I developed my ideas from concept through to a final solution. I conducted tests to evaluate my designs and communicated with a supplier outlining my needs. I practiced talking on the phone during my contact with the supplier. This project demonstrated my growth and learning over the year.

Evaluation of Placement

I have benefitted greatly from being able to contribute to large project within the department as the need for additional resource has presented itself. This has led to good variety, and an opportunity to work on many of the key products which has helped me understand the wider traffic management system. Not having a tailored or rigid programme has been beneficial as I have been able to assist on real projects in a more organic work environment where issues arise, and deadlines change. The knowledge I have gained is much deeper due to being able to apply my new knowledge immediately within other projects and I could progressively see myself working more independently.

My time on the Plus+ project was brilliant as I have witnessed some of the project management and tracking aspects of the project alongside the documentation phase which I contributed to. My work during the placement has predominantly been on preparing assembly and installation drawings. By doing such work I have been able to develop my understanding of good assembly workflows and how to design components for much simpler assembly. By engaging with the on-site production facility, I have a greater understanding of how such a facility may be setup and why an engineering (design) decision may conflict with the practicality of assembling a product. Although an aspect of a design may be innovative it can be difficult to implement into an assembly workflow including logistical aspects like storing components on the shop floor.

I have been grateful for the feedback I have received on my work especially on the detailed drawings I have prepared for manufacture while working on the Greenpower steering and brake mounts. The feedback has aided my understating of best practices when annotating and dimensioning drawings in addition to controlling the tolerance of dimensions. This had been reinforced by the site visits to the manufacturer.

Experience and exposure to manufacturing processes was something I was lacking at the start of my placement. Over the course of the year, I have sat in meeting with suppliers and on one occasion an injection moulding company (Avalon) who demonstrated how they design and validate moulds for their customers. In that time, I have visited two sheet metal manufacturers. The site visits to the two manufacturers was great because I was able to observe their machines in operation and ask questions about how they work with the drawings provided.

While creating the annual pub quiz trophy, which was a miniature Siecore II camera, I programmed an Arduino Micro for the first time and tested the code and circuitry using breadboard. Siecore II is an Automatic Number Plate Recognition (ANPR) camera designed by Siemens recently brought to market. To create the top of the trophy I used the on-site Makerbot 3D printer. In addition, I have volunteered at two Siemens sponsored events alongside colleagues and have helped school children with 3D modelling during their work experience at Siemens.

Overall, the experience gained during the placement has been invaluable. I have been able to demonstrate, to myself, that I can perform within an engineering environment, utilise the knowledge from my university degree and grow in areas outside of mechanical engineering. The experience has given me the confidence to design and manufacture components and engage with manufacturers.

Line Manager Comments

Junedul quickly adapted to our business processes, becoming competent in new tool chains rapidly, and thus very quickly became a valuable member of the team, contributing significantly to real company projects.

It was very pleasing to see Junedul grow in confidence and be able to refine his capabilities, it gave everyone the confidence to allow him to tackle complex and important tasks for the business, knowing that they would be handled professionally and competently.

As can be seen from some of the STEM activities, Junedul readily worked with others to encourage them in to developing engineering skills, and volunteered his own time to do so, which was great to see.

I can confirm that what is described in this document is an accurate record of just some of the activities undertaken by Junedul in his placement.

Signature: 

Date: 18/09/2018

Mentor Comments

Junedul has been employed as a Year-in-Industry student since September 2017 and I have been his EDT mentor for this placement. During this time, he has experienced many different aspects of working in an engineering team and has personally developed both in his knowledge of engineering and in working life skills. In his mid-year review he scored very well across all competence areas and was assessed as "excellent" in many of them. I can testify that he is a very conscientious person and, in my opinion, fully deserving of an Industrial Cadet award.

After reviewing this document with Junedul and his line manager, I am satisfied that it is an accurate and representative submission.

Signature: 

Date: 3rd Oct 2018

Appendix A – Supporting Material (Evidence)

Evidence 2 – Plus+ Supporting Material

Communication and Collaboration

Finalising a fixing with supplier and gathering information such as RoHS (Restriction of Hazardous Substance) declaration and manufacturer part number to able to create a Siemens part number.

Shahid, Junedul (MO RC-GB MM-ITS TS PR)

From: Robin Danks [robind@trfastenings.com]
Sent: 17 April 2018 10:45
To: Shahid, Junedul (RC-GB MO MM-ITS TS PR)
Subject: RE: screws for Camden Boss enclosure

Hi ya

The part number will be, N6 0.375 PA260 SF.

Robin

From: Shahid, Junedul [mailto:junedul.shahid@siemens.com]
Sent: 17 April 2018 10:41
To: Robin Danks <robind@trfastenings.com>
Cc: Silvey, Michael <michael.silvey@siemens.com>
Subject: RE: screws for Camden Boss enclosure

Hi

Thanks.

Are you able to give me a “manufacturer part number” for this fixing or create a new number? – I don’t think I can point our system to the Steel variant (TR00032551-103) as we are ordering Stainless Steel versions. This will be important to avoid messing up future orders.

With best regards,
Junedul Shahid
Mechanical Design Intern

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From: Robin Danks [mailto:robind@trfastenings.com]
Sent: 17 April 2018 10:28
To: Shahid, Junedul (RC-GB MO MM-ITS TS PR)
Cc: Silvey, Michael (RC-GB MO MM-ITS TS PR)
Subject: RE: screws for Camden Boss enclosure

Hi ya

Please follow the link below for the spec.

<https://www.trfastenings.com/products/Catalogue/Fasteners-for-Plastic/Screws-for-Plastic/Plas-Fix-60/Pan-Head/TR00032551-103>

Amended quote attached.

Robin

From: Shahid, Junedul [<mailto:junedul.shahid@siemens.com>]
Sent: 17 April 2018 10:06
To: Robin Danks <robind@trfastenings.com>
Cc: Silvey, Michael <michael.silvey@siemens.com>
Subject: RE: screws for Camden Boss enclosure

Hi Robin

Can you add a comment to the quote to say something along the lines of "The quoted item is ROHS compliant"

Also, I am struggling to find a datasheet for the part, probably because it is made to order. Can you provide a datasheet for our records.

With best regards,
Junedul Shahid
Mechanical Design Intern

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From: Robin Danks [<mailto:robind@trfastenings.com>]
Sent: 17 April 2018 08:51
To: Silvey, Michael (RC-GB MO MM-ITS TS PR)
Cc: Shahid, Junedul (RC-GB MO MM-ITS TS PR); Edbrooke, Dave (RC-GB MO MM-ITS OPS MFG TECH PROD)
Subject: RE: screws for Camden Boss enclosure

Good Morning Michael,

Please find your quotation attached.

Robin

From: Silvey, Michael [<mailto:michael.silvey@siemens.com>]
Sent: 16 April 2018 11:52
To: Robin Danks <robind@trfastenings.com>
Cc: Shahid, Junedul <junedul.shahid@siemens.com>; Edbrooke, Dave <dave.edbrooke@siemens.com>
Subject: screws for Camden Boss enclosure

Hi Robin,

The screws you sent me are great, we would like to opt for the plastech 60 no.6x3/8. Can you confirm if these can be made available in stainless steel? If so can you advise a part number and lead time?

With best regards,
Michael Silvey

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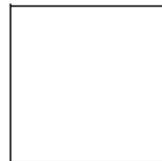
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Below is a conversation between a colleague and me regarding information for a label and procurement specification. The label was my responsibility while the procurement specification was passed onto another colleague who was in charge of it.

Shahid, Junedul (MO RC-GB MM-ITS TS PR)

From: Anderson, David (RC-GB MO MM-ITS TS PR)
Sent: 09 May 2018 11:46
To: Shahid, Junedul (RC-GB MO MM-ITS TS PR)
Subject: RE: REG sign label

Thanks for letting me know

From: Shahid, Junedul (RC-GB MO MM-ITS TS PR)
Sent: 09 May 2018 11:38
To: Anderson, David (RC-GB MO MM-ITS TS PR)
Subject: RE: REG sign label

Hi

The RFC raised for the procurement spec. is [TS008870](#)

I think I have detailed everything required.

With best regards,
J

From: Anderson, David (RC-GB MO MM-ITS TS PR)
Sent: 09 May 2018 11:10
To: Dennison, Mark (RC-GB MO MM-ITS TS PR); Shahid, Junedul (RC-GB MO MM-ITS TS PR)
Subject: RE: REG sign label

As long as this is in the RFC it will be carried across to the document update !

From: Dennison, Mark (RC-GB MO MM-ITS TS PR)
Sent: 09 May 2018 11:06
To: Shahid, Junedul (RC-GB MO MM-ITS TS PR)
Cc: Anderson, David (RC-GB MO MM-ITS TS PR)
Subject: RE: REG sign label

Yes, it does affect that figure. A short wire loop is connected from RETURN to the middle terminal block connection, on the right hand side of the terminal block as shown in the figure, using the same 7/0.2 Black/grey wire type as the RETURN wire going to the LED strips. This connects the metal plate to 0V.

Best regards,

Mark Dennison
Senior Product Development Engineer

From: Shahid, Junedul (RC-GB MO MM-ITS TS PR)
Sent: 09 May 2018 10:43

To: Dennison, Mark (RC-GB MO MM-ITS TS PR)
Subject: RE: REG sign label

Hi

What does "documenting a wiring change to connect RETURN to the middle terminal block pin on the 'inside' terminal block connections." Mean with regards to the passage below.

Does it affect the figure below found in the SG document?

<< OLE Object: Picture (Device Independent Bitmap) >>

Please note: the wiring between the RAG node and REG sign internal illumination will be specified on a different drawing.

With best regards,
J

From: Dennison, Mark (RC-GB MO MM-ITS TS PR)
Sent: 08 May 2018 14:30
To: Shahid, Junedul (RC-GB MO MM-ITS TS PR)
Cc: Anderson, David (RC-GB MO MM-ITS TS PR)
Subject: RE: REG sign label

Hi J,

There has been a change to the labeling requirement, where the earth symbol must be removed from the middle connection (leave the middle unlabelled).

There is also an error on the label drawing which I hadn't spotted before – the connection on the left must be labeled 'POWER+' and the connection on the right must be labeled 'RETURN' and not 'POWER'.

These corrections are needed on the 667/SG/33510/000 also (section 23.2), as well as documenting a wiring change to connect RETURN to the middle terminal block pin on the 'inside' terminal block connections. The /SG/ also needs to be raised a Meridian issue to match the Rev 5 within the /SG/ document, or raised 2 issues in Meridian if these changes force an increase of the /SG/ itself to Rev 6. If we do go to Rev 6, that also affects 667/7/53512/000 which calls up the /SG/ and currently specifies the revision as 5.

Best regards,

Mark Dennison
Senior Product Development Engineer

From: Shahid, Junedul (RC-GB MO MM-ITS TS PR)
Sent: 08 May 2018 14:08
To: Dennison, Mark (RC-GB MO MM-ITS TS PR)
Subject: REG sign label

Hi

Can you just confirm the power ratings on this label are correct for plus+ variants of Reg sign?

<< OLE Object: Picture (Device Independent Bitmap) >>

With best regards,
Junedul Shahid
Mechanical Design Intern

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Below, I am arranging for samples that would hopefully replace existing connectors which were labour intensive to use. These alternative connectors ended up being too expensive.

Shahid, Junedul (MO RC-GB MM-ITS TS PR)

From: Whipps, Colin (RC-GB MO MM-ITS CS OS ENG)
Sent: 08 May 2018 11:00
To: Shahid, Junedul (RC-GB MO MM-ITS TS PR)
Subject: RE: Alternative PSU connectors to WAGO

Awesome :o)

Best regards

Colin

Tel: 01202 782875
Mob: 07808 822177

From: Shahid, Junedul (RC-GB MO MM-ITS TS PR)
Sent: 08 May 2018 10:59
To: Whipps, Colin (RC-GB MO MM-ITS CS OS ENG)
Subject: RE: Alternative PSU connectors to WAGO

Yes

I've sent the request to Peter Addison this morning.

With best regards,
Junedul Shahid
Mechanical Design Intern

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From: Whipps, Colin (RC-GB MO MM-ITS CS OS ENG)
Sent: 08 May 2018 10:58
To: Shahid, Junedul (RC-GB MO MM-ITS TS PR)
Cc: Atkinson, Neil (RC-GB MO MM-ITS TS PR); Dennison, Mark (RC-GB MO MM-ITS TS PR); Silvey, Michael (RC-GB MO MM-ITS TS PR)
Subject: RE: Alternative PSU connectors to WAGO

Hi Junedul,

Are you organising this?

Best regards

Colin

Tel: 01202 782875
Mob: 07808 822177

From: Dennison, Mark (RC-GB MO MM-ITS TS PR)
Sent: 04 May 2018 13:50
To: Whipps, Colin (RC-GB MO MM-ITS CS OS ENG); Shahid, Junedul (RC-GB MO MM-ITS TS PR); Silvey, Michael (RC-GB MO MM-ITS TS PR)
Cc: Atkinson, Neil (RC-GB MO MM-ITS TS PR)
Subject: RE: Alternative PSU connectors to WAGO

I suggest just samples and prices at this stage?

Best regards,

Mark Dennison
Senior Product Development Engineer

From: Whipps, Colin (RC-GB MO MM-ITS CS OS ENG)
Sent: 04 May 2018 13:12
To: Dennison, Mark (RC-GB MO MM-ITS TS PR); Shahid, Junedul (RC-GB MO MM-ITS TS PR); Silvey, Michael (RC-GB MO MM-ITS TS PR)
Cc: Atkinson, Neil (RC-GB MO MM-ITS TS PR)
Subject: RE: Alternative PSU connectors to WAGO

I agree it would be good to see some samples. I believe the new Harting contact is Peter Addison peter.addison@HARTING.com would you like me to set up a meeting or would you just prefer samples of the products shown?

<< Message: HARTING update >>

Best regards

Colin

Tel: 01202 782875
Mob: 07808 822177

From: Dennison, Mark (RC-GB MO MM-ITS TS PR)
Sent: 04 May 2018 12:59
To: Shahid, Junedul (RC-GB MO MM-ITS TS PR); Silvey, Michael (RC-GB MO MM-ITS TS PR); Whipps, Colin (RC-GB

MO MM-ITS CS OS ENG)
Cc: Atkinson, Neil (RC-GB MO MM-ITS TS PR)
Subject: RE: Alternative PSU connectors to WAGO

Hi J,

I believe these are interesting if they fit with plastic hoods e.g. 19 20 003 0720 and 19 20 003 0420. With a total mated length of 120mm I don't think the solution is much smaller, but if it's easier to put together or generally nicer to use – and cost competitive – it could be better.

Some samples would be needed as a next step, as well as a pricing comparison. I believe we would need the screw type as their crimp tool is probably very expensive.

Best regards,

Mark Dennison
Senior Product Development Engineer

From: Shahid, Junedul (RC-GB MO MM-ITS TS PR)
Sent: 04 May 2018 12:09
To: Silvey, Michael (RC-GB MO MM-ITS TS PR); Dennison, Mark (RC-GB MO MM-ITS TS PR); Whipps, Colin (RC-GB MO MM-ITS CS OS ENG)
Cc: Atkinson, Neil (RC-GB MO MM-ITS TS PR)
Subject: Alternative PSU connectors to WAGO

Hi

Harting have replied back with the following datasheets to look at (I've copied their reply below),

"The options are Crimp or Axial Screw. Axial Screw is a termination that requires the use of Class 5 Fine Stranded Wire, video to show the termination below:

<< File: Han Q2.pdf >>

<https://www.youtube.com/watch?v=iEdY0w2nwhg>

Crimp Tool if required:

<https://b2b.harting.com/ebusiness/en/Crimping-Tool-Han-C-4-6-10-mm2/09990000377>

These inserts will need to be located in a hood and housing.

I have attached some standard options for your consideration as there are a few options being metal or plastic and then cable entry size and top or side entry?"

<< File: Han 3A Hood and Housing Options.pdf >>

I will go through the datasheets but I thought it would be better to get everyone involved due to my limited experience in electronics. I'm still waiting for prices.

With best regards,
Junedul Shahid
Mechanical Design Intern

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I was asked to arrange for the cost of work to be calculated for 2 different cable assemblies. To do this I had to create the drawings and BOMs, and then explain to a colleague within production the labour involved so they could calculate the time element of the total cost to build the assemblies.

Shahid, Junedul (MO RC-GB MM-ITS TS PR)

From: Dennison, Mark (RC-GB MO MM-ITS TS PR)
Sent: 04 June 2018 17:24
To: Shahid, Junedul (RC-GB MO MM-ITS TS PR); Brocklehurst, Dave (RC-GB MO MM-ITS TS PR); Silvey, Michael (RC-GB MO MM-ITS TS PR); Whipps, Colin (RC-GB MO MM-ITS CS OS ENG)
Cc: Martin, Dave (RC-GB MO MM-ITS TS PR); Atkinson, Neil (RC-GB MO MM-ITS TS PR)
Subject: RE: Plus+ Cables assys

Hi J,

Yes I think it is acceptable. I expect any alternative would be a similar price. We could knock a few pounds off using a subcontractor but best to support the factory on this one. I suggest we go ahead.

Best regards,

Mark Dennison
Senior Product Development Engineer

From: Shahid, Junedul (RC-GB MO MM-ITS TS PR)
Sent: 04 June 2018 15:18
To: Dennison, Mark (RC-GB MO MM-ITS TS PR); Brocklehurst, Dave (RC-GB MO MM-ITS TS PR); Silvey, Michael (RC-GB MO MM-ITS TS PR); Whipps, Colin (RC-GB MO MM-ITS CS OS ENG)
Cc: Martin, Dave (RC-GB MO MM-ITS TS PR); Atkinson, Neil (RC-GB MO MM-ITS TS PR)
Subject: FW: Plus+ Cables assys
Importance: High

Hi

As requested, attached is the cost breakdown of building both sides of the PSU loom using WAGO connectors.

667/1/53095/000 PLUS+ PSU-SIDE LOOM @ £6.60 each works cost

667/1/53096/000 PLUS+ PSU CABINET-SIDE LOOM @ £5.60 each works cost

Is the cost acceptable and can I move forward with finalizing the drawings and BOMs?

With best regards,
Junedul

From: Ketchley, Colin (RC-GB MO MM-ITS OPS MFG TECH EST)
Sent: 31 May 2018 14:48
To: Shahid, Junedul (RC-GB MO MM-ITS TS PR)
Subject: RE: Plus+ Cables assys

Take II

Sorry about that, amended as required:

667/1/53095/000 PLUS+ PSU-SIDE LOOM @ £6.60 each works cost

667/1/53096/000 PLUS+ PSU CABINET-SIDE LOOM @ £5.60 each works cost

Based on draft issue Eng BoMs supplied.

Revised cost breakdowns as attached.

Regards
Colin Ketchley

Siemens plc
MO MM OP PLE BA
Sopers Lane
Poole BH17 7ER, United Kingdom
Tel.: +44 1202 782297
<mailto:colin.ketchley@siemens.com>

From: Shahid, Junedul (RC-GB MO MM-ITS TS PR)
Sent: 31 May 2018 11:05
To: Ketchley, Colin (RC-GB MO MM-ITS OPS MFG TECH EST)
Subject: RE: Plus+ Cables assys

Hi

Thank you but I think there are some mistake?

2	MALE SOCKET CONNECTOR 3 WAY PITCH 10MM	531/4/04176/003	1 PC
2	CONNECTOR PLUG 3 POLE 250V 25A	531/4/04218/003	1 PC

The above parts are not used and the retaining clip (Wago 770-101) is missing from your quote (please refer to the attached spreadsheets or pictures below).

Below are the parts we plan to use but don't have Siemens part numbers for – there's a bit more labor required as we need to fit the housing over the connector and screw it down. Please refer to the attached GA drawings. The cost in my spreadsheets is what Wago quoted per part.

Item Number	Component number	Object description	Qty	Component unit
	667/1/53095/000	PLUS+ PSU-SIDE LOOM		
0001	Wago 770-113	CONNECTOR PLUG 3 POLE - Female with strain relief	1	PC
0002	Wago 770-101	Retaining Clip	1	PC

Item Number	Component number	Object description	Qty	Component unit
	667/1/53096/000	PLUS+ PSU CABINET-SIDE LOOM		
0001	Wago 770-103	MALE SOCKET CONNECTOR 3 WAY PITCH - Male with Strain Relief	1	PC

Thank you

With best regards,
Junedul Shahid
Mechanical Design Intern

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From: Ketchley, Colin (RC-GB MO MM-ITS OPS MFG TECH EST)
Sent: 31 May 2018 10:49
To: Shahid, Junedul (RC-GB MO MM-ITS TS PR)
Subject: Plus+ Cables assys

Junedul,

667/1/53095/000 PLUS+ PSU-SIDE LOOM @ £5.65 each works cost

667/1/53096/000 PLUS+ PSU CABINET-SIDE LOOM @ £4.70 each works cost

As SAP draft issue BoMs released Jan 18 (valid from Jan 2038)

Cost breakdowns as attached.

Regards
Colin Ketchley

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Teamwork

Before leaving for holiday, I handed over some work I was unable to complete. On my return I followed up on the progress of the new part numbers which were requested.

Shahid, Junedul (MO RC-GB MM-ITS TS PR)

From: Churchill, Genette (MO RC-GB MM-ITS OPS TECH 1)
Sent: 28 June 2018 13:43
To: Shahid, Junedul (MO RC-GB MM-ITS TS PR)
Subject: RE: +ESS50 for WAGO PSU connectors

Apologies Junedal, that would have been me; we use the standard text in partfinder for descriptions and I believe I was looking at a 4way – all now amended.

Kind regards

Genette

From: Shahid, Junedul (MO RC-GB MM-ITS TS PR)
Sent: 28 June 2018 13:38
To: Churchill, Genette (MO RC-GB MM-ITS OPS TECH 1)
Subject: RE: +ESS50 for WAGO PSU connectors
Importance: High

Hi

Apologies, there seems to have been a mistake on the ess50 for 531/4/04176/103. It should read "3 way" not 4 way. Not sure what happened as I didn't fill in the ess50 but the actual part is a 3-way and the datasheet reflects that so all that needs changing is the description in SAP.

Thank you.

With best regards,
Junedul Shahid
Mechanical Design Intern
RC-GB MO MM-ITS TS PR

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From: Churchill, Genette (MO RC-GB MM-ITS OPS TECH 1)
Sent: 28 June 2018 10:55
To: Shahid, Junedul (MO RC-GB MM-ITS TS PR)
Subject: RE: +ESS50 for WAGO PSU connectors

Hi Junedal,

New part no.s have been created as follows:

531/4/04176/113 – 770-113
531/4/04176/101 – 770-101
531/4/04176/103 – 770-103

Kind regards,

Genette

From: Shahid, Junedul (MO RC-GB MM-ITS TS PR)
Sent: 27 June 2018 15:14
To: Churchill, Genette (MO RC-GB MM-ITS OPS TECH 1)
Subject: FW: +ESS50 for WAGO PSU connectors
Importance: High

Hi

Have you had a chance to complete the below request?

Their part numbers are needed urgently for a plus+ release – thank you

With best regards,
Junedul Shahid
Mechanical Design Intern
RC-GB MO MM-ITS TS PR

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From: Silvey, Michael (MO RC-GB MM-ITS TS PR)
Sent: 22 June 2018 09:54
To: Churchill, Genette (MO RC-GB MM-ITS OPS TECH 1)
Cc: Shahid, Junedul (MO RC-GB MM-ITS TS PR); Atkinson, Neil (MO RC-GB MM-ITS TS PR)
Subject: +ESS50 for WAGO PSU connectors
Importance: High

Hi Genette,

Can you please create these part numbers for Junedul? Info attached.

<< File: WAGO 770-113.xls >> << File: WAGO 770-101.xls >> << File: WAGO 770-103.xls >>

<< File: 770-113.pdf >> << File: 770_113.pdf >>

<< File: 770-103.pdf >> << File: 770_103.pdf >>

<< File: 770-101.pdf >> << File: 770_101.pdf >>

With best regards,
Michael Silvey
Lead Product Engineer

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<< OLE Object: Picture (Device Independent Bitmap) >>

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From: Shahid, Junedul (MO RC-GB MM-ITS TS PR)
Sent: 22 June 2018 08:19
To: Atkinson, Neil (MO RC-GB MM-ITS TS PR)
Cc: Silvey, Michael (MO RC-GB MM-ITS TS PR)
Subject: FW: Handover +ESS50 for WAGO PSU connectors
Importance: High

Hi Neil

Would you be able to copy the ESS50 data from the below spreadsheets into the latest ESS50 form (EXPRESS) and send the new request to Genette.

The below ESS50's weren't sent to her in time.

They are for the WAGO PSU and will be urgent for next week's release

With best regards,
J

From: Shahid, Junedul (MO RC-GB MM-ITS TS PR)
Sent: 08 June 2018 16:41
To: Silvey, Michael (MO RC-GB MM-ITS TS PR)
Subject: Handover +ESS50 for WAGO PSU connectors

Hi

Attached are the ESS50 requests for the WAGO parts used on PSU to be sent to Genette with a booking number

Tasks I was unable to start are:

- Palette
- Cable loom – 667/1/53174/000 (drawing notes on my desk)
- The Autocad drawings for 667/GA/53010/ETC and 667/GA/53015/ETC relating to Plus+ cabinet with no stool

With best regards,
Junedul Shahid
Mechanical Design Intern
RC-GB MO MM-ITS TS PR

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Organisation and Planning (Project Management/Action Planning)

Product Description

Actions Required

New Part Numbers

Task Assigned to Members of the Team ("JIS" – are my initials)

Additional Comments or Actions

Status of the Individual Components of the Task (e.g. "READY FOR REVIEW")

Product Category

Category	Description	Action	Part No.	RFC	Assigned To	Comments	BOM Top Level No.	Part No.	BOM	Action Stat	Drawing/ BOM checked	Drawing Released - Yes/Rejected
ByPass Module	PLUSP BYPASS MODULE COVER		667/2/53195/000	TS008501	NRA		667/2/53195/000	In SAP	Sub Full	READY FOR REVIEW	Y	Y
ByPass Module	PLUSP BYPASS MODULE COVER ARTWORK		667/MA/53195/000	TS008501	NRA		667/6/53016/000	In SAP	Sub Full	READY FOR REVIEW	Y	Y
ByPass Module	Plus+ Bypass Module Ribbon Cable		667/7/53022/000	TS008501	JIS	Check if drawing is complete	667/1/53000/ETC	In SAP	Sub Full	READY FOR REVIEW	Y	Y
ByPass Module	BYPASS RAG MODULE ASSY	Create BOM with PCB, cover, 6 core cable, ribbon cable, fixings	667/1/53194/000	TS008501	JIS	ADD TO RFC Etch drawing? IS THE CONNECTOR ON RIBBON CABLE CHANGING TO A PUSH ON	Top Lv	In SAP	Complete	READY FOR REVIEW	Y	Y
ByPass Module	BYPASS RAG MODULE ASSY	GA drawing	667/GA/53194/000	TS008501	JIS	ADD TO RFC Etch drawing?	667/1/53194/000	In SAP	Complete	READY FOR REVIEW	Y	Y
ByPass Module	PLUS+ DROPPER CABLE (6 CORE, NON-ARM)		667/7/53192/000	TS008501	JIS	CREATE BLANK SPEC DRAWING UNTIL INFO IS CONFIRMED	In SAP	In SAP	Edit	IN PROGRESS	Y	
PCaTS	PLUS+ HELIOS PCaTS ASSY	Create BOM	667/1/53129/000	TS008779	JIS	Side mount only. Copy 667/1/52500/100.	Top Lv	In SAP	Complete	READY FOR REVIEW	Y	Y
PCaTS	PLUS+ HELIOS PCaTS ASSY	Create GA	667/GA/53129/000	TS008779	JIS	Copy 52500 GA, without Peek	667/1/53129/000	In SAP	Complete	READY FOR REVIEW	Y	Y
PCaTS	PLUS+ PCaTS INSTALLATION DETAILS	Create CI	667/CI/53129/000	TS008779	JIS	Copy 667/CA/52500 but without Peek PCB-Rain Cover-Rivets. Added all items into pcb - 667/1/53131/001	In SAP	In SAP	Complete	READY FOR REVIEW	Y	Y
PCaTS	DO NOT USE PLUS+ PCaTS ADAPTER ASSY	Create BOM	667/1/53520/000	JIS	JIS	Send out copy to pcb cell to be included with pcb GA.	In SAP	In SAP	Complete	READY FOR REVIEW	Y	Y
PCaTS	DO NOT USE PLUS+ PCaTS ADAPTER ASSY	Create GA	667/GA/53520/000	JIS	JIS		In SAP	In SAP	Complete	READY FOR REVIEW	Y	Y
PCaTS	Plus+ PCaTS Adapter PCB	Get the part number from Carl	667/1/53131/001	CAD2091-6	JIS		667/1/53129/000	In SAP	Complete	READY FOR REVIEW	Y	Y
PCaTS	PLUS+ PCaTS ADAPTER PCB RAIN COVER		667/2/53525/000	TS008779	JIS	Check this is ok to be assembled in the pcb cell.	667/5/53131/001	In SAP	Complete	READY FOR REVIEW	Y	Y
PCaTS	PLUS+ PCaTS ADAPTER TO PCaTS LOOM	Get details from Carl and set up drawing	667/1/53521/000	TS008779	JIS	9 Way on the PCaTS adapter to PCaTS PCB	667/1/53129/000	In SAP	Complete	READY FOR REVIEW	Y	Y
PCaTS	PLUS+ PCaTS ADAPTER TO PCaTS LOOM	Get details from Carl and set up drawing	667/GA/53521/000	TS008779	JIS	9 Way on the PCaTS adapter to PCaTS PCB	667/1/53521/000	In SAP	Complete	READY FOR REVIEW	Y	Y
PCaTS	PLUS+ PCaTS R/G ADAPTER MONITOR LOOM	Get details from Carl and set up drawing	667/1/53520/000	TS008779	JIS	Red & Green signal plug to socket adapter with adapter board monitor plug soldered	667/1/53129/000	In SAP	Complete	READY FOR REVIEW	Y	Y
PCaTS	PLUS+ PCaTS R/G ADAPTER MONITOR LOOM	Get details from Carl and set up drawing	667/GA/53522/000	TS008779	JIS	Red & Green signal plug to socket adapter with adapter board monitor plug soldered	667/1/53522/000	In SAP	Complete	READY FOR REVIEW	Y	Y
PCaTS	PLUS+ PCaTS POWER SUPPLY AND I/O LOOM	Get details from Carl and set up drawing	667/1/53523/000	TS008779	JIS	RAG Node to PCaTS Adapter board. 22-way is I/O Control. 4 way is power	667/1/53129/000	In SAP	Complete	READY FOR REVIEW	Y	Y
PCaTS	PLUS+ PCaTS POWER SUPPLY AND I/O LOOM	Get details from Carl and set up drawing	667/GA/53523/000	TS008779	JIS	RAG Node to PCaTS Adapter board. 22-way is I/O Control. 4 way is power	667/1/53523/000	In SAP	Complete	READY FOR REVIEW	Y	Y
PCaTS	PLUS+ PCaTS RATING LABEL		667/2/53524/000	TS008779	JIS	See 667/2/52527/000	667/1/53129/000	In SAP	Complete	READY FOR REVIEW	Y	Y
PCaTS	RED NYLON SPACER		999/4/44425/000	JIS	JIS	Spacer reduces bend in board	In SAP	In SAP	Complete	READY FOR REVIEW	Y	Y
Secret Sign						Do we need to create Family Tree as there currently list one for other Helios types						
Family Tree (DZ)	PLUSP HELIOS FAMILY TREE		667/DZ/53500/ETC									
RAG	PLUSP HELIOS ASSY	Copy 667/GA/33500/ETC and update for Plus+ equipment/cable routing etc. Update to include Plus+ CLS units, RAG node & ByPass Module	667/GA/53500/ETC	TS008735	JIS	Covers all RAG assy's + side mounted doors	667/1/53000/ETC	In SAP	Complete	READY FOR REVIEW	Y	Y
RAG	PLUS+ HELIOS RAG NO HDS/BB		667/1/53500/850	TS008735	JIS	RAG Basic Assy	n/a	In SAP	Complete	READY FOR REVIEW	Y	Y

Digital Skills

SAP provides a series of tools for managing business operations from financial management to customer service and sales and distribution. The tools within SAP I utilised were to create part number, up-issue the revisions of part number, which would be associated with a change number for tractability and create and edit BOMs (Bill-of-Materials).

Item Numbers Relate to Balloons
on the Assembly Drawing

The screenshot shows the SAP 'Material BOM' interface. The title bar reads 'Material BOM Edit Goto Extras Settings Environment System Help'. Below the title bar is a toolbar with various icons. The main content area is titled 'Display BOM Level by Level'. It displays the following information:

Material 667/1/53185/000
Plant/Usage/Alt. 73H4 / E / 01
Description PLUS+ REDUNDANCY MODULE ASSY NO CABLES
Base Qty (PC) 1
Reqd Qty (PC) 1

Document
Doc. Version

Lv	Item	Ob...	Component number	Object description	Ovfl	Qty (CUn)	Un	Asm	Reqmnt	Segment	Stock Segment
	1	0001	667/1/53180/001	REDUNDANCY MODULE PCB ASSY ----- PLUS+		1	PC	<input checked="" type="checkbox"/>			
1	0002		915/4/10434/000	ENCLOSURE BOX DIN RAIL POLYCARBONATE		1	PC	<input type="checkbox"/>			
1	0003		915/4/10435/000	ENCLOSURE COVER POLYCARBONATE		1	PC	<input type="checkbox"/>			
1	0020		703/4/01366/004	TERMINAL-ACC END STOP		1	PC	<input type="checkbox"/>			
1	0030		667/2/53186/000	PLUS+ REDUNDANCY MODULE LABEL		1	PC	<input type="checkbox"/>			
1	0040		999/4/44426/007	SCREW PAN HEAD M3.5 X 9.5MM LG POZI SELF		2	PC	<input type="checkbox"/>			
1	0050		667/GA/53185/000	PLUS+ REDUNDANCY MODULE ASSY NO CABLES		1	PC	<input type="checkbox"/>			

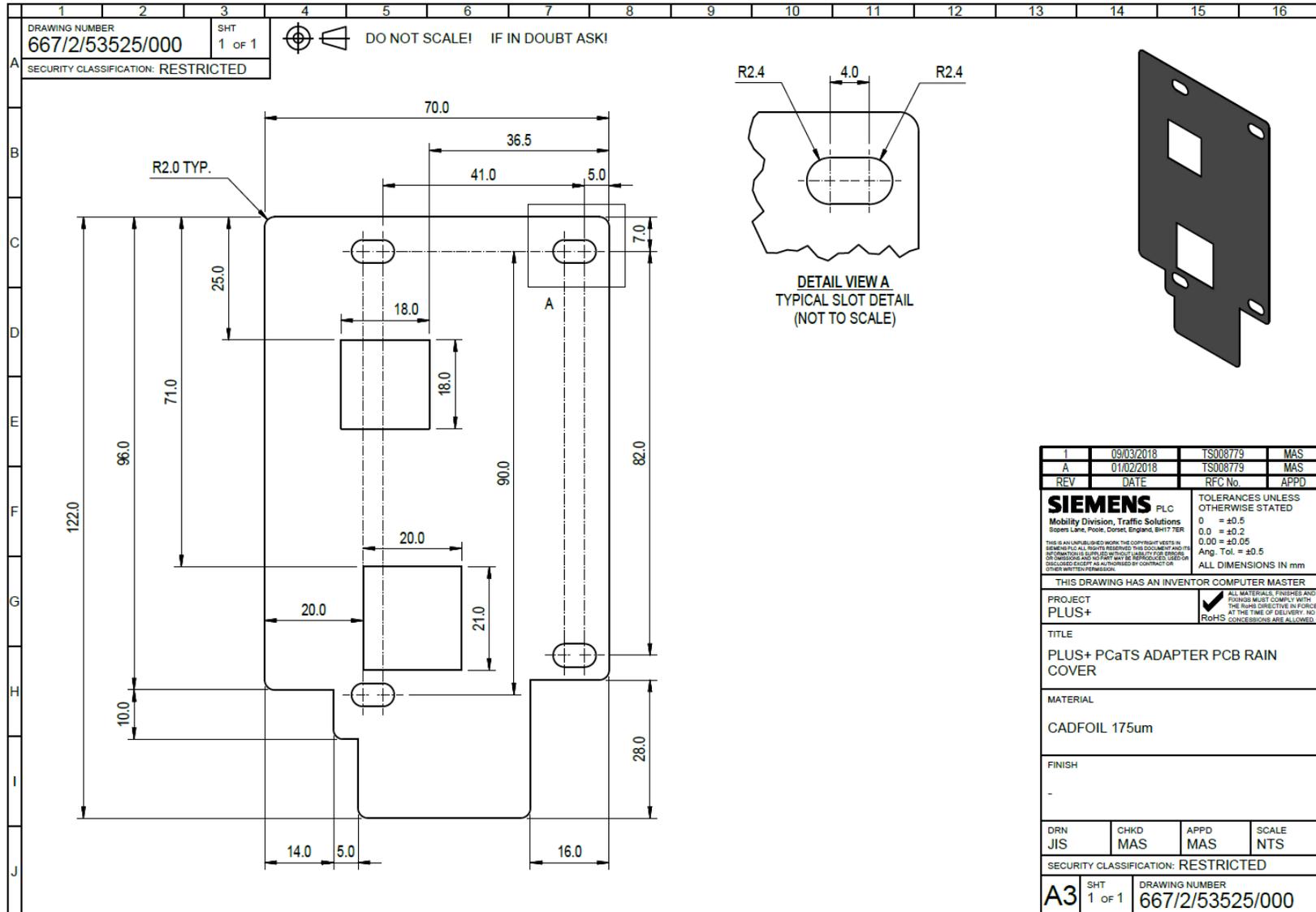
Meridian is used to store released documents alongside archives of older revisions.

The screenshot shows the Siemens Meridian Enterprise 2012SP interface. The search bar at the top contains the text '53185'. The main window displays a 'Find Results' table with the following data:

Name	To-Do Person	Part No.	Revision Number	Branche	Status	Do...	Title
667-GA-53185-000 Rev_C.pdf		667/GA/53185/000	C	Archive	Full Approval	53...	PLUS+ REDUNDANCY MODULE ASSY NO CABLES
667-GA-53185-000.pdf		667/GA/53185/000	1	Released	Full Approval	53...	PLUS+ REDUNDANCY MODULE ASSY NO CABLES

The left sidebar contains an 'Explorer' view with various filters such as 'All Parts - Released', 'All Parts - Working Copies', 'All to-do lists', 'Author', 'Author and Date', 'CompanyArea', 'Customer', 'Document Type - File Type', 'Document Type - Status', 'Draft Approver', 'FileType', 'Full Approver', 'Fully Approved Pending Release', 'Issue Date', 'My to-do list', 'Part No', and 'Product Number'.

Technical drawings are used to manufacture parts.



Assembly drawings demonstrate how to assemble a product.

DRAWING NUMBER 667/GA/53185/000		SHT 1 OF 1		DO NOT SCALE! IF IN DOUBT ASK!											
SECURITY CLASSIFICATION: RESTRICTED															
A															
B															
C															
D															
E															
F															
G															
H															
I															
J															

ROCK SPRUE ON ENCLOSURE BOX UNTIL LOOSE, THEN REMOVE AND DISPOSE OF. THIS IS A BY-PRODUCT OF MANUFACTURE.

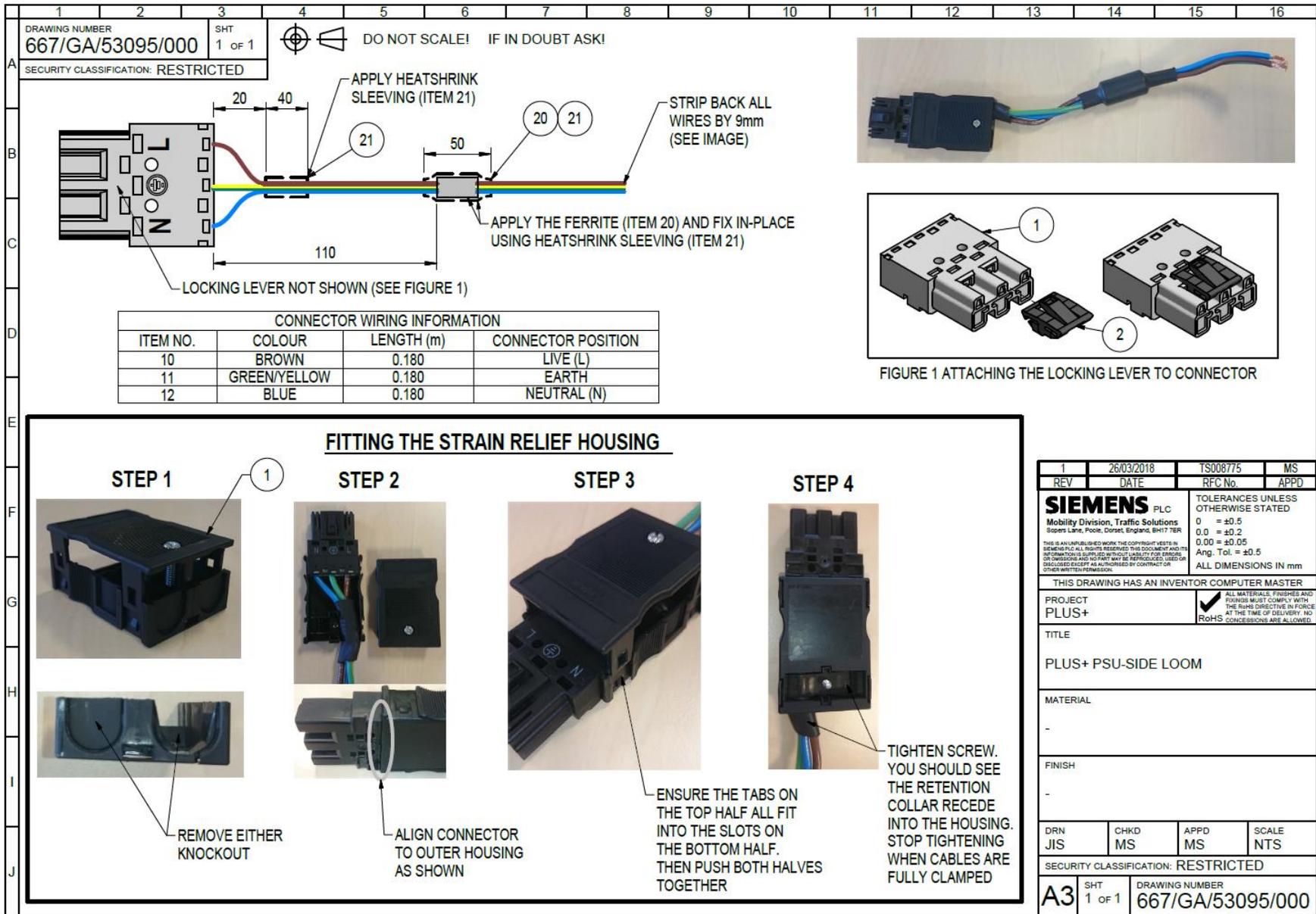
SEE NOTE 1

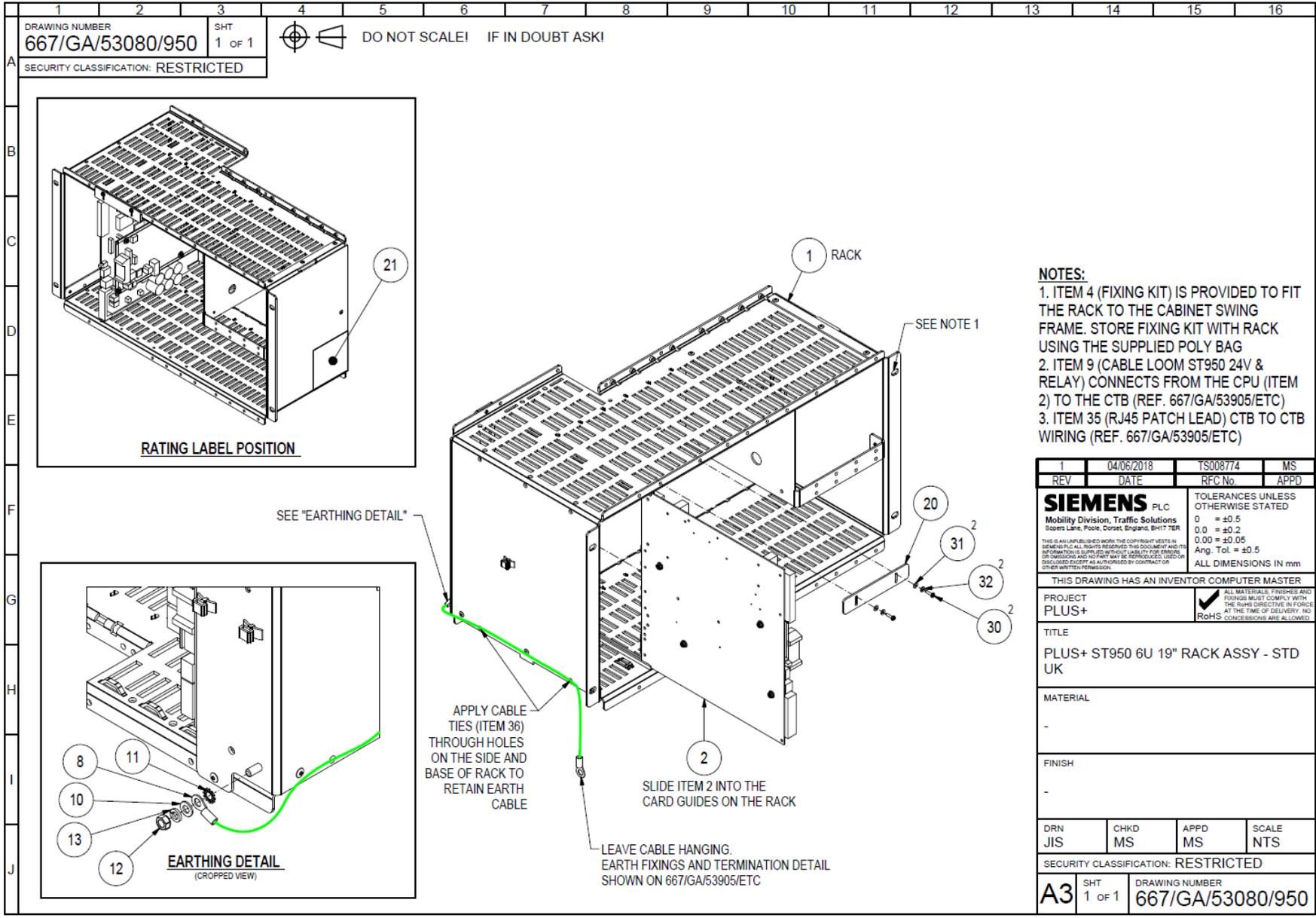
IF DIN-CLIPS ARE PROVIDED SEPARATE FROM BASE, FIT AS SHOWN, OTHERWISE IGNORE THIS STEP

VIEW OF COMPLETE ASSEMBLY

NOTES:
 1. HAND TIGHTEN FIXINGS (ITEM 40). DO NOT OVERTIGHTEN
 2. END STOP (ITEM 20) PROVIDED WITH KIT FOR INSTALLATION WITHIN CABINET

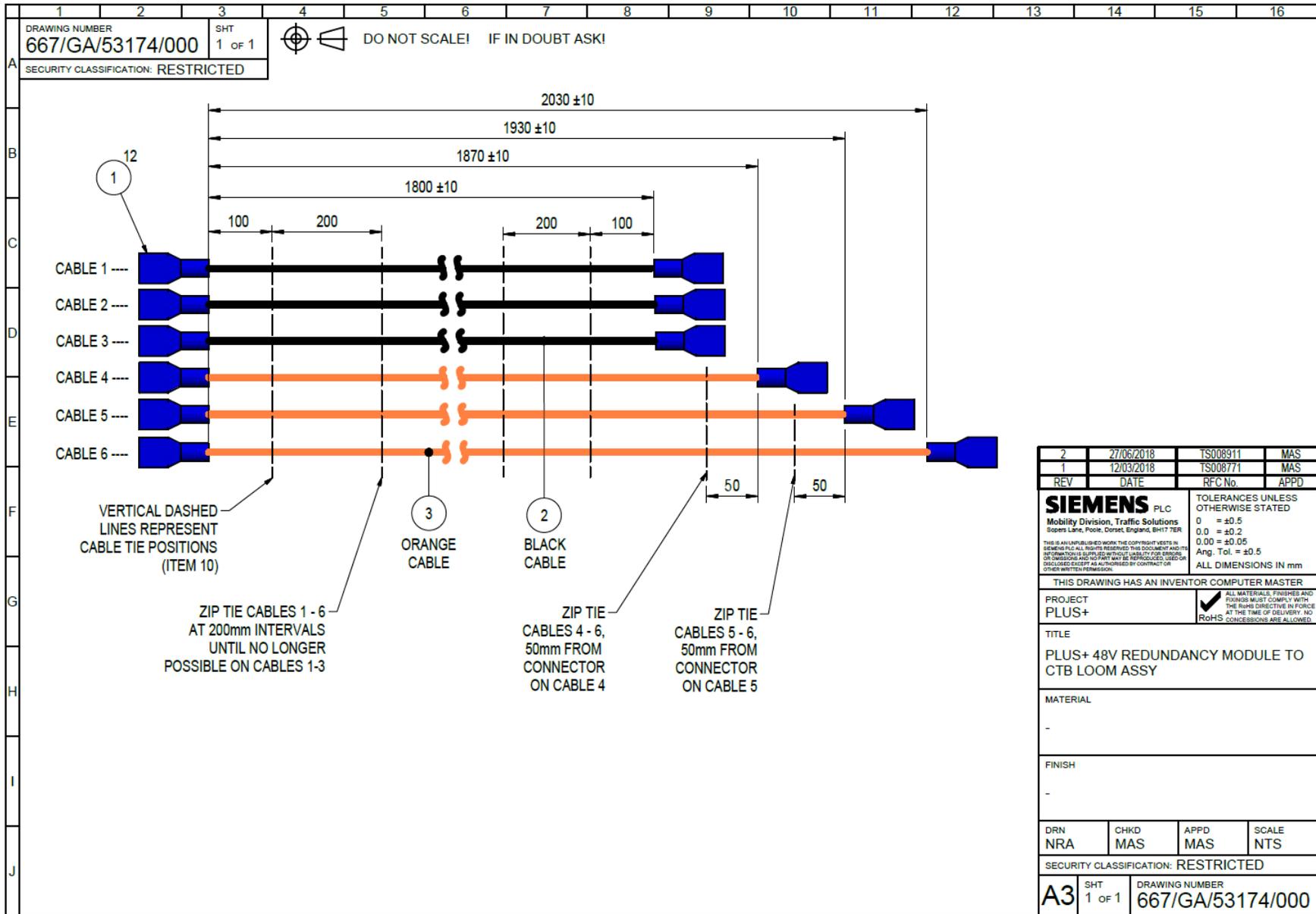
2	08/06/2018	TS008893	MS
1	21/03/2018	TS008776	MS
REV	DATE	RFC No.	APPD
SIEMENS		PLC	
Mobility Division, Traffic Solutions		TOLERANCES UNLESS OTHERWISE STATED	
Sopers Lane, Poole, Dorset, England, BH17 7ER		0 = ±0.5	
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		0.00 = ±0.05	
		Ang. Tol. = ±0.5	
		ALL DIMENSIONS IN mm	
THIS DRAWING HAS AN INVENTOR COMPUTER MASTER			
PROJECT	ALL MATERIALS, FINISHES AND FIXINGS MUST COMPLY WITH THE RIGHTS DIRECTIVE IN FORCE AT THE TIME OF DELIVERY. NO RIGHTS CONCESSIONS ARE ALLOWED.		
PLUS+			
TITLE	PLUS+ REDUNDANCY MODULE ASSY NO CABLE		
MATERIAL	-		
FINISH	-		
DRN	CHKD	APPD	SCALE
JIS	MS	MS	NTS
SECURITY CLASSIFICATION: RESTRICTED			
A3	SHT 1 OF 1	DRAWING NUMBER 667/GA/53185/000	

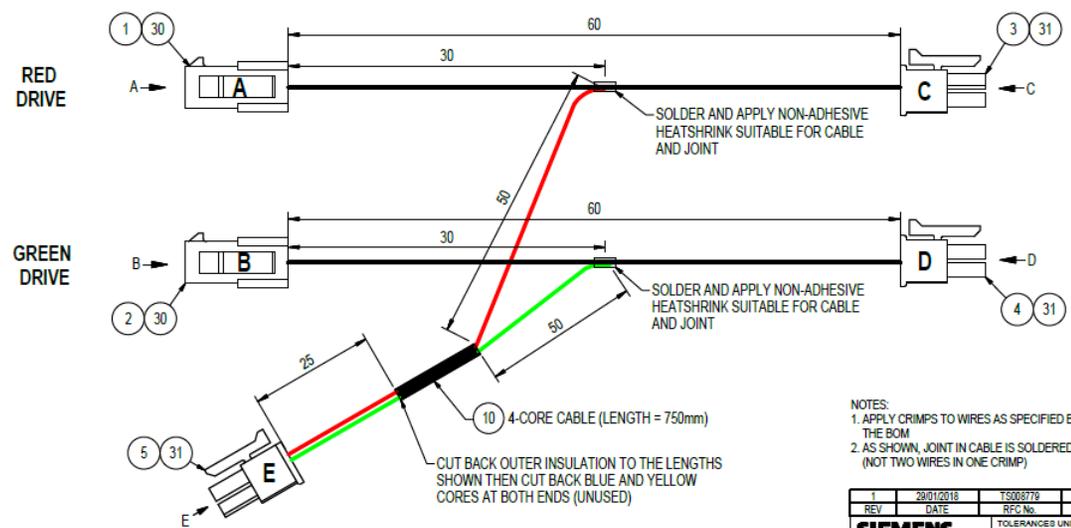
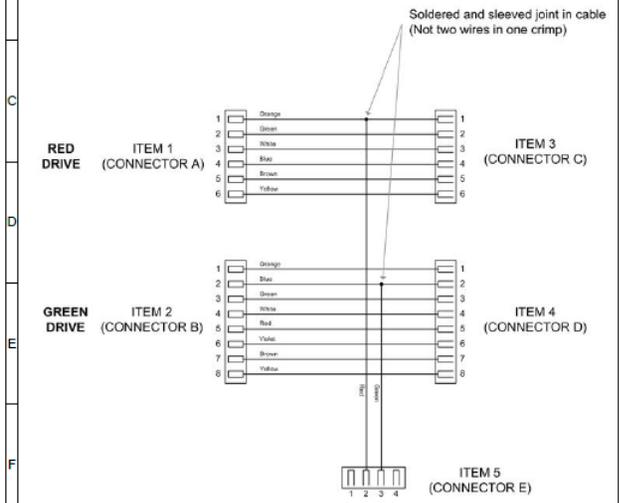
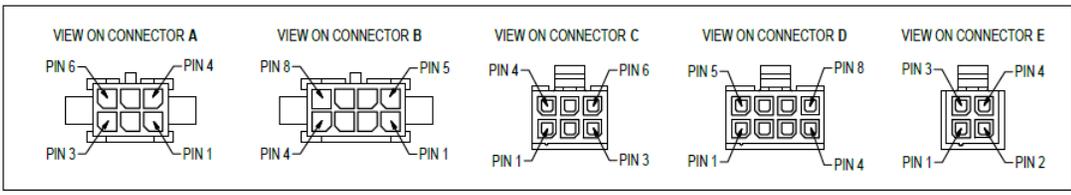




- NOTES:**
- ITEM 4 (FIXING KIT) IS PROVIDED TO FIT THE RACK TO THE CABINET SWING FRAME. STORE FIXING KIT WITH RACK USING THE SUPPLIED POLY BAG
 - ITEM 9 (CABLE LOOM ST950 24V & RELAY) CONNECTS FROM THE CPU (ITEM 2) TO THE CTB (REF. 667/GA/53905/ETC)
 - ITEM 35 (RJ45 PATCH LEAD) CTB TO CTB WIRING (REF. 667/GA/53905/ETC)

1	04/06/2018	TS008774	MS
REV	DATE	RFC No	APPD
SIEMENS PLC		TOLERANCES UNLESS OTHERWISE STATED	
Mobility Division, Traffic Solutions		0 = ±0.5	
Sopht, Lohr, Poole, Dorset, England, BH17 7ER		0.0 = ±0.2	
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THIS DRAWING HAS AN INVENTOR COMPUTER MASTER		ALL DIMENSIONS IN mm	
PROJECT	PLUS+	✓ ALL MATERIALS, FINISHES AND FIXINGS MUST COMPLY WITH THE RING DIRECTIVE IN FORCE AT THE TIME OF DELIVERY. NO RoHS CONCESSIONS ARE ALLOWED.	
TITLE	PLUS+ ST950 6U 19" RACK ASSY - STD UK		
MATERIAL	-		
FINISH	-		
DRN	CHKD	APPD	SCALE
JIS	MS	MS	NTS
SECURITY CLASSIFICATION: RESTRICTED			
A3	SHT 1 OF 1	DRAWING NUMBER 667/GA/53080/950	





NOTES:
 1. APPLY CRIMPS TO WIRES AS SPECIFIED BY THE BOM
 2. AS SHOWN, JOINT IN CABLE IS SOLDERED (NOT TWO WIRES IN ONE CRIMP)

ITEM NO.	WIRE COLOUR	CONNECTOR A TO CONNECTOR C	CONNECTOR B TO CONNECTOR D
11	ORANGE	1-1	1-1
12	GREEN	2-2	3-3
13	WHITE	3-3	4-4
14	BLUE	4-4	2-2
15	BROWN	5-5	7-7
16	YELLOW	6-6	8-8
17	RED	-	5-5
18	VIOLET	-	6-6

4-CORE CABLE COLOUR	CONNECTOR E	RED DRIVE	GREEN DRIVE
RED	PIN 2	ORANGE	-
GREEN	PIN 3	-	BLUE

REV	DATE	T5003772	MS
1	20/01/2018	RFC No.	APPD
SIEMENS PLC TOLERANCES UNLESS OTHERWISE STATED Modelling Division, Traffic Solutions Supera Lane, Poole, Dorset, England, BH17 7RN D ±0.5 Ø ±0.2 0.05 ±0.05 Ang. Tol. ±0.5 ALL DIMENSIONS IN mm			
THIS DRAWING HAD AN INVENTOR COMPUTER MASTER PROJECT PLUS+ ROHS COMPLIANT AND APPROVED			
TITLE PLUS+ PcATS R/G ADAPTER MONITOR LOOM			
MATERIAL -			
FINISH -			
DRN JIS	CHKD MS	APPD MS	SCALE NTS
SECURITY CLASSIFICATION: RESTRICTED			
A2	SH1 1 OF 1	DRAWING NUMBER 667/GA/53522/000	

Evidence 3 – Greenpower Steering and Brake Mounts

Initial Steering Mount

Notes:

1. All holes 5.5mm
2. Material – 3mm THK Aluminium
3. Finishing – Clean and Deburr + Break any sharp edges

See "2D Sketch of angled section" for cutting detail

Bend 90°

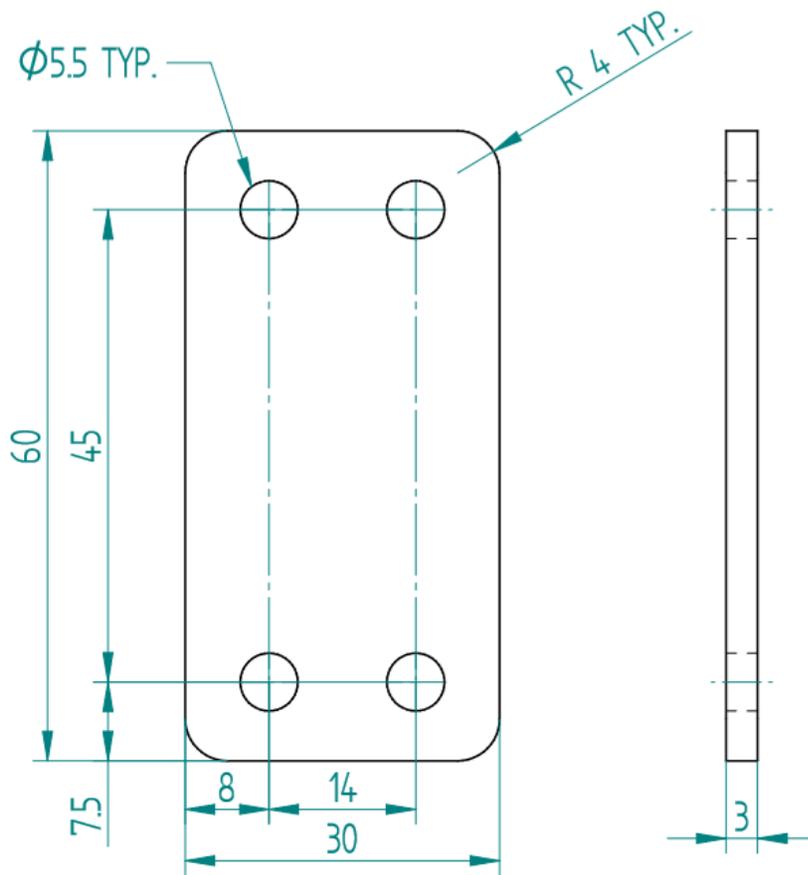
2D Sketch of angled section

REVISION HISTORY

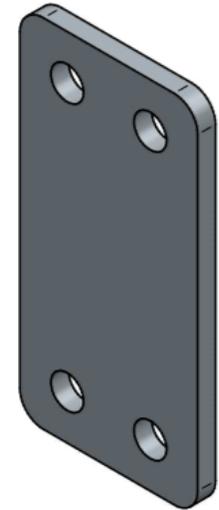
REV	DESCRIPTION	DATE	APPROVED

SOLID EDGE ACADEMIC COPY

NAME	DATE	Solid Edge	
DRAWN	JIS 30/08/2017	TITLE	Greenpower Steering Mount
CHECKED		SCALE	
ENG APPR		FILE NAME	mount2.dwg
PROJ APPR		SCALE	NTS
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS ANGLES IN DEGREES		SIZE	A4
2 PL. XXXX 3 PL. XXXX		WEIGHT	
SHEET 1 OF 1			REV 1



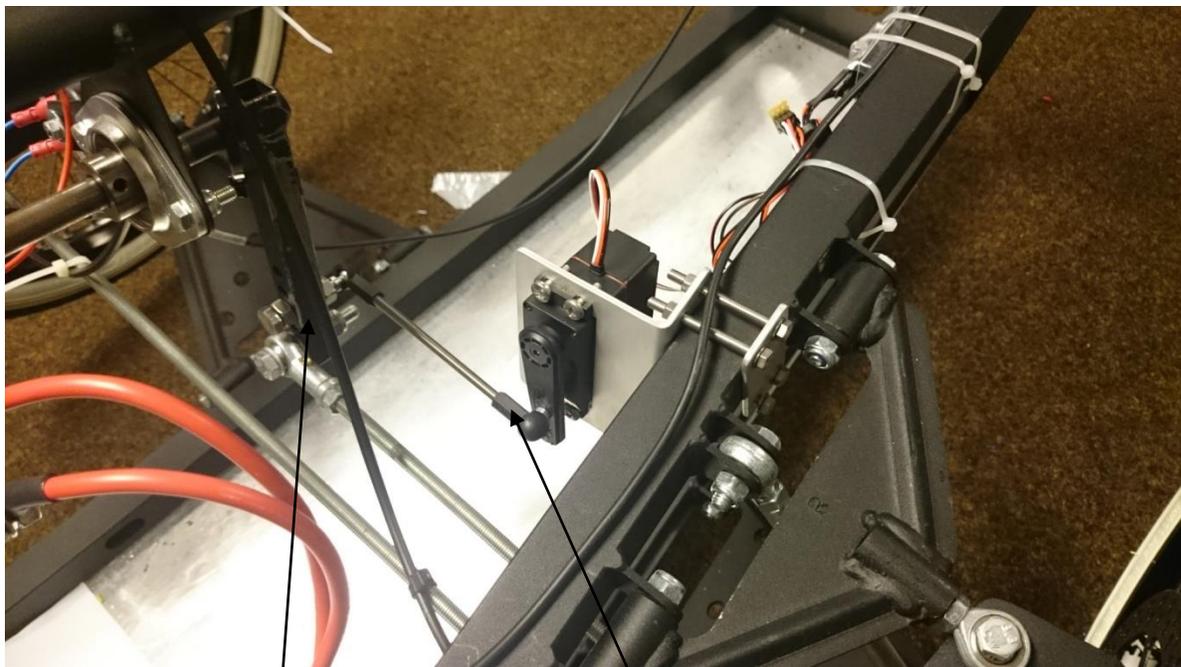
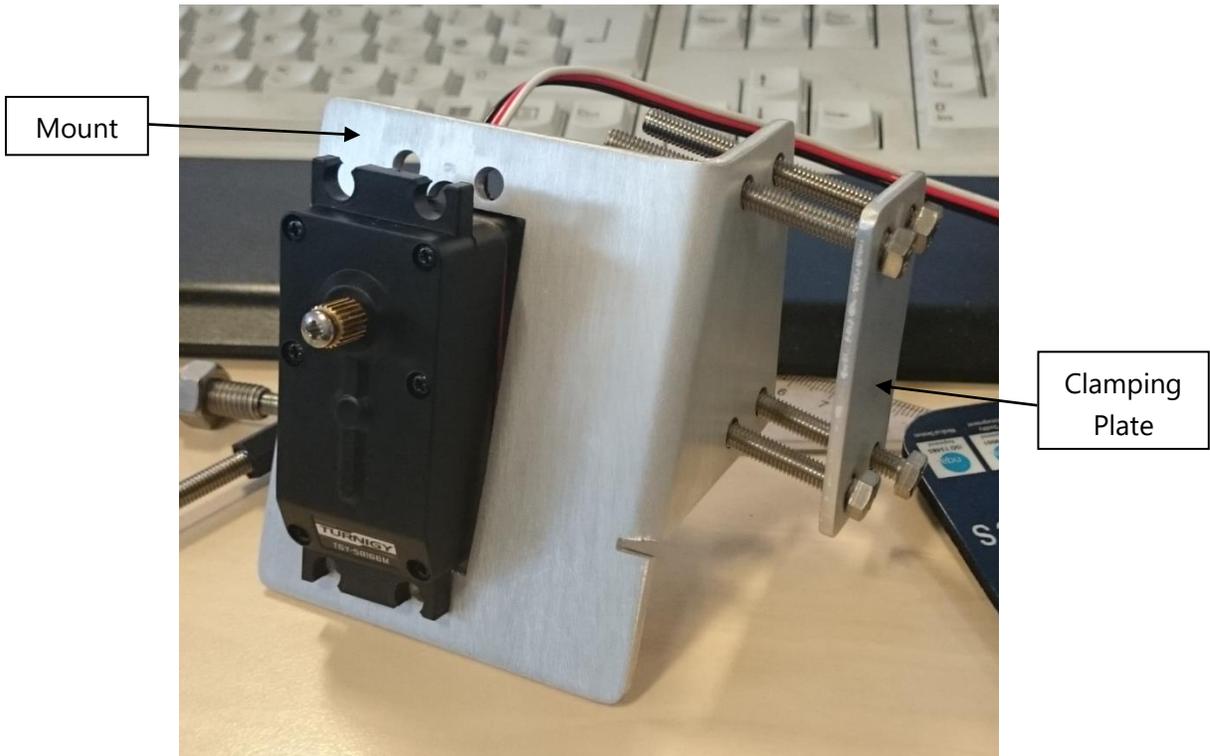
REVISION HISTORY			
REV	DESCRIPTION	DATE	APPROVED



- Notes:**
1. Material - 3mm THK Aluminium
 2. Finishing - Clean and Deburr + Break any sharp edges

SOLID EDGE ACADEMIC COPY

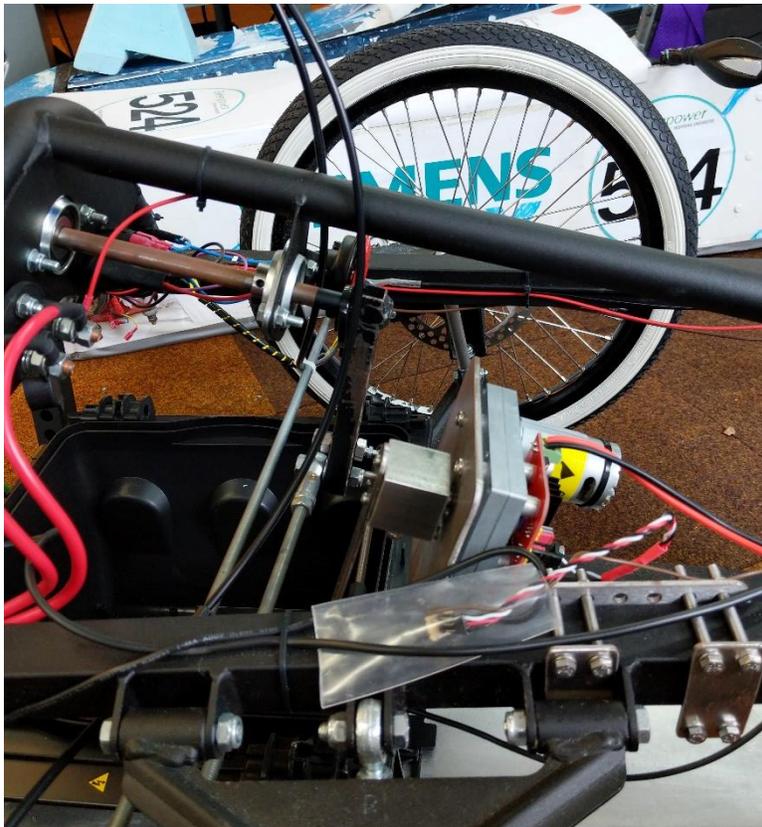
	NAME	DATE	Solid Edge	
DRAWN	JS	30/08/2017		
CHECKED				
ENG APPR				
MGR APPR			TITLE Greenpower Clamping Plate	
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS ANGLES *X.X*			SIZE A3	DWG NO
2 PL *XXX 3 PL *XXXX				
				REV 1
			FILE NAME: mounting plate 4 holes.dft	
			SCALE NTS	WEIGHT
			SHEET 1 OF 1	



Creativity and Innovation

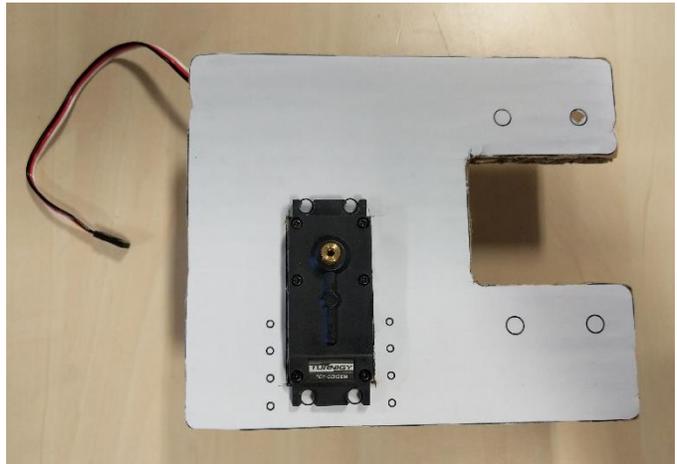
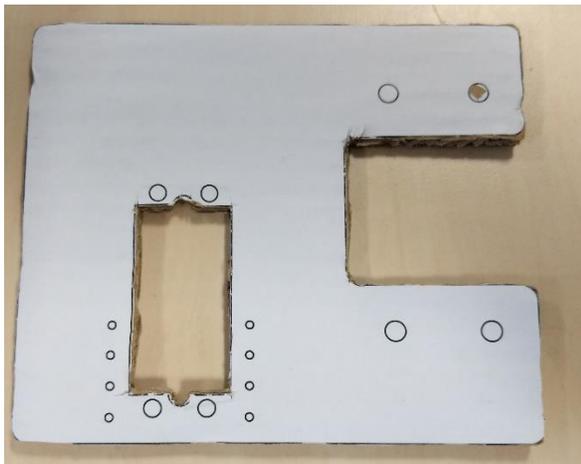
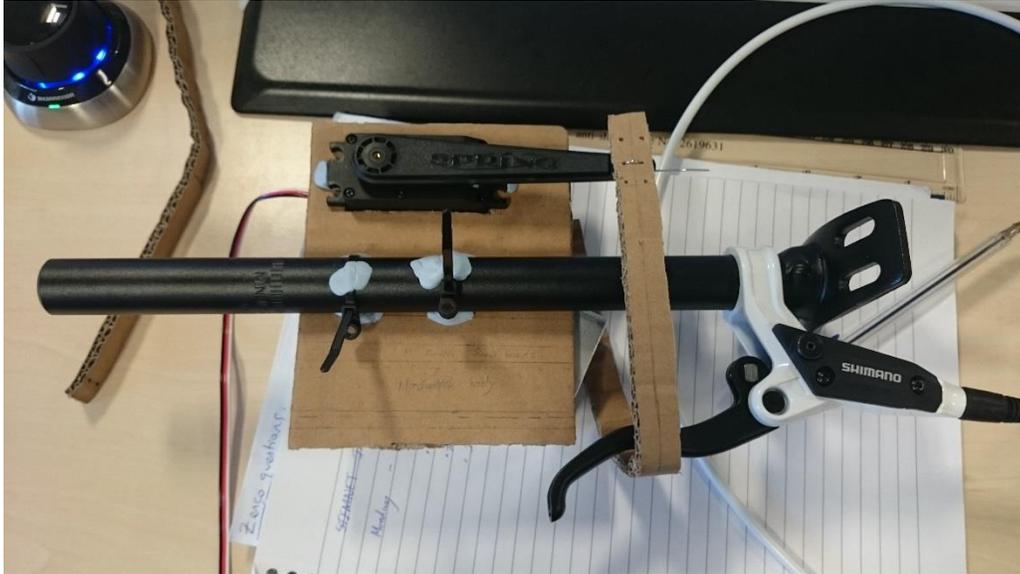
Steering System

Bolts fasten motor to the mount (reference Figure 2)

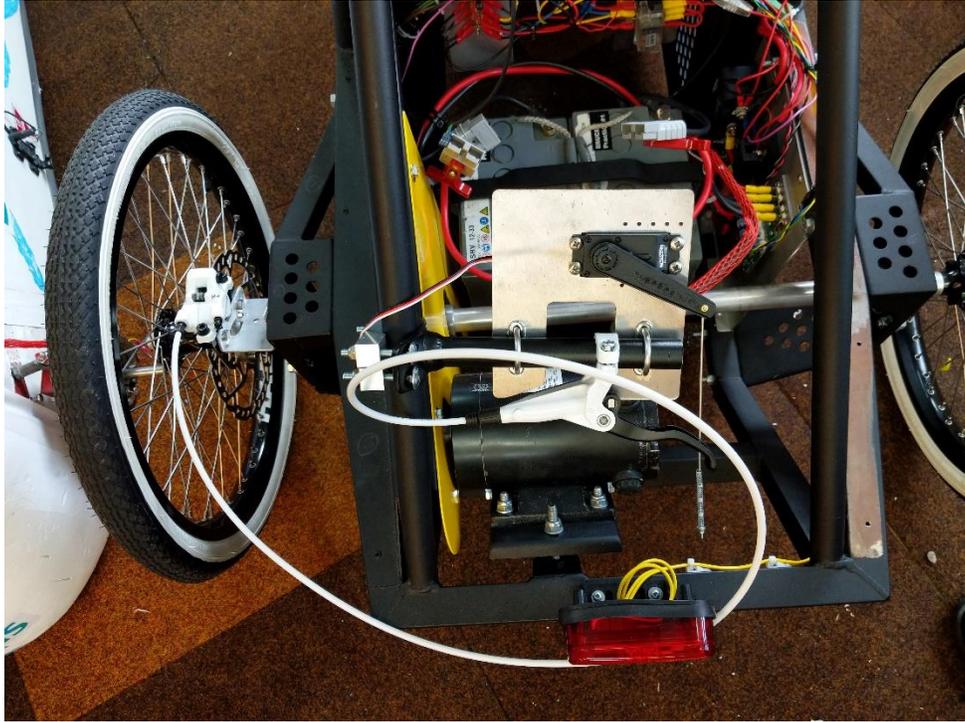


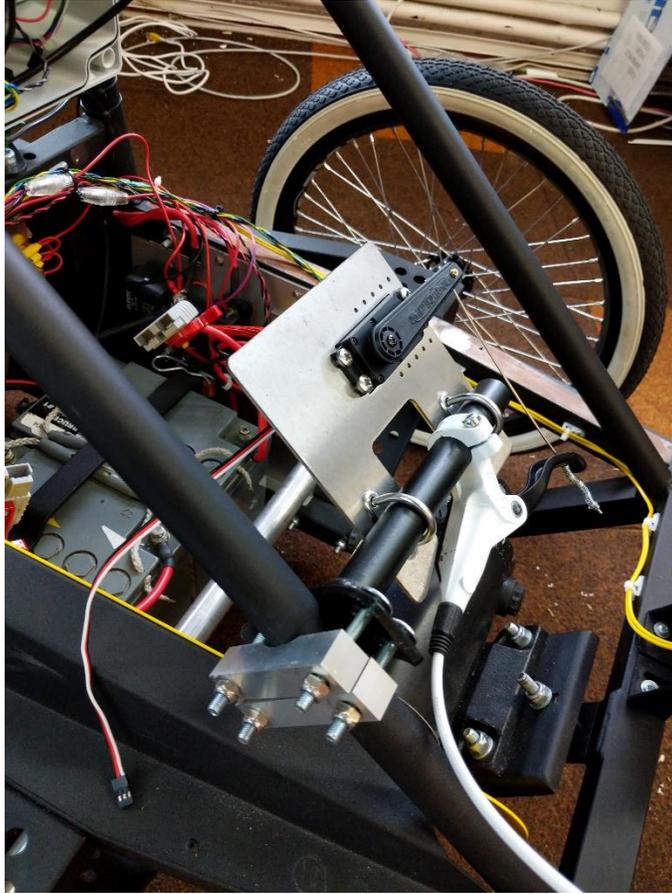
Braking System

Cardboard Models (Concepts)

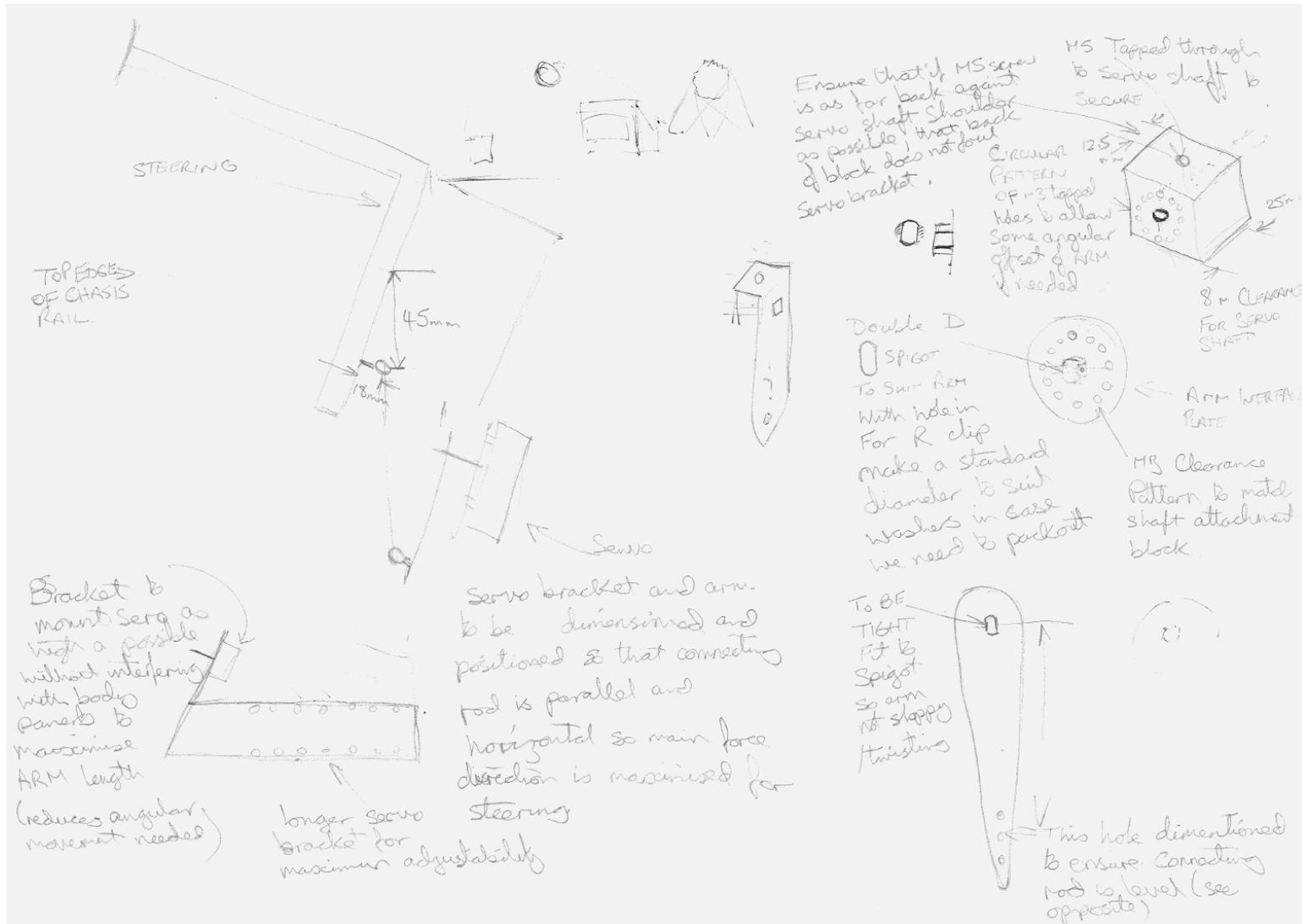


Assembled on the car





Communication and Collaboration



Interaction with Supplier

Shahid, Junedul (MO RC-GB MM-ITS TS PR)

From: wendasheetmetal@talktalkbusiness.net
Sent: 15 December 2017 10:53
To: Shahid, Junedul (RC-GB MO MM-ITS TS PR)
Subject: RE: Request for Quote - GREENPOWER
Attachments: SIEMENS 6668_15-12-2017_10-51.htm

Wenda quote thanks

From: Shahid, Junedul [<mailto:junedul.shahid@siemens.com>]
Sent: Thursday, December 14, 2017 5:08 PM
To: Danny (wendasheetmetal@talktalkbusiness.net) <wendasheetmetal@talktalkbusiness.net>
Cc: Silvey, Michael <michael.silvey@siemens.com>
Subject: Request for Quote - GREENPOWER
Importance: High

Hi Danny

Please ignore any previous emails.

We've gone through a few changes. Can you quote the following

Part	Revision	Quantity
Shaft Clamp Cube	3	1
4 Hole Mounting Plate	2	2
Primary Servo Mount	2	1
Servo Arm	3	1

If you can get the quote to me before 12pm on Friday (tomorrow) I can get the purchase order to you before I leave for my annual leave which starts tomorrow afternoon.

In any case, please keep Michael Silvey cc'd into your response just in case I am away - thanks.

With best regards,
Junedul Shahid
Mechanical Design Intern

Siemens plc
RC-GB MO MM-ITS TS PR
Sopers Lane
Poole BH17 7ER, United Kingdom
<mailto:junedul.shahid@siemens.com>
www.siemens.co.uk
www.siemens.com/ingenuityforlife

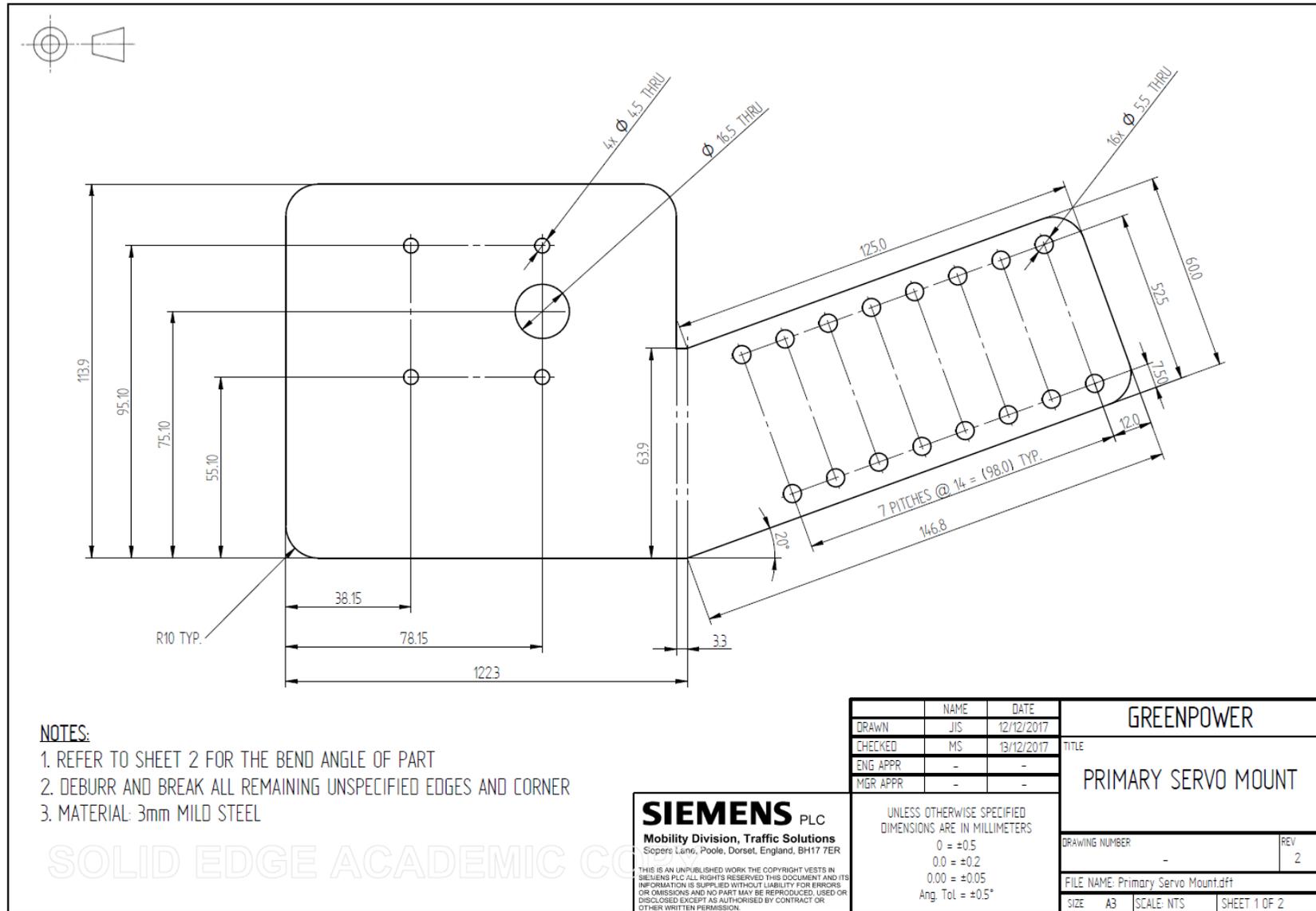
SIEMENS
Ingenuity for life

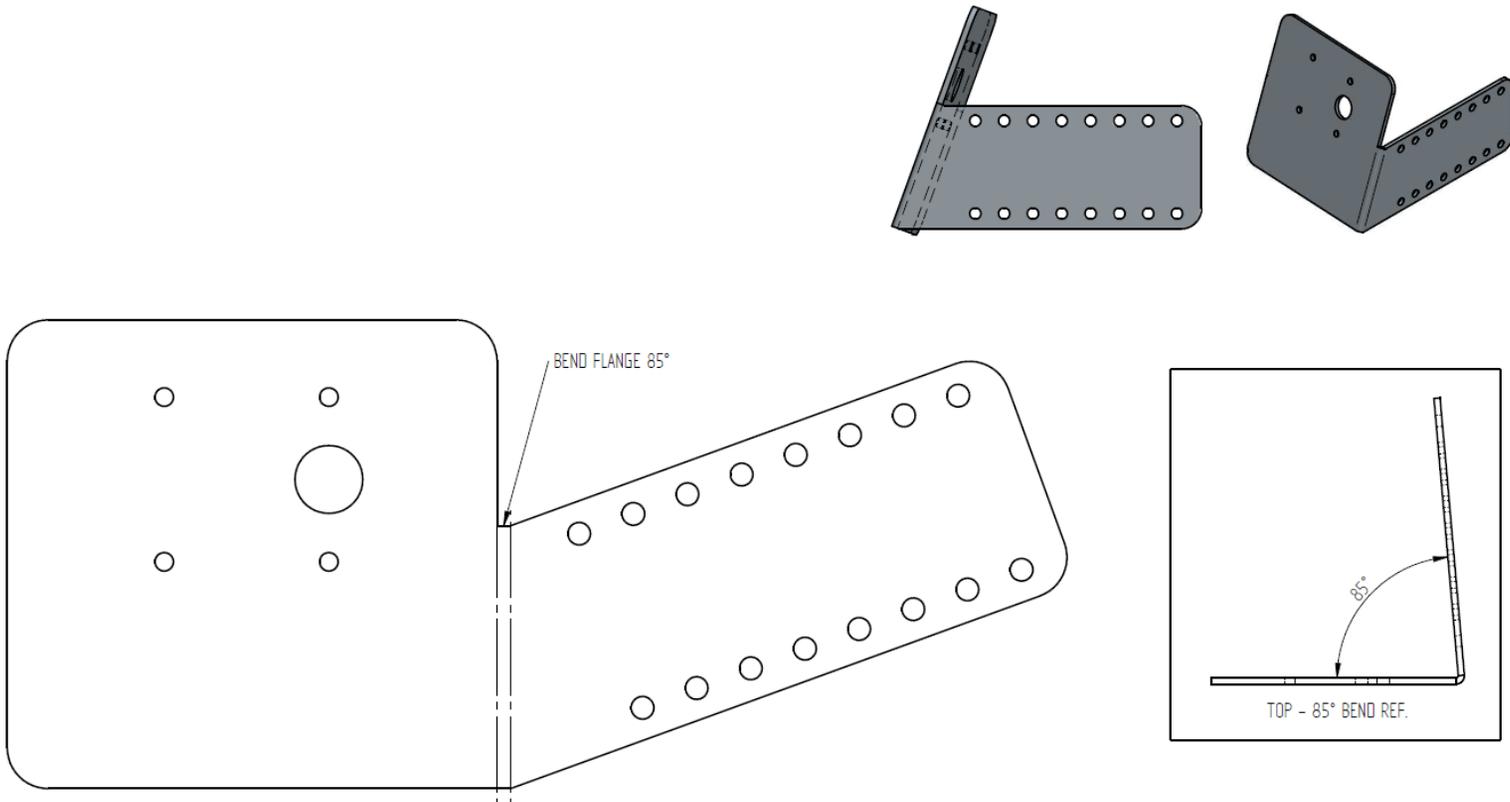
Siemens plc registered office: Faraday House, Sir William Siemens Square, Frimley, Camberley, GU16 8QD. Registered no: 727817, England.

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Digital Skills (Using Solid Edge)

Steering System





SOLID EDGE ACADEMIC CO

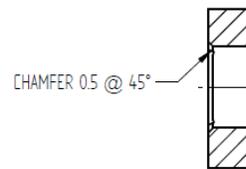
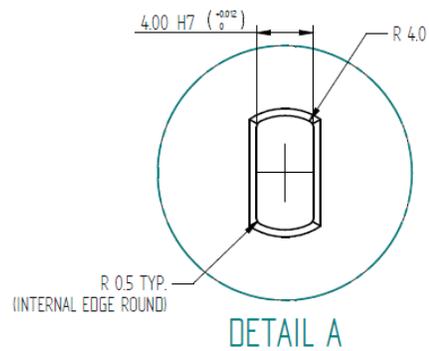
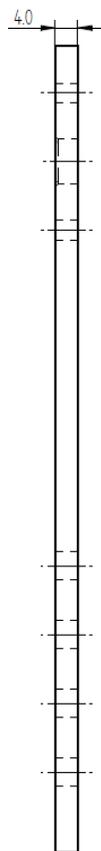
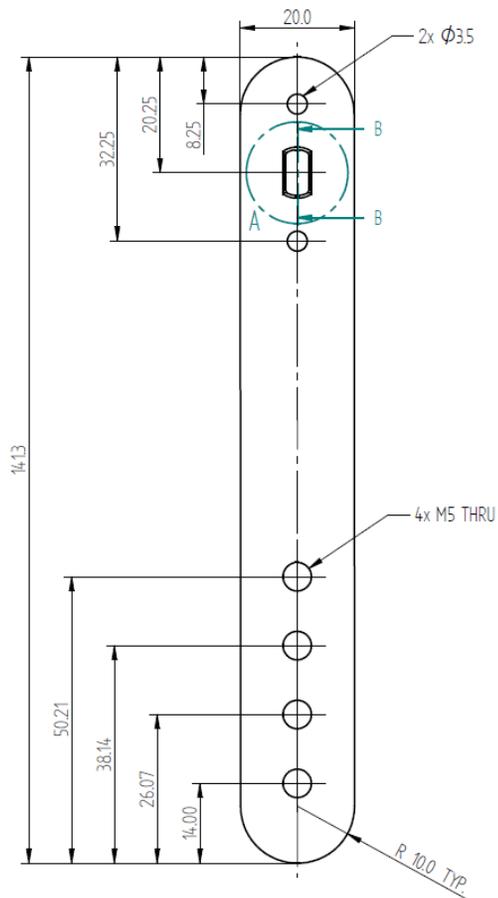
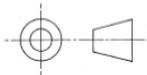
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 Mobility Division, Traffic Solutions
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	NAME	DATE
DRAWN	JIS	12/12/2017
CHECKED	MS	13/12/2017
ENG APPR	-	-
MGR APPR	-	-

UNLESS OTHERWISE SPECIFIED
 DIMENSIONS ARE IN MILLIMETERS
 0 = ±0.5
 0.0 = ±0.2
 0.00 = ±0.05
 Ang. Tol = ±0.5°

GREENPOWER	
TITLE	
PRIMARY SERVO MOUNT	
DRAWING NUMBER	REV
-	2
FILE NAME: Primary Servo Mount.dft	
SIZE	SCALE: NTS
A3	SHEET 2 OF 2



NOTES

1. DEBURR AND BREAK ALL REMAINING UNSPECIFIED EDGES AND CORNER
2. MATERIAL: MILD STEEL

SOLID EDGE ACADEMIC CO

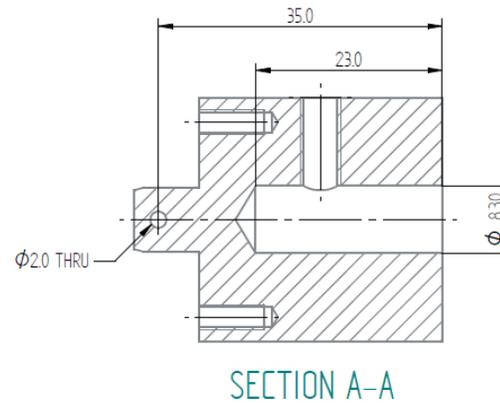
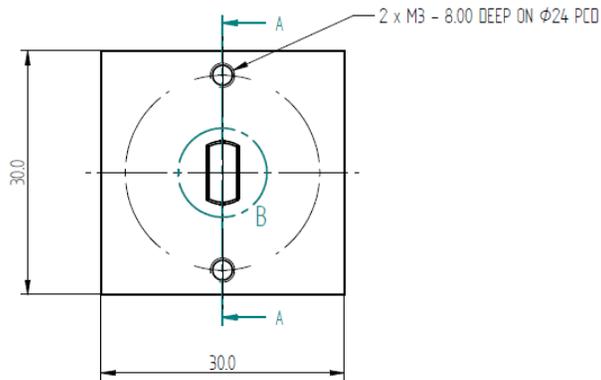
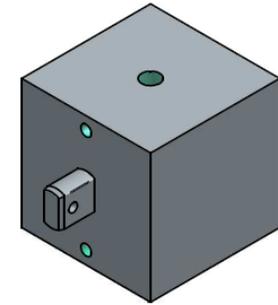
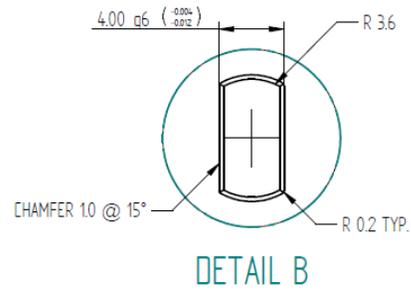
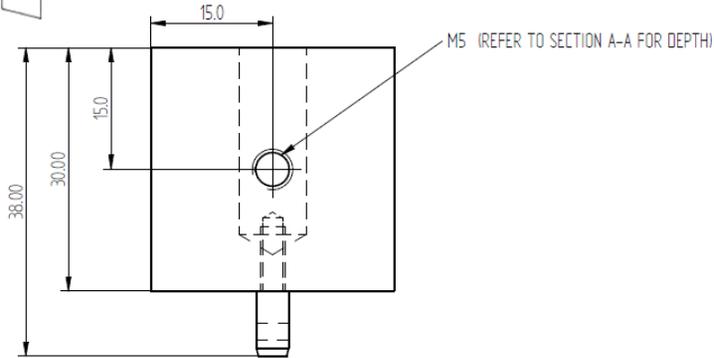
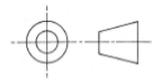
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	NAME	DATE
DRAWN	JIS	14/12/2017
CHECKED	MS	14/12/2017
ENG APPR	-	-
MGR APPR	-	-

UNLESS OTHERWISE SPECIFIED
 DIMENSIONS ARE IN MILLIMETERS
 0 = ± 0.5
 0.0 = ± 0.2
 0.00 = ± 0.05
 Ang. Tol = $\pm 0.5^\circ$

GREENPOWER	
TITLE	
SERVO ARM	
DRAWING NUMBER	REV
-	3
FILE NAME: Servo Arm.dft	
SIZE: A3	SCALE: NTS
SHEET 1 OF 1	



NOTES

1. DEBURR AND BREAK ALL REMAINING UNSPECIFIED EDGES AND CORNER
2. MATERIAL: MILD STEEL

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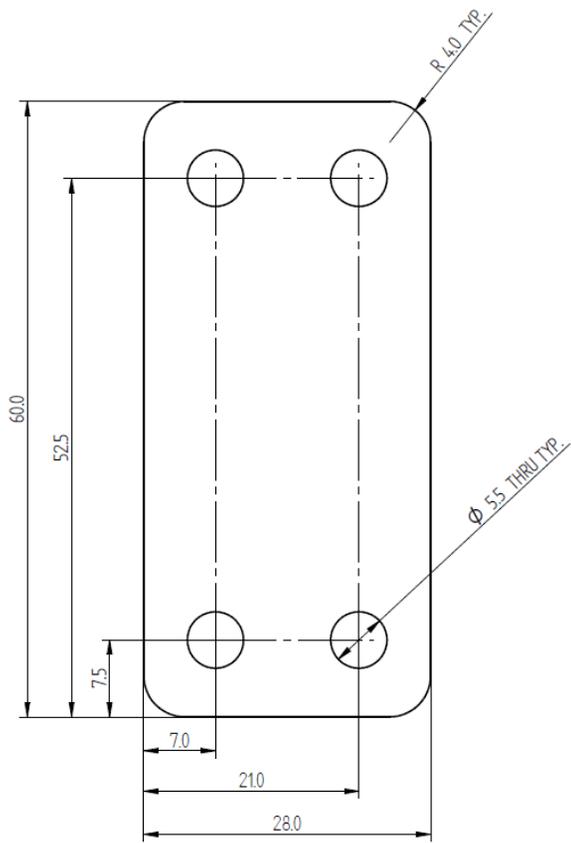
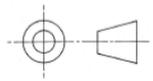
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	NAME	DATE
DRAWN	JIS	14/12/2017
CHECKED	MS	14/12/2017
ENG APPR	-	-
MGR APPR	-	-

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 DIMENSIONS ARE IN MILLIMETERS
 0 = ±0.5
 0.0 = ±0.2
 0.00 = ±0.05
 Ang Tol = ±0.5°

GREENPOWER	
TITLE	SHAFT CLAMP CUBE
DRAWING NUMBER	REV 3
FILE NAME: Shaft Clamp Cube.dft	
SIZE: A3	SCALE: NTS SHEET 1 OF 1



NOTES

1. DEBURR AND BREAK ALL REMAINING UNSPECIFIED EDGES AND CORNER
2. MATERIAL: MILD STEEL

SOLID EDGE ACADEMIC COPY

SIEMENS PLC
 Mobility Division, Traffic Solutions
 Sopers Lane, Poole, Dorset, England, BH17 7ER

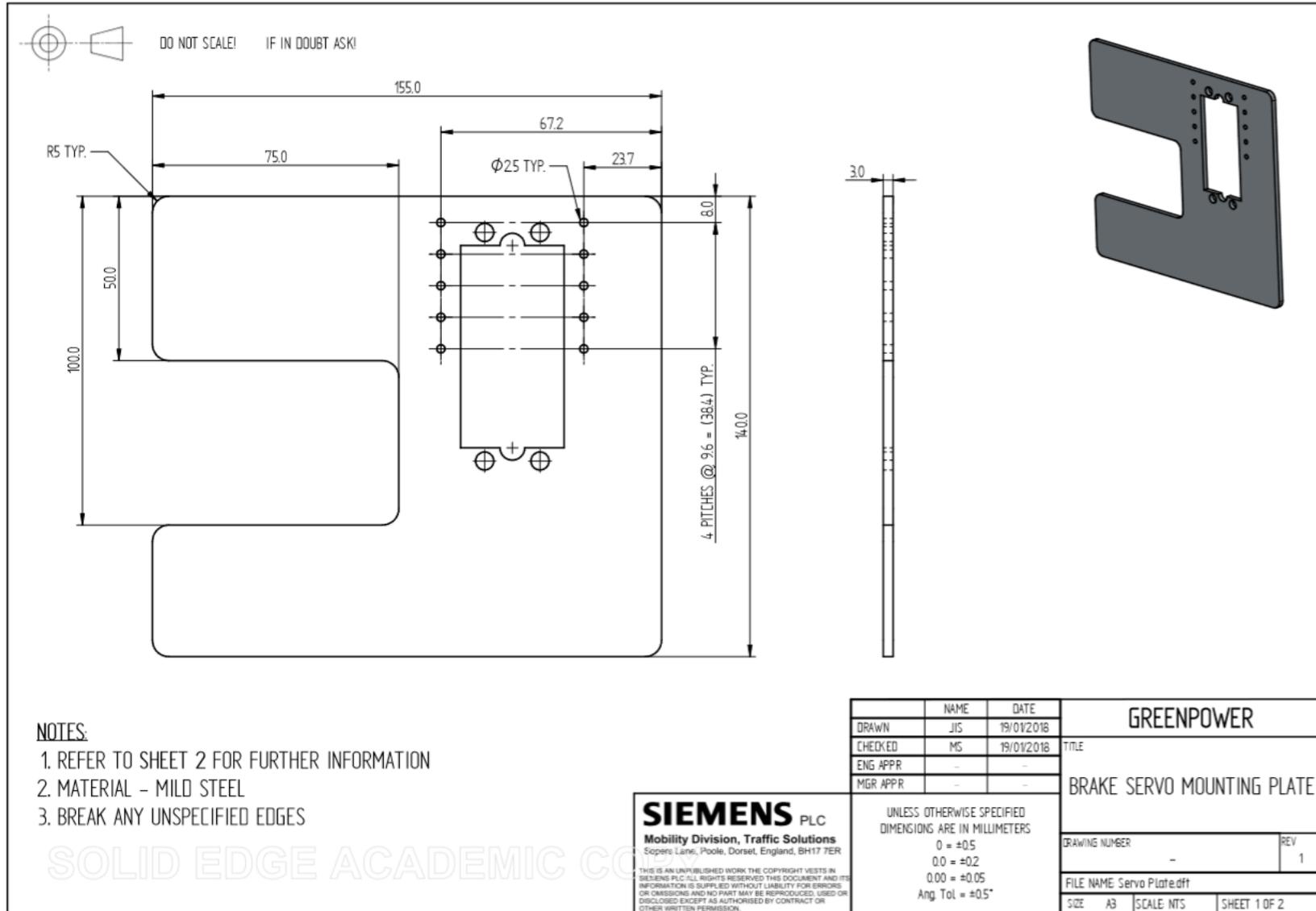
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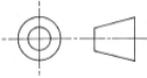
	NAME	DATE
DRAWN	JIS	27/11/2017
CHECKED	MS	30/11/2017
ENG APPR	-	-
MGR APPR	-	-

UNLESS OTHERWISE SPECIFIED
 DIMENSIONS ARE IN MILLIMETERS
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 0.0 = ± 0.2
 0.00 = ± 0.05
 Ang. Tol = $\pm 0.5^\circ$

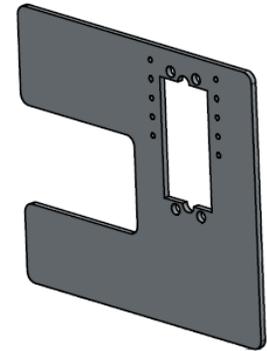
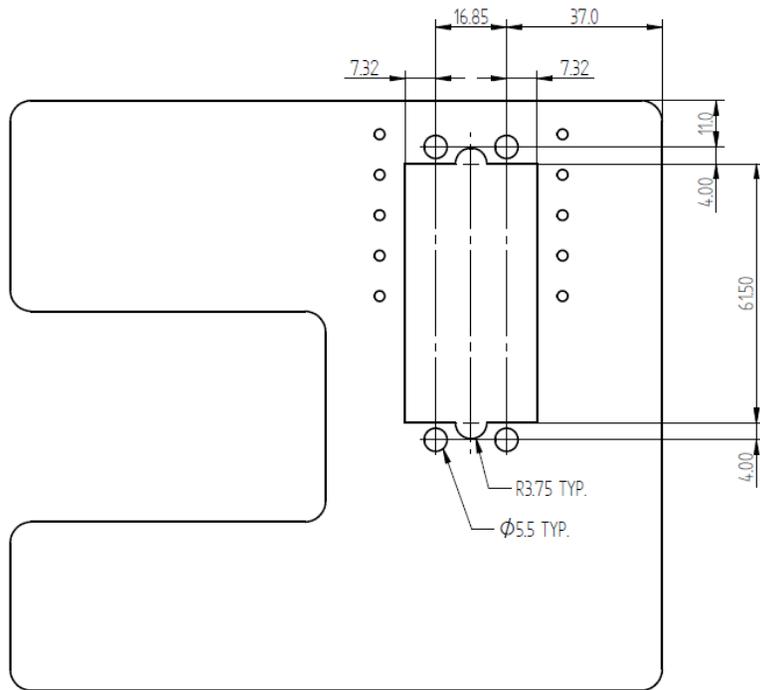
GREENPOWER	
TITLE	
4 HOLE MOUNTING PLATE	
DRAWING NUMBER	REV
-	2
FILE NAME: Mounting Plate 4 Holes.dft	
SIZE	A3
SCALE:	NTS
SHEET 1 OF 1	

Braking System





DO NOT SCALE! IF IN DOUBT ASK!



SERVO CUT-OUT

	NAME	DATE
DRAWN	JIS	19/01/2018
CHECKED	MS	19/01/2018
ENG APPR	-	-
MGR APPR	-	-

GREENPOWER

TITLE

BRAKE SERVO MOUNTING PLATE

DRAWING NUMBER	REV
-	1

FILE NAME: Servo Plate.dff

SIZE	A3	SCALE	NTS	SHEET	2 OF 2
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0 = ±0.5
 0.0 = ±0.2
 0.00 = ±0.05
 Ang. Tol = ±0.5°

SOLID EDGE ACADEMIC CO

Commercial Awareness

1st Quote

**ELECTRONIC ASSEMBLY AND
MANUFACTURE**

CNC PRECISION SHEET METAL

WENDA ENGINEERING & ELECTRONICS

47 COBHAM ROAD
FERNDOWN IND. ESTATE
WIMBORNE, DORSET
BH21 7QZ
TEL: 01202 874961
TEL/FAX: 01202 861260
VAT REG. No 188 0549 02

Customer: SIEMENS PLC
Sopers Lane
Poole
Dorset
BH17 7ER

Quote Ref: SIEMENS 6668
Date: 06/12/2017
Cost Ref: 341
Your Ref:

QUOTATION

We thank you for your enquiry and have pleasure in quoting as follows:-

Qty	Drawing No.	Iss	Description	Cost per	Total
1	-	1	ANGULAR DISK	146.64	146.64
1	-	1	SHAFT CLAMP CUBE	118.64	118.64
2	-	2	4 HOLE MOUNTING PLATE	18.79	37.58
1	-	1	PRIMARY SERVO MOUNT	47.60	47.60
2	-	1	PRIMARY SERVO MOUNT	25.30	50.60
1	-	1	SERVO ARM MADE FROM 3MM STEEL	41.75	41.75

No finishing included

Minimum order value excluding finish is £28.00
All our products are RoHS Compliant unless otherwise specified
TERMS: Nett Cash Monthly
DELIVERY: (To be agreed 14 days, 7 days from receipt of order etc.)

Quote valid for 30days

Please supply TWO COPIES of drawings with order

2nd Quote

**ELECTRONIC ASSEMBLY AND
MANUFACTURE**

CNC PRECISION SHEET METAL

WENDA ENGINEERING & ELECTRONICS

47 COBHAM ROAD
FERNDOWN IND. ESTATE
WIMBORNE, DORSET
BH21 7QZ
TEL: 01202 874961
TEL/FAX: 01202 861260
VAT REG. No 188 0549 02

Customer: SIEMENS PLC
Sopers Lane
Poole
Dorset
BH17 7ER

Quote Ref: SIEMENS 6668
Date: 15/12/2017
Cost Ref: 341
Your Ref:

QUOTATION

We thank you for your enquiry and have pleasure in quoting as follows:-

Qty	Drawing No.	Iss	Description	Cost per	Total
1	-	1	ANGULAR DISK	146.64	146.64
1	-	3	SHAFT CLAMP CUBE	137.68	137.68
2	-	2	4 HOLE MOUNTING PLATE	18.79	37.58
1	-	2	PRIMARY SERVO MOUNT	47.60	47.60
2	-	2	PRIMARY SERVO MOUNT	25.30	50.60
1	-	3	SERVO ARM MADE FROM 3MM STEEL	41.75	41.75

The Servo arm is quoted using 3mm thick steel sheet.

No finishing included

Minimum order value excluding finish is £28.00
All our products are RoHS Compliant unless otherwise specified
TERMS: Nett Cash Monthly
DELIVERY: (To be agreed 14 days, 7 days from receipt of order etc.)

Quote valid for 30days

Please supply TWO COPIES of drawings with order

Having merged the key features on the "angular disk" and "shaft clamp cube", the cost of manufacturing the cube went up by roughly £20 but meant the angular disk was not required, saving roughly £120.

Evidence 4 – ST750 (T400S) LV European Maintenance Socket

Communication and Collaboration

Supplier Interaction

Shahid, Junedul (MO RC-GB MM-ITS TS PR)

From: Dale Jones [Dale.Jones@adivision.co.uk]
Sent: 24 May 2018 15:36
To: Shahid, Junedul (RC-GB MO MM-ITS TS PR)
Cc: Michael Derrick
Subject: RE: EM01.009 Information

Good afternoon Junedul,

Thank you for your email.

I have requested a branded copy of the previous document – once this has been received I will forward the details to you.

Kind regards,

Dale Jones
Technical Sales Assistant
Addvent, Emitex, Heatstore & MTI

A Division Bristol Group
Unit 12, Access 18, Bristol, BS11 8HT, United Kingdom
T 01179 235 375 F 01179 235 374 E Dale.Jones@adivision.co.uk

Lancaster Holdings Limited; registered in England and Wales number 11089637
Registered office: 81 Whiteladies Road, Bristol, BS8 2NT

From: Shahid, Junedul [mailto:junedul.shahid@siemens.com]
Sent: 24 May 2018 13:10
To: Dale Jones
Subject: FW: EM01.009 Information
Importance: High

Hi

Any news on the below.

With best regards,
Junedul Shahid
Mechanical Design Intern

Siemens plc
RC-GB MO MM-ITS TS PR
Sopers Lane
Poole BH17 7ER, United Kingdom
<mailto:junedul.shahid@siemens.com>
www.siemens.co.uk
www.siemens.com/ingenuityforlife

SIEMENS
Ingenuity for life

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From: Shahid, Junedul (RC-GB MO MM-ITS TS PR)
Sent: 18 May 2018 13:28
To: 'Dale Jones'
Subject: RE: EM01.009 Information
Importance: High

Hi

Is the product EM01.009 something you manufacture or are you distributing someone else's product. We have to ensure our system aligns to the manufacturer part number so we can always trace back to the source and it also tells people who is responsible for maintaining RoHS compliance.

If you are the manufacturer, do you have a datasheet with your logo or something that shows Emitex as the owner of the product, ideally with a RoHS declaration. The current datasheet attached is considered generic.

If not, can you create one with all the info on the attached datasheet but with your logo?

With best regards,
Junedul Shahid
Mechanical Design Intern
Siemens plc
RC-GB MO MM-ITS TS PR
Sopers Lane
Poole BH17 7ER, United Kingdom
<mailto:junedul.shahid@siemens.com>
www.siemens.co.uk
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From: Dale Jones [<mailto:Dale.Jones@adivision.co.uk>]
Sent: 15 May 2018 09:28
To: Shahid, Junedul (RC-GB MO MM-ITS TS PR)
Subject: RE: EM01.009 Information

Good morning Junedul,

I've chased this with the factory this morning, who have now supplied the following document.

I hope this provides the information you require.

Kind regards,

Dale Jones

Technical Sales Assistant
Addvent, Emitex, Heatstore & MTI

A Division Bristol Group
Unit 12, Access 18, Bristol, BS11 8HT, United Kingdom
T 01179 235 375 F 01179 235 374 E Dale.Jones@adivision.co.uk

Lancaster Holdings Limited; registered in England and Wales number 11089637
Registered office: 81 Whiteladies Road, Bristol, BS8 2NT

From: Shahid, Junedul [<mailto:junedul.shahid@siemens.com>]
Sent: 08 May 2018 09:53
To: Dale Jones
Subject: RE: EM01.009 Information
Importance: High

Hi

Any update on the RoHS information.

This is becoming a bit time critical – thanks.

With best regards,
Junedul Shahid
Mechanical Design Intern

Siemens plc
RC-GB MO MM-ITS TS PR
Sopers Lane
Poole BH17 7ER, United Kingdom
<mailto:junedul.shahid@siemens.com>
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From: Dale Jones [<mailto:Dale.Jones@adivision.co.uk>]
Sent: 02 May 2018 11:19
To: Shahid, Junedul (RC-GB MO MM-ITS TS PR)
Subject: EM01.009 Information

Good morning,

Thank you for your call regarding the EM01.009.

Unfortunately, we do not have current ROHS certificate available at this time – I have requested a copy of this from the factory and will send across the document once we have received it.

Please let me know if you require any further information.

Kind regards,

3

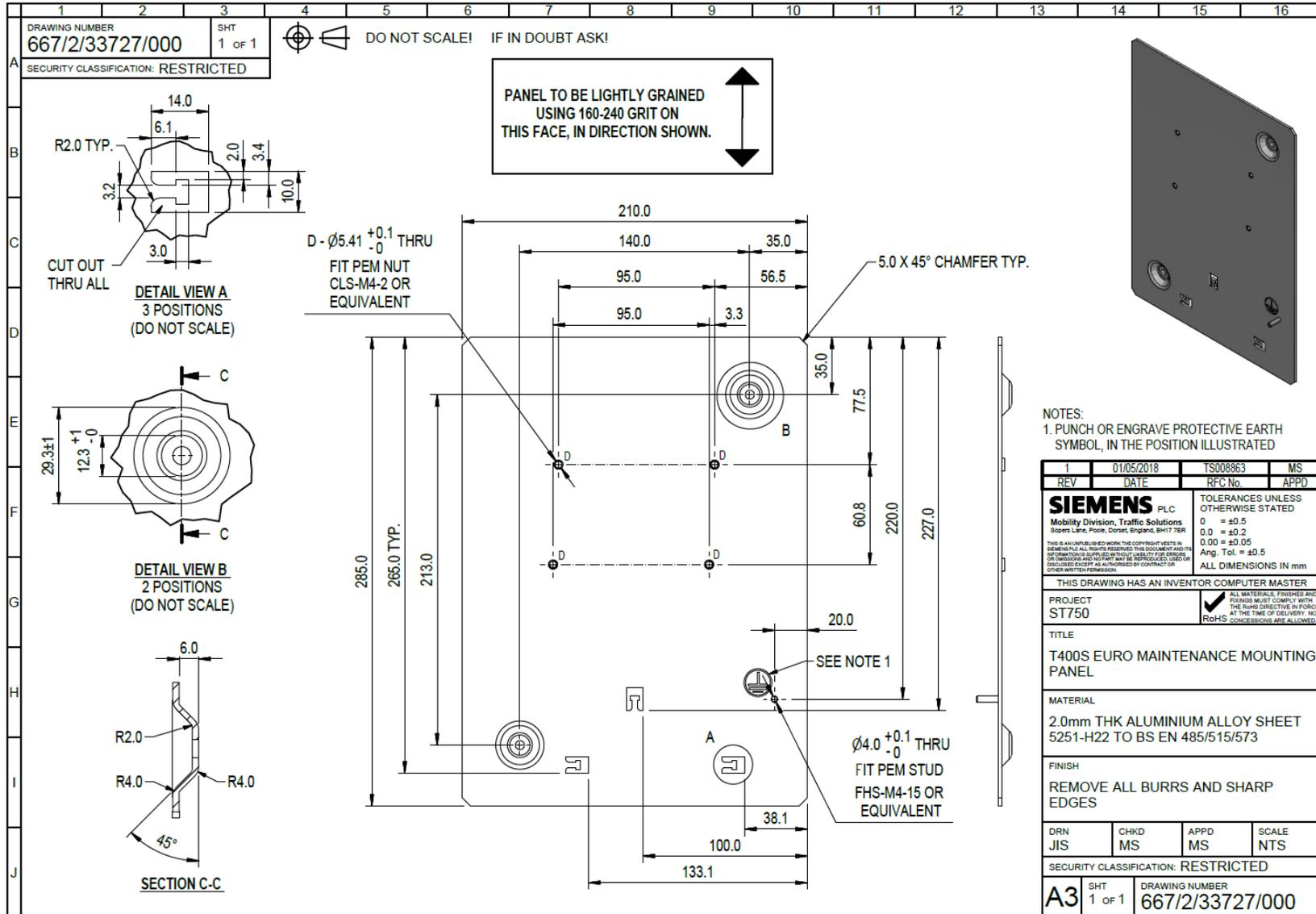
Dale Jones
Technical Sales Assistant
Addvent, Emitex, Heatstore & MTI

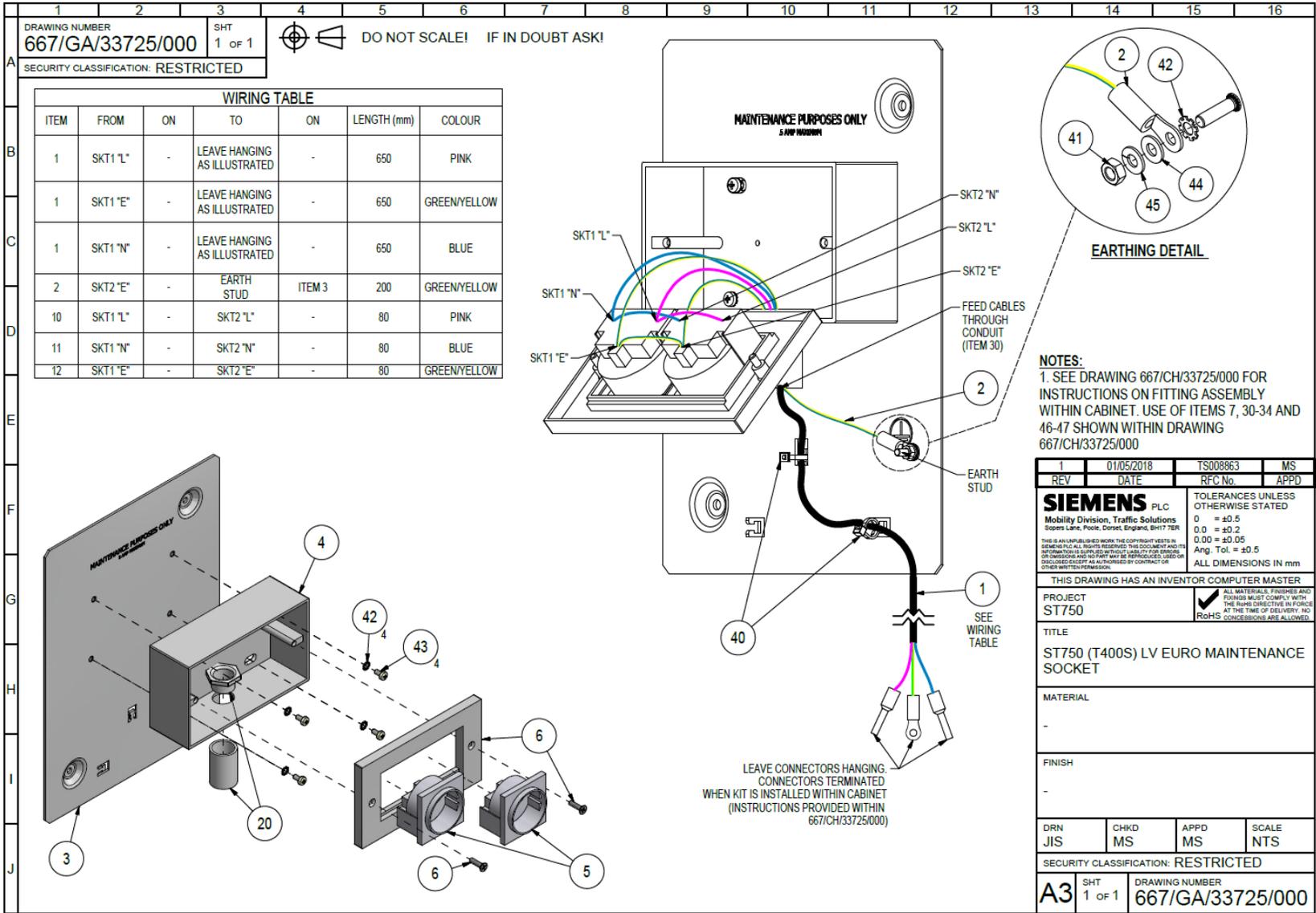
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Unit 12, Access 18, Bristol, BS11 8HT, United Kingdom
T 01179 235 375 F 01179 235 374 E Dale.Jones@adivision.co.uk

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Registered office: 81 Whiteladies Road, Bristol, BS8 2NT

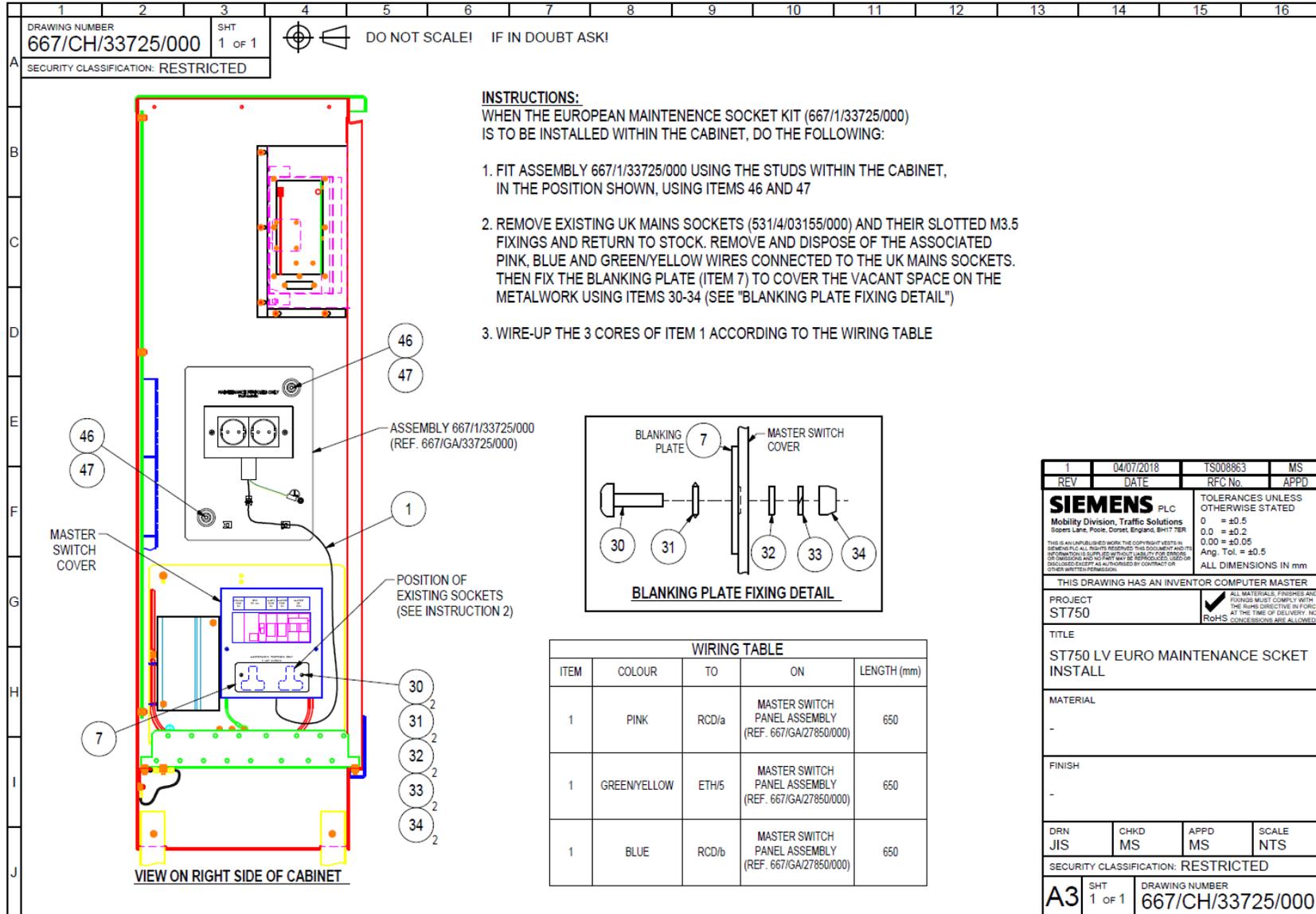
Click [here](#) to report this email as spam.

Digital Skills





1	01/05/2018	TS008863	MS
REV	DATE	REF No	APPD
SIEMENS PLC		TOLERANCES UNLESS OTHERWISE STATED	
Mobility Division, Traffic Solutions		0 = ±0.5	
Slopes Lane, Poole, Dorset, England, BH17 7ER		0.0 = ±0.2	
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THIS DRAWING HAS AN INVENTOR COMPUTER MASTER		Ang. Tol. = ±0.5	
PROJECT ST750		ALL DIMENSIONS IN mm	
TITLE		✓ ALL MATERIALS, FINISHES AND FORMS MUST COMPLY WITH THE REHS DIRECTIVE IN FORCE AT THE TIME OF DELIVERY. NO RoHS CONCESSIONS ARE ALLOWED.	
ST750 (T400S) LV EURO MAINTENANCE SOCKET			
MATERIAL			
-			
FINISH			
-			
DRN	CHKD	APPD	SCALE
JIS	MS	MS	NTS
SECURITY CLASSIFICATION: RESTRICTED			
A3	SHT 1 of 1	DRAWING NUMBER 667/GA/33725/000	



1	04/07/2018	TSD08863	MS
REV	DATE	RFC No.	APPD
SIEMENS PLC		TOLEANCES UNLESS OTHERWISE STATED	
Mobility Division, Traffic Solutions		0 = ±0.5	
Siemens Ltd., Pinner, Greater London, HA11 7TB		0.0 = ±0.2	
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		Ang. Tol. = ±0.5	
		ALL DIMENSIONS IN mm	
THIS DRAWING HAS AN INVENTOR COMPUTER MASTER			
PROJECT	ST750	ALL MATERIALS, FINISHES AND POINTS MUST COMPLY WITH THE HARSIS DIRECTIVE IN FORCE AT THE TIME OF DELIVERY. NO RoHS CONCESSIONS ARE ALLOWED.	
TITLE			
ST750 LV EURO MAINTENANCE SOCKET INSTALL			
MATERIAL			
-			
FINISH			
-			
DRN	CHKD	APPD	SCALE
JIS	MS	MS	NTS
SECURITY CLASSIFICATION: RESTRICTED			
A3	SHT 1 OF 1	DRAWING NUMBER 667/CH/33725/000	

Evidence 5 – Greenpower – Dunsfold Heat (STEM Volunteering)

Greenpower Scrutineering Checklist

Greenpower MOT Scrutineering Checklist 2018

ADMIN

Event Name:

Scrutineer Full Name:

Team Name:		Car no	
------------	--	--------	--

RULE	ITEM	REQUIREMENT	PASS	FAIL	RETEST
	Logbook	Check previous comments have been completed			
T9.1	Roll Bars	A line drawn between roll bars is at least 50mm above the helmet of the tallest driver			
T7.1	Bodywork	The bodywork reaches at minimum from the drivers back to feet and covers elbows to sides			
T7.6	Bodywork	All bodywork and windscreens to front or sides are below the driver's eye level			
T6.5	Seating	There is a padded headrest located to avoid whiplash			
T10.4	Safety Eqpt	The safety harness lap strap fully tightens around the lap, with mounting points on either side			
T10.4	Safety Eqpt	Harness mounting points are around shoulder level to rear approx 150mm wide			
T8.1	Safety Eqpt	The car does not move when brakes are fully applied and a 300N force is applied forwards			
T10.6	Safety Eqpt	There is a clearly visible non-flashing red brake light			
T10.2	Safety Eqpt	There is a clearly audible single-tone horn			
T10.1	Safety Eqpt	Two driver adjustable, rear view mirrors are fitted with a wide field of view, farings attached to mirror			
T10.3	Safety Eqpt	A 100A isolator switch is fitted, easily operable by drivers and marshals			
T6.3	Exit	The driver can exit the car unaided from racing seated position			
T5.1	Dimensions	The whole vehicle is less than 2800mm long, 1200mm wide and 1200mm high			
T5.2	Dimensions	The ground clearance under the entire car is greater than 30mm			
T5.3	Dimensions	The rear of the vehicle extends no more than 800mm from the rear axle centreline			
T3.1	Wheels	Tyres are pneumatic, in good condition, and between 300mm and 520mm in diameter			
T3.3	Wheels	The track, as measured from where the tyres contact the ground, is greater than 500mm			
T3	Wheels	The wheels are secure with minimal play in the bearings, axles and kingpins			
T3.4/5	Wheels	Plastic spoked wheels are not permitted			
T11.1	Steering	There is minimal play in the steering system and control rods do not reach horizontal position			
T11.4/5	Steering	The car is steered by front wheels only and is operated only using hands			
T11.2/3	Steering	Steering is mechanical and operates smoothly from lock to lock without fouling bodywork, lodnuts are secure			
T8.2	Brakes	There are two independent brakes acting on both front or both rear wheels			
T8.3/4	Brakes	The brakes are operated by hand without removing either hand from the steering wheel			
T9.3	Roll Bars	The rear roll bar is braced within 200mm of the top either centrally or on both sides			
T9.4	Roll Bars	Both front and rear roll bars are made of steel or aluminium. The rear is of circular/square cross section			
T9.2	Roll Bars	The roll bars are sufficient dimensions and fixings are mechanical not glued or bonded			
T9.5	Roll Bars	The top 150mm of the rear roll bar does not have any attached aerodynamic aids			
T7.7	Bodywork	Closed cell foam of at least 25mm thickness protects a substantial part of the drivers body			
T7.9	Bodywork	A frontal crash structure of at least 200mm length is fitted to the front bulkhead			
T7.9	Bodywork	The above crash structure is made from foam with a compressive strength between 300 and 700 Kn/m ²			
T7.1	Bodywork	A minimum bodywork thickness of 1.5mm (3mm if plywood) surrounds the driver, to 250mm high			
T7.4	Bodywork	The cockpit must have a minimum opening of 600x350mm in a complete rectangle			
T7.8	Bodywork	There are no sharp edges in the cockpit area and seat is padded			
T10.4	Safety Eqpt	A minimum of 4 point harness is fitted, with straps at least 50mm wide, its anchor points are secure			
T10.5	Safety Eqpt	If the seat has combined angles of less than 45 degrees a 5 fixing point harness is fitted			
T10.3	Safety Eqpt	The battery isolator switch(es) are clearly marked on/off and is directly operated by the driver			
T6.2	Seating	The seat is secure and the driver is sat in a feet first, reclined position			
T4.2	Seating OG	The driver's seat including padding is less than 100mm from ground level			
T7.3	Seating	There is a suitable bulkhead to prevent the driver contacting the wheels			
T6.4	Seating	There is a solid floor under the whole of the driver			

CONTINUED OVER

RULE	ITEM	REQUIREMENT	PASS	FAIL	RETEST
T2.4	Batteries	Both batteries are removed and installed independently, i.e. not strapped together as a pair			
T2.2	Batteries	Auxiliary devices are powered by maximum 1 PP3 or 6AA batteries, not fed into the main power			
T2.1/6	Batteries	Batteries cannot move at all, fixings are of rigid material, and release clips are secure (no plastic)			
T2.8	Batteries	The batteries are inside the body of the car			
T2.8	Batteries	Batteries are separated by a bulkhead capable of restraining them from the driving compartment			
T2.9	Batteries	Batteries have quick release connections (releaseable without tools) that are not liable to short			
T4.1	Batteries	The base of the batteries is below 100mm from ground level			
T1.1	Motor	A standard Greenpower motor is fitted and has not been tampered with, drilled or machined			
T1.2/3	Motor	The motor is air cooled only, and any fans are powered by the main batteries only			
T10.7	Safety Eq	The drivetrain is guarded to prevent fingers, hair, clothing etc becoming trapped at any time			
T12.1	Electrics	The accelerator is spring loaded to the off position			
T12.3	Electrics	There is a 70 amp or lower circuit breaker or fuse fitted			
T12.4/5	Electrics	All wiring is secured away from moving parts and correctly rated for its use			
T13.4	Other	Three numbers are fitted, one on each side and one on the front, all are clearly visible			
T13.6	Bodywork	The drivers crash helmet has no fairings or cameras attached to it			
T13.5	Other	Transponder is mounted outside the bodywork with no fairings			
T10.8	Other	Critical components use locking nuts with at least 1 thread protruding, locking compound is not acceptable			
	Other	All Greenpower Partner Stickers Prominently, Both Sides & Front, Displayed (Siemens, IET, BMWi, Silverline)			
	Other	There is nothing else on the car that would cause you to deem it unsafe			

Done?

If the car has not completely passed scrutineering, please give this form and their logbook to the Chief Scrutineer

If the car has fully passed scrutineering apply an MOT pass sticker AND a race pass sticker in a clearly visible position

Send the School/team leader to Race Admin with this form and their logbook to collect their Transponder

NOTES:

Scrutineer - have you noticed anything exceptional about this car?

Teamwork, Communication and Collaboration

I and other volunteers received a demonstration on how to inspect the car and complete the checklist. We later began conducting inspections ourselves.



Evidence 6 – Gadget Factory (School Engagement)



Evidence 7 – Year in Industry (6 Month Review)

Supervisor Review

YINI Student Review 2nd/ final visit (Supervisor Section)

Student Name: Junedul Shahid

To be completed by Supervisor: David Martin

COMPETENCE AREAS	ASSESSMENT LEVEL				COMMENTS
	Excellent	Fully Met	Marginal	Not Met	
Knowledge & Understanding <ul style="list-style-type: none"> • Keeps academic knowledge up-to-date • Understands principles of workplace tasks • Open to change, innovation & willing to try new tasks • Willing to accept feedback from others 	✓ ✓ ✓ ✓				Never refuses taking on anything and willingly learns. Junedul will also suggest improvements, and accepts feedback and puts it in to practice.
Application to Practice & Achieving Results <ul style="list-style-type: none"> • Completes tasks; achieves goals & deadlines • Defines and solves problems • Identifies & understands root cause of problems • Produces reliable & innovative solutions • Comfortable with and uses IT applications including word processing, spreadsheet and data base applications, e-mail, www, specialist applications • Collects, locates &/or retrieves, analyses and interprets information efficiently 		✓ ✓ ✓ ✓ ✓			Tracks tasks well and ask questions when he needs more input to progress those tasks. He is comfortable with the tools that are used in the department and has picked them up very quickly. The department lead will work with him to review format and structure of project documentation.
Leadership, Management & Supervision <ul style="list-style-type: none"> • Manages time effectively • Understands how projects are managed • Seeks opportunities for quality improvement 	✓	✓ ✓			Only limited by the opportunities that we have been able to give him. Junedul has so far shown drive and leadership all be it in perhaps a smaller closed environment of the projects that he has been involved with. We will look at opportunities to give him more expansive experience across the business / outside of the department and current projects.

Confidential YINI Student review Final Visit – Supervisor Form)

COMPETENCE AREAS	ASSESSMENT LEVEL				COMMENTS
	Excellent	Fully Met	Marginal	Not Met	
Interpersonal Skills & Personal Effectiveness <ul style="list-style-type: none"> Seeks opportunities to improve own performance Aware of own strengths, weaknesses and abilities Relates to people at different levels Communicates clearly and effectively Contributes to team work; understands effect on others Makes effective presentations 	✓	✓			<p>Junedul is confident and able to collaborate at all levels within the department.</p> <p>He has integrated into the team well, and we aim to offer him more opportunities to shine, in the later part of his stay with us.</p>
Professional Conduct <ul style="list-style-type: none"> Has understood Company safety training and observes safe practices Committed to gaining and recording competences, development action and review Aware of the broader impact of work based solutions 	✓	✓	✓		<p>Junedul will consider if any of his goals need a deeper insight / experience in the second half of placement.</p> <p>Junedul considers how his designs are going to be manufactured / assembled and the practicality of those processes. He considers the sequence / order that may be involved and the effect on the operators.</p>
Supervisor's Overall Comments: <p>From our initial interview with Junedul I knew he had the technical skill set that was needed, and hoped that the experience of being an intern would give him that broader experience to be confident in designs. I'm happy to say that during this first part of his internship, I have seen his confidence grow in the interaction with other engineers across the projects he has been involved with, and within the broader engineering team. He has performed well, and contributed well to the projects.</p>					
Supervisor's signature: <i>D.A. Marks</i> Date: <i>06/04/2018</i>					

Confidential YINI Student review Final Visit – Supervisor Form)

Self – Evaluation

YINI Student Review Form (2nd/ final visit)

To be completed by YINI Student

Placement Details:

Mentor Name: Colin Davies		Date of visit:	
	Name	Telephone No	e-mail address
YINI Student:	Junedul Shahid	01202782082	junedul.shahid@siemens.com
Supervisor:	David Martin	01202782188	dave.martin@siemens.com
Company:	Siemens (Intelligent Traffic Systems)	Department:	Mechanical Department/Drawing Office

Duties undertaken:

Summary: Mechanical design, 3D CAD models and assemblies, engineering and assembly drawings, Bill-of-Materials (BOMs) preparation

- TFL Low Level Access Pole Kit
- Warrington Variable Message Sign (VMS)
- Plus+:
 - RAG Node General Assembly (GA) drawing
 - Helios RAG BOMs for relevant variants + GA drawing
 - Bypass Module (BOM + GA drawing)
 - REG Signs BOMs
 - CLS Aspect (Red, Amber, Green) BOMs + GA drawing
 - PCaTS Installation (CI) drawing + GA drawing + 3 cable looms (BOMs + GA drawings)
 - Redundancy Module BOM + GA drawing
 - PSU assembly and cable loom BOM + GA drawing

Key Competences utilised and developed (see overleaf):

- CAD - Improved accuracy and planning with creating 3D CAD models. This includes measuring third party parts and replicating them for use in assemblies
- Improved attention to detail and understanding of preparing engineering documents, with regards to, preparing Bill-of-Materials (BOMs), dimensioning and applying tolerances appropriately when detailing a drawing, providing clear assembly instructions through different views and annotations
- Improved understanding of working with sheet metal – modelling, manufacturing (punches, presses, surface finishing) and different fixings and inserts
- Improved understanding of lean design - using fewer variations of fixings, ensuring the design is easy to assemble,
- Following a product data management (PDM) system and maintaining revision control of parts to satisfy ISO standards
- Improvement in questioning team members and suppliers to extract information relevant to complete my tasks correctly
- Improved understanding of creating solutions as kits for easy installation and investigating current products for re-usable components
- Planning and organisational skills - plan own workload and realistically set and achieve targets in a project-based environment

Unrestricted

- Listening to people and their experiences to generate new ideas and concepts

YINI Student's overall evaluation of this period:

Gained invaluable experience of working in project environment and supporting day-to-day business related tasks. Was given the opportunity to practise mechanical design, work with large 3D CAD models and develop good practises in preparing assembly and production drawings.

During this time, I have also gained a better understanding of electrical safety, attended a visit to a manufacturer's facility and have started learning basic Arduino programming.

I have discussed this review with my supervisor

Signature of YINI Student:*Shahid*..... Date:*06/04/2018*.....

Evidence 8 – Project Review Presentation (University Tutor Visit)

Read slides horizontally.

Project Review Year In Industry

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Junedul Shahid

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Contents

- Role Responsibilities
- Drawing Office Workflow
- Project Overview – Plus+
- Project Contribution
- Questions



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Role Responsibilities Drawing Office Workflow Project Overview Project Contribution Feedback and Improvement

Role Responsibilities – Mechanical/Drawing Office

- Design mechanical components
- CAD modelling and assemblies
- Detail drawings and assembly/installation drawings
- Preparing Bill-of-Materials (BOM)
- Supplier Liaison

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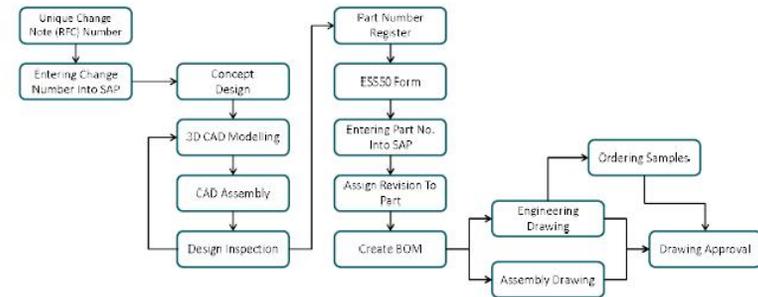
Junedul Shahid

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Role Responsibilities Drawing Office Workflow Project Overview Project Contribution Feedback and Improvement

Drawing Office Workflow



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Role Responsibilities | Drawing Office Workflow | Project Overview | Project Contributions | Feedback and Improvement

RFC Number Generation

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A Request-for-Change (RFC) note is generated when an affected party requires a change to an existing process/product due to a mistake or change in requirements

RFC numbers are used to control the revision of part numbers and ensure easier traceability if multiple changes to different parts are made at the same time

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Role Responsibilities | Drawing Office Workflow | Project Overview | Project Contributions | Feedback and Improvement

Part Number Register

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The part number register contains a record of every part number in use. Available part numbers can be reserved for use

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Role Responsibilities | Drawing Office Workflow | Project Overview | Project Contributions | Feedback and Improvement

ESS50 Form

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- The ESS50 form is used to generate a text file with the relevant information relating to a new part number.
- For internally controlled parts, the supplier information is not required at this stage as the drawing will specify the requirements and purchasing will source the supplier

For 3rd party component however the following are required:

- Datasheet Traceability + Protects Supply Chain
- Manufacturer Part Number
- RoHS* Declaration

*The Restriction of Hazardous Substances (RoHS) Directive restricts the use of certain hazardous substances in electrical and electronic equipment

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Role Responsibilities | Drawing Office Workflow | Project Overview | Project Contributions | Feedback and Improvement

BOM - SAP

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- Uploading Request-For-Change (RFC) notes
- Raising part numbers
- Associating part numbers to the appropriate factory cell
- Revision control using the RFC number
- Creating Bill-of-Materials for assemblies

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Role Responsibilities Drawing Office Workflow Project Overview Project Contributions Feedback and Improvement

CAD – Modelling Components

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Role Responsibilities Drawing Office Workflow Project Overview Project Contributions Feedback and Improvement

CAD – Assembly

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Role Responsibilities Drawing Office Workflow Project Overview Project Contributions Feedback and Improvement

CAD – Assembly Drawing

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Role Responsibilities Drawing Office Workflow Project Overview Project Contributions Feedback and Improvement

CAD – Detail Drawings

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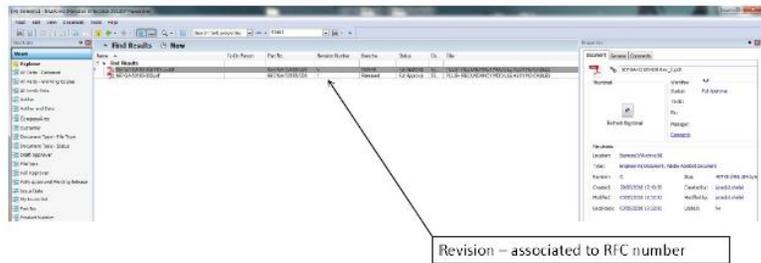
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Role Responsibilities | Drawing/Office Workflow | **Project Overview** | Project Contribution | Feedback and Improvement

Meridian – Drawing Approval

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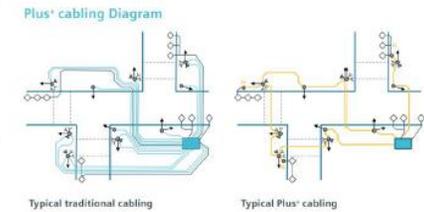
Role Responsibilities | Drawing/Office Workflow | **Project Overview** | Project Contribution | Feedback and Improvement

Project Overview – Plus+

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The ST950 Plus+ system is an advanced traffic control system using distributed intelligence with simple power and data cabling to increase intersection availability and reduce overall installation costs (modular installation).

System Overview:
The Plus+ system distributes intelligence, particularly related to signal switching and monitoring, around the intersection using intelligent 'nodes' connected to the central controller via simple two pair cables. This reduces cabling, labelling of cables and testing during commissioning



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Role Responsibilities | Drawing/Office Workflow | **Project Overview** | **Project Contribution** | Feedback and Improvement

Project Contribution

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BOMs and Assembly Drawings:

- Helios Traffic Signals (RAG)
- Central Light Source (CLS)
- Bypass Module
- PCaTS (inc. cable looms)
- In-Rush Kit
- PSU Kit
- Redundancy Module
- Regulatory (REG) Signs
- Main Cabinet Rack



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Role Responsibilities | Drawing/Office Workflow | **Project Overview** | Project Contribution | **Feedback and Improvement**

Feedback and Improvement Areas

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- Quickly became proficient in using the complicated tools and processes that dominate the design office workflow
- Has demonstrated a flair for 3D modelling and has been able to confidently use two different 3D packages
- Has produced very good general assembly and instruction drawings that will be used to assist our field and production teams
- He has a good eye on how to effectively present the information and has responded well to feedback from others when suggestions have been given on how to improve a drawing layout
- Has progressed well in his ability to identify key stakeholders and communicate effectively with them

An area of improvement, and one that will develop naturally with experience, is determining the relevant stakeholders and which questions to ask to get the most from the dialogue.

A suggested tactic would be to note the salient points on a piece of paper beforehand and having those as a reference so they are not forgotten. Another useful tactic with complicated or involved dialogue is to repeat received answers in summary form to ensure that they are completely understood.

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Any Questions?

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Evidence 9 – Poole Site Charity Quiz Trophy

Arduino Code – Used to control behavior of LED's using a switch

// constants won't change. Used here to set a pin number:

```
const int buttonPin = 2;           // the number of the pushbutton pin
//const int ledPin = LED_BUILTIN; // the onboard LED on Arduino (used for testing)
const int ledPin1 = 4;            // the number of the LED pin on Arduino
const int ledPin2 = 5;            // the number of the LED pin on Arduino
```

// variables will change:

```
int buttonState = 0;              // variable for reading the pushbutton status
```

void setup()

```
{
  // set button as an input
  pinMode(buttonPin, INPUT);

  // set the digital pin as output:
  //pinMode(ledPin, OUTPUT);
  pinMode(ledPin1, OUTPUT);
  pinMode(ledPin2, OUTPUT);
}
```

```

void loop()

    // put your main code here, to run repeatedly:

    {

    buttonState = digitalRead(buttonPin);           // read the state of the pushbutton value:

    if (buttonState == LOW)                         //this state has been programmed to cause
                                                    the LED's to flash

    {

    delay(50);                                       //delay response by 50 milliseconds to avoid
                                                    button debounce

    //digitalWrite(ledPin, HIGH);                   // turn the LED off (HIGH/LOW is the voltage
                                                    level)

    digitalWrite(ledPin1, HIGH);

    digitalWrite(ledPin2, HIGH);

    delay(250);                                     // wait 250 milliseconds

    //digitalWrite(ledPin, LOW);                    // turn the LED on

    digitalWrite(ledPin1, LOW);

    digitalWrite(ledPin2, LOW);

    delay(250);

    }

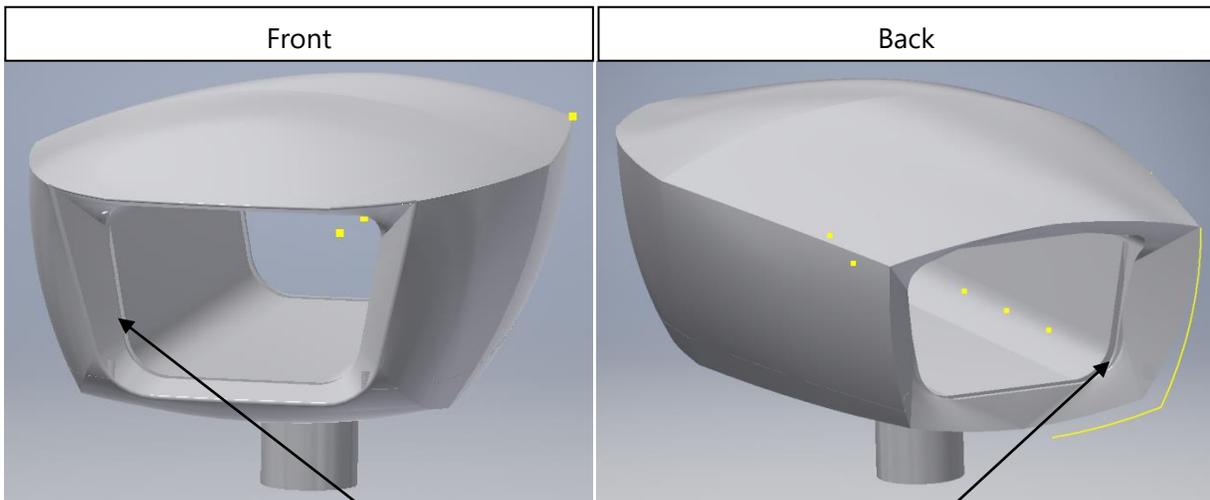
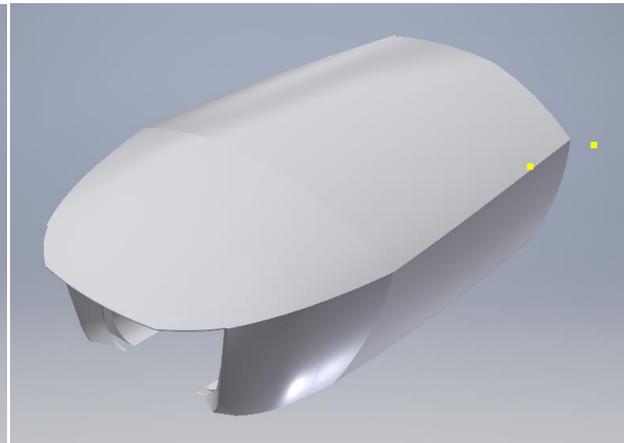
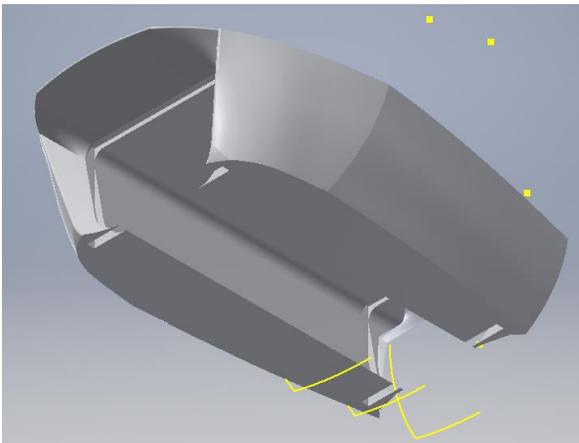
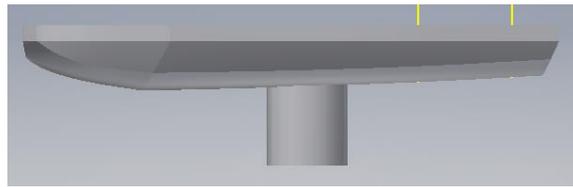
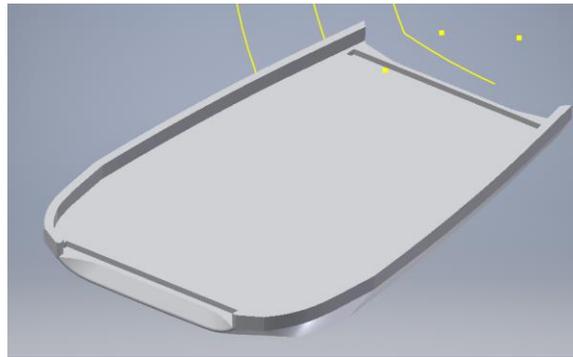
    }

```

Note:

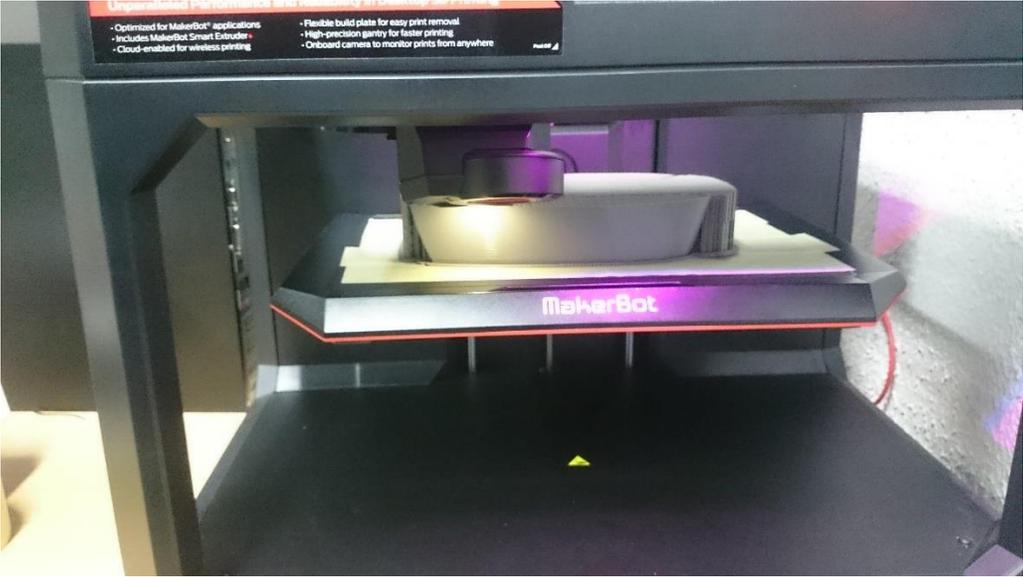
Whatever follows “//” is treated by the software as simple text and does not behave as active code. “//” is used to add comments to make the code easier to follow and make lines of code inactive without deleting the code itself. In this instance the onboard LED on the Arduino has been disabled.

CAD Model

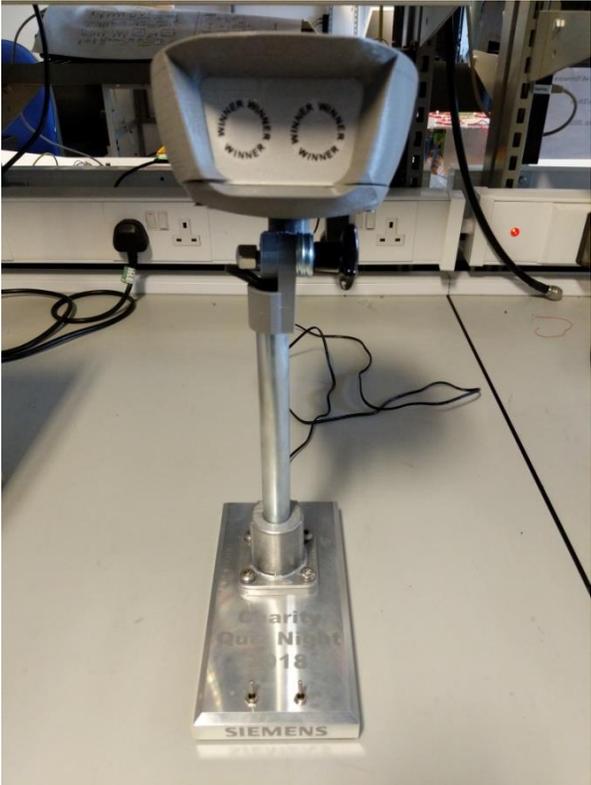


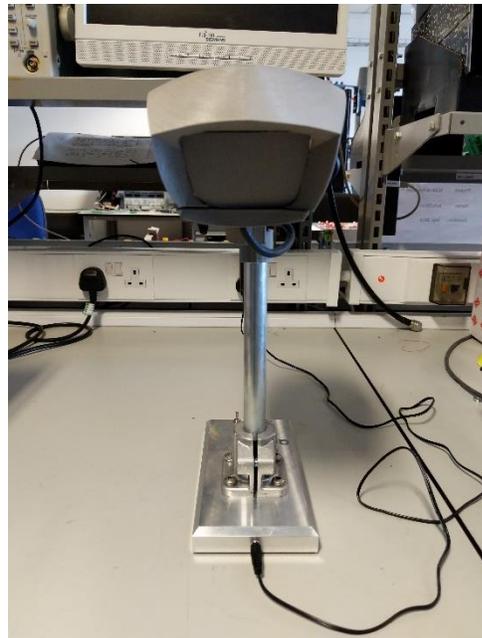
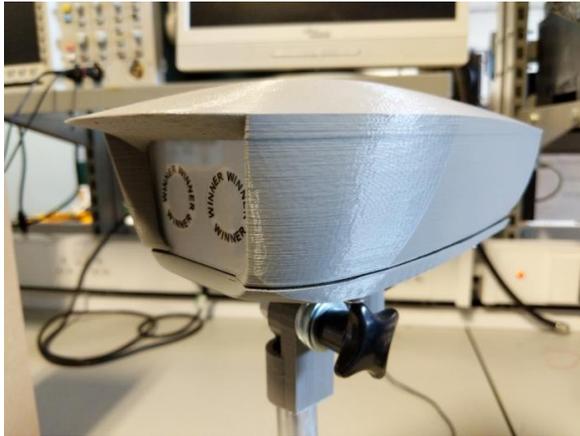
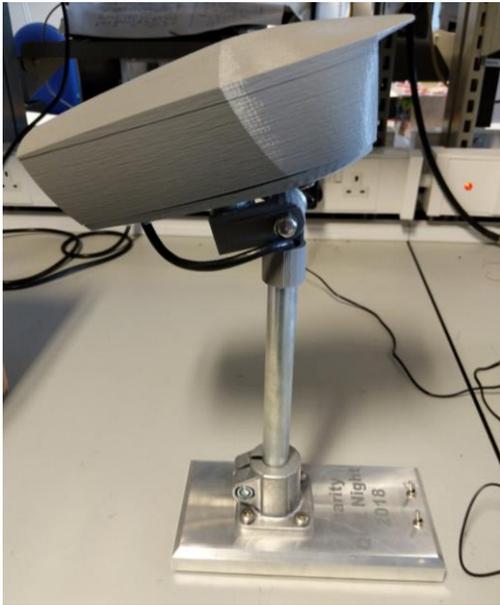
Slots for Perspex cover and display

Photographs



(Makerbot 3D Printer – printing top half of the camera head)



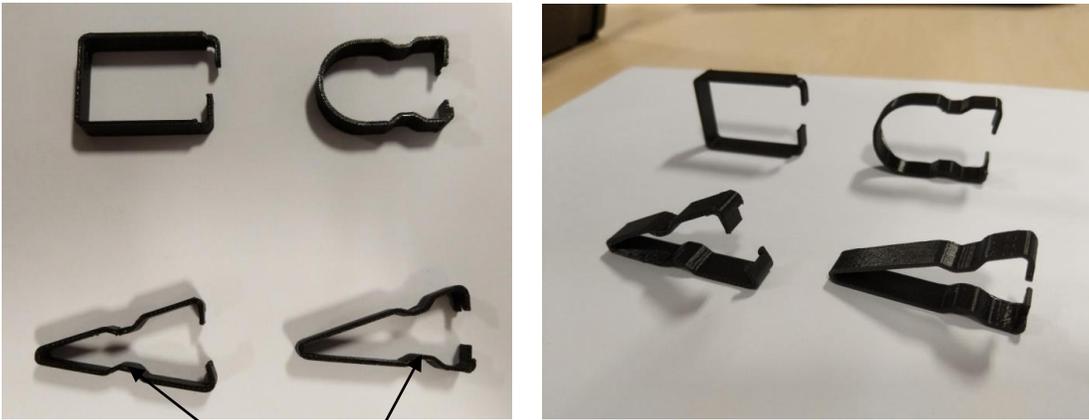


Evidence 10 – RAG Node Connector Release Tool

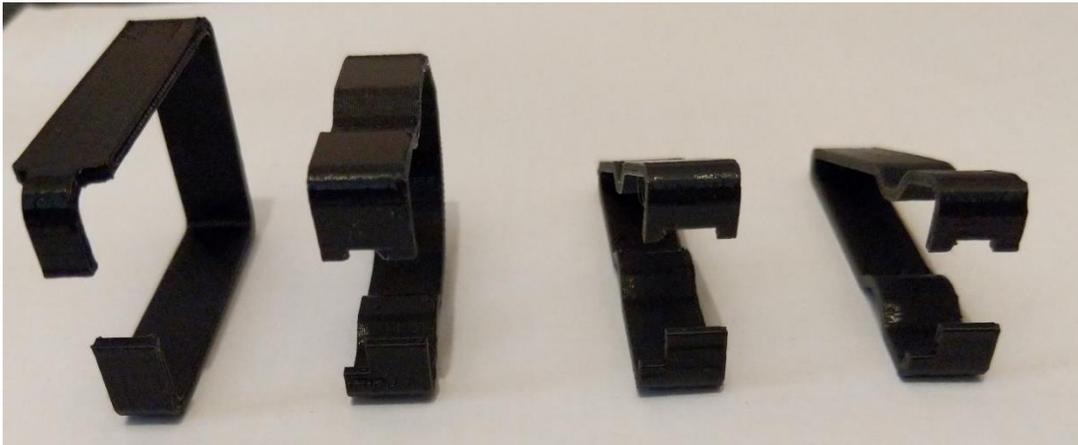
Creativity and Innovation

Concept 1

3D Printed Models

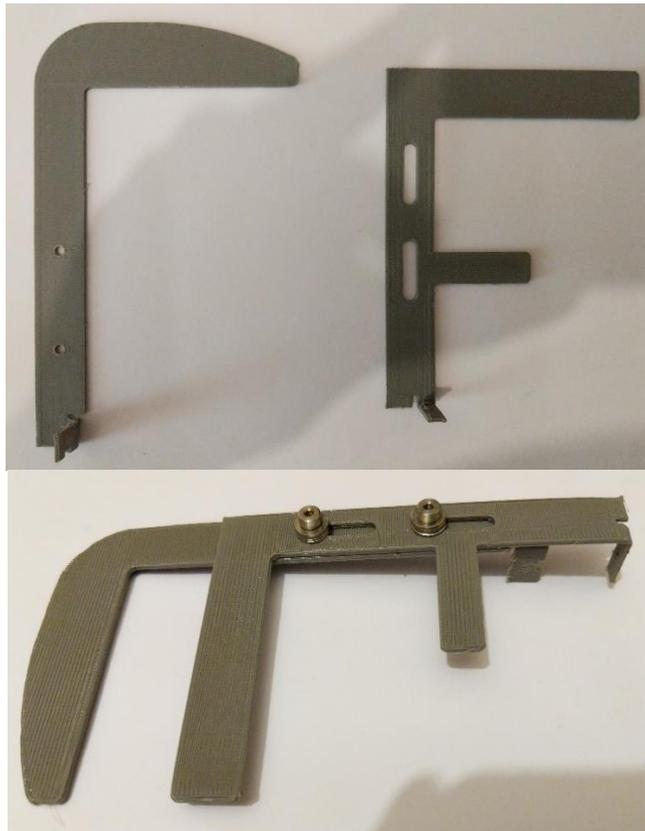


Notches moved further forward for better control when operating the tool



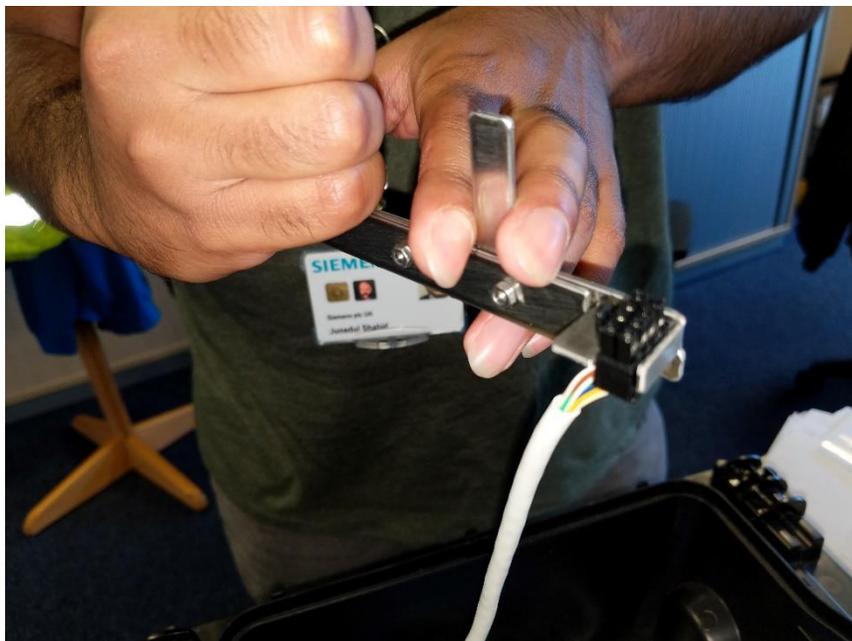
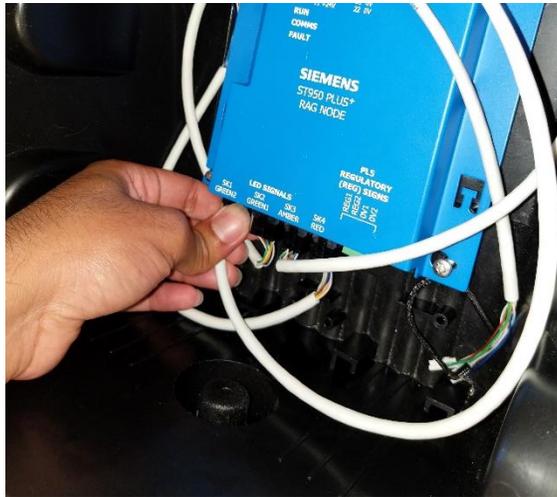
Concept 2

3D Printed Model



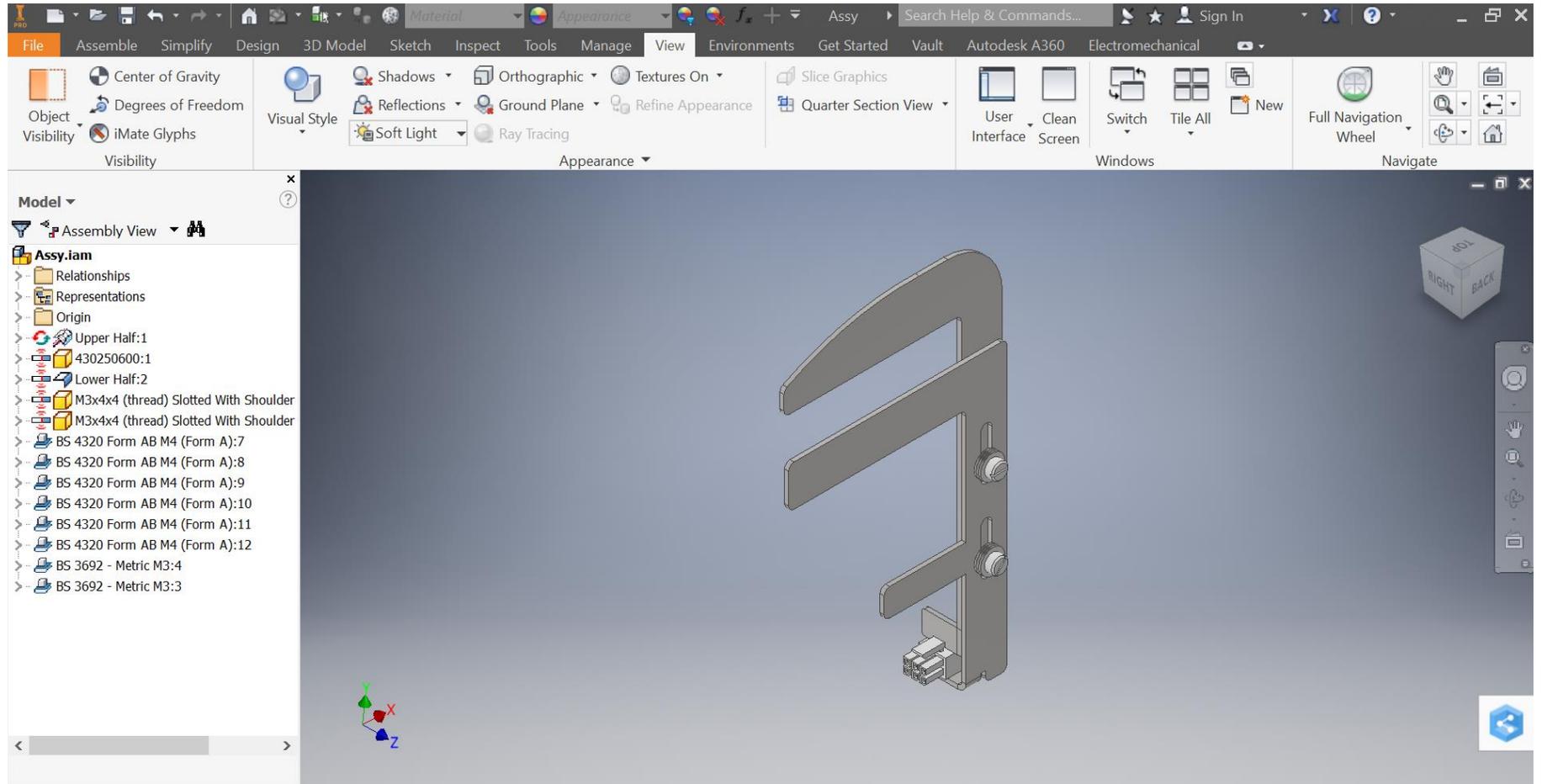
Final Prototype



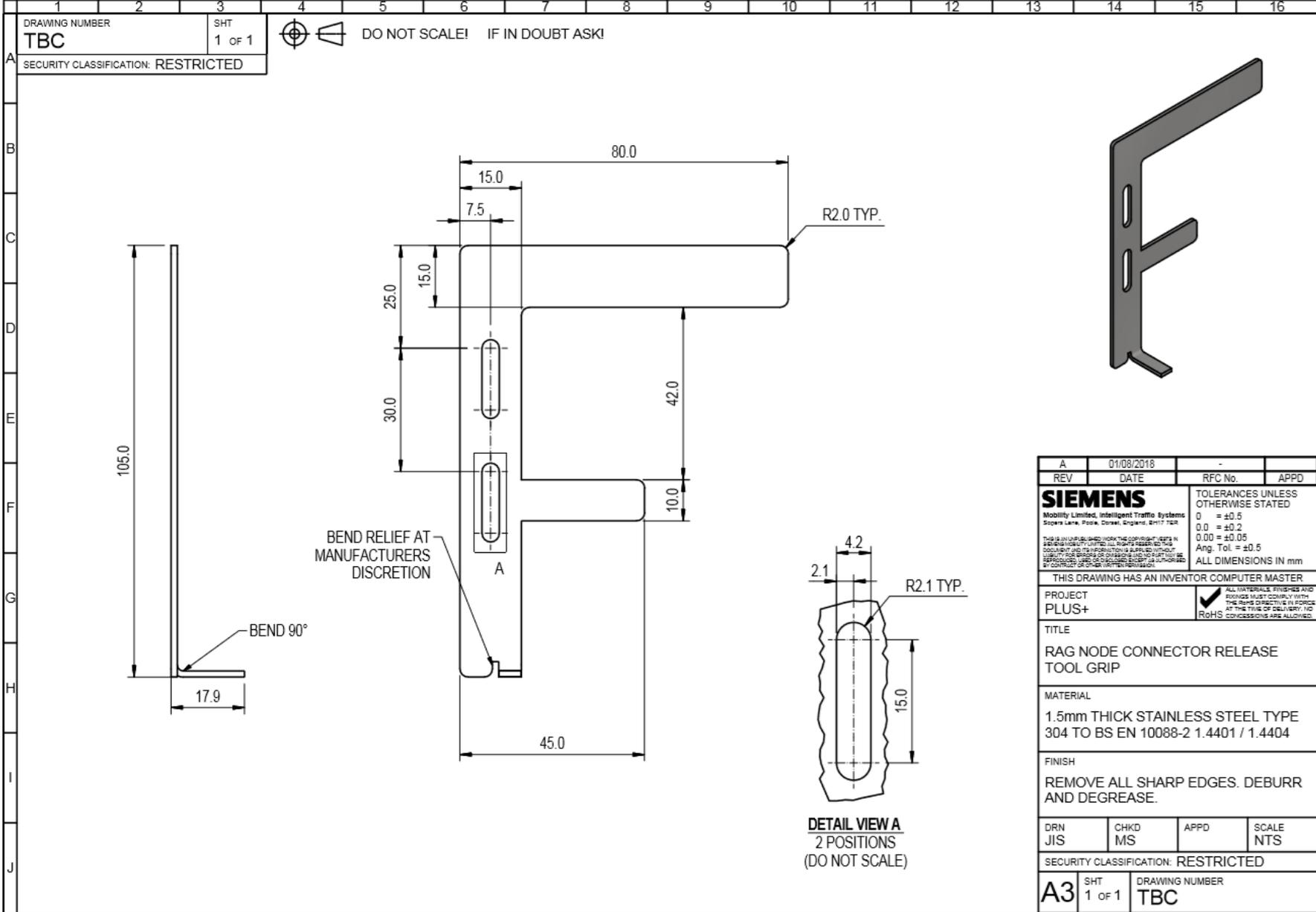


Digital Skills

Modelling in Inventor



For Help, press F1



A	01/08/2018	-	
REV	DATE	RFC No.	APPD
SIEMENS		TOLERANCES UNLESS OTHERWISE STATED	
Mobility Limited, Intelligent Traffic Systems		0 = ±0.5	
Siemens AG, Munich, Germany, 81737		0.0 = ±0.2	
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		Ang. Tol. = ±0.5	
		ALL DIMENSIONS IN mm	
THIS DRAWING HAS AN INVENTOR COMPUTER MASTER			
PROJECT	PLUS+	<input checked="" type="checkbox"/> ALL MATERIALS, FINISHES AND FINISHES MUST COMPLY WITH THE BEND OBJECTIVE IN FORCE AT THE TIME OF DELIVERY. NO RoHS CONCESSIONS ARE ALLOWED.	
TITLE			
RAG NODE CONNECTOR RELEASE TOOL GRIP			
MATERIAL			
1.5mm THICK STAINLESS STEEL TYPE 304 TO BS EN 10088-2 1.4401 / 1.4404			
FINISH			
REMOVE ALL SHARP EDGES. DEBURR AND DEGREASE.			
DRN	CHKD	APPD	SCALE
JIS	MS		NTS
SECURITY CLASSIFICATION: RESTRICTED			
A3	SHT 1 OF 1	DRAWING NUMBER TBC	

