

Student name:	Will Gabriel	Student ID number:	2404403
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Lecturer:	Mark Sandford	Internal Verifier:	Abigail Penny
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Project Introduction

The purpose of this report is to lay out the rigorous, structured plan for our Level 5 group project, focusing specifically on the systematic upgrading and enhancement of a target motorcycle platform. In this case, a 2006 Honda CB600F Hornet.

Our team's objective is not merely to perform modifications, but to execute a professional engineering exercise that delivers tangible, measurable improvements in performance, aesthetics, and, most critically - rider safety.

The necessity for this project stems from the inherent compromises found in stock vehicles. By targeting key areas, specifically the braking system, rider ergonomics, and general aesthetics, we aim to demonstrate how targeted, cost-effective engineering solutions can take an old-man's production bike beyond its factory performance. This whole process is our proving ground for applying core management and engineering principles in a real-world scenario.

For us, success will be measured by two primary outcomes. First, achieving our Gateway Objective of demonstrating a significant, measurable improvement in braking consistency and **feel** - through the use of steel braided lines and fresh fluid. Second, success means executing the entire project within the defined time and budget constraints set forth in the Bill of Materials (BOM) and the Gantt charts. Ultimately, we are aiming to deliver a project that is not just completed, but *flawlessly* documented, proving our ability to manage, coordinate, and technically deliver a complex engineering challenge. We want to work so well as a team, as a group, that one could easily mistake the group as efforts being made by just the one person.

Team Roles & Responsibilities

In this section I will refer to Belbin's Team Roles model, so I've included a table showing the 9 roles his model outlines – seen below.

Team Role	Contribution	Allowable Weaknesses
Plant 	Creative, imaginative, free-thinking. Generates ideas and solves difficult problems.	Ignores incidentals. Too preoccupied to communicate effectively.
Resource Investigator 	Outgoing, enthusiastic, communicative. Explores opportunities and develops contacts.	Over-optimistic. Loses interest once initial enthusiasm has passed.
Co-ordinator 	Mature, confident, identifies talent. Clarifies goals. Delegates effectively.	Can be seen as manipulative. Offloads own share of the work.
Shaper 	Challenging, dynamic, thrives on pressure. Has the drive and courage to overcome obstacles.	Prone to provocation. Offends people's feelings.
Monitor Evaluator 	Sober, strategic and discerning. Sees all options and judges accurately.	Lacks drive and ability to inspire others. Can be overly critical.
Teamworker 	Co-operative, perceptive and diplomatic. Listens and averts friction.	Indecisive in crunch situations. Avoids confrontation.
Implementer 	Practical, reliable, efficient. Turns ideas into actions and organises work that needs to be done.	Somewhat inflexible. Slow to respond to new possibilities.
Completer Finisher 	Painstaking, conscientious, anxious. Searches out errors. Polishes and perfects.	Inclined to worry unduly. Reluctant to delegate.
Specialist 	Single-minded, self-starting, dedicated. Provides knowledge and skills in rare supply.	Contributes only on a narrow front. Dwells on technicalities.

Team Table:

Name	Role
Will	Ideas & Solutions
Billy	Resource Investigator
Bill	Co-ordinator
William	Shaper
Wiz	Monitor Evaluator
Wilhelm	Teamworker
Wyll	Implementer
Willson	Completer/Finisher
Willum	Specialist

Name	Responsibility
Will	Think of ideas for project direction and solutions for project problems.
Billy	Determining the inventory requires for each idea/concept, the contacts to facilitate the goal.
Bill	Leads the team as if it were one person, united. Delegates, explains and motivates the team effectively.
William	Keeps efforts high by clarifying end goals, making distant tasks feel reachable. Motivates.
Wiz	Works closely with Will, providing a logical perspective on solutions. Judging with impartial logic.
Wilhelm	Meshes with the team, checking in and relaying feedback throughout to ensure smooth operation.
Wyll	Working with Billy, planning strategy for Bill, builds plans based off resources required.
Willson	Does most of the physical work; ensures his work is done to high standards and scrutinised vigorously.
Willum	Focused research and understanding on proposed project directions, providing new information to support improvement as it develops.

Using Belbin's model, I have titled each member within that framework. Of course, within the group I'm "Will". My duty is to conjure up creative solutions to the dynamic problems of this project, which is a fancy way of saying "I'll think of upgrades".

For my role, I need to be able to think creatively. To be able to invent solutions which might not always be immediately compatible – but must always be able to become compatible with relative ease. Restructuring the bike might permit a modest upgrade however that involves *restructuring the bike*. The drain on resources goes up.

Someone who undertakes this role needs to be able to keep their minds rolling free and not get "snagged" on a problem, missing creative solutions. Most importantly, this person needs to be able to relay their ideas in an easily understandable way to the team. Communication of the solutions in clear language, with the aid of diagrams if deemed necessary to ensure all can understand what's being presented. I have been assigned this role as I am understood to meet all the criteria above.

Group Tasks & Associated Timings

Task ID	Task Description	Assigned key member	Duration (in weeks)
G-1	Project definition & phase-1 R&D	Will, Wyll, Wiz & Billy	1
G-2	Technical specification complete	Will	1
G-3	Procurement & budgeting	Billy & Wyll	2
G-4	Bar & levers installation	Will & Wilhelm & William	1
G-5	Braided brake line installation	Will & Wilhelm	1
G-6	Performance testing & recording	Willum & Wiz	2
G-7	Final analysis & report compiling	Will & Willson	1
G-8	Final submission	Team effort	1

Above is a table of the main group tasks, with their respective members. Of course, nobody is barred from helping if their duties are temporarily sparse or on hold, however for the sake of team structure these are the assigned key members who *should* be fully available and designated for these tasks.

Detailed task list

In technical speak: My tasks will focus on specifying the non-stock components, determining the technical methodology for the suspension and braking improvements, and detailing the aesthetic changes. In more easily digestible language: I'm going to outline upgrades to suspension, braking and the general aesthetic of the bike, for the team to enact.

Task ID	Task Description	Hours Required (Estimated)	Task Duration (Days)
D-1	Research & Selection of Tail Tidy, Handlebars (Bend/Material) & Levers	5	1
D-3	Selection & Specification of Braided Brake Line Kit (Length/Fittings/Colour)	2	1
D-4	Development of Rim Tape Application Protocol & Aesthetic Report	2	1
D-5	Installation of Handlebars & Levers (My main hands-on ergonomic task)	3	1
D-7	Documentation & Technical Analysis (Report writing, linking changes to ergonomics/handling)	6	3
TOTAL		18	7

Item	Qty	Estimated Cost (Each)	Estimated Total Cost (£)	Purchase Lead Time (Days)	Notes
Tail Tidy/Fender Eliminator	1	70	70	5	Model-specific kit (e.g., R&G) for a clean look.
Aftermarket Handlebars	1	60	60	3	E.g., Clips-ons or Renthal bars (requires bar ends).
Adjustable Brake/Clutch Levers	1 Set	45	45	4	Aesthetic and ergonomic upgrade.
Braided Brake Line Kit	1	120	120	5	Front and rear lines increase responsiveness (e.g., Goodridge, Hel).
Brake Fluid (DOT 4)	1 Litre	10	10	3	Required for the brake line bleed.
Wheel Rim Tape	1 Roll	6	6	8	For a cleaner finish than stock rims.
BOM Sub-Total			£311		

Specialist Equipment List

In this short section, I will include a list of the tools needed to complete this project.

Due to width constraints and ease of reading, I have chopped the table up into two, providing notes/explanation for why each listed tool has been chosen.

Quantity	Item	Purpose
1	Brake bleeding kit	To remove air from the brake lines safely
1	Torque wrench	To tighten all bolts, clamps and fittings to the manufacturers specification
1	Motorcycle paddock stand	For overall stability during work
1	Digital caliper	Used to take pre & post modification measurements
1	Electric kettle	Rapid delivery of essential tea during work

Item	Notes
Brake bleeding kit	Vacuum or pressure; ensures a professional, air-free seal for rider safety.
Torque wrench	Prevents component failure (under-tightening) or stripping threads (over-tightening).
Motorcycle paddock stand	Will also aid rim-tape application
Digital caliper	Essential for Gateway Objective verification and technical analysis (D-7)
Electric kettle	Milk & digestives offer significant improvement to experience.

Milestone Identification

Milestones are key moments for the whole group, like goals reached and decisions made.

Milestone 1

All technical specifications finalised for the handlebars, braided lines, tail tidy etc. All aspects of the plans thoroughly inspected and scrutinised for potential issues down the road. A clear specification means procurement is clear-cut, no ambiguity or uncertainty with what the group needs. No surprises, just results.

Milestone 2

All components procured, checked against the specifications. Everything now in-house and 100% confident we have the correct parts and equipment to proceed, through QA checks.

Milestone 3

All bolt-on parts now fitted. These would be the new bars, tail-tidy etc. Everything securely mounted and ergonomically adjusted – ready to ride again.

Milestone 4

This would be to have the braided lines now installed, brake lines fully flushed and refilled with the new DOT4 fluid. So M3 we have the “exterior” modifications finished, M4 sees the essential drive modifications completed. It is essential for this installation to be done with due care and attention, for brake failure presents fatal risks.

Milestone 5

Now the bike is built, tested and safe, this milestone would mark the completion of all final measurements having been recorded, compiled, and the analysis section of the final report drafted. Everything that’s happened now to be logged appropriately.

Milestone 6

All recordings taken, analysis’ done, full report finalised and all submitted.

Deeper look into a personal gateway objective

For me, my gateway objective will be to prove that installing the braided brake lines and refreshing the bike with new DOT4 fluid has resulted in a significant and measurable improvement in braking performance (and general feel/responsiveness for the rider). Also, as a result, prove an increase in rider safety.

The reason I've chosen to change the bike from standard rubber brake lines to steel braided brake lines (and DOT4 fluid) in this project is because the steel braided lines offer improved pedal & level feel, as well as improved consistency. This upgrade is one I'd consider to be critical in terms of a safety *and* performance upgrades.

(Walker Jr., 2007)

The standard rubber lines are subject to (volumetric) expansion under pressure, which gives worsened pressure application and feel. In a simple sense, you squeeze the grip which pressures the brake fluid down the brake lines – however, with rubber lines some of that pressure going into expansion of the brake line. The expansive pressure is wasted energy. Because of this expansion, some of the feedback from the brake system is absorbed (how I'd say) horizontally; into the walls.

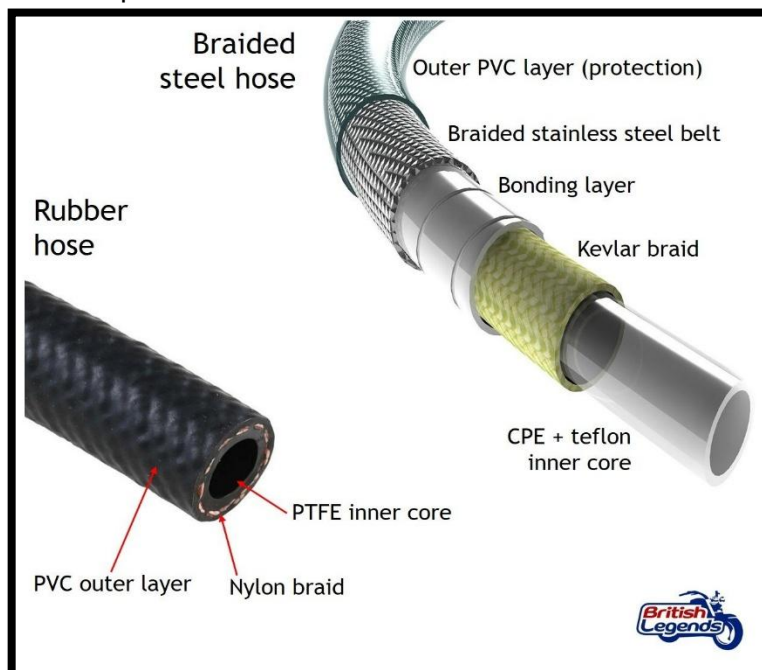
This occurs due to the PVC outer, nylon braid centre and PTFE inner makeup being susceptible to expansion. It's not as stiff as other materials, nor as durable. Most motorcycles advise changing the lines every 4 years.

With the S.B.Lines, there is no absorption into the walls, no wasted energy nor pressure. This is what gives them more consistent pressure, more instantaneous feedback and infinitely better rider feel. The braided steel belt, Kevlar braid and Teflon inner provide significantly improved stiffness; resistance to flex/expansion. As a bonus, durability is immensely improved; steel braided brake lines will last as long as the bike itself.

See here a picture showing the make-up of both lines:

Source:

(BritishLegends, 2025)



Areas of concern

As the team's creative lead, two main risks could undermine my contribution. These risks are that of feature/scope creep and miscommunication. Keeping a project grounded throughout, and efficient communication, is quintessential to achieve success.

Area of Concern 1 (of 2): Over-Complex or Impractical Design Concepts

I'm responsible for theorising potential upgrades and creative improvements to our bike. The downside to that is it's easy to go too far down the rabbit hole. One moment I'm thinking about swapping the suspension geometry, and the next I'm sketching something that'd need a machine shop, maybe cost a few thousand pounds, and about four months of free time. That'd be scope creep, when creative enthusiasm quietly outruns time, budget, or team capability. Whilst a different kettle of fish, it's something I'm still familiar with, we can observe scope/feature creep within other projects – like a multiplayer space game called “Star Citizen”. In development for over 10 years with no finish in sight, as they run with ideas and increasing scope seemingly without basis in what's realistically achievable for the team and project. (WordPress, 2022)

The risk here is that I could pitch ideas that are clever but simply not feasible for the scope of this project. That kind of overreach doesn't just waste time; it can derail planning and cause frustration across the team.

To avoid that, I'll be putting in place what I'm calling a concept gate. Every idea that comes to mind will get screened through three criteria before I pitch it:

- **Complexity:** how much it changes or affects other systems.
- **Compatibility:** whether the team can realistically implement it with our current skills.
- **Resource Demand:** how much money, time, or equipment it needs.

If it can't pass those, it goes in the “future upgrades” folder, not the current build. I'll also run any borderline ideas past the Implementer and Specialist early, so the creative side stays grounded in technical feasibility. That keeps things moving without letting imagination chew through the schedule.

Area of Concern 2 (of 2): Miscommunication of Technical Specifications

The other big risk tied to my role is communication, or more specifically, miscommunication. My job involves translating creative solutions into something the rest of the team can actually build or order. If I describe something vaguely, forget a small detail, or assume everyone's following my mental image, we could end up ordering the wrong part or building something that doesn't fit.

It's a classic "lost in translation" problem, and in a project, that costs time, money, and sanity. Keeping to an ethos/procedure means communication can be clear, easily tracked and serve to enhance workflow. (Belbin, 2010)

To counter that, I'm using a two-stage verification system. First, I'll visualise everything, maybe through diagrams, quick CAD models, or even annotated sketches, so nobody's relying purely on my descriptions. Second, before anything goes to procurement or fabrication, I'll have it peer-reviewed by Wiz, the Monitor-Evaluator. He's geared to spot inconsistencies and missing details, so his sign-off acts as a safeguard.

This process basically turns good ideas into *action*; ideas that can survive contact with reality.

Overall project summary

So what we're doing here isn't just bolting on a few parts; we're taking a solid platform, being this motorcycle, and systematically turning it into a focused high performance monster... with enhanced safety features.

My role is essentially the 'Upgrade Architect'. I'm the one generating the creative solutions and making sure they actually work within the constraints of the project. We're not just chasing flashy mods; we're focused on making a real-world difference. Our key technical focus is the braking system. We're swapping out the old rubber lines for steel braided ones to deliver immediate, consistent feel and most critically a measurable improvement in rider safety.

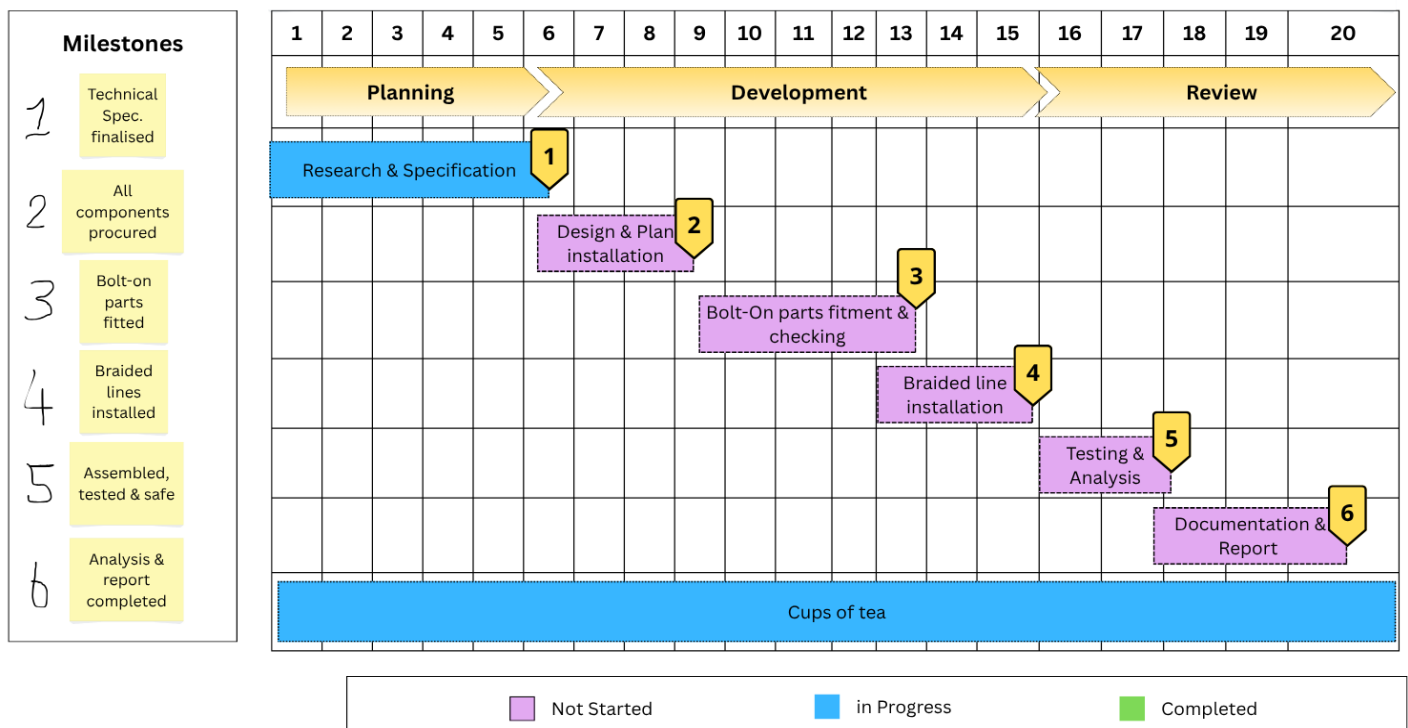
The whole team is organized using a Belbin structure to keep things tight, and we've planned every hour and every component. This isn't a wish list; it's a detailed, budgeted engineering plan to deliver a safer, sharper, and better-looking bike on schedule. The mission is to get maximum return on minimum resource drain, because we're broke.

Below I will insert a Gantt chart for the whole project, which also marks the progress of milestones. The time allocations are of course preliminary and subject to change. "No plan survives the first contact with the enemy." (Elder, n.d.)

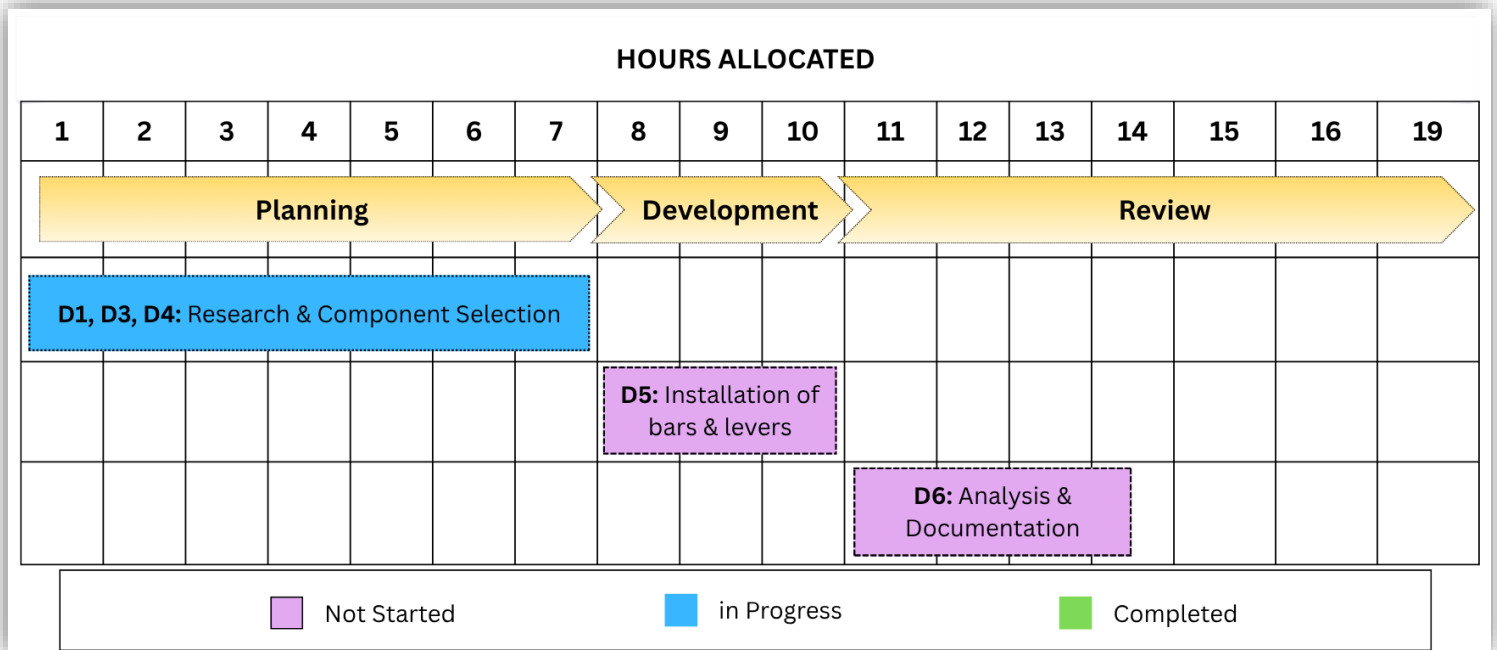
In this scenario, the enemy is one of flying by the seat of our pants and learning as we go.

Project Timeline

HOURS ALLOCATED



Below I will insert also a more focused Gantt chart, displaying *my* general duties and time allocation for these duties and objectives.



First up, the Aesthetic and Brake Specification. I've carved out a generous seven hours for D-1, D-3 and D-4, the pure R&D on the components. I already banked a few hours just getting my head wrapped around the market, which is technically billable research, even if the general chart didn't capture that particular moment of genius. The point is, those seven hours ensure we lock down the *exact* right part the first time.

Then, the Development phase: three hours to handle the bars and levers. I've got a decent handle on the hands-on fitment here, so that time allocation is confidently allocated.

Finally, Analysis and Documentation. I've actually tacked an extra hour onto the report writing here, bringing it to three-and-a-half hours. Whilst 2.5 hours is the theoretical minimum for completion, I'm happy to invest this extra personal time. I'm less invested in hitting the exact deadline; I'd rather double-check the data and delivering a finished product.

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