Cover Letter

16th December 2020

To INFO8440 Senior Business Analyst
Conestoga Design Limited (CDL)

299 Doon Valley Drive

Kitchener, Ontario

Dear INFO8440 Senior Business Analyst,

We, Team H are mentioning for information with respect to the manufacturing process of TrackR for Conestoga Design Limited (CDL). Also, we have put our time in investigating the issues that are emerging in the production process. After cautiously picturing the current situation, we have seen that a lot of time is wasted in assembly process of TrackR that results in production inefficiency.

This document will facilitate the cycle of defining TrackR manufacturing process and we can effectively meet the client desires in the wake of reducing failure points and production inefficiency. This will help CDL achieve its target of improving their TrackR manufacturing process .

All the data shared over any correspondence media (email, video conferencing) will be kept classified. In addition, this request for information will ultimately help us in efficiently automating the TrackR assembly process.

Warm regards,
Team H

Project 3 Team Draft
Integrated Case Study INFO8440

NOVEMBER 20, 2020 TEAM H

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Client Background

Client Background includes the history of the client i.e. CDL. It determines the work history and achievements the company have achieved . It also involves the stakeholders and the current business challenges been faced by CDL. It also mentions the brands which are involved with their current statuses. It also involves the AS-Is Principles as well as the key metrics of the CDL.

CDL History

Conestoga Design Limited (CDL) started In January in the year 1998 with the manufacturing and customization of the medical imaging scanners and supplying it to the local medical stores. After years of services in January 2014 the company finally achieved the market leader in commercial B to B manufacturing of the medical imaging scanners. After this success they decided to move on and begin designing of their first non-commercial product called TrackR. In August 2014, the stakeholders decided to start the manufacturing plant for the TrackR. While the demand was rising the authorities decided to expand their team management with the new team formations like technical support , customer services for the TrackR support. Getting upgradation into the application they got selected in CES as one of the most innovative designs of the year and being rewarded for the best new innovation. They achieved what they want to make the TrackR system successful with the highest record sales volume. The success goes rapidly down when a client returned the 7000 units back to CDL with no longer dealership with CDL. It quite showed that the response from the market went low and they must make several changes. There need to be quick changes made from the management on all the issues and reviews that were negative on the social media platforms. CDL is facing issue in production process of TrackR as they do not have any automation that leads to inefficiency in manufacturing process.

The current production overview can be referred from the link below
https://conestoga.desire2learn.com/d2l/le/content/380205/viewContent/7942817/View

Stakeholders

External Stakeholders:

1 **Billy Bob (CEO)** ○ Billy Bob is the CEO of the Conestoga design Limited. The main aim of the CEO is to rise the company image and make all the high authority decisions best suitable for the company.

2 **TrackR End Users** ○ Users are the one who judges the product quality and values and provide feedback for making the product more successful.

3 **CDL Users** ○ CDL Users are the source through which the product is been distributed in the market and been delivered to the end users

Internal Stakeholder

Marketing VP ○ The marketing VP is responsible for the product marketing strategies and its outcomes. The decisions taken for each strategy to be carried out is been taken by marketing VP.

2 HR VP

○ The HR VP is the entity in the organisation who is responsible for each and every internal administrative or hiring process work. The decisions to be made how many members each team should have or what steps should be taken in the office except the official work is been taken care by HR VP.

3 Finance VP

○ The Finance VP is an official entity who is responsible for having all the financial decisions of the company.

4 **IT VP** ○ The IT VP is the guy who is solely responsible for all the IT activities which is been performed in the company .

5 **Production VP** ○ The Production VP is the owner of all the production need to be taken care of all the products that are been manufactured in the company.

6 **Facilities VP** ○ The Facilities VP is responsible for all the shipping receiving work or the things which are needed for the production of the work.

7 **Call Center Staff** ○ The call center staff is been required to solve the queries which is been presented by our end users or our CDL Users related to the products.

8 **TrackR Upgrade Team** ○ TrackR upgrade team plays a vital role in making decisions regarding the upgradation regarding the TrackR and other products for better productivity.

9 **TrackR Assemblers** ○ TrackR Assemblers do the assembly process and testing of TrackR to develop TrackR units that are free of defects.

10 **TrackR Maintaining Team** ○ TrackR maintaining team do the recovery of defective TrackR components and ship final TrackR products to retailers.

Current Business Challenges:

1. **Suggestions regarding manufacturing process** - Suggestions been needed on how to reorganize the current manufacturing process to achieve at least financial breakeven.
2. **Increased Cost Production –** There is an increase of the production rate for the assembly area.
3. **Improper workplace for assembly -** Assembly work is just been done beside the shipping/receiving dock.
4. **Six Sigma Technology** - There is requirement of the six-sigma philosophy guidance which is needed for profiling the effects of the failures.
5. **Health and Safety Measures** - There are several heath related issues which are right now been faced in the working environment.
6. **Transforming manual to automate process** - CDL right now planning to transform the current manual process to automation but need a price quote for the transformation

Brands involved and their status:

1. Medical imaging scanners: The CDL built and sold three medical imaging scanners in January 1998. It was recognized as highly reliable because of its quality and fine attention to detail and CDL became market leader in the manufacturing of medical imaging scanners in commercial business.

2. TrackR:

February 2015 – March 2016

TrackR developed by CDL was selected at CES for its innovative design and received an award for best new product.

July 2016

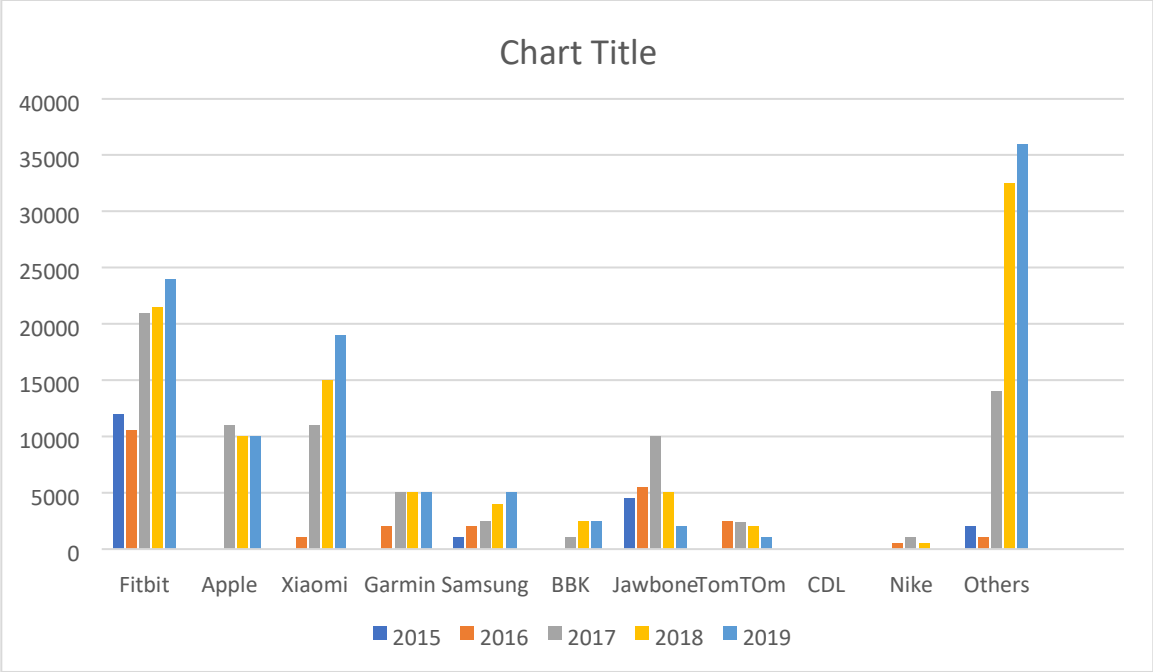
3.**CDL Website:** CDL website was launched in 2004, it provides basic information about their medical imaging products that CDL does not offer any more. Their web site was not in accordance with the business plans.

CDL has good presence on social media after launching its TrackR application but does not have updated website, their web site is old and does not show their recent products. So CDL is planning to launch a new web site to keep up to in the competition.

The following table represents the various competitive brands of similar category involved in the market.

It can be observed from the give data that CDL's business is getting effected because of this outdated website.

The following table represents the various competitive brands involved in the market. Highly competitive brands in the market are – Other, Fitbit, Xiaomi, Jawbone, TomTom, Nike, Samsung, Garmin Apple.



Client Requirements:

Sequence	Need name	Details
1	Suggestions Overview	CDL needs 2 significant suggestions about how to re-organize the current manufacturing process to achieve at least financial breakeven. The Sip lace machine possibility, and anything related to the Six Sigma analysis, are extra. You should suggest more, each with a general description, but pick the two suggestions that your team feels have the best chance of bringing the manufacturing to fiscal breakeven.
2	As-Is Profile	CDL needs a complete profile of the current manufacturing process, including a detailed mathematical model (in Excel, please) of the process, and its financial performance (Profit/Loss / Income/Expenses). All distances must be recorded in meters.
3	To-Be Profile for Each Suggestion	For each suggestion meeting needs 1, 4 and 5, a complete profile of the re-organized process, including a detailed mathematical model of the process, and its financial performance (Profit/Loss / Income/Expenses), must be provided.
4	Six Sigma and Failure Reduction	CDL has collected data on several process failure points. CDL needs guidance on how to apply Six Sigma philosophy and techniques to profiling the effects of the failures, as they are now, and how production performance might change if the failures were reduced or eliminated
5	Sip lace Impact and ROI	CDL is considering purchasing some automation (Sip lace machine) to replace several of the manual assembly steps. CDL needs a mathematical model of the current processes that would be involved,

		and then a detailed profile of the production and financial changes that would come from purchase and installation of the automation.
6	Suggestion Education	CDL's current production staff and management will be affected by suggested changes. Each suggested change (Needs 1, 4 and 5) must provide analysis on education and training needs, and plans.
7	Environment Changes	CDL looks forward to receiving 2 or more suggestions from you regarding the work environment. Apparently, there are some health and safety concerns in the plant. These suggestions do not require a detailed TO-Be profile; instead a listing followed by 2-4 paragraphs of explanation would be sufficient.
8	Payrate changes	CDL is currently considering changing staff payrates for the different classifications of workers. Be sure that your models allow for high/low values for payrates. CDL will provide the payrates at a later time, and their payroll burden factors.
9	Constraints	Please be sure that you clearly state the constraints that CDL has about re-structuring the workspace. Much of the workspace, but not all of it, can be changed.
10	Background Detail on Production Rates	There is over 2 years of daily production and shipping data in the TrackR Data Generation engine. You are strongly urged to analyze this data to help to understand the daily production capacity of the manufacturing unit. Of course, results of your analysis should be included in your final report, as well as math models.
11	Sip lace Machine Purchase	an old Siemens Sip lace 841AB would bring the total placement and solder process down to 1.4 seconds for both HG213123-221 and STMA11233 chips (total time) yielding only a 0.3% fail rate. This time does not include the time to load the infeed or remove completed units. However, the Sip lace 841AB will cost $260,000 installed and will last only 2 years before needing to be replaced
12	Updated Failure Rates	Track R Final Testing = 98.3% success. Human Error Rate after HG213123-221 tug test = 6.8% failures

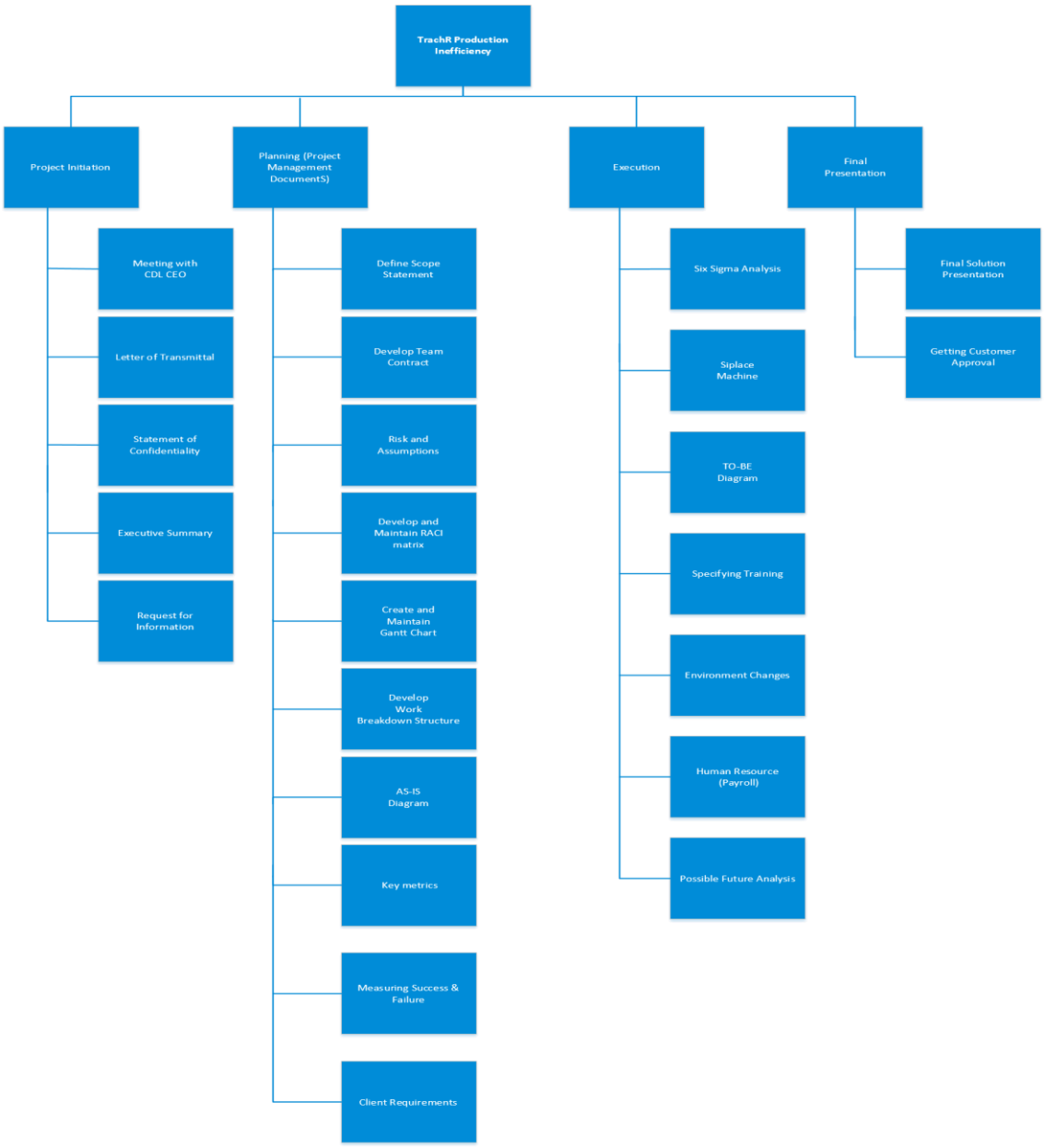
Gantt Chart

Attached excel File for Gantt Chart

RACI Matrix

Attached excel file for RACI matrix

Work-breakdown structure



Team Contract

Team H

Team Goals/Objective

The goal of Junior BA's team is to improve the production process of TrackR and reduce the failure rates using automation system for assembling the TrackR components.

Team Roles and responsibilities

Junior BA (6 students)
Project manager/Scrum master (Bill)

Senior BA Responsibilities

To provide guideline and direction to team with deadline of project part and during meeting get feedback about project work from every team member.

Team-H Responsibilities Work
on app to upgrade it.
Meet the goals of CDL.
Meet deadline of project and focus on the project all aspect.
Keep the vision clear and the work on track and fulfil their duties.
Give appropriate solution to company under budget.

Team Protocol

Code of conduct: As team we will
Engaging positively in all squad events.
Act for the Team Goal / Objective, independent of individual objectives.
Respect every Team member decision and accepting the ideas of each team member

Participation: We will

Divide all roles similarly among the participants of the team.
For all participants of the organization, participation is mandatory.
Any absence should be advised beforehand.

Communication: We will:

All documents is sent via Organizational Mail (College Mail) by mail.
Communicate with each other in during meeting and share their ideas.

Problem Solving: We will:

Work actively as well as take decision according to project requirement. Meet determine goals of project.

Team Conditions for Reward and Penalty

Reward	**Penalty**
Hard work will be given maximum marks by other team members during peer review	If any Team member is absent in meetings, then they will not be assigned any tasks and will lose the respective grade.

Team member

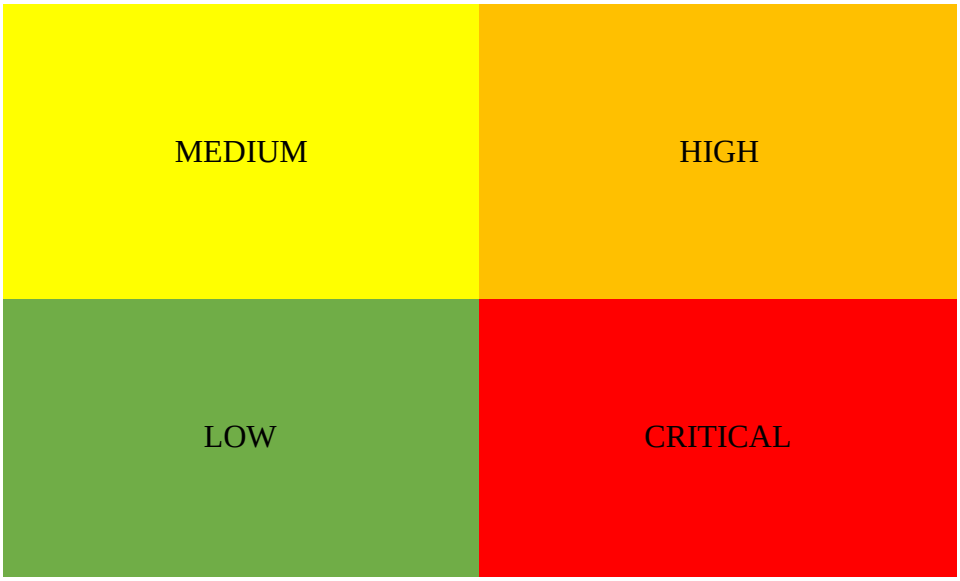
Name (Last, First)	**Role**	**Email**	**Date (MM/DD/YY)**
Singh, Amandeep	Junior BA	Asingh3296@conestogac.on.ca	(MM/DD/YY)
Singh, Jasmeet	Junior BA	Jsingh6764@conestogac.on.ca	11/20/2020
Makkar, Pawan	Junior BA	Pmakkar7515@conestogac.on.ca	11/20/2020
Saini, Romal	Junior BA	Rsaini6540@conestogac.on.ca	11/20/2020
Kaur, Rajdeep	Junior BA	Rkaur6462@conestogac.on.ca	11/20/2020

Brar, Manvir	Junior BA	Mbrar8536@conestogac.on.ca	11/20/2020

Completion of this section constitutes said Team Member's acceptance of this Contract.

Risks:

Risk Impact Visualization Table:



• The Risk Occurrence chances are further categorized into 3 parts:

1. Likely – The chances are common
2. Unlikely – The chances are almost 0.99%
3. Rare – The chances are less

ID	Risk	Description	Impact	Risk Occurrence
1	Quality Issues	If the quality of the work being provided to the client is not refined and tuned, it might create problems in implementing the solution in the real world.	Medium	Likely
2	Trust Issues	The team members can face various problems while working with each other on the completion of the project if they do not have trust on each other.	High	Likely

3	Health and Safety Issues	As the continuous world pandemic (COVID-19) circumstance is continually expanding, it might affect the strength of individuals working in the undertaking which could decrease the task productivity and at last will surpass the cut-off time to finish the venture.	High	Unlikely
4	Protection and Security Issues	There is consistently a danger of a security occurrence during the venture which prompts hole of secret data.	High	Rare
5	Communication Issues	Different clash events will occur if there is ill-advised correspondence or misconception between colleagues while clarifying about the venture outstanding burden and its methodology for finish.	High	Likely
6	Decision Issues	Postponed choices sway the smooth undertaking work process and can cause clashes inside the timings.	Low	Rare
7	Work Division Issues	If the remaining task at hand is not appropriately separated among the individuals from the undertaking, at that point it will be tedious cycle with heaps of mistakes in the work. Besides, it additionally probably will not wind up with what customer anticipated that it should be.	Medium	Likely

Risk Mitigation Plan:

The given table describes how to eliminate the risks if they occur.

ID	Risk	Risk Mitigation
1	Quality Issues	The quality of the work being provided to the client should be well defined and easy to implement with modifications anytime in the future.

2	Trust Issues	The group ought to have trust on all the individuals paying little heed to any factor. By doing this, they will advance more effectively in the venture with no issues. Also, this will assist them with thinking of better thoughts for the venture while working and understanding the situation on the opportune time with right prerequisites.
3	Health and Safety Issues	On the off chance that there are any wellbeing related issues to any of the colleagues which are making delays in the work, they ought to advise the entire group immediately so the group can deal with the outstanding burden and timetable the timings appropriately to meet the task needs.
4	Protection and Security Issues	The group contract is made for this reason. Each colleague will sign the secrecy standard which expresses that no data will be spilled close by and on the off chance that it occurs during or after the venture, they should confront the lawful results.
5	Communication Issues	On the off chance that the group is working ideal through web access, they need a legitimate and most dependable correspondence media to appropriately comprehend what others are stating and to communicate. What is more, they must obviously clarify every single detail to dodge any blunders ahead.
6	Decision Issues	All the temporary as well as final decisions should be made on time by all the team members so that any further changes can be made if required before the final submission.
7	Work Division Issues	The work should be examined among the team to explain which team person will be liable for what part of the undertaking consummation. Also, on the off chance that they need support, they can chat with other colleagues to continue with work in advance and present the work before the cutoff time with no issues.

Team Performance Measures:

S. No.	Factors	Accepted	Not Accepted
1.	Quality	The project quality must meet the user requirements,	Any bug or defect in the project, must figure out the defect
2.	Time	Timely delivery of project, that is project must be delivered before deadline	Any delay in project delivery

3.	Efficiency	All the work done by team members will be efficient and up to the mark.	Unprofessional work done by any team member
4.	Participation	Each team member participates equally during the project	Person not giving proper attention towards the deliverables
5.	Teamwork	All the team members must have good coordination and spirit of teamwork	Any kind of argument among team members, disrespect of other team members

Measure of Success:

ID	MEASURING UNITS	DESCRIPTION	MEETING PROFESSIONAL STANDARDS	ACCEPTABLE	EXPECTATION	UNACCEPTABLE
1	Consistency	The proper logic, accuracy and fairness of the project are all fulfilled by the team	On the off chance that all the desires are met, the undertaking fulfills the requirements	On the off chance that limit of 2 desires are not met, the task is satisfactory	If limit of 4 desires are not met, the project is beneath desire	Any task not meeting multiple desires are not acceptable at all
2	Team Coordination	Effectiveness of the project through support and coordination are all through undertaking	On the off chance that all members working together effectively, the project satisfies the expert guideline	If there is little conflict in the coordination, it is still acceptable	If there are a maximum of 2 conflicts, then the project stands as below expectation	Finally, if there are more than 2 conflicts, then the project is unacceptable

3	Project Interaction	In throughout the project, it is made sure that proper interaction of team members is established for project success	On the off chance that every member has understand the concept while communicating with each other over the requirements	If there is maximum of 1 conflict in the interaction, still the project is acceptable	Not applicable in this case	If there is more than one conflict in the Interaction, then the project is unacceptable
4	Ethics and Values	The metrics decided for the project are driven by actions and values decided by members weather they are right or wrong	If the actions and decisions are acceptable by all others, the project is standing at professional level	If the slight change in actions kept it running on same track, it is still acceptable	If there are enormous changes in the actions and decisions, then it is below expectation	The project is unacceptable, if there is complete change of actions and decisions that were initially set to be met
5	Deadline	The completion of the project within the time limit	If the project is completed within or prior to time limit, it has met professional standards	If maximum of 2 deliverables are late, it is still acceptable	If maximum of 3 deliverables are late, it is below expectation	The project is not accepted at all, if there are more than 3 deliverables that are overdue for submission

RFI Responses:

QID	Plain RFI Text	Response
1RS	After the damaged goods are stored in the shelf, is there any restoration process performed on the goods?	No
2 MK	What do maintenance worker do?	Fixes broken assembly equipment. Refills the Replacement Parts shelf. Trains new workers. Fills in as an emergency assembly worker. Packages and finalizes shipments of TrackR's. Cleans the areas. Possibly acts as first response QC.

3 RS	Does the production rate is putting more workload on the workers per day according to the capacity manufacturing?	Please build the Exlsx models to find this out.
4 RS	Do we have any backup labor if one of the three labor is not present on someday?	Yes. There are currently 3 "standby" workers. The 3 tables can operate with fewer than 3 standby workers
5 PM	What will be the method of training for the team?	CDL looks forward to receiving your suggestion on this.
6 MK	What are the requirements for working environment of CDL building for TrackR production?	Please be more specific.
7 MK	Who tests the TrackR on the computer?	The worker who assembled it.
8 JS	What steps are currently taken for health and safety measures?	Please arrange to interview a CDL Lead Hand.
9 JS	Do CDL provide any heath safety benefits to the employees?	Yes. This is out of scope for you, though.
10 AS	If we follow the process for automation then are, we going to hire new people or giving the training to the current staff?	Train the current staff.
11 PM	What should be the effects on management team after changes?	No changes.
12 PM	What are the main health issues currently?	Please view the CDL Lead Hand's video.
13 RK	Approximate how much time is wasted in taking the component from the shelve and getting back to the assembly area?	Your team will build a model, and do the measurements, to calculate all of this. Please see the videos.
14 RK	What is the approximate distance traveled by an assembler to get the component from the shelve?	Your team will build a model, and do the measurements, to calculate all of this. Please see the videos.
15 MK	What is the failure rate of current assembly process?	All the rates are given in the "Making a TRackR" document.
16 RS	On the average basis, how usually are the constraints updated for the TrackR manufacturing units?	Please see you Senior BA about this question.
17 AS	Do we need provide training to the current staff after suggested changes?	You will not be providing the training. You will be specifying the training.

18 RK	Is there only one shelve for the components or multiple?	Each bay has probably 3 or 4 shelves
19 RK	At one time, only one assembly table out of three is under use?	The must be continuous assembly happening at all three assembly tables.
20 JS	What measures taken to improve the human error rate?	CDL looks forward to your suggestions on this issue.
21 Js	What are the failure points CDL detected as of now?	See the "Making a TRackR" documentation.
22 AS	Where does TrackR goes after shipment?	To Retailers receiving doors.
23 PM	What were the previous flaws in six sigma implementations?	None. Six sigma hasn't been tried before.
24 RK	Are the components different for the three TrackR models?	The band/strap and the packaging are different.
25 MK	With the installation of sip lace, would CDL like to remove assemblers?	That would be impossible. The Siplace machine will only do 3 or so of about 20 assembly steps.
26 RS	By what percentage, the CDL is considering changing the payrate?	None. CDL wants you to build models so that the payrates can be changed, and all of your related calculations will change as well.
27 JS	Do we have people which are Six Sigma Certified in the team?	No
28 AS	Is there any specific amount or budget related to buying of machines	CDL looks forward to your suggestions on this topic.
29 AS	What is the purpose of Sip lace machine and how does it will prove beneficial?	Please Internet search either "Siemens Siplace" or "Automated Soldering Machine"
30 PM	How workers will be Classified for payrate?	See the Org Chart or the Staff Attitudes Survey for data.

Assumptions:

Currently our Team H has no assumptions.

Key metrics:

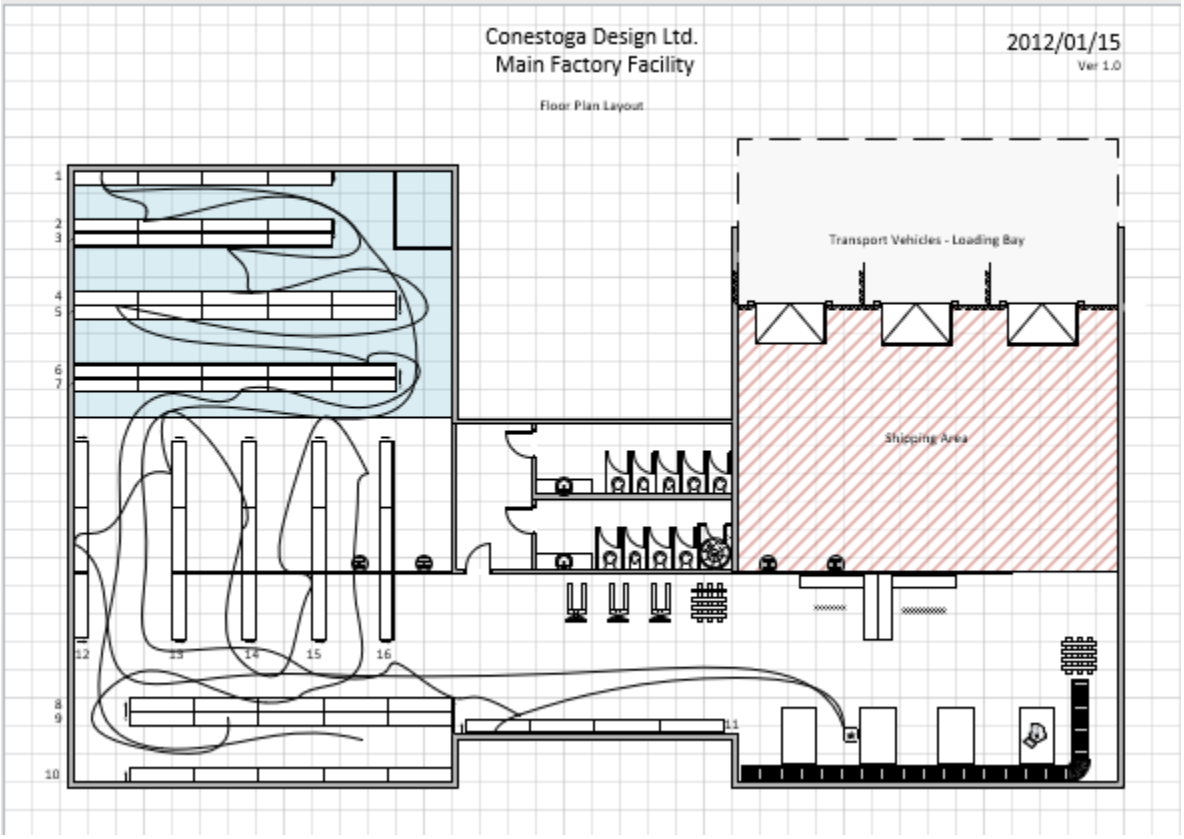
The below key metrics will help CDL to know the performance of TrackR in the market:

1. **Sales per year:** It is the number of TrackR sold per year by the CDL to increase the profit of company.
2. **Number of Returns:** It is the number of TrackR products returned by the customer.
3. **Per day sales Target:** It states if the CDL is achieving the target of per day sales of TrackR.
4. **Monthly Sales Target:** It states if the CDL is achieving per month sales target of TrackR.
5. **Production quantity:** It is the number of TrackR units produced by CDL to meet the customer demand.

Style Guide:

S.no	Font type	Font Size	Font Color
1.	Heading	16	Light Blue
2.	Sub-Heading	13	Light Blue
3.	Body	11	Black
4.	Cover Page	11	Black
5.	Table of Contents	11	Black
6.	Table Formatting	N/A	Grid4, Accent 2

Detailed Graphics of the TrackR Component Picking process



Excel Sheet and Calculations of Component Picking

Component picking

	SP	Starting Point							
	Pickup time in seconds	10							
Path	**Part Number**	**Distance (meters)**	**Minimum Time (s)**	**Maximum Time (min)**					
								Minimum Speed	**Maximum Speed**
SP to 12	VHN44PGP3FT	31.9	22.8	32.8					
12 to 13	OYX53IEQ4SX	3.6	11.4	12.6				1.4	2.5
13 to 14	LS1121	7.8	13.1	15.6					
14 to 15	SNC13ELZ5LU	9.2	13.7	16.6					
15 to 16	SKM76JEA5VJ	10	14.0	17.1					
16 to 8	PSI14ZUG7YP	10.1	14.0	17.2					
8 to 9	GPR42GXJ2TZ	14.5	15.8	20.4					
9 to 10	VDH12RUL7JT	5.9	12.4	14.2					
10 to 7	KNR35NZD6GR	24.9	20.0	27.8					
7 to 6	VKN98WXE8YV	9.3	13.7	16.6					
6 to 5	EAE72FYU2PL	9.5	13.8	16.8					
5 to 4	UEG47LXG1RJ	19.5	17.8	23.9					
4 to 3	VEA77BAF2MB	1.8	10.7	11.3					
3 to 2	QTB96PHQ5WB	13.5	15.4	19.6					
2 to 1	TJT88COB2WC	2.9	11.2	12.1					
1 to 11	ILV42BNA8CO	53.2	31.3	48.0					
11 to SP		13.8	15.5	19.9					
	Total	**241.4**	**266.6**	**342.4**					

AS-IS

To- Be Component picking

	SP			Starting Point							
	Pickup time in seconds			5							
Path	**Part Number 1**	**Part Number 2**	**Part Number 3**	**Distance (meters)**	**Minimum Time (s)**	**Maximum Time (s)**					
										Minimum Speed	**Maximum Speed**
SP to 1	BLE112	KXQ91CZD9HD	TJT88COB2WC	9.06	8.6	11.5					
1 to 2	SFLV25	XWC78UDC5SC	QTB96PHQ5WB	12	9.8	13.6				1.4	2.5
2 to 3	AVG29VUB7SL	VEA77BAF2MB	SDMALBB3033G	6.13	7.5	9.4					
3 to 4	BXB97BSC1XM	UEG47LXG1RJ	FnOFI-GN1212	12.3	9.9	13.8					
4 to 5	YZX22KZL2HF	IBY12CDH4SL	EWX53SED9NM	6.4	7.6	9.6					
5 to 6	KXK73IRZ2HX	UDB14FSH6CA	ZDV52XYP7TO	10.2	9.1	12.3					
6 to 7	CBP81TTJ9ZZ	HG213123-221	SYS66SEN5OX	9.2	8.7	11.6					
7 to 12	XKU43PZH8ZY	PUQ55DVUZYT	VHN44PGP3FT	12.4	10.0	13.9					
12 to 13	OYX53IEQ4SX	TBE46HWQ8VP	RNN73OKP9XR	7.7	8.1	10.5					
13 to 14	LS1121	YAU44NWF2PW	HQO23PLY1SX	8.4	8.4	11.0					
14 to 15	WAA72WHV9DB	SNC13ELZ5LU	BDE91XMS5AB	6.9	7.8	9.9					
15 to 16	EGI91LPQ4OS	SKM76JEA5VJ	LFR43NBR8HV	9.9	9.0	12.1					
16 to 11	WNC89MPT8OR	ILV42BNA8CO	HCC81GBV6CA	33.4	18.4	28.9					
11 to 8	IFH94FFH1AW	WTV61KZX1HD	PSI14ZUG7YP	11.7	9.7	13.4					
8 to 9	DCL19DMK4GX	GPR42GXJ2TZ	OZC72CMZ8WX	16.2	11.5	16.6					
9 to 10	ZEU24SQG6UA	MPC432119-2	MPC44422	7.5	8.0	10.4					
10 to SP				25.11	15.0	22.9					
	Total			**204.5**	**166.8**	**231.1**					

TO-BE

Excel Components and Data

Table of Components

Manufacturer	Part Number	Description	Comment	Unit Price	Maximum Price	Quantity	Shelf Location (ROV)	Shelf Location (BAY)	Fixed Location
Mitchell's Plastics	MPC432119-2	Vulcanized Rubber casing	Outer housing for TRACKR	$6.61	$6.61	15423	10	C	YES
Mitchell's Plastics	MPC44422	Rigid plastic pins	Connects MPC432119-2 to LS1121	$0.08	$0.08	30846	10	E	YES
American Vanadium	SFLV25	Slimflex Lithium-Vanadium printed battery	A paper thin battery operating using vanadium dipped alloys to reduce heat production and power waste.	$17.42	$17.42	27220	2	A	YES
Foxconn	FnOFI-GN1212	Main printed circuit board (PCB)		$14.99	$14.99	1455	4	D	NO
Qualcomm	BD2098733AAB	Secure housing for orientation equipment	Rigid plastic frame	$4.15	$4.15	62197	5	E	NO
Qualcomm	BD20911131BB	Micro-transmitter for LTE communication		$1.88	$1.88	43795	6	B	YES
ST Microelectronics	HG213123-221	3-axis digital gyroscope		$0.57	$0.57	32798	7	B	YES
ST Microelectronics	STMA11233	2-axis analogue accelerometer		$0.31	$0.31	46795	8	E	NO
Samsung	SS98AAIS	18mm x 29mm OLED screen		$38.15	$38.15	43647	7	E	NO
Sandisk	SDMALBB3033G	2GB FLASH NAND	Small flash chip for data storage.	$4.00	$4.00	43121	3	C	YES
BlueGiga	BLE112	Bluetooth 4.0 low energy chipset	Wireless connectivity using Bluetooth 4.0 LTE	$2.00	$2.00	32146	1	A	YES
Banda Bracelets (HK) Ltd	LS1121	Plastic wrist strap		$3.00	$3.00	20400	14	A	YES
Banda Bracelets (HK) Ltd	LS1124	Leather wrist strap		$6.00	$6.00	19800			
Banda Bracelets (HK) Ltd	LS1128	Gold expansion strap		$10.00	$10.00	14990			
Packaging	KK425	Economy TrackR Packaging		$2.00	$2.00	23560			
Packaging	KK433	Standard TrackR Packaging		$3.00	$3.00	26660			
Packaging	KK438	Deluxe TrackR Packaging		$4.00	$4.00	19820			

Excel Model for Assembly Sheet

Assembling Components

Calculation

Minimum Labour Cost	$ 22.00	per hour	Maximum Labour Cost	$ 26.00	per hour
	$0.0061	per second		$ 0.0072	per second

Main Assembly Process

Task	Action	Duration (seconds)	Total Time To Task	Minimum Labour Task Value	Maximum Labour Task Value	Minimum Labour Total To Task	Maximum Labour Total To Task	Component	Minimum Component Cost	Maximum Component Cost	Minimum All Total to Task	Maximum All Total to Task	Fail%	On Fail Action	On Fail Time	On Fail Minimum Labor Cost	On Fail Maximum Labour Cost	On Fail Component Cost	Total Time to task with 1 fail and good repeat	Minimum All total to task	Maximum All total to task	Reliability	Reliability to task
1	Unpack	14	14	$ 0.09	$ 0.10	$ 0.09	$ 0.10	A	$ 7.00	$ 6.61	$ 6.70	$ 6.71	0%						14	$ 6.70	$ 6.71	100%	100%
2	Inspect	5	19	$ 0.03	$ 0.04	$ 0.12	$ 0.14	A			$ 6.73	$ 6.75	2%	Process 1	36	$ 7.22	$ 7.26	7	55	$ 20.95	$ 21.01	98%	98.00%
3	Connect	3	22	$ 0.02	$ 0.02	$ 0.13	$ 0.16	B	$ 0.08	$ 0.08	$ 6.82	$ 6.85	0%						58	$ 21.04	$ 21.11	100%	98.00%
4	Connect	7	29	$ 0.04	$ 0.05	$ 0.18	$ 0.21	L	$ 6.00	$ 6.00	$ 12.87	$ 12.90	0%						65	$ 27.09	$ 27.16	100%	98.00%
5	Test	2	31	$ 0.01	$ 0.01	$ 0.19	$ 0.22				$ 12.88	$ 12.91	5.20%	Process 2	12	$ 6.14	$ 6.15	$ 6.08	79	$ 39.32	$ 39.41	95%	92.90%
6	Connect	6.6	37.6	$ 0.04	$ 0.05	$ 0.23	$ 0.27	J	$ 4.00	$ 4.00	$ 16.92	$ 16.96	0%						85.6	$ 43.36	$ 43.45	100%	92.90%
7	Soldering	20	57.6	$ 0.12	$ 0.14	$ 0.35	$ 0.42	D	$ 14.99	$ 14.99	$ 32.03	$ 32.10	0%						105.6	$ 58.47	$ 58.59	100%	92.90%
8	Test	30	87.6	$ 0.18	$ 0.22	$ 0.54	$ 0.63				$ 32.22	$ 32.31	2%	Process 3	61	$ 19.36	$ 19.43	$ 18.99	196.6	$ 97.01	$ 97.23	98%	91.05%
9	Clamping	24	111.6	$ 0.15	$ 0.17	$ 0.68	$ 0.81	L	$ 6.00	$ 6.00	$ 38.36	$ 38.49	0%						220.6	$ 103.16	$ 103.40	100%	91.05%
10	Connect	18	129.6	$ 0.11	$ 0.13	$ 0.79	$ 0.94	G	$ 0.57	$ 0.57	$ 39.04	$ 39.19	0%						238.6	$ 103.84	$ 104.10	100%	91.05%
11	Test	2	131.6	$ 0.01	$ 0.01	$ 0.80	$ 0.95				$ 39.05	$ 39.20	7.50%	Process 4	24	$ 6.72	$ 6.74	$ 6.57	264.6	$ 117.13	$ 117.43	93%	84.22%
12	Connect	4.4	136	$ 0.03	$ 0.03	$ 0.83	$ 0.98	E	$ 4.15	$ 4.15	$ 43.23	$ 43.38	0%						269	$ 121.31	$ 121.61	100%	84.22%
13	Solder	14.8	150.8	$ 0.09	$ 0.11	$ 0.92	$ 1.09	H	$ 0.31	$ 0.31	$ 43.63	$ 43.80	0%						283.8	$ 121.71	$ 122.03	100%	84.22%
14	Test	2	152.8	$ 0.01	$ 0.01	$ 0.93	$ 1.10				$ 43.64	$ 43.81	0%						285.8	$ 121.72	$ 122.04	100%	84.22%
15	Connect	1.2	154	$ 0.01	$ 0.01	$ 0.94	$ 1.11	K	$ 3.00	$ 3.00	$ 46.65	$ 46.82	0%						287	$ 124.73	$ 125.05	100%	84.22%
16	Connect	1.2	155.2	$ 0.01	$ 0.01	$ 0.95	$ 1.12	F	$ 1.88	$ 1.88	$ 48.54	$ 48.71	0%						288.2	$ 126.62	$ 126.94	100%	84.22%
17	Connect	12	167.2	$ 0.07	$ 0.09	$ 1.02	$ 1.21	C	$ 17.42	$ 17.42	$ 66.03	$ 66.22	0%						300.2	$ 144.11	$ 144.44	100%	84.22%
18	Connect	8	175.2	$ 0.05	$ 0.06	$ 1.07	$ 1.27	I	$ 38.15	$ 38.15	$ 104.23	$ 104.43	3%	Process 5	148.2	$ 181.85	$ 182.01	$ 180.94	456.4	$ 545.10	$ 545.60	97%	81.69%
19	Remove Clamp	13.3	188.5	$ 0.08	$ 0.10	$ 1.15	$ 1.36				$ 104.31	$ 104.52	0%						469.7	$ 545.18	$ 545.70	100%	81.69%
20	Heat Test	10	198.5	$ 0.06	$ 0.07	$ 1.21	$ 1.43				$ 104.37	$ 104.59	9.50%	Process 6	255.5	$ 182.50	$ 182.79	$ 180.94	735.2	$ 908.68	$ 909.50	91%	73.93%
21	Discarding	18	216.5	$ 0.11	$ 0.13	$ 1.32	$ 1.56				$ 104.48	$ 104.72	0%						753.2	$ 908.79	$ 909.63	100%	73.93%
22	Synchronization test	40	256.5	$ 0.24	$ 0.29	$ 1.57	$ 1.85				$ 104.73	$ 105.01	0%						793.2	$ 909.04	$ 909.91	100%	73.93%

On Fail - Process 1

Task		Duration (seconds)	Total Time to Task	Minimum Labour Task Value	Maximum Labour Task Value	Minimum Labour Total To Task	Maximum Labour Total To Task	Component	Component Cost	Minimum All Total to Task	Maximum All Total to Task	Total Component Cost
1	Walk	5	5	$ 0.03	$ 0.04	$ 0.03	$ 0.04			$ 0.03	$ 0.04	7
2	Drop damaged component	3	8	$ 0.02	$ 0.02	$ 0.05	$ 0.06	A	7	$ 7.05	$ 7.06	
3	Walk	2	10	$ 0.01	$ 0.01	$ 0.06	$ 0.07			$ 7.06	$ 7.07	
4	Pickup replacment component	2	12	$ 0.01	$ 0.01	$ 0.07	$ 0.09	A		$ 7.07	$ 7.09	
5	Walk	5	17	$ 0.03	$ 0.04	$ 0.10	$ 0.12			$ 7.10	$ 7.12	
6	Unpack	14	31	$ 0.09	$ 0.10	$ 0.19	$ 0.22	A		$ 7.19	$ 7.22	
7	Inspect	5	36	$ 0.03	$ 0.04	$ 0.22	$ 0.26	A		$ 7.22	$ 7.26	

On Fail - Process 2

Task		Duration (seconds)	Total Time to Task	Minimum Labour Task Value	Maximum Labour Task Value	Minimum Labour Total To Task	Maximum Labour Total To Task	Component	Component Cost	Minimum All Total to Task	Maximum All Total to Task	Total Component Cost
	MPC44422 into holes through LS1121	3	3	$ 0.02	$ 0.02	$ 0.02	$ 0.02	B	0.08	$ 0.10	$ 0.10	$ 6.08
	Depress and insert LS1121 into MPC432119-2	7	10	$ 0.04	$ 0.05	$ 0.06	$ 0.07	L	6	$ 6.14	$ 6.15	
	Tug Test	2	12	$ 0.01	$ 0.01	$ 0.07	$ 0.09					

On Fail - Process 3

Task		Duration (seconds)	Total Time to Task	Minimum Labour Task Value	Maximum Labour Task Value	Minimum Labour Total To Task	Maximum Labour Total To Task	Component	Component Cost	Minimum All Total to Task	Maximum All Total to Task	Total Component Cost
	Clean old solde	11	11	$ 0.07	$ 0.08	$ 0.07	$ 0.08	J	4	$ 4.07	$ 4.08	$ 18.99
	soldering	20	31	$ 0.12	$ 0.14	$ 0.19	$ 0.22	D	14.99	$ 19.18	$ 19.21	
	Optical inspection	30	61	$ 0.18	$ 0.22	$ 0.37	$ 0.44			$ 19.36	$ 19.43	

On Fail - Process 4

Task		Duration (seconds)	Total Time to Task	Minimum Labour Task Value	Maximum Labour Task Value	Minimum Labour Total To Task	Maximum Labour Total To Task	Component	Component Cost	Minimum All Total to Task	Maximum All Total to Task	Total Component Cost
	Disposal	14	14	$ 0.09	$ 0.10	$ 0.09	$ 0.10	L	6	$ 6.09	$ 6.10	$ 6.57
	Recording loss in system	8	22	$ 0.05	$ 0.06	$ 0.12	$ 0.16	G	0.57	$ 6.70	$ 6.73	
	Tug test	2	24	$ 0.01	$ 0.01	$ 0.13	$ 0.17			$ 6.72	$ 6.74	

On Fail - Process 5

Task		Duration (seconds)	Total Time to Task	Minimum Labour Task Value	Maximum Labour Task Value	Minimum Labour Total To Task	Maximum Labour Total To Task	Component	Component Cost	Minimum All Total to Task	Maximum All Total to Task	Total Component Cost
	Disposal Internal components	12	12	$ 0.07	$ 0.09	$ 0.07	$ 0.09	J,D,L,J,E,H,K,F,C,I	$ 90.47	$ 90.54	$ 90.56	$ 180.94
	Repeat task 6 to 17	136.2	148.2	$ 0.83	$ 0.98	$ 0.91	$ 1.07	J,D,L,J,E,H,K,F,C,I	$ 90.47	$ 181.85	$ 182.01	

On Fail - Process 6

Task		Duration (seconds)	Total Time to Task	Minimum Labour Task Value	Maximum Labour Task Value	Minimum Labour Total To Task	Maximum Labour Total To Task	Component	Component Cost	Minimum All Total to Task	Maximum All Total to Task	Total Component Cost
	Extract Electronic components inside	18	18	$ 0.11	$ 0.13	$ 0.11	$ 0.13	J,D,L,J,E,H,K,F,C,I	$ 90.47	$ 90.58	$ 90.60	$ 180.94
	Repeat task 6 to 22	237.5	255.5	$ 1.45	$ 1.72	$ 1.56	$ 1.85	J,D,L,J,E,H,K,F,C,I	$ 90.47	$ 182.50	$ 182.79	

AS-IS

Calculation

Minimum Labour Cost	$ 22.00	per hour					Maximum Labour Cost			$ 26.00	per hour													
	$0.0061	per second								$ 0.0072	per second													
Main Assembly Process														On Fail										
Task	Action	Duration (seconds)	Total Time To Task	Minimum Labour Task Value	Maximum Labour Task Value	Minimum Labour Total To Task	Maximum Labour Total To Task	Component	Minimum Component Cost	Maximum Component Cost	Minimum All Total to Task	Maximum All Total to Task	Before Fail Rate%	Action	Time	Minimum Labor Cost	Maximum Labour Cost	Component Cost	Total Time to task with 1 fail and good repeat	Minimum All total to task	Maximum All total to task	Before Reliability	Before Reliability to task
1	Unpack	14	14	$ 0.09	$ 0.10	$ 0.09	$ 0.10	A	$ 7.00	$ 6.61	$ 6.70	$ 6.71	0%						14	$ 6.70	$ 6.71	100%	100%
2	Inspect	5	19	$ 0.03	$ 0.04	$ 0.12	$ 0.14	A			$ 6.73	$ 6.75	2%	Process	36	$ 7.22	$ 7.26	7	55	$ 20.95	$ 21.01	98%	98.00%
3	Connect	3	22	$ 0.02	$ 0.02	$ 0.13	$ 0.16	B	$ 0.08	$ 0.08	$ 6.82	$ 6.85	0%						58	$ 21.04	$ 21.11	100%	98.00%
4	Connect	7	29	$ 0.04	$ 0.05	$ 0.18	$ 0.21	L	$ 6.00	$ 6.00	$ 12.87	$ 12.90	0%						65	$ 27.09	$ 27.16	100%	98.00%
5	Test	2	31	$ 0.01	$ 0.01	$ 0.19	$ 0.22				$ 12.88	$ 12.91	5.20%	Process	12	$ 6.14	$ 6.15	$ 6.08	79	$ 39.32	$ 39.41	95%	92.90%
6	Connect	6.6	37.6	$ 0.04	$ 0.05	$ 0.23	$ 0.27	J	$ 4.00	$ 4.00	$ 16.92	$ 16.96	0%						85.6	$ 43.36	$ 43.45	100%	92.90%
7	Soldering	20	57.6	$ 0.12	$ 0.14	$ 0.35	$ 0.42	D	$ 14.99	$ 14.99	$ 32.03	$ 32.10	0%						105.6	$ 58.47	$ 58.59	100%	92.90%
8	Test	30	87.6	$ 0.18	$ 0.22	$ 0.54	$ 0.63				$ 32.22	$ 32.31	2%	Process	61	$ 19.36	$ 19.43	$ 18.99	196.6	$ 97.01	$ 97.23	98%	91.05%
9	Clamping	24	111.6	$ 0.15	$ 0.17	$ 0.68	$ 0.81	L	$ 6.00	$ 6.00	$ 38.36	$ 38.49	0%						220.6	$ 103.16	$ 103.40	100%	91.05%
10	Connect	18	129.6	$ 0.11	$ 0.13	$ 0.79	$ 0.94	G	$ 0.57	$ 0.57	$ 39.04	$ 39.19	0%						238.6	$ 103.84	$ 104.10	100%	91.05%
11	Test	2	131.6	$ 0.01	$ 0.01	$ 0.80	$ 0.95				$ 39.05	$ 39.20	7.50%	Process	24	$ 6.72	$ 6.74	$ 6.57	264.6	$ 117.13	$ 117.43	93%	84.22%
12	Connect	4.4	136	$ 0.03	$ 0.03	$ 0.83	$ 0.98	E	$ 4.15	$ 4.15	$ 43.23	$ 43.38	0%						269	$ 121.31	$ 121.61	100%	84.22%
13	Solder	14.8	150.8	$ 0.09	$ 0.11	$ 0.92	$ 1.09	H	$ 0.31	$ 0.31	$ 43.63	$ 43.80	0%						283.8	$ 121.71	$ 122.03	100%	84.22%
14	Test	2	152.8	$ 0.01	$ 0.01	$ 0.93	$ 1.10				$ 43.64	$ 43.81	0%						285.8	$ 121.72	$ 122.04	100%	84.22%
15	Connect	1.2	154	$ 0.01	$ 0.01	$ 0.94	$ 1.11	K	$ 3.00	$ 3.00	$ 46.65	$ 46.82	0%						287	$ 124.73	$ 125.05	100%	84.22%
16	Connect	1.2	155.2	$ 0.01	$ 0.01	$ 0.95	$ 1.12	F	$ 1.88	$ 1.88	$ 48.54	$ 48.71	0%						288.2	$ 126.62	$ 126.94	100%	84.22%
17	Connect	12	167.2	$ 0.07	$ 0.09	$ 1.02	$ 1.21	C	$ 17.42	$ 17.42	$ 66.03	$ 66.22	0%						300.2	$ 144.11	$ 144.44	100%	84.22%
18	Connect	8	175.2	$ 0.05	$ 0.06	$ 1.07	$ 1.27	I	$ 38.15	$ 38.15	$ 104.23	$ 104.43	3%	Process	148.2	$ 181.85	$ 182.01	$ 180.94	456.4	$ 545.10	$ 545.60	97%	81.69%
19	Remove Clam	13.3	188.5	$ 0.08	$ 0.10	$ 1.15	$ 1.36				$ 104.31	$ 104.52	0%						469.7	$ 545.18	$ 545.70	100%	81.69%
20	Heat Test	10	198.5	$ 0.06	$ 0.07	$ 1.21	$ 1.43				$ 104.37	$ 104.59	9.50%	Process	255.5	$ 182.50	$ 182.79	$ 180.94	735.2	$ 908.68	$ 909.50	91%	73.93%
21	Discarding	18	216.5	$ 0.11	$ 0.13	$ 1.32	$ 1.56				$ 104.48	$ 104.72	0%						753.2	$ 908.79	$ 909.63	100%	73.93%
22	Synchronization test	40	256.5	$ 0.24	$ 0.29	$ 1.57	$ 1.85				$ 104.73	$ 105.01	2%						793.2	$ 909.04	$ 909.91	98%	72.45%

TO-BE

Excel model for staffing

0	A	B	C	D	E	F	G	H	I
5	B	A	C	E	D	F	H	G	I
10	A	B	C	D	E	F	G	H	I
15	B	A	C	E	D	F	H	G	I
20	C	B	A	F	E	D	I	H	G
25	B	C	A	E	F	D	H	I	G
30	A	C	B	F	D	E	G	I	H
35	C	A	B	D	F	E	I	G	H
40	A	C	B	F	D	E	G	I	H
45	C	A	B	D	F	E	I	G	H
50	A	C	B	F	D	E	G	I	H
55	C	A	B	D	F	E	I	G	H

0	A	B	C	D	E	F	G	H	I
5	B	A	C	E	D	F	H	G	I
10	A	B	C	D	E	F	G	H	I
15	B	A	C	E	D	F	H	G	I
20	C	B	A	F	E	D	I	H	G
25	B	C	A	E	F	D	H	I	G
30	A	B	C	D	E	F	G	H	I
35	C	A	B	F	D	E	I	G	H
40	A	C	B	D	F	E	G	I	H
45	B	A	C	E	D	F	H	G	I
50	A	B	C	D	E	F	G	H	I
55	B	A	C	E	D	F	H	G	I

0	A	B	C	D	E	F	G	H	I
5	B	A	C	E	D	F	H	G	I
10	A	B	C	D	E	F	G	H	I
15	B	A	C	E	D	F	H	G	I
20	C	B	A	F	E	D	I	H	G
25	B	C	A	E	F	D	H	I	G
30	A	B	C	D	E	F	G	H	I
35	C	A	B	F	D	E	I	G	H
40	A	C	B	D	F	E	G	I	H
45	B	A	C	E	D	F	H	G	I
50	A	B	C	D	E	F	G	H	I
55	B	A	C	E	D	F	H	G	I

35	C	A	B	F	D	E	I	G	H
0	A	B	C	D	E	F	G	H	I
5	B	A	C	E	D	F	H	G	I
10	A	B	C	D	E	F	G	H	I
15	B	A	C	E	D	F	H	G	I
20	C	B	A	F	E	D	I	H	G
25	B	C	A	E	F	D	H	I	G
30	A	B	C	D	E	F	G	H	I
35	C	A	B	F	D	E	I	G	H
40	A	C	B	D	F	E	G	I	H
45	B	A	C	E	D	F	H	G	I
50	A	B	C	D	E	F	G	H	I
55	B	A	C	E	D	F	H	G	I

0	A	B	C	D	E	F	G	H	I
5	B	A	C	E	D	F	H	G	I
10	A	B	C	D	E	F	G	H	I
15	B	A	C	E	D	F	H	G	I
20	C	B	A	F	E	D	I	H	G
25	B	C	A	E	F	D	H	I	G
30	C	B	A	E	F	D	I	H	G
35	B	C	A	F	E	D	H	I	G
40	C	B	A	E	F	D	I	H	G
45	B	C	A	F	E	D	H	I	G
50	C	A	B	D	F	E	I	G	H
55	A	C	B	F	D	E	G	I	H

0	A	B	C	D	E	F	G	H	I
5	B	A	C	E	D	F	H	G	I
10	A	B	C	D	E	F	G	H	I
15	B	A	C	E	D	F	H	G	I
20	C	B	A	F	E	D	I	H	G
25	B	C	A	E	F	D	H	I	G
30	A	C	B	F	D	E	G	I	H
35	C	A	B	D	F	E	I	G	H
40	A	C	B	F	D	E	G	I	H
45	C	A	B	D	F	E	I	G	H
50	A	C	B	F	D	E	G	I	H
55	C	A	B	D	F	E	I	G	H

	A	38	38	20		**D**	38	37	20		**G**	38	38	20
	B	38	38	20		**E**	38	38	20		**H**	38	38	19
	C	20	20	56		**F**	20	20	56		**I**	20	20	56

AS-IS

To-Be Staffing														
Total staff	9													
Assembly and pick work	A,B,D,E,G Only G is fix for assembly rest of do both thing assembly and picking. These are full time empolyee													
Testing	H will do testing on all table.													
Breaks	C,F,I are part time worker they are come only three hours when others are take break than C,F,I do work.													

Time	**Assembly 1**	**Pick 1**	**standby 1**	**Assembly 2**	**Pick 2**	**standby 2**	**Assembly**	**Test3**	**standby 3**
0	A	B		D	H		G	E	
5	B	A		E	D		G	H	
10	A	H		D	E		G	B	
15	B	A		E	H		G	D	
20	A	B		D	E		G	H	
25	B	H		E	D		G	A	
30	A	B		D	H		G	E	
35	B	A		E	D		G	H	
40	A	H		D	E		G	B	
45	B	A		E	H		G	D	
50	A	B		D	E		G	H	
55	B	H		E	D		G	A	
0	A	B		D	H		G	E	
5	B	A		E	D		G	H	
10	A	H		D	E		G	B	
15	B	A		E	H		G	D	
20	A	B		D	E		G	H	
25	B	H		E	D		G	A	
30	A	B		D	H		G	E	
35	B	A		E	D		G	H	
40	A	H		D	E		G	B	
45	B	A		E	H		G	D	
50	A	B		D	E		G	H	
55	B	H		E	D		G	A	

0	A	B				D	H				G	E		
5	B	A				E	D				G	H		
10	A	H				D	E				G	B		
15	B	A				E	H				G	D		
20	A	B				D	E				G	H		
25	B	H				E	D				G	A		
30	A	B				D	H				G	E		
35	B	A				E	D				G	H		
40	A	H				D	E				G	B		
45	B	A				E	H				G	D		
50	A	B				D	E				G	H		
55	B	H				E	D				G	A		
0	C	B	A			F	H	D			I	E	G	
5	B	C	A			E	F	D			I	H	G	
10	C	H	A			F	E	D			I	B	G	
15	B	A	C			E	H	F			G	D	I	
20	A	B	C			D	E	F			G	H	I	
25	B	H	C			E	D	F			G	A	I	
30	A	C	B			D	I	E			G	F	H	
35	C	A	B			F	D	E			G	I	H	
40	A	I	B			D	F	E			G	C	H	
45	B	A	B			F	I	E			G	D	H	
50	A	C	B			D	F	E			G	H	H	
55	C	I	B			F	D	E			G	A	H	
0	C	B	A			F	H	D			I	E	G	
5	B	C	A			E	F	D			I	H	G	
10	C	H	A			F	E	D			I	B	G	
15	B	C	A			E	H	D			I	F	G	
20	C	B	A			F	E	D			I	H	G	
25	B	H	A			E	F	D			I	A	G	
30	A	B	C			D	H	F			G	E	I	
35	B	A	C			E	D	F			G	H	I	
40	A	H	C			D	E	F			G	B	I	
45	C	A	B			F	I	E			G	D	H	
50	A	C	B			D	F	E			G	I	H	
45	C	A	B			F	I	E			G	D	H	
50	A	C	B			D	F	E			G	I	H	
55	C	H	B			F	D	E			G	A	H	
0	C	B	A			F	H	D			I	E	G	
5	B	C	A			E	F	D			I	H	G	
10	C	H	A			F	E	D			I	B	G	
15	B	A	C			E	H	F			G	D	I	
20	A	B	C			D	E	F			G	H	I	
25	B	H	C			E	D	F			G	A	I	
30	A	B	C			D	H	F			G	E	I	
35	B	A	C			E	D	F			G	H	I	
40	A	H	C			D	E	F			G	B	I	
45	C	A	B			F	I	E			G	D	H	
50	A	C	B			D	F	E			G	I	H	
55	C	H	B			F	D	E			G	A	H	
0	A	B				D	H				G	E		
5	B	A				E	D				G	H		
10	A	H				D	E				G	B		
15	B	A				E	H				G	D		
20	A	B				D	E				G	H		
25	B	H				E	D				G	A		
30	A	B				D	H				G	E		
35	B	A				E	D				G	H		
40	A	H				D	E				G	B		
45	B	A				E	H				G	D		
50	A	B				D	E				G	H		
55	B	H				E	D				G	A		
0	A	B				D	H				G	E		
5	B	A				E	D				G	H		
10	A	H				D	E				G	B		
15	B	A				E	H				G	D		

0	A	B				D	H				G	E		
5	B	A				E	D				G	H		
10	A	H				D	E				G	B		
15	B	A				E	H				G	D		
20	A	B				D	E				G	H		
25	B	H				E	D				G	A		
30	A	B				D	H				G	E		
35	B	A				E	D				G	H		
40	A	H				D	E				G	B		
45	B	A				E	H				G	D		
50	A	B				D	E				G	H		
55	B	H				E	D				G	A		
A	41	28	12		**D**	69	40	12		**G**	84	12	12	
B	42	28	12		**E**	69	40	12		**H**	29	41	12	
C	13	8	12		**F**	22	20	12		**I**	15	15	12	

To-Be

Past Cost

Staff Member	Hours	Hourly Rate	Monthly Payment	Daily Payment
A	8	26	6240	208
B	8	22	5280	176
C	8	22	5280	176
D	8	22	5280	176
E	8	22	5280	176
F	8	22	5280	176
G	8	22	5280	176
H	8	22	5280	176
I	8	22	5280	176
Total	**72**		**48480**	**1616**

Assembly time	3	Min
Total worker	9	
TrackR production per table	180	
failure rate	0	

Future Cost

Staff Member	Hours	Hourly Rate	Monthly Payment	Daily Payment
A	8	26	6240	208
B	8	22	5280	176
C	3	22	1980	66
D	8	22	5280	176
E	8	22	5280	176
F	3	22	1980	66
G	8	22	5280	176
H	8	22	5280	176
I	3	22	1980	66
Total	**57**		**38580**	**1286**

To-Be Staffing Calculation

To-Be Staffing Rainy and Sunny-Day Calculations

Sunny Day

Staff Member	Hours	Hourly Rate	Monthly Payment	Daily Payment
A	8	26	6240	208
B	8	22	5280	176
C	3	22	1980	66
D	8	22	5280	176
E	8	22	5280	176
F	3	22	1980	66
G	8	22	5280	176
H	8	22	5280	176
I	3	22	1980	66
Total	**57**		**38580**	**1286**

Rainy Day

Staff Member	Hours	Hourly Rate	Monthly Payment	Daily Payment
A	8	26	6240	208
B	8	22	5280	176
C	4	22	2640	88
D	8	22	5280	176
E	8	22	5280	176
F	4	22	2640	88
G	8	22	5280	176
H	8	22	5280	176
I	4	22	2640	88
Total	**60**		**40560**	**1352**

Assembly and pick time	3	Min
Total worker	9	
TrackR production per table	160	
failure rate	2%	

Excel Model for P&L Calculation

Profit/Loss			
	to make	5	Minutes
	to pick	6	Minutes
		60	Total Minutes
		8	Per shift work Hours
		12	Track R 's per table per hour (Two persons working)
		96	Track R's per table per shift
	TrackR A	$150	Incomer per TrackR
		$95.16	Component cost
		$5	Marketing Costs
		$45	Utilities bill for 24 hr
		$464.64	Gross Profit for 1 table per shift
		$28	Per hour for labour
		10%	Payroll Burden
		30.8	Per hour for labour
		16	employees
		50	Percentage of employees

8	Total Working
4	Manufacturing Employees
$986	Shift labour cost 1 table
-$520.96	Profit after components, marketing and labour cost for 1 shift 1 table
3	Tables
-$1,562.88	Profit after components, marketing and labour cost for 1 shift 3 tables
	Total Shifts
-$3,125.76	Profit after components, marketing and labour cost for 2 shifts for 3 tables
$24	Per hour for indirect labour
8	hrs per day
$1,536	Indirect labour expense for 1 day
-$4,661.76	Profit after components, marketing and labour cost and indirect labour

As-Is

Profit/Loss (Sunny Day)

to make	4	Minutes
to pick	4	Minutes
	60	Total Minutes
	8	Per shift work Hours
	0%	Assembled TrackR's Failure Rate
	15	Track R 's per table per hour
		(Two persons working)
	120	Track R's per table per shift
TrackR A	$150	Income per TrackR
	$95.16	Component cost
	$12	Marketing Costs
	$20	Utilities bill for 24 hr
	$2,740.80	Gross Profit for 1 table per shift
	$17	Per hour for labour
	5%	Payroll Burden
	$17.85	Per hour for labour
	9	Manufacturing Employees
	$1,285	Shift labour cost 1 table
	$1,455.60	Profit after components, marketing and labour cost for 1 shift 1 table
	3	Tables
	$4,366.80	Profit after components, marketing and labour cost for 1 shift 3 tables
		Total Shifts
	$8,733.60	Profit after components, marketing and labour cost for 2 shifts for 3 tables
16 employees	$17	Per hour for indirect labour
50 Percentage of employees	8	hrs per day
8 Total Working	$1,088	Indirect labour expense for 1 day
	$7,645.60	Daily Profit after components, marketing and labour cost and indirect labour
	$38,228.00	Weekly (5 days) Profit after components, marketing and labour cost and indirect labour
	$152,912.00	Monthly (20 days) Profit after components, marketing and labour cost and indirect labour

To-Be

Profit/Loss (Rainy Day)

to make	4	Minutes
to pick	4	Minutes
	60	Total Minutes
	8	Per shift work Hours
	2%	Assembled TrackR's Failure Rate
	14.98	Track R 's per table per hour
		(Two persons working)
	119.84	Track R's per table per shift
Trackr A	$150	Income per TrackR
	$98.19	Component cost
	$15	Marketing Costs
	$23	Utilities bill for 24 hr
	$1,654.99	Gross Profit for 1 table per shift
	$19	Per hour for labour
	5%	Payroll Burden
	$19.95	Per hour for labour
	9	Manufacturing Employees
	$1,436	Shift labour cost 1 table
	$218.59	Profit after components, marketing and labour cost for 1 shift 1 table
	3	Tables
	$655.77	Profit after components, marketing and labour cost for 1 shift 3 tables
		Total Shifts
	$1,311.54	Profit after components, marketing and labour cost for 2 shifts for 3 tables
16 employees	$19	Per hour for indirect labour
50 Percentage of employees	8	hrs per day
8 Total Working	$1,216	Indirect labour expense for 1 day
	$95.54	Daily Profit after components, marketing and labour cost and indirect labour
	$477.71	Weekly (5 days) Profit after components, marketing and labour cost and indirect labour
	$1,910.85	Monthly (20 days) Profit after components, marketing and labour cost and indirect labour

TO-BE

Risks, Mitigations from all the different To-Be's

Staffing (Risk)

It is possible that at the same day, 2 to 3 employees may take the day off which could slow down the workflow.

Improperly trained employees can create conflicts while working on TrackR products.

Staffing (Mitigation)

The manager should be informed 1-2 days in advance by the employee for taking the days off so the arrangements can be made easily.

Employees should be given efficient hands-on training before starting the work.

Picking (Risk)

It is possible that the picking and placing of the products after and before manufacturing is kept on the wrong place.

The part numbers assigned for uniquely identifying the products may get incorrect which can cause wrong product selection for process.

Picking (Mitigation)

It needs to be assured everytime the product is placed at the place to make sure it is correctly assigned to the mentioned area.

The part numbers of the products needed to be verified to avoid any product conflicts for any process in the manufacturing and assembling.

Shelving (Risk)

The shelves might not be strong enough after some time which may lead to falling of the shelf over the other causing product damage.

The shelf locations might clash with the similar part numbers with minor differences which may lead to wrong placing of product.

Shelving (Mitigation)

A regular maintenance should be done by the maintenance crew to ensure that shelves are strong enough to handle enough load to avoid any damage.

Verification before placing or picking the product should be performed every time to avoid any ambiguity.

Pricing (Risks)

The price of the components might vary by time which can cause profit conflicts.

The pricing list and details might not be available al the time to the company if they are stored offline in a register.

Pricing (Mitigation)

The pricing needs to be verified for any future updates.

The pricing details should be stored and made available online via digital devices all the time for retrieval and fetching.

Components (Risks)

The minimum and maximum costs might differ per unit price.

The poor product description might mislead someone.

Components (Mitigation)

The component costs need to be mentioned with any new pricing updates.

The product description should be addressed properly to avoid any misreading.

Profit/Loss (Risks)

The machine operator and electricity costs might change in the future.

The breakdown of each and every process taking place in the cdl factory might miss some costing.

Profit/Loss (Mitigation)

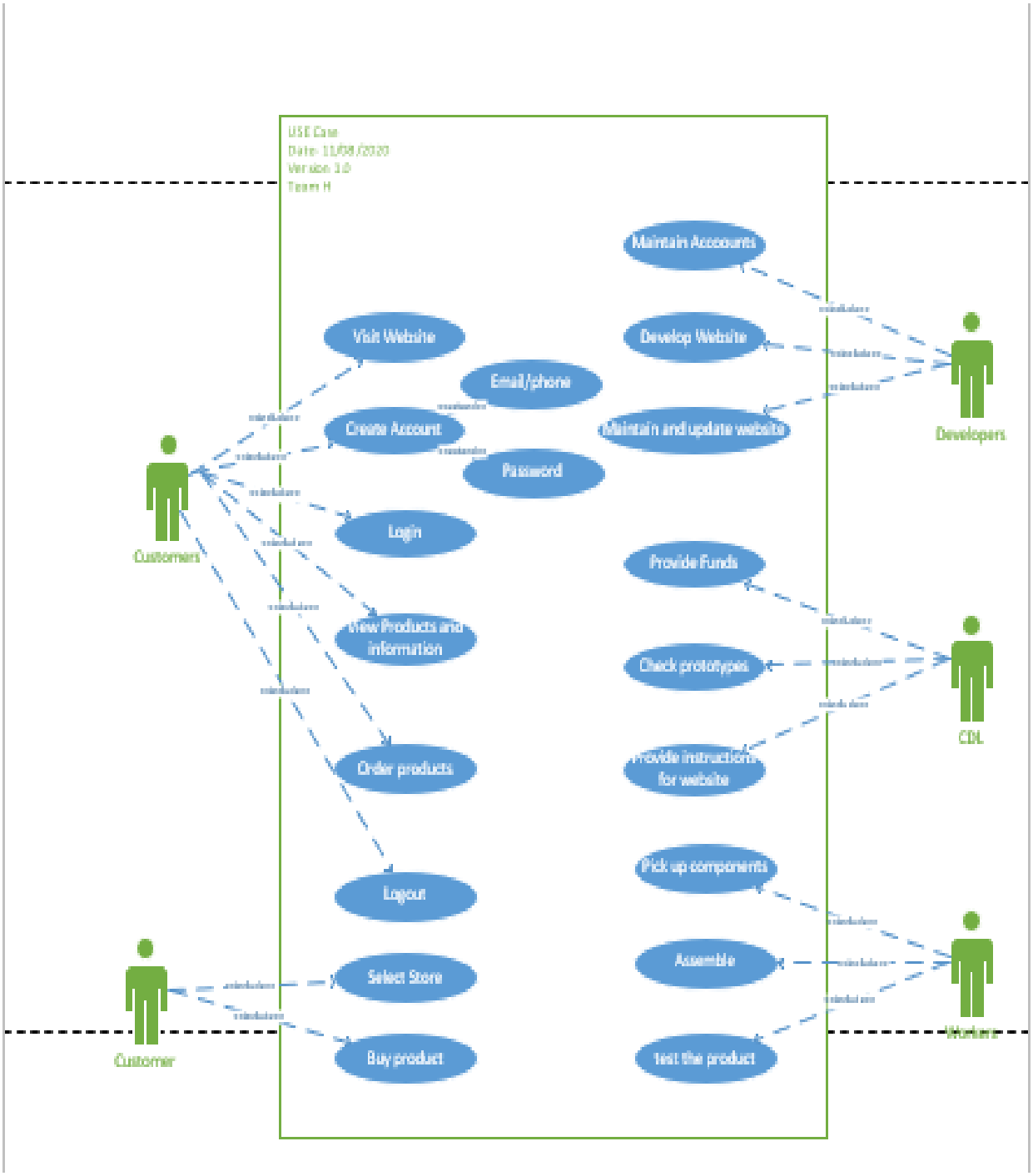
The machine operator and electricity costs needs to be updated regularly.

The breakdown of each and every process taking place in the cdl factory should be clear and detailed to avoid any budget conflicts.

Cockburn Template

Goals	**To assemble TrackR components**	
Scope	Customer use TrackR device for fitness purpose	
Assumption	Customer know how to use TrackR device	
Success	Device is assembled successfully	
Fail Condition	Device is not assembled properly	
Actors	End users Developers Stakeholders	
Trigger	Customer want to use device	
Description	Step	Action
	1	Go to website/ Store
	2	Select the product
	3	Pay and place order
	4	Branching Action
Extensions	Step	Customers have to fill E-mail password if they want to login with email on website
	2a	Customers have to fill Phone number password if they want to login with phone number to use website

Use Case Diagram



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