

How to fill the Cost Report

Cost Report Structure.....	3
1- System Cost Formats.....	4
1.1 Part Template.....	5
Material.....	6
Process.....	7
Process Multipliers.....	8
Tooling & Fixtures.....	8
Fasteners.....	9
Total Part cost and Extended Cost.....	10
1.2 Assembly Template.....	10
1.3 System BOM Template.....	11
1.4 Common Mistakes and Recommendations.....	12
2 Vehicle Cost Summary and BOM.....	13
3 Complete Report with supporting material.....	15

Cost Report Structure

The Cost Report consists of a full vehicle BOM (Bill of Materials) with its cost derived from the Cost Tables and supporting documentation. The following is how the Cost Report must be delivered:

- I. Eight System Cost Formats as Microsoft Excel[®] file (.xls or .xlsx).
Use the Template **BSAE_Cost_System_Template.xls**
- II. Vehicle Cost Summary and BOM as Microsoft Excel[®] file (.xls or .xlsx)
Use the template **BSAE_Cost_eBOM_Template.xlsx**
- III. Complete Report with supporting material as one PDF file (.pdf)

The electronic version of the files must be identified as follows:

- I. Carnumber_schoolname_MXYear_CR_SystemCode.xls
- II. Carnumber_schoolname_MXYear_CR_BOM.xls
- III. Carnumber_schoolname_MXYear_CR_Complete.pdf

Systems Codes are listed in the Addendum as follows:

No	System	System Code
1	Brake System	BR
2	Engine and Drivetrain	EN
3	Frame & Body	FR
4	Electrical	EL
5	Miscellaneous, Finish and Assembly	MS
6	Steering System	ST
7	Suspension System	SU
8	Wheels, Wheel Bearings and Tires	WT

Examples:

- i. 087_University of SAE_MX2023_CR_EN.xls
- ii. 087_University of SAE_MX2023_CR_BOM.xls
- iii. 087_University of SAE_MX2023_CR_Complete.pdf

The 10 electronic files of the Cost Report must be sent to **cost@bajasaemexico.com**.

1- System Cost Formats

The overall vehicle is broken down into eight (8) systems

- Systems are made up from Assemblies.
- Assemblies are made up from Parts, materials, processes and fasteners.
- Parts consist of materials, processes and fasteners.

Steps to create System Cost Format

Use the Template **BSAE_Cost_System_Template.xls** and change the name according to the format.

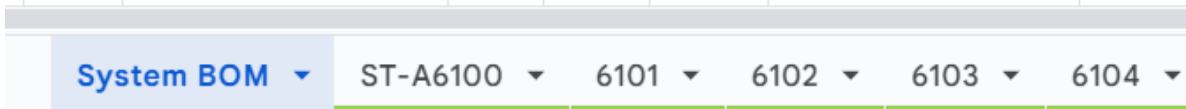
Example:

087_University of BSAE_MX2023_CR_SU.xls (SU for suspension)

Analyze your system design and propose a list of assemblies and parts based on which parts you could include in your system (see the document **Cost Report Addendum BSAE MX part CL.1 SYSTEMS AND ASSEMBLY LIST**). Once you have the structure assign numbers to the parts and assemblies (see the document **Cost Report Addendum BSAE MX part CL.2 ASSEMBLY AND PART NUMBERING**). Example:

Area of Commodity	Asm/Prt #	Rev. Lvl.	Asm (Assembly)	Component
Steering System	A6100	AA	Rack and Pinion Assembly	
Steering System	06101	AA		Pinion gear
Steering System	06102	AA		Rack gear
Steering System	06103	AA		Steering rack housing
Steering System	A6200	AA	Steering Column Assembly	
Steering System	06201	AA		Column
Steering System	06202	AA		Column joints
Steering System	A6300	AA	Steering Wheel Assembly	
Steering System	06301	AA		Steering wheel
Steering System	A6400	AA	Tie Rod Assembly	
Steering System	06401	AA		Rod tube
Steering System	06402	AA		Rod inserts

Once you have the Numbers Assign and the complete design of a part, you will copy one sheet for each part and assembly, naming them with the part number assigned.



It is important to use the template “Assembly_1” for the Assemblies (as example **A6100**, **A6200**, **A6300** and **A6400**) and use the Template “Part_1” for the parts (as seen in the example **06101**, **06102**, **06103**, **06201**, **06202**, etc.).

After listing the components, all process, materials and fasteners required for each part must be identified. This is the section that each of the judges review for determining the process feasibility and your understanding of the chosen methodologies, so be as specific as you can. Use as a guide the **Cost Report Addendum BSAE MX**, which contains all the processes and materials rules.

Every process, materials and fasteners should be priced according to the cost tables in the file **BSAE_Cost_Catalogs_MX2023.xlsm**

1.1 Part Template

Example:

The Part_1 Format is formed by: Part Information, School Information, Material, Process and Fasteners. Total Part Cost and Extended

System					School		SAE Mexico University			Asm Cost		\$ 22.04
Assembly		Steering wheel			Team		Judges			Qty		1
P/N Base		6300			Car #		00			Extended Cost		\$ 22.04
Suffix		AA										
Details		Text describing the assembly, especially unique content										
Item	Part	Part Cost	Quantity	Sub Total								
6301	Quick release	\$13.35	1	\$ 13.35								
6302	Steering wheel	\$5.97	1	\$ 5.97								
			Sub Total	\$ 19.32								
Item	Material	Use	UnitCost	Size Label	Unit1	Size 1	Size 2 Label	Unit 2	Size2	Quantity	Sub Total	
											\$ -	
											Sub Total	\$ -
Item	Process	Use	UnitCost	Size Label	Unit	Size Value	Process Multipl	Quantity	Sub Total			
115	Ratchet <= 6.35 mm	Fix column to joint	\$0.50		unit	1		1	\$ 0.50			
118	Reaction Tool <= 6.35 mm	Steering wheel to quick release	\$0.25		unit	1		6	\$ 1.50			
									Sub Total	\$ 2.00		
Item	Fastener	Use	UnitCost	Size1 Label	Unit1	Size 1	Size 2 Label	Unit 2	Size2	Quantity	Sub Total	
10	Bolt, Grade 8.8 (SAE 5)	Fix to chasis	\$0.13	diameter	mm	6.35	length	mm	50	1	\$ 0.13	
10	Bolt, Grade 8.8 (SAE 5)	Steering wheel to quick release	\$0.06	diameter	mm	6.35	length	mm	25	6	\$ 0.37	
35	Nut, Grade 8.8 (SAE 5)	For bolts	\$0.03	Diameter	mm	6.35	NA	NA	---	7	\$ 0.22	
											Sub Total	\$ 0.722
Item	Tooling	Use	UnitCost	Size Label	Unit	Size Value	Frac. Incl.	Quantity	Sub Total			
											Sub Total	\$ -

As a reminder, complete the School and Part information on the upper left part of the Tab.

System	Steering	School	SAE Mexico University
Assembly	Steering Wheel	Team	Judges
Part	Steering wheel	Car #	00
P/N Base	6301		
Suffix	AA		
Details	Text describing the assembly, especially unique content		

Material

Adding raw material or a purchased part is done in the material section of the document **BSEAE_Cost_Catalogs_MX2023.xlsm**.

Apply	Material	Formula	Unit Cost	Size 1 Label	Unit 1	Size 1 Value	Size 2 Label	Unit 2	Size 2 Value	C1	C2
Item	Material	Supplier	Description	Category							
1	Bearing Ball, Steel	Any	Any steel material. This material is for a single steel sphere ball, not a complete bearing.	Bearings							
2	BEARING, BALL #3514635	Polaris		Bearings							
3	Bearing, Ball, Angular Contact	Any	Not to be used for wheel bearings.	Bearings							
4	Bearing, Ball, Deep Groove	Any	Not to be used for wheel bearings.	Bearings							
5	Bearing, Ball, Radial	Any	Not to be used for wheel bearings.	Bearings							
6	Bearing, Cylindrical Roller	Any	Not for wheel bearing use.	Bearings							
7	Bearing, Double Row, Ball, Angular Contact	Any	Not to be used for wheel bearings.	Bearings							
8	Bearing, Double Row, Ball, Deep Groove	Any	Not to be used for wheel bearings.	Bearings							
9	Bearing, Double Row, Ball, Radial	Any	Not to be used for wheel bearings.	Bearings							
10	Bearing, Linear, Closed	Any	Use with end-supported shafts.	Bearings							
11	Bearing, Linear, Open	Any	Use with continuously supported shafts or where access to shaft ends is not possible.	Bearings							
12	Bearing, Needle	Any	Any style of needle bearing. Not for wheel bearing use.	Bearings							
13	Bearing, Spherical	Any		Bearings							
14	Bearing, Tapered Needle	Any	Cost includes outer ring, inner ring and roller assembly. Not to be used for wheel bearings.	Bearings							

To check the material use the filters by Material, Supplier, Description or Category, and select Apply. It shall display the Size Labels and Units.

Apply	Material	Formula	Unit Cost	Size 1 Label	Unit 1	Size 1 Value	Size 2 Label	Unit 2	Size 2 Value	C1	C2
1391	Aluminum, Normal (by Dimensions)	[C1]*[Size1]*[Size2]*[C2]	# VALOR!	Area	mm^2		Length	mm		4.2	0.000002712
Item	Material	Supplier	Description	Category							
1391	Aluminum, Normal (by Dimensions)	Any	Density=2712kg/m^3 e.g. 2024, 6061, A356, A380	Raw Material							

Fill the sizes in **green** and copy the cells from the cells Item to Size2 Value on the format

Apply	Material	Formula	Unit Cost	Size 1 Label	Unit 1	Size 1 Value	Size 2 Label	Unit 2	Size 2 Value	C1	C2
1391	Aluminum, Normal (by Dimensions)	[C1]*[Size1]*[Size2]*[C2]	\$10.85	Area	mm^2	150069	Length	mm	6.35	4.2	0.000002712
Item	Material	Supplier	Description	Category							
1391	Aluminum, Normal (by Dimensions)	Any	Density=2712kg/m^3 e.g. 2024, 6061, A356, A380	Raw Material							

Paste the data to the cells from Item Order to the Size2, replace the formula for the use and add the Quantity. As a comment, It is important to select paste values in order to maintain the template format.

ItemOrder	Material	Use	UnitCost	Size1 Label	Unit1	Size 1	Size 2 Label	Unit 2	Size2	Quantity	Sub Total
1382	Aluminum, Normal (by Dimensions)	Central plate	\$2.50	Area	mm^2	34500	Length	mm	6.35	1	\$ 2.50

Do this procedure for every material used. Add rows if required. (When a new row is added, the total cost formula must be modified to consider all the items.) **Process**

Adding process is done in the process section of the document **SAE_Cost_Catalogs_MX2023.xlsm**.

Apply	Process	Formula	Unit Cost	Size Label	Unit	Size Value	Process Multiplier	Multiplier Value	C1
Item	Process	Description	Category	Tooling Req	Process Multiplier	Comments			
1	Adjustment - Misc.	Chain tension, etc.	Labor	No					
2	Aerosol Apply		Labor	No					
3	Anodize	It is not necessary to include any cost for anodizing. Included for reference only.	Labor	No					
4	Anodizing			No					
5	Assemble, >20 kg, Interference		Labor	No	Assembly	For this item it is required to add ASSEMBLE-LENGTH multiplier			
6	Assemble, >20 kg, Line-on-Line		Labor	No	Assembly	For this item it is required to add ASSEMBLE-LENGTH multiplier			
7	Assemble, >20 kg, Loose		Labor	No	Assembly	For this item it is required to add ASSEMBLE-LENGTH multiplier			
8	Assemble, 1 kg, Interference		Labor	No	Assembly	For this item it is required to add ASSEMBLE-LENGTH multiplier			
9	Assemble, 1 kg, Line-on-Line		Labor	No	Assembly	For this item it is required to add ASSEMBLE-LENGTH multiplier			
10	Assemble, 1 kg, Loose		Labor	No	Assembly	For this item it is required to add ASSEMBLE-LENGTH multiplier			

To look for the process use the filters by Process, Description or Category, and select Apply. It will display the Size Labels and Units.

Apply	Process	Formula	Unit Cost	Size Label	Unit	Size Value	Process Multiplier	Multiplier Value	C1
94	Machining	C1*Size1	#VALOR!		cm^3			#N/D	0.04
Item	Process	Description	Category	Tooling Req	Process Multiplier	Comments			
94	Machining	Machining can include roughing (1.5mm machine stock min., Tol +/- 0.5mm) and/or finishing (0.5mm machine stock min.). All parts should include the minimum 1.5mm material stock except parts produced by "near net shaped" basic forming	Material Removal	No	Machining	For this item it is required to add MATERIAL multiplier			

Fill the sizes in green and copy the cells from Item to Size Value on the format

Apply	Process	Formula	Unit Cost	Size Label	Unit	Size Value	Process Multiplier	Multiplier Value	C1
94	Machining	C1*Size1	\$6.54		cm^3	123	Material - Bronze	1.33	0.04
Item	Process	Description	Category	Tooling Req	Process Multiplier	Comments			
94	Machining	Machining can include roughing (1.5mm machine stock min., Tol +/- 0.5mm) and/or finishing (0.5mm machine stock min.). All parts should include the minimum 1.5mm material stock except parts produced by "near net shaped" basic forming	Material Removal	No	Machining	For this item it is required to add MATERIAL multiplier			

Paste the data to the cells from Item Order to the Size Value, replace the Formula for the Use and add the quantity multiplier if it is required.

ItemOrder	Process	Use	UnitCost	Size Label	Unit	Size Value	Process Multiplier	Quantity	Sub Total
96	Machining Setup, Install and remove	Steering Wheel Machining	\$1.30		unit	1			\$ 1.30
86	Laser Cut	Steering Wheel Machining	\$1.37		cm	137			\$ 1.37
112	Rapid Prototype - Plastic	Handle grip	\$4.41		kg	0.1378			\$ 4.41

Do this procedure for every Process used. Add rows if required. Just remember, when a new row is added, the total cost formula must be modified to consider all the items.

Process Multipliers

Process Multipliers are applied to modify the standard costs of different operations to account for material and geometric differences in the part. Every process included in the Cost Report, select list of Process Multipliers and then include any applicable Process Multipliers with the cost

Process	Formula	Unit Cost	Size Label	Unit	Size Value	Process Multiplier	Multiplier Value	C1

Tooling & Fixtures

Adding Tooling & Fixtures is done in the Tooling & Fixtures section of the document BSAE_Cost_Catalogs_MX2023.xlsm.

Material	Formula	Unit Cost	Size 1 Label	Unit 1	Size 1 Value	C1
Item	Tooling	Description	Process Title			
1	Brazing Fixture	Each point is a pickup or support point.	Braze			
2	Die Casting - Die	Per die not die set. Minimum number of dies is 2 per die set.	Die Casting			
3	Lamination - Flat Panel Tool	Use surface area of tool that is used to form part geometry. To use this tooling type composite part must have geometry that is possible to obtain from sheet metal tool with no complex curvature or shape. For example flat panel parts are allowed or...	Lamination, Manual			
4	Lamination - Mold Tool	Use surface area of tool that is used to form part geometry. To use this tooling type composite part must have geometry that is possible to obtain from sheet metal tool with no complex curvature or shape. For example flat panel parts are allowed or...	Lamination, Manual			
5	PCB Stencil	One side of PCB stencil for solder paste application	Solder Paste Apply			
6	Plastic injection molding - Die	Per die not die set.	Plastic injection molding			
7	Pouring Fixture	Use surface area of tool that is used to form part geometry, e.g. fully expanded final volume.	Liquid Apply - Pour Expanding Foam			
8	Powder Metal Forming - Die	Per die not die set.	Powder Metal Forming			
9	Sand Casting - Die	Per die not die set.	Sand Casting			
10	Sand Casting - Sand Core Package	Per core not core package.	Sand Casting			
11	Welds - Welding Fixture	Each point is a pickup or support point. For a spaceframe this would = the number of nodes + additional brackets or tabs.	Weld			

To look for the process use the filters by Fastener, Description or Category, and select Apply. It will display the Size Labels and Units.

Material	Formula	Unit Cost	Size 1 Label	Unit 1	Size 1 Value	C1
Botón						
4	Lamination - Mold Tool	[C1]*[Size1]	Area	m^2	0.63	20
Item	Tooling	Description	Process Title			
4	Lamination - Mold Tool	Use surface area of tool that is used to form part geometry. To use this tooling type composite part must have geometry that is possible to obtain from sheet metal tool with no complex curvature or shape. For example flat panel parts are allowed or...	Lamination, Manual			

Fill the sizes in green and copy the cells from Item to Size Value on the format

Material	Formula	Unit Cost	Size 1 Label	Unit 1	Size 1 Value	C1
Botón						
4	Lamination - Mold Tool	[C1]*[Size1]	Area	m^2	0.63	20

Paste the data to the cells from Item Order to the Size2 Value, replace the formula for the use and add the quantity multiplier if required.

Item	Fastener	Use	UnitCost	Size1 Label	Unit1	Size 1	Size 2 Label	Unit 2	Size2	Quantity	Sub Total
10	Bolt, Grade 8.8 (SAE 5)	Fix to chasis	\$0.13	diameter	mm	6.35	length	mm	50	1	\$ 0.13

Do this procedure for every Tooling & Fixtures used. Add rows if required. (When a new row is added, the total cost formula must be modified to consider all the items)

Fasteners

Adding Fasteners is done in the Fasteners section of the document
BSAE_Cost_Catalogs_MX2023.xlsm

Item	Fastener	Description	Category
1	Alcoa Camloc Fastener 1/4 turn		
2	Ball Joint Linkage	Ball Joint Link, Right and Left hand, use shank thread size	Ball Joint
3	Ball Joint Rod End Heim	Heim Joint	Ball Joint
4	Ball Joint Rod End Male, Super-Swivel	Ball Joint Rod End, Steel Max Ball Swivel 55 degrees or greater	Ball Joint
5	Ball Joint Rod Ends	Use Ball Joint Rod End Heim	Ball Joint
6	Bolt, Aluminum	Strength 255 Mpa. Special varities included (drilled head, locking, etc.)	Bolt
7	Bolt, Grade 10.9 (SAE 8)	Strength 1030 Mpa. Special varities included (drilled head, locking, etc.)	Bolt
8	Bolt, Grade 12.9	Strength 1170 Mpa. Special varities included (drilled head, locking, etc.)	Bolt
9	Bolt, Grade 6.8 (SAE 3) and All Grades less than Metric 8.8	Strength 670 Mpa. Special varities included (drilled head, locking, etc.)	Bolt
10	Bolt, Grade 8.8 (SAE 5)	Strength 830 Mpa. Special varities included (drilled head, locking, etc.)	Bolt
11	Bolt, Grade AN	Strength 830 Mpa. Special varities included (drilled head, locking, etc.)	Bolt
12	Bolt, Grade NAS 12-Point	Strength 1240 Mpa. Special varities included (drilled head, locking, etc.)	Bolt
13	Bolt, Grade NAS 6-Point	Strength 1100 Mpa. Special varities included (drilled head, locking, etc.)	Bolt
14	Bolt, Nylon Hex		Bolt
15	Buckle, side release, metal		

To look for the process use the filters by Fastener, Description or Category, and select Apply. It will display the Size Labels and Units.

Botón	Fastener	Formula	Unit Cost	Size 1 Label	Unit 1	Size 1 Value	Size 2 Label	Unit 2	Size 2 Value	C1	C2
5	Ball Joint Rod Ends	[C1]*[Size1]*[Size1]+[C2]*[Size1]	#VALOR!			4	NA	NA	---	0.0204	0.2678

Item	Fastener	Description	Category
5	Ball Joint Rod Ends	Use Ball Joint Rod End Heim	Ball Joint

Fill the sizes in green and copy the cells from Item to Size Value on the format

Botón	Fastener	Formula	Unit Cost	Size 1 Label	Unit 1	Size 1 Value	Size 2 Label	Unit 2	Size 2 Value	C1	C2
5	Ball Joint Rod Ends	[C1]*[Size1]*[Size1]+[C2]*[Size1]	\$1.40			4	NA	NA	---	0.0204	0.2678

Paste the data to the cells from Item Order to the Size2 Value, replace the formula for the use and add the quantity multiplier if required.

Item	Fastener	Use	UnitCost	Size1 Label	Unit1	Size 1	Size 2 Label	Unit 2	Size2	Quantity	Sub Total
10	Bolt, Grade 8.8 (SAE 5)	Fix to chasis	\$0.13	diameter	mm	6.35	length	mm	50	1	\$ 0.13
10	Bolt, Grade 8.8 (SAE 5)	Steering wheel to quick release	\$0.06	diameter	mm	6.35	length	mm	25	6	\$ 0.37
35	Nut, Grade 8.8 (SAE 5)	For bolts	\$0.03	Diameter	mm	6.35	NA	NA	---	7	\$ 0.21

Do this procedure for every Fastener used. Add rows if required. (When a new row is added, the

total cost formula must be modified to consider all the items.)

Total Part cost and Extended Cost

The Part Cost and Extended Cost will be filled automatically. It is required to fill the quantity, if there are more than 1 parts exactly the same, they may be reported in the same tab only considering the quantity in the extended cost.

Part Cost	\$ 13.35
Qty	1
Extended Cost	\$ 13.35

1.2 Assembly Template

Example:

The Assembly_1 Format is formed by: Assembly Information, School Information, Parts, Material, Process and Fasteners. Total Part Cost and Extended.

System	Steering																			Part Cost	\$ 13.35
Assembly	Steering Wheel																			Qty	1
Part	Steering wheel																			Extended Cost	\$ 13.35
P/N Base	E301																				
Suffix	AA																				
Details	Text describing the assembly, especially unique content																				
ItemOrder	Material	Use	UnitCost	Size1 Label	Unit1	Size 1	Size 2 Label	Unit 2	Size2	Quantity	Sub Total										
1382	Aluminum, Normal (by Dimensions)	Central plate	\$2.50	Area	mm^2	34500	Length	mm	6.35	1	\$ 2.50										
1433	Plastic, ABS (per kg)	Handle Grip	\$0.46	mass	kg	0.138	NA	NA	---	2	\$ 0.91										
1433	Plastic, ABS (per kg)	Logo	\$0.02	mass	kg	0.0068	NA	NA	---	1	\$ 0.02										
1227	Paint	Handle grip	\$0.87	Area	m^2	0.087	NA	NA	---	2	\$ 1.74										
1227	Paint	Logo	0.065	Area	m^2	0.0065	NA	NA	---	1	\$ 0.07										
1229	Double Side Tape	Handle grip and Logo	0.054	Area of Tape Use	mm^2	1500	NA	NA	---	1	\$ 0.05										
											\$ -										
											\$ -										
											Sub Total	\$ 5.288									
ItemOrder	Process	Use	UnitCost	Size Label	Unit	Size Value	Process Multiplier	Quantity	Sub Total												
96	Machining Setup, Install and remove	Steering Wheel Machining	\$1.30		unit	1			\$ 1.30												
86	Laser Cut	Steering Wheel Machining	\$1.37		cm	137			\$ 1.37												
112	Rapid Prototype - Plastic	Handle grip	\$4.41		kg	0.1378			\$ 4.41												
112	Rapid Prototype - Plastic	Logo	\$0.23		kg	0.007208			\$ 0.23												
2	Aerosol Apply	Paint	\$0.49	Surface painted	m^2	0.0935			\$ 0.49												
9	Assemble, 1 kg, Line-on-Line	Handle Grip to Steering Wheel	\$0.26		unit	2			\$ 0.26												
											\$ -										
											\$ -										
											\$ -										
											\$ -										
											\$ -										
											\$ -										
											\$ -										
											\$ -										
											Sub Total	\$ 8.06									
ItemOrder	Fastener	Use	UnitCost	Size1 Label	Unit1	Size 1	Size 2 Label	Unit 2	Size2	Quantity	Sub Total										
											\$ -										
											\$ -										
											\$ -										
											\$ -										
											\$ -										
											\$ -										
											\$ -										
											\$ -										
											\$ -										
											\$ -										
											\$ -										
											Sub Total	\$ -									
Item	Tooling	Use	UnitCost	Size Label	Unit	Size Value	Frac. Incl.	Quantity	Sub Total												

The assembly is filled similar to the parts. The only change is that the assemblies include one section more that is parts. To fill it, link the art numbers, Names, Cost, Quantity and Extended cost from the parts.

System	Steering	School	SAE Mexico University	Part Cost	\$ 13.35
Assembly	Steering wheel	Team	Judges	Qty	1
Part	Steering wheel	Car #	00	Extended Co	\$ 13.35
PIN Base	6301				
Suffix	AA				
Details	Text describing the assembly, especially unique content				

Item	Part	Part Cost	Quantity	Sub Total
6301	Steering wheel	\$13.35	1	\$ 13.35
6302	Quick release	\$5.97	1	\$ 5.97
			Sub Total	\$ 19.32

Remember, the Assembly Cost and the Extended cost include the part cost but the total price included in the BOM does not include the part cost to avoid duplicating this cost.

1.3 System BOM Template

Finally every System Format have a Tab for the System BOM, it contains a list of Assemblies and Parts. Link to the list the System, Part numbers, Names, descriptions, Subtotal costs (for material, Process and Fasteners ignoring Tooling cost) and quantities.

Line Num	Area of Commodity	Level	Asm/Prt #	Rev. Lvl.	Asm	Component	Description	Unit Cost	Quantity	Material Cost	Process Cost	Fastener Cost	Tooling Cost	Total Cost	Details Page Number
1	Brake System		A1100	AA	Balance Bar			3.92	1	\$ 1.17	\$ 2.75			3.92	
3	Brake System		A1200	AA	Brake Lines Assembly			33.77	1	\$ 31.02	\$ 2.75			33.77	
4	Brake System		01201	AA		Brake Lines		65.72	1	\$ 65.72				65.72	
5	Brake System		01202	AA		Brake Master Cylinder		28.00	2	\$ 28.00				56.00	
7	Brake System		01203	AA		Brake Fluid		5.00	2	\$ 5.00				10.00	
8	Brake System		A1300	AA	Rotors Assembly			10.71	4	\$ -	\$ 3.76	\$ 6.95		42.83	
9	Brake System		01301	AA		Caliper		55.00	4	\$ 55.00				220.00	
10	Brake System		01302	AA		Caliper Mounts		1.67	4	\$ 0.34	\$ 1.33			6.68	
11	Brake System		01303	AA		Brake Pads		2.46	8	\$ 2.46				19.65	
13	Brake System		01304	AA		Brake Discs		4.96	4	\$ 0.95	\$ 4.01			19.82	
	Brake System				Area Total					408.69	41.90	27.79	0.00	478.39	

System	Brake System (BR)	School	IPN UPI/ITA	Asm Cost	\$ 3.92									
Assembly	Balance Bar	Team	FENIX	Qty	1									
P/N Base	A1100	Car #	07	Total Cost	\$ 3.92									
Suffix	AA													
Details														
RemOrder	Part	Part Cost	Quantity	Sub Total										
10			1.00	\$ -										
			Sub Total											
RemOrder	Material	Use	Unit Cost	Size1	Unit1	Size2	Unit2	Area Name	Area	Length	Density	Quantity	Sub Total	
10	Steel, Mild	Balance Bar Center	\$ 2.25									0.16	\$ 0.36	
20	Steel, Mild	Balance Bar Right	\$ 2.25									0.18	\$ 0.41	
30	Steel, Mild	Balance Bar Left	\$ 2.25									0.18	\$ 0.41	
													\$ -	
													Sub Total	\$ 1.17
RemOrder	Process	Use	Unit Cost	Unit	Quantity	Multiplier	Mult. Val.	Sub Total						
10	Machining Setup, Install and Remove		\$ 1.30		1			\$ 1.30						
20	Drilled Hole <=25.4	Holes for Assembly	\$ 0.35		2			\$ 0.70						
30	Machining	Balance Bar Right Machining	\$ 0.04	cm^3	3.18			\$ 0.13						
40	Machining	Balance Bar Left Machining	\$ 0.04	cm^3	3.18			\$ 0.13						
50	Machining	Balance Bar Center Machining	\$ 0.04	cm^3	2.56			\$ 0.10						
60	Assemble, 1 kg, Line-on-Line	Assembly Balance Bar on Break	\$ 0.13		3			\$ 0.39						
								Sub Total	\$ 2.75					
RemOrder	Fastener	Use	Unit Cost	Size1	Unit1	Size2	Unit2	Quantity	Sub Total					
									\$ -					
									Sub Total	\$ -				

1.4 Common Mistakes and Recommendations

- To paste the materials, process and fasteners from the Catalog use always **paste value**.
- Make sure the cost is correct and all calculations and formulas work correctly – automated processes and spreadsheets need to be audited to make sure all formulas are correct and reasonable. Foolish math errors make up a good portion of the penalties given out.

plier	Mult. Val.	Sub Total	er	Mult. Val.	Sub Total
		\$ 1.30			\$ 1.30
		\$ 1.37			\$ 1.37
		\$ 4.41			\$ 4.41
		\$ 0.23			\$ 0.23
		\$ 0.49			\$ 0.49
		\$ 0.26			\$ 0.26
		\$ -			\$ -
		\$ -			\$ -
	Sub Total	=SUM(J21:J25)		Sub Total	=SUM(J21:J28)

Wrong range

Correct range

- Take care of the number of parts and number of assemblies.
- A common mistake is to have not enough installation process for all the fasteners.
- Each weld joint on the frame should have included tube end preparation welding process, which covers all process except saw cutting to length and welding.
- A common missed item is the assembly processes. There are multiple weight categories and fit tolerances. The weight categories are 1, 3, 5, 10, 15, 20, and >20 The weight categories are 1, 3, 5, 10, 15, 20, and >20 kg. The team should select the next highest category, i.e. a 16 kg part would be 20 in the assembly i.e. a 16 kg part would be 20 in the assembly i.e. a 16 kg part would be 20 in the assembly. There are three types of fits: loose, line on line, and interference.
- If the brand or model used is not included in the catalog the options "OEM" for material and "Any" in the Supplier must be used.

Item	Material	Supplier	Description	Category
440	OEM Brake Caliper - Automotive	Any		Brake Caliper
441	OEM Front Caliper - ATV	Any		Brake Caliper
442	OEM Rear Caliper - ATV	Any		Brake Caliper


2 Vehicle Cost Summary and BOM

Use the Template **BSAE_Cost_eBOM_Template.xlsx** and change the name according to the format.
Example:

In the BOM Tab paste every System BOM, taking care about the total costs and the order established at the beginning of this document and fill the team information. For the Cost Summary Tab Link the final costs for Material, Processes and Fasteners, for each system. Fill the School Information and add your University or Team logo.

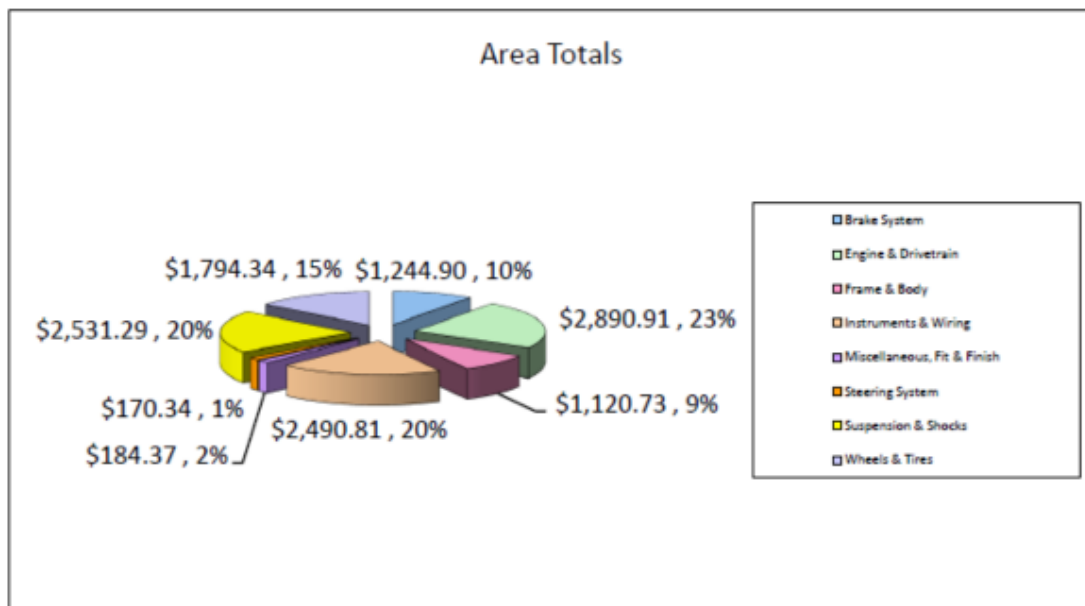
Example:

FOR: University of Akron
Car # 73



Area Totals		Materials	Processes	Fasteners	Tooling	Total
BR	Brake System	\$ 1,066.18	\$ 171.30	\$ 7.42	\$ -	\$ 1,244.90
EN	Engine & Drivetrain	\$ 2,347.20	\$ 506.22	\$ 37.49	\$ -	\$ 2,890.91
FR	Frame & Body	\$ 470.83	\$ 499.32	\$ 50.66	\$ 99.93	\$ 1,120.73
EL	Instruments & Wiring	\$ 2,178.52	\$ 312.30	\$ -	\$ -	\$ 2,490.81
MS	Miscellaneous, Fit & Finish	\$ 121.24	\$ 62.51	\$ 0.62	\$ -	\$ 184.37
ST	Steering System	\$ 107.30	\$ 53.52	\$ 9.50	\$ 0.02	\$ 170.34
SU	Suspension & Shocks	\$ 1,835.47	\$ 586.93	\$ 44.88	\$ 64.01	\$ 2,531.29
WT	Wheels & Tires	\$ 997.30	\$ 762.32	\$ 14.72	\$ 20.00	\$ 1,794.34
Total Vehicle		\$ 9,124.03	\$ 2,954.42	\$ 165.29	\$ 183.96	\$ 12,427.69

Composition for total vehicle:



3 Complete Report with supporting material

The Cost Report is a file that contains the complete cost report including the Cost Summary, General BOM, and every Assembly and Part. The report must contain the following:

1. **Cover sheet:** It must include the following. University name, competition name, and vehicle number.
2. **Table of Contents:** page numbers rather than section numbers – the less flipping around in the book that you make the judges do the less cumbersome the book is to work with
3. Cost Summary Copy from Cost Summary Tab at

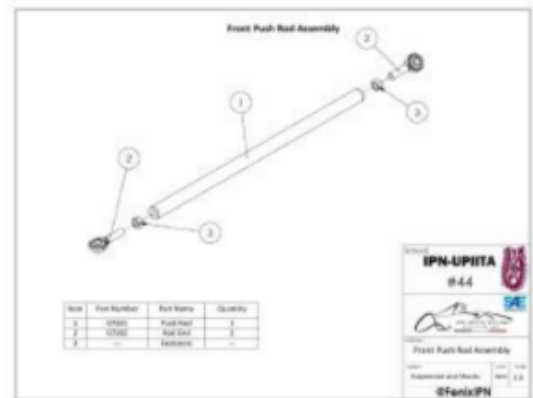
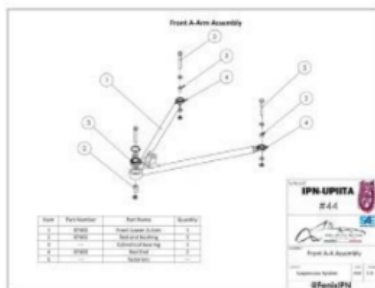
BSAE_Cost_eBOM_Template.xlsx General BOM Copy from BOM Tab at

BSAE_Cost_eBOM_Template.xlsx

4. **Global Vehicle Drawings:** Front View, Right View, Top View and Isometric View of the complete vehicle.
5. Eight system report sections with the parts and assemblies placed in the systems as specified.
6. Visual Aids: Drawings, Diagrams and/or Photographs that help to clarify the process used. These Aids Could be included in two ways:

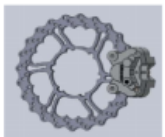
a) In a final section using parts name or parts number to identify the component:

Suspension System Drawings



b) In every system or in every page where the component is reported.

Assembly	Brake disc Assembly
Part Name	Brake disc Assembly
Part Cost	100.00
Quantity	1
Sub Total	100.00




Part Number	Part Name	Part Cost	Quantity	Sub Total
10000	Caliper	50.00	1	50.00
10001	Hub	50.00	1	50.00
10002	Brake pad	0.00	2	0.00
Sub Total				100.00

Part Number	Part Name	Part Cost	Quantity	Sub Total
10000	Caliper	50.00	1	50.00
10001	Hub	50.00	1	50.00
10002	Brake pad	0.00	2	0.00
Sub Total				100.00

Part Number	Part Name	Part Cost	Quantity	Sub Total
10000	Caliper	50.00	1	50.00
10001	Hub	50.00	1	50.00
10002	Brake pad	0.00	2	0.00
Sub Total				100.00

Assembly	Brake pad
Part Name	Brake pad
Part Cost	0.00
Quantity	2
Sub Total	0.00



Part Number	Part Name	Part Cost	Quantity	Sub Total
10002	Brake pad	0.00	2	0.00
Sub Total				0.00

Part Number	Part Name	Part Cost	Quantity	Sub Total
10002	Brake pad	0.00	2	0.00
Sub Total				0.00

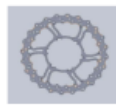
Assembly	Brake caliper
Part Name	Brake caliper
Part Cost	50.00
Quantity	1
Sub Total	50.00



Part Number	Part Name	Part Cost	Quantity	Sub Total
10000	Caliper	50.00	1	50.00
Sub Total				50.00

Part Number	Part Name	Part Cost	Quantity	Sub Total
10000	Caliper	50.00	1	50.00
Sub Total				50.00

Assembly	Brake disc
Part Name	Brake disc
Part Cost	100.00
Quantity	1
Sub Total	100.00



Part Number	Part Name	Part Cost	Quantity	Sub Total
10001	Hub	50.00	1	50.00
10002	Brake pad	0.00	2	0.00
10000	Caliper	50.00	1	50.00
Sub Total				100.00

Part Number	Part Name	Part Cost	Quantity	Sub Total
10001	Hub	50.00	1	50.00
10002	Brake pad	0.00	2	0.00
10000	Caliper	50.00	1	50.00
Sub Total				100.00