FSA Cost Event 2017

A ~~howtobasic~~ basic how-to

Basic premises

- The BOM should reflect the car as presented at the event
- The Costs in the CBOM should be realistic
- The processes should be realistic/feasible

FORMULA STUDENT AUSTRIA

What do we mean by … „as presented“ ?

- The BOM should be for one (1) vehicle as presented to the judges at the cost event
- No benefits from mass production are to be assumed!
- There are no addenda, but a late deadline.
- Like always, obvious late fixes and stuff done to pass scrutineering Is not going to be used against you

FORMULA STUDENT AUSTRIA

What do we mean by … „should be realistic“

Short: Anybody, given the complete plans and documentation to the vehicle, should be able to build one for the price in the CBOM

- They will not have (your/any) sponsors
- They will not have students working for free and outside all known labor regulations
- They will not have any leftovers/carry-over-parts/junkyard parts
- They will have to procure everything for real-worls prices/rates!

FORMULA STUDENT AUSTRIA

What do we mean by … „realistic/feasible“

- The processes/materials/etc. should be how the part on the car was actually made
- There is no cost penalty!
- Ex: upright milled from big block of aluminum, not „near end form“ cast blank
- All calculations are for one prototype, not a 100/1000/10000 pcs. production run!
- There is no free ~~lunch~~ work / parts!
  - Self made parts are to be costed as if they were procured from a commercial manufacturing company
  - Engineering/design is „free“ (assumed to be done), but e.g. CAM/CNC work is not!

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How to derive production cost

- 1st rule: provide back up material!
  - Have calculations/quotes/assumptions in the supporting docs!
- Example: machining costs
  - Get them from manufacturer quotes
  - Derive them from sensible assumptions
    - Machine price + operator wages + running costs + … = hourly cost
  - Get them from relevant literature (manufacturing handbooks…)
- Especially labor cost is wildly different around the globe. It is OK to use local rates (remember, no penalty for cost amount) but explain yourself!

For some additional insight:

FSG FAQ EXCERPTS

FORMULA STUDENT AUSTRIA

Question	Which costs should we calculate for selfmade parts which were produced by our teammembers? E.g. Bushings, Shimps, Carbon parts. There isn`t a service company and we don`t pay anything to our teammembers. So in realism the personnel cost are zero. We only have machining hourly rates, material cost, tooling cost...
Answer	Hello Vanessa, when talking from realistic costs it is suppost to be cost to build your vehicle. Even if your students work for free please concidere some "unskilled workers" or the minimum wage for personel costs. Best regards Sebastian

Question	Dear Rules Committee, We'd like to verify our understanding of "as realistic as possible" concerning the work our team is doing itself. Most of it won't have to be costed (S 2.5.7 The costs of hand or power tools must not be included.) but manufacturing some parts e.g. on a lathe at our university we don't have to pay for. We think we also have to asign costs to such parts, so that every assembly/part of the chosen system(s) have costs (no matter if there were actual costs for us) as if it was manufactured by a real company. Looking forward for your reply
Answer	Hello Nicolas, even if your team members work for free the costs should be realistic. Therefore take some personal costs with the minimum wage or a "unskilled worker". Regarding the machines: Even if you don`t have to pay for the machines you could calculate costs for it - try to show the judges how costs for those machines are calculated. This is the same with parts you get machined from sponsores: even for those parts you have to calculate prices. Best regards Sebastian

Question	While estimating the cost of hour of machining work, should we take into account its maximum capacity (8-16 hours per week)? For example: for our prototype production we use machines in the university which are working only few hours a week, so the cost will be extremely high. Best regards Sebastian
Answer	Hello Sebastian, for a cost break down normaly there is a more or less 100% capacity use estimated. Of course you can use just the 8-16 hours per week - but normaly the rest of the time the machine would be able to work for another project. Best regards Sebastian

FORMULA STUDENT AUSTRIA

Question	Hello, About the Bill of Material of Electrical System. Regarding PCBs, it is supposed to be done all the porcesses of preparing, placing and soldering of all the components used on it? Since it is completely new compared with last year rules, we want to do the better of Cost but we need to know some of the details expected on the electrical BOM part. Thank you very much, Regards,
Answer	Hello Jordi, for the PCBs you could estimated a general cost for a PCB. Please make sure to explain your estimation within the cost explaination file (if you have one in this years C-BOM System). Otherwise you can make one Process PCB creation for example (and explain this within the Supporting Material). Best regards Sebastian

Question	Dear FSG team, while working with the new online tool we had some problems. 1. What is the difference between the two types of machining in the online tool? 2. Is it necessary to specify the weight, length or the machining volume? If so should we specify this in the comments? 3. Where can we change the quantity for a part of an assembly e.g. the brake discs? Otherwise do we have to fill out every process for the left front brake discs and then every process for the right front brake disc? 4. Why couldn't we fill in the quantity of processes like the machining (setup, change) e.g.? Is this no longer necessary? we hope you can answer our questions. best regards, Isabel & Carolin
Answer	Hello Isabel & Carolin, 1.) There is no difference. this is a mistake within the onlinetool. 2.) An explaination what you do is more important then a detailes explaination for lenght or other dimensions. If you have to explain for example the process machining for a specific part within the CBOM section you can for example say "40min 5-axis-cnc" and put a value in. Within the cost explainaition file you have shown how much the hourly rate of your machining center is and everybody can understand the numbers. 3.) put in "Both brake disks are included" at the commment section for the part and of course if it is the CBOM you have to fill in costs for all parts. 4.) Important for the judges is if you can explain the process steps needed (e.g. 1. sawing, machining, polishing) you can add a machining install/setup/change of course but if you include this in your general cost explaination you dont have to add them in every step several times). Best regards Sebastian

Question	Dear Sir or Madame, we have several Questions regarding the BOM, CBOM and the online tool. 1. Regarding the costs for a 5-Axis CNC machine for example. We have different parts on our car which are milled by different companies on different CNC machines. Each machine has a different price. Therefore we would have to calculate different prices for milling on a 5-Axis CNC machine. Can we make one general price for 5-Axis CNC milling or do we have to consider the different machines ? 2. Looking at the Quantity for Materials, which Units should be used ? There is no possibility to write the Unit in the Quantity section. Further the price is labelled as per piece. What does 1 piece of Aluminium mean ? 3. The process machining occurs twice in the list. I assume one should be machining setup ? 4.When choosing a process the quantity is set to 1. Looking at last years BOM we were able to set the quantity for a process which was used several times to assemble an assembly for example, tape (quantity 3) for three different strips of tape. Could you add this feature in the online tool or do we have to add tape 3 times for 3 different strips of tape ? 5. Looking at last years BOM, we were able to set quantity for parts. For the BOM we can use the comment section, looking at the CBOM the price will not be updated. Therefore we would have to create to same part several times. Could you add this feature in the online tool ? 6.When buying parts, a lot of companies have discount for Formula Student teams. Do we have to consider this discount or do we have to use the original price for the CBOM ? Thank you very much for your help. Kind regards, David Fritz
Answer	Hello David, 1) If the Judges can see which specific CNC machine has done the maching of each part you have to have different hourly rates for the machines - but if you cannot see it you dont have to use different hourly rates. For example: You can see if it is a manual 3-axis machine or a 5-axis CNC machining center there fore you need to have different hourly rates for those machines. 2) use comment section for explaination (e.g. you select aluminum and explain at one part "Alu-Tubes" and on another part "Round Material" or "Block Material" or "Casting material" 3) this is a mistake in the tool. we just need one machining (use whatever you want) 4)You can combine processes by explaining this in the comment section (and for CBOM explaining the costs within the cost explaination file for example "Average taping process costs") But a special quantaty will not be added to processes 5) Use comment section (for example "both front-brake-disks") Then you can add the processes and in the CBOM section of course you calculate everything 2x. 6) This doesent matter. The price should be realistic. A discount price is as realistic as a original price (you can use the comment section to be on the save side and explain "with student discount") or just use the original price. best regards Sebastian