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2.007 Design and Manufacturing I
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FAQ, Supreme Court Decisions, and Rule Clarifications

Size Questions:

Can I pack my machine into the FREM box nice and tight, then expand it out onto the table in the full potential starting area of the zone?

NO! Your machine should fit into the FREM box in its starting configuration. You cannot break your machine down into a bunch of pieces, force it into the FREM box, and then expand it back out on the table. When you have set up your machine on the starting zone, it must still fit within the volume of the FREM box. You have a wide variety of options for where you locate this virtual FREM box (2 inches outside the plastic side walls, up to 21 inches above the playing surface, on the rail, etc).

Scoring by the Scales:

May we place our robot (or the opponent!) in the scoring bin to increase our mass score?

NO! Only pucks and ball may used as weight on the scales.

Can we use machines that push down on the scale? i.e. not trying to collect mass or spin the pyramid tables, just a big power screw, clamp it to the wall, and let it go.

NO! Only pucks and ball may used as weight on the scales.

If the scales register a negative mass, will this be used for scoring purposes?

Scales will NOT register negative force.

How much do the hockey balls and pucks weigh?

Both the hockey balls and pucks are made of plastic. The balls are approximately 7 cm in diameter while the pucks are about 8 cm in diameter and about 3 cm thick. Measurements of the weight of the scoring items can be made anytime during lab.

What happens if I try to scoop balls out of the opponents bucket or block his bucket and my bits and pieces fall off in the bin? Will the bits and pieces count as mass for his score?

No! Only balls and pucks can be used for mass. If something like this does happen, we will wait until the end of the contest, record the rotation, removes the bits and pieces, record the new mass, and re-determine your score using the formula.

Can we score points with our opponents balls and pucks after we have scored with our own?

Yes! You absolutely can, as long as you have placed mass on the scale.

Can my opponent attack me after I have placed mass on my scale or if they have placed mass on my scale?

No! The rule states that each contestant must put weight on his/her own scale before their machine can deploy any offensive tactics or cross the line.

Aggression on your opponent:

May we throw the other robot out of the playing field?

If you do it nicely and with love and no malice....you are just helping them to explore new horizons. . .

May we flip our opponent over onto its backside?

...and help them show the audience their awesome underbelly paint job? of course! **BUT this is NOT Battlebots**....if you get too violent about flipping or your focus is disabling your opponent while doing nothing to score. . . . the judges will disqualify you. History has shown that actively blocking (pinning them against the wall) is one of the best strategies (use a Molestabot, maybe one that is part of main robot, and then it detaches and the main robot goes and does its scoring thing). Active scoring strategies are encouraged over negative spoiling tactics.

Would my opponent be disqualified for repeatedly ramming into a part of my machine, such as a barricade, until it breaks?

No, if you build a barricade and it is in your opponent's way. You are responsible for building a wimpy barricade....else we will have a nightmare of judging. Beware of barricades that can cause entanglement problems.

If our opponent has clamped onto the table and we try to lift them off and accidentally rip a part of the table off do we get disqualified? Or do they?

It will be the judges' discretion, BUT it is not likely that they will be upset over this.

Please explain more about the rule on offensive tactics?

No robots will be allowed to cross the line or deploy offensive tactics until after weight has been placed on the scale. Offensive techniques include any intentional contact with the opponent's robots or the intention that the deployed device will come in contact with the opponent's robots. This includes any sort of direct robot-robot blocking or any deployable barriers. Unintentional contact and contact with any part of the table (walls, bins, pipes, etc) is still allowed. Balls or pucks knocked onto the opponent's side cannot be retrieved until after you have scored and do not count as an offensive tactic. The focus of the contest is on positive scoring strategies not on negative tactics aiming on the disabling of your opponent. See the note above about flipping. To eliminate confusion, a one inch wide line will be drawn down the middle of the table. This line extends to an infinite height above the table. Any robot intentionally crossing this line without scoring points will be disqualified. The judges at the contest will have the final ruling on line crossings.

Can I make a device that stops the platter from rotating?

Yes, you can. BUT you may not apply this device on the opponents platter until after you have scored points by placing mass on the scale (balls or pucks). You can stop your own platter from rotating any time you want. Also, note that you may NOT use a wedge or prying device under the lip of the platter. You may only try to stop the platter by applying forces on the platter rim, rubber o-ring, or the top

surface. If you try to pry up the platter, you will damage the table and be disqualified.

Did you mean for one inch line to go right through puck stack and not curve around it like on lazy susan? If so, this limits opportunities with the pucks before putting mass in my scale.

The line curves around the pucks, therefore you can attack your own pucks as much as you want before loading up the scale. BUT, if your pucks fall across the line, they are lost to you until after you put a ball on the scale. If you knock balls onto the other side of the line, they are also lost to you until after you put a ball on the scale. Your opponent can kindly borrow any mass knocked onto his side of the line.

The wording on the web on offensive tactics and the border line is that we cannot "cross the line." Can I go .999999 etc inches over near the edge of line without crossing it or is it like football, where the rule is that anything that breaks the plane of the line is considered crossing the line?

You can be on the line - but it is a danger zone. If one atom of your machine goes over onto the other side of the line, your machine will go POOF!

Projectiles and secondary robots:

Can an un-tethered part detach from my robot to hinder my opponent or to help me score (not a projectile or a net)?

Sure! Be careful about offensive tactics.

Can my machine shoot projectiles?

Yes! BUT, remember a few things -

1. The naked phone booth rule always applies. If you are afraid to have someone point your projectile shooter at you, it probably is not a good idea. Prof. Slocum or your lab instructors will give definitive answers on the risk of specific projectile designs.
2. Remember that if any part of your machine crosses the one inch dividing line before you place mass in the scale, you are disqualified. This includes any projectiles that miss their target or that fall on the other side of the line before mass is on the scale.
3. If you have a tether attached to your projectiles, be sure that it does not become entangled in anything. Using tethers as nets or bolas is not allowed.

Is it allowable to have a completely autonomous robot?

Sure, BUT you cannot add batteries or other power sources. You can only use the wireless control system and power electronics we provide. You may add any other electronics you wish (microprocessors, filters, resistors, pretty blinking lights, etc), but be mindful of the weight limit! Also be careful of the complexity of an autonomous system, as there may be incredibly simple and robust

solutions that are purely mechanical. Always make sure you have a countermeasure for the risk that the control system doesn't work. Please see the autonomous control system instructors listed on the staff page for assistance with these sort of systems.

*The stuff I've seen on the course web page about sub-robots involves tethers and what you can't do with them. Do sub-robots *need* to be tethered? (i.e., an autonomous sub-robot powered by the motors.)*

Nope. You can have sub-robots powered separately with a wireless control system on the main robot. If your robot will be using any wireless communications, be sure that they don't interfere with the table control system's radio frequencies. Check with the controls instructors to be sure.

*Are bolas (two weights tethered together with *one* rope) allowed? Judging from our lab group's discussion, their use seems to be ok. Technically, it's not a net, which is explicitly disallowed in the rules. However, it can still be used to entangle in a similar fashion.*

No, you may not use a bola or any other such device!! It is entanglement that we do not allow!!!! (not even Battlebots allows them!).

May we throw untethered objects onto the playing field?

The judges have been thinking about this, and we have decided that we will not allow anyone to launch a bunch of random obstacles. It is not in the spirit of the competition (great mechanical design and strategy vs. great mechanical design and strategy). Untethered projectiles are allowed, but not recommended. Beware of the rules about offensive tactics crossing the line and, as always, remember the naked phone booth rule applies.

May our robot have different modules that can be swapped before rounds depending on the opponent?

Absolutely, that is an excellent example of good design and strategy! But you will have to show at impoundment that each configuration of your machine meets weight and size limits in their specific starting configuration.

In the rules, it explicitly states that no nets are allowed. However, the Supreme Court Decisions elaborate to say that it is intentional entanglement in any form that is not allowed. Is it allowable to use a string-mesh net in a case where there is no intent to entangle (i.e., as a collection device for scoring mass?)

That is a real tough question . . . If you string a net and someone gets caught in it, even if you have no intent to entangle them, you are still liable and will be disqualified under the rules. There otherwise would be far too many "meshas" that were there for "gathering with no intent".

Kit:

What are the exact dimensions of the green FREM box? (And therefore the maximum dimensions of the robot?)

The dimensions of the green FREM box are 21 inches by 13 inches with a height of 11 inches or 533 mm

by 330 mm with a height of 279 mm (approximately).

I've been told that in past years that handy boards have been permitted.

You are allowed to do your own electronics, so if you want to, you can use a handy board and make an autonomous system....BUT you cannot add batteries or other power sources. Please see above and talk to the controls instructors listed on the staff page.

I'm confused about additions. if people are allowed to add programmable electronics. what are we allowed to and not allowed to add as far as materials that are not in our kits?

We have always allowed people to use wire and logic, but no added power or motors (unless you build your own from scratch....not worth the effort). Every year some students ask about this, and we say "OK" and most students don't end up using it. You may not add any other items or substitute any other materials, except for fasteners.

Can we exchange or trade kit materials?

No, the kit is "as is". You are allowed to buy your own fasteners and adhesives and electronic bits...that's it! Each student is limited to the motors included in their kit. Check the kit list online to make sure you have all your motors.

Are we allowed to construct our own pneumatic pistons? I know there was some confusion in past years, and I want to be absolutely sure at the beginning of this contest?

The only problem is we are not offering pneumatic lines, its an all-electric contest. The table is too big and the hassle of the lines makes it impractical. This also addresses the safety issues. Anything you could want to do can be done with electric motors and screws.

To what extent may we process the kit materials? For instance, would it be permissible to heat-treat and anneal steel parts to make springs, or to turn the wood into sawdust and make a fiberboard material from that sawdust and an adhesive? Also, to what extent can copper wire be used? In past contests, it was said that a non-kit electrical wire could be used to bear a load. What limits are there to the acceptable use of wire?

You can heat treat to your hearts delight...You can also grind and glue. You can only use wire as electrical elements....else we will have people melting wire and making stuff....You have more stuff in your kits than you can imagine. Focus your creative energies on using what you have as it is. create a strategy and concepts that kicks but with it as is. Please note that you must have a drawing before using the large machines (milling machines, lathes, water jet, etc). The shop guys will help you process the parts, but they will not make the parts for you. Drawings are not necessary, but are highly suggested, before processing materials using machines in the general area (belt sanders, drill presses, etc).

Will we be able to use flexible plastic/rubber tubing? It is not on the kit parts list, probably because its main purpose was as pneumatic tubing, but it was also the best material with which to make compliant motor shaft couplings?

We will provide hose as coupling material.

May we use the syringes as elements of a simple hydraulic system?

You may NOT create any fluid system (fluids are NOT part of the kit). You may create a pneumatic system if you want to, but only using elements in the kit.

Is Velcro a fastener?

Yes, but you have to supply your own.

May I make creative use of rubber bands?

Yes you may, BUT they can store no energy (prior to the machines starting) that will be released once the contest starts.

Why? Because they are notorious for breaking and causing premature unintended release, which with some mechanisms can cause an owie.

Safety:

What is the "Naked Phone Booth rule"?

DO NOT create any machine you are not willing to get into a phone booth with, where you are naked while your machine is operating in there with you (so no spinning spikes, flaming wheels of death, etc).

Table:

If I use sandpaper to grip the lexan, the plastic will probably get a little scratched up. Does this count as destroying the table. i.e. for disqualification?

You should be fine.

Can you start with things dug into the carpet, to hold a machine from lifting off?

Not if you hurt my carpet. In other words, I should not be able to tell the difference before/after. Now, if you have dug in and someone rams you and little tufts appear, that's OK, we will trim them, BUT you cannot then complain that the carpet is not letting you grab a good hold. It will be what it is.

Is the contest table somehow coated, painted,...?

The contest table is constructed as follows:

The base is constructed of wood. The top playing surface is covered in carpet.

There are plastic walls around the entire table to prevent things from running away. The walls are not painted or coated.

The rails running across the table are made of PVC pipe.

May I extend more than 2 inches beyond the outside of the table after starting?

Yes! You can extend out as far as you wish. You are only constrained to the Starting Zone with the extra

2 inches at the start of the contest. Note that anything that falls off your machine or anything that leaves the table cannot be reintroduced to the table. The only interaction you have is with the controls.

Can I apply a clamping force to the lazy susan platter?

Yup! You can apply a force to clamp the platter, but you cannot pry. Make sure the engineering of your clamp is done properly. If you break the table, you lose.

I don't see exact dimensions for the location of the pucks on the pictures on the web. Where are they located?

The location is listed in the text of the table description page as being located halfway between the edge of the platter closest to the chasm and the edge of the chasm. This dimension can also be easily measured on the Solid Works CAD Model.