



2019 Elected Officers

- Pres.....Ed Dumas.....ed@eddumas.com
- Vpres.....Paul Funk.....paulfunk24@gmail.com
- Secretary.....Roger Kroodsma.....rogkroods@att.net
- TreasurerMike Catlin.....catlimi2000@yahoo.com
- Executive Board
- Randy Philipps.....randy@accesssolutionsinc.com
- John Basalone.....jrbfarm@yahoo.com
- Safety Officer
- Denny Evans.....evans9633@bellsouth.net

May 2019 Newsletter

Knoxville TN AMA #594

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KCRC Meeting Minutes - March 19, 2019

President Ed Dumas began the meeting at New Beginnings Baptist Church on Yarnell Road in west Knoxville at 7:00 p.m. Tuesday March 19. There were 23 members attending, with no new members. There were no corrections to the December minutes, which were approved by unanimous voice vote.

Michael Catlin presented his Treasurer's report, which was approved by unanimous voice vote. The membership list stands at 75 including 23 members emeritus, but only 54 members have paid their dues for 2019. Non-paid members have been notified. Taxes were submitted to the State of Tennessee for KCRC registration.

Field Officer John Basalone reported that those driving up to the flight line to unload planes need to avoid the wet area at the portajohn to avoid further damage to the grass and ground. Smokers need to do a more consistent job of emptying the butt cans. The Pavilion has some rotten floor and roof boards that may need to be replaced soon.

Safety Officer Denny Evans stated that the Pavilion and the flight line may need some safety improvements in chairs, cushions, and benches. Applying a sealer to the Pavilion was also considered.

OLD BUSINESS

Ed stated that the club's indoor flying event held in February at the K9 Center was a big success. It attracted members from other clubs, including some flyers from Chattanooga.

NEW BUSINESS

Ed discussed that the bylaws amendment (including the change to quarterly meetings) passed by a vote at the October meeting was not voted on in accordance with the KCRC bylaws, as pointed out in a previous email by Allan Valeo. The club needs to do a poll vote, giving all members a chance to vote at a meeting or by mail or electronic means. Proposed changes in the bylaws must be advertised for a month prior to the poll vote, and the process needs to begin with the next newsletter. Then the poll vote will begin at least a month later. An additional change that will be required is to include RC cars and trucks as RC models that may be operated at the KCRC field...the reference to model aircraft in the bylaws may be changed to radio control models so that cars and trucks are included. The due date for member's dues will be changed to be consistent with quarterly meetings. Ed and Rick Thompson will be the committee to develop the proposed wording changes in the bylaws, and these proposed changes are planned to be included in the next newsletter.

Ed presented the budget proposal for this year. The budget includes about \$3500 in both income and expenses. The amount of \$1400 was included to cover all field repairs. The proposed budget was approved by unanimous voice vote.

The successful indoor fly in February will be followed by another one, which Michael Catlin will also handle. It is planned for April.

Jimmy Russell stated that the Senior Pattern Association Contest will be held May 18 and 19 at the KCRC field. He will be the contest director and thanked the club for its support for the contest, which is AMA sanctioned. The entry fee is \$30 and the lunch is \$5. The novice class will be different this year as a wider variety of aircraft will be permitted. Volunteers are needed to help with the contest.

Ed reported on several items. (1) The Cub Fest he is handling will be June 1 with a rain date of June 2 (this is an updated change since the February Executive Committee meeting). The entry fee is \$5 and the cost of lunch is \$5. (2) The Marine Mud Run will be September 28 with all the same arrangements as in previous years. (3) This year's Float Fly may be held on the same day as the Marine Mud Run. Paul Funk is exploring the use of several possible sites for this event, including the place on Melton Hill Lake where Paul participates in an RC boat activity. Holding the Float Fly near KCRC on the day of the Mud Run would conflict with parking needed for Mud Run participants. (4) Paul Funk has agreed to handle two Fun Fly events at the KCRC field this year. One is planned for this spring and one for fall. (5) August 17 is the date for the AMA National Model Aviation Day, which was created to encourage clubs to celebrate the hobby and share it with the public. Phil Spelt is coordinating KCRC involvement. (6) A Scout Fest will be held near Blaine October 19. KCRC has been invited to have a booth there displaying planes and to possibly demonstrate the flying of RC aircraft. The feasibility of flying there will be explored and would need AMA sanction for insurance purposes. (7) The combination of the gate lock has been changed. (8) Regarding the drainage ditch along the driveway, Knox County wants control of this ditch and wants no one else to modify it.

Denny Evans discussed his proposed community outreach events. He has three possible events to work into the KCRC schedule for this year at the flying field. A related event is the Eggapaloosa April 20 at Karns High School, which is an Easter event sponsored by the Fellowship Pellissippi Church located at the high school. Many people from the Karns and Hardin Valley areas attend. Last year 20,000 plastic eggs were hidden. KCRC has been invited to demonstrate RC flying, which would need AMA sanction for insurance purposes. A motion to seek AMA sanction for KCRC flying at this event was approved by unanimous voice vote.

Randy Philipps gave a presentation on his effort to develop an RC car and truck track for the general public at the KCRC field, which would be west of the driveway. A drone flying course with gates was also proposed, for the area east of the driveway. He gave a similar presentation at the Executive Committee meeting in February, which was covered by the meeting minutes in the April newsletter. Randy stressed that the car and truck track is needed to increase the radio control activity at the KCRC field to justify the club's continued presence on the field as permitted by Knox County. Gary Phillips at HobbyTown, which sells over 1000 cars and trucks per year, would help promote the track. John Basalone has started construction of a driver platform for the track and has also donated some drone gates. The cost of corrugated pipe and spikes for the grass track is estimated to be about \$1100. Randy proposed that KCRC allocate \$3000 for construction associated with the track. Steve Jones made a motion to allocate \$3000 for a track and drone course and to have a two-level membership including dues of \$36 for members using only the track and higher dues for members who may both fly aircraft and run vehicles on the track. The motion was approved by unanimous voice vote. There was brief discussion of the effect of a track on Mud Run parking.

Michael Marshall offered to pay for corrugated pipe and spikes for the track. (Note: John Basalone says in a March 21 email that he met Michael at Lowe's where Michael paid for 1000 feet of 4-inch pipe and 100 spikes totaling over \$800.00)

Ed started a discussion of incorporating an incentive for club members to pay dues by the end of the year. Beginning next year, this could include dues of \$84 per year with a bonus of \$12 such that the total cost of someone paying before the end of the year would be \$72, i.e. the current dues. Currently, there is a late fee of \$5.

No one reported a Crash of the Month, and no one presented a Model of the Month.

The next club meeting will be the second Tuesday of June at the flying field.

The meeting was adjourned at 8:31 p.m.

Respectfully submitted, Roger Kroodsma, KCRC Secretary...--Roger

Proposed KCRC By-Laws Changes

The KCRC Executive Committee feels that the following proposed changes to the club By-Laws are necessary to accommodate recent changes to the club's meeting schedule, as well as the expansion of the club to include an RC car track to help increase our membership and foster the creation of a true RC environment for Knox County. Accordingly, all references in the By-Laws to monthly meetings, meetings on specific months, and references to model aircraft would need to be changed to accommodate the evolution of KCRC.

In order to make any changes to the KCRC By-Laws, a poll vote by the membership is required. This is a vote of all club members, taken either in person at a club meeting, by e-mail, or by regular postal mail. Each club member can vote either Yay, Nay, or abstain from the vote. Poll-voting is detailed in Article V, paragraph 6 of the current KCRC By-Laws, which is reproduced below:

For poll voting all balloting shall be restricted to two options. They are: "Yea" or "Nay". No other vote will be considered as valid, and shall not be counted. A "Yea" vote will be considered as a vote for approval, a "Nay" vote will be considered a vote against the proposal. Abstentions (nonvote) will be considered as meaning the member has no opinion on the proposal and gives tacit approval of the results as determined by a tally of the "Yea" and "Nay" votes. Only "Yea" or "Nay" votes will be counted for approval or disapproval of the proposal.

A ballot to indicate your vote is included at the end of this document. Please fill out the ballot and return to Michael Catlin, KCRC Treasurer, 6812 Adrian Rd Knoxville, TN 37918 or e-mail your vote to Michael at catlimi2000@yahoo.com. Note the text of the current By-Laws is in black and the proposed changes are in red.

Article I, General. Change paragraph 5 from		
The purpose and objective of KCRC is to provide for the orderly environment, safety, and enjoyment for members to pursue all aspects of their hobby/sport of Radio Controlled Model Aircraft.	To :	The purpose and objective of KCRC is to provide for the orderly environment, safety, and enjoyment for members to pursue all aspects of their hobby/sport of Radio Controlled Models .

Article III, Committees. Change paragraph 5, sentence 2 from		
Any change to the Bylaws and approved by the Club shall be put in proper form and submitted to the Secretary who will notify each Club member of the change.	To :	Any change to the Bylaws and approved by the Club shall be put in proper form and submitted to the Treasurer who shall notify each Club member of the change either by mail or email .

Article IV, Elections. Change paragraphs 2 & 3 from		
<p>2. The Nominating committee shall consist of three members appointed by the President and shall be appointed no less than one month prior to the November meeting.</p> <p>3. The Nominating committee shall make every effort to submit no less than two member nominees for each elected office, and this report</p>	To :	<p>2. The Nominating committee shall consist of three members appointed by the President and shall be appointed by October of each year.</p> <p>3. Annually, no later than mid-November of each year, the nominating committee shall make every effort to submit no less than two member nominees for each elected office. The list of nominees shall be communicated to the</p>

shall be given at the November meeting.		membership via mail, email and/or at a regular club meeting.
Article IV, Elections. Change paragraph 8 from		
Installation of new officers shall occur at the January meeting.	To :	Installation of new officers shall occur at the first general membership meeting of the year.

Article V, Voting. Change paragraph 9 from		
The monthly Club newsletter will be posted on the Club's web site.	To :	The Club newsletter will be posted on the Club's web site.

Article VI, Dues / Fees. Change paragraph 1, sentences 1 and 2 from		
The dues and field fees shall be set for the following year at the regular December meeting, and shall be reviewed, and voted upon annually. The Executive Committee, being the most cognizant of the fiscal needs of the Club, shall present to the members a summation of anticipated needs and recommend dues as appropriate at the November meeting.	To :	The dues and field fees shall be set for the following year by December of each year and shall be voted upon by the membership by mail, email or at a regular club meeting near (shortly before or after) the first of each year. The Executive Committee, being the most cognizant of the fiscal needs of the Club, shall present to the members a summation of anticipated needs and recommend dues as appropriate through mail, email and/or at a regular club meeting by November of each year.

Article VI, Dues / Fees. Change paragraph 2, sentences 1 and 2 from		
The dues and field fees are due and payable January 1st of each year and members shall be considered delinquent if dues are not paid in full on or before the February general membership meeting. The delinquent penalty period shall run from the day following the January meeting through the March general membership meeting after which time if still delinquent, the member shall be dropped from the membership rolls.	To :	The dues and field fees are due and payable January 1 st of each year and members shall be considered delinquent if dues are not paid in full on or before the first general membership meeting of the year. The delinquent penalty period shall run from January 1 st through the first general membership meeting, after which time if still delinquent, the member shall be dropped from the membership rolls.

Article X, Treasurer's Responsibility and Financial Oversight. Change Budget paragraph, sentence 2 from		
Once prepared, the proposed budget shall be presented to the Executive Committee for possible revisions and then, as soon as practical thereafter, to the club membership for a final vote of approval.	To :	Once prepared, the proposed budget shall be presented to the Executive Committee for possible revisions and then, as soon as practical thereafter, to the club membership for a final vote of approval by mail, email and/or at a regular club meeting.

Article X, Treasurer's Responsibility and Financial Oversight. Change Financial Reporting paragraph, sentence 1 from		
The Treasurer shall present a financial report to the membership at each regular monthly club meeting.	To :	The Treasurer shall present a financial report to the membership at each regular club meeting.

Ballot: Name _____ Date _____ AMA
 _____ Vote (circle one): Yea – I APPROVE of the changes to the By-Laws
 Nay – I DO NOT approve of the proposed changes to the By-Laws

May's Article

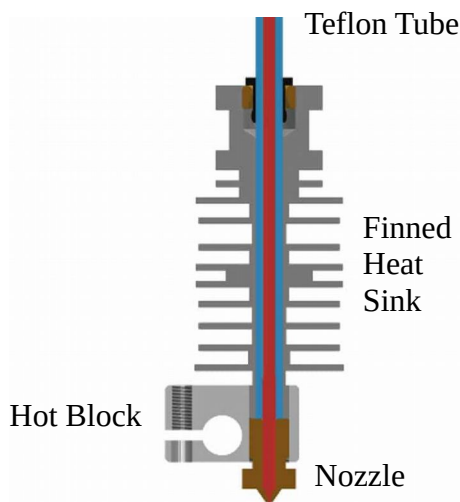
Hardly a flying session goes by that I don't get asked about 3D printing. At the December meeting I gave a presentation on 3D printing. While the printer was running I went through the steps to design and slice the item that was being printed but by the glazed over expressions on most of the attendee's faces I think I lost most people's attention during the first minute...

For a quick demonstration of 3D printing grab your hot melt glue gun and draw the outline of something. Then after the first layer has cooled, draw another outline on top of the first, then another, and another. Soon, if you are very skilled (and patient) you will have a 3D item made of cooled hot glue. Possible, but very impracticable. Now do the same with some 1.75mm diameter plastic filament.



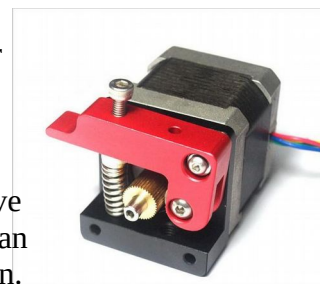
We will need something to melt the filament other than a hot glue gun so let's introduce the 'hot end'. The hot end on a 3D printer consists of a nozzle screwed into a hot block. The hot block contains a heating element to heat up the block and nozzle and a thermister to measure the temperature.

For the ABS filament I use, the nozzle must be at 240 deg C (464 degrees F) and held to within +/- 5 degrees. The blue area in the drawing is a Teflon tube that provides a guide and a seal. The finned item above the block is to keep the incoming filament cool and not melt before the nozzle. The nozzle opening is 0.4 mm in diameter (0.016 in).

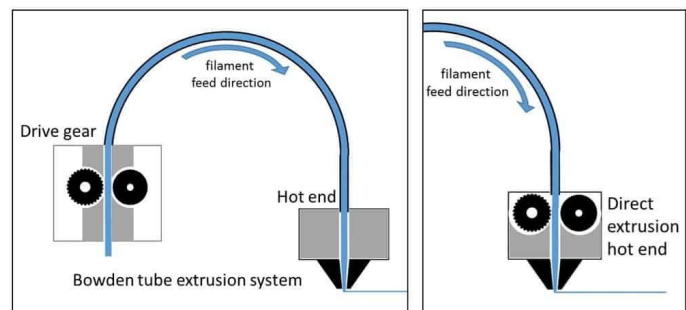


To feed the filament into the hot end at precisely the right rate requires an extruder. An extruder is a toothed wheel which is attached to a stepper motor. The teeth grab the filament and push it into the hot end and to keep the filament in contact with the toothed wheel there is an opposing spring loaded pulley.

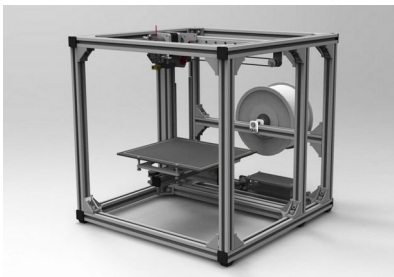
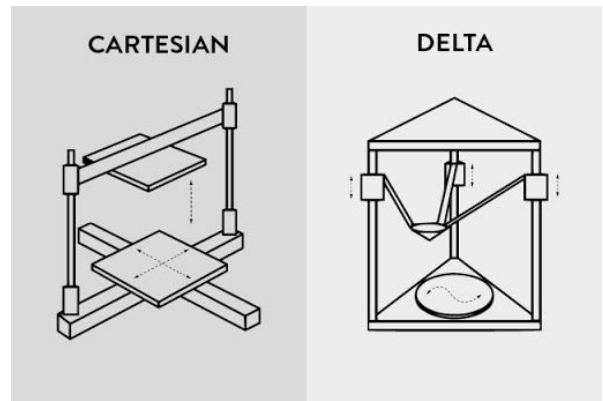
There are 2 types of extruder arrangements a Direct and a Bowden. The Direct has the extruder mounted on the hot end and the printer must move both during printing which can reduce speed and acceleration.



The Bowden arrangement has the extruder separated from the hot end and the filament is pushed through a Teflon tube connecting the extruder and the hot end. Having a printers with both arrangements, I prefer the Bowden arrangement.

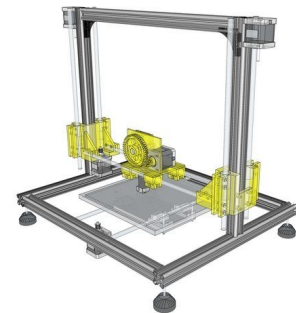


There are 2 main types of 3D printers the Cartesian and the Delta. Although the Delta looks strange and difficult to explain it is quite workable and provides a considerable height to the workspace. But for the following discussion I'll be sticking to the Cartesian.



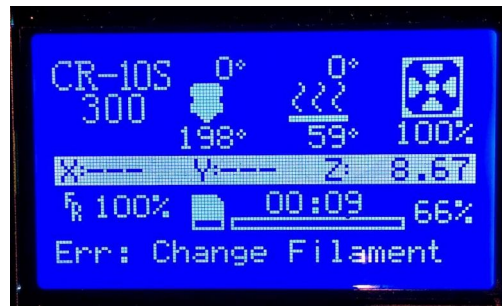
It is much easier to explain moves in X, Y and Z. There are 2 popular styles of Cartesian printers the Rep_Rap which has the hot end mounted near the top and is moved in X and Y with a printing bed which moves down in Z as the part is printed. Several companies make this style (Dremel, MakerBot and FlashForge). The disadvantage is a small print volume for their size.

The other style of Cartesian printer is the Prusa. In the Prusa design the hot end moves side to side (X axis), the bed moves front to back (Y axis) and the carriage carrying the hot end moves up and down (Z axis). This is the style I have and it provides better visibility of what is being printed as well as easier to 'level' the print surface so that all 4 corners and the center is within fractions of a millimeter of the nozzle.



The X and Y axis are moved by stepper motors driving toothed belts. The Z axis is moved using threaded rods. The use of toothed belts allow quicker movement and virtually zero backlash. The Z axis is only moved during layer changes and gravity removes the backlash. My first printer had simply lengths of threaded rod for the Z axis and the slight bow in the rods caused a very noticeable periodic surface waviness in the parts being printed. My new printer has machined and ground ACME threaded rods and there is no trace of 'Z-wobble'.

To control the 4 stepper motors (X, Y, Z and extruder) a computer is added. This computer converts G-code to the proper steps and temperature control needed. The computer also controls the step rates for acceleration, retracting the filament, controlling the temperatures and communicating with the outside world.



G-code is the language of all 3D printers that I am aware of. It is a text file of codes to control movement and although a G-code file is easily written if you know the proper codes for now we'll leave writing G-code to the slicer.

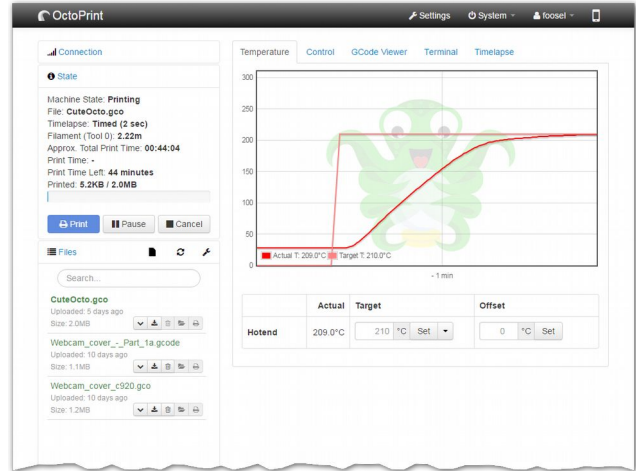

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N10 G00 G49 G40.1 G17 G80 G50 G90
N20 G20
N30 (2 1/2 Axis Profiling)
N40 M6 T1
N50 M03 S5000
N60 G00 Z0.250
N70 X1.482 Y2.408
N80 G01 X1.482 Y2.408 Z-0.125 F35.0
N90 G17
N100 G03X1.018Y2.592I-0.232J0.092 F45.0
N110 X1.482Y2.408I0.232J-0.092
N120 G00 Z0.250
N130 X1.482 Y2.408
N140 Z0.250
N150 X2.959 Y1.787
N160 G01 X2.959 Y1.787 Z-0.125 F35.0
N170 G03X3.155Y1.512I1.326J0.735 F45.0
N180 X2.959Y1.787I1.096J0.986
N190 G00 Z0.250
N200 X2.959 Y1.787
N210 Z0.250
N220 X7.028 Y2.385
N230 G01 X7.028 Y2.385 Z-0.125 F35.0
N240 G03X7.472Y2.615I0.222J0.115 F45.0
N250 X7.028Y2.385I-0.222J-0.115
N260 G00 Z0.250
N270 X7.028 Y2.385
N280 (2 1/2 Axis Profiling)
N290 Z0.250
N300 X1.437 Y0.998
N310 G01 X1.437 Y0.998 Z-0.125 F35.0

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The computer also needs a means to receive the G-code and most printers use a USB port and an SD card slot. When an SD card is inserted it can be accessed through the control panel for printing. Communicating through the USB port allows direct control of the printer from another computer without needing to use the control panel and in my case allows me to control the printer from my desktop from the other end of the house.

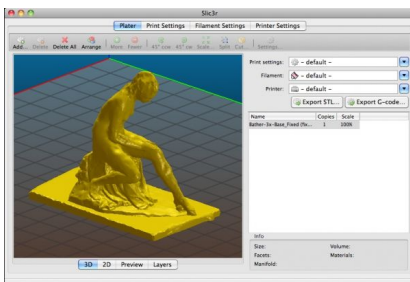
My desktop browser connects through my home network to a wireless router in my shop. The wireless router connects to a Raspberry Pi computer over WiFi running a program called Octoprint and the Raspberry Pi is connected to the printer via USB. Convenient, until something goes wrong...



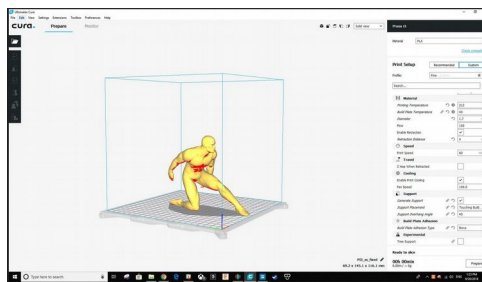
Octoprint allows me to upload files to print, lets me view the path the print head will take, monitors temperature, displays print time elapsed and time remaining. There are also provision for hooking up a web cam to monitor to print as well as recording time lapse video. All while running on a credit card sized computer.

So, where do we get G-code? G-code is generated by a slicer. The slicer takes the computer model file and figures out the motion for each layer.

As an example, imagine you hollow a book to smuggle a gun to someone in jail. The back cover would remain intact but each page from back to front would consist of the normal perimeter edges of the pages as well as the perimeter edges of the gun cutout. On top is the solid cover. The slicer generates the perimeters for each page (inner and outer) as well as the motion to create the remnants of the page around the gun cutout. All this information is written out as thousands (millions?) of printer movements. I am familiar with 2 slicers; Slic3r and Cura. Both are free downloads and are available for Windows, Mac and Linux.



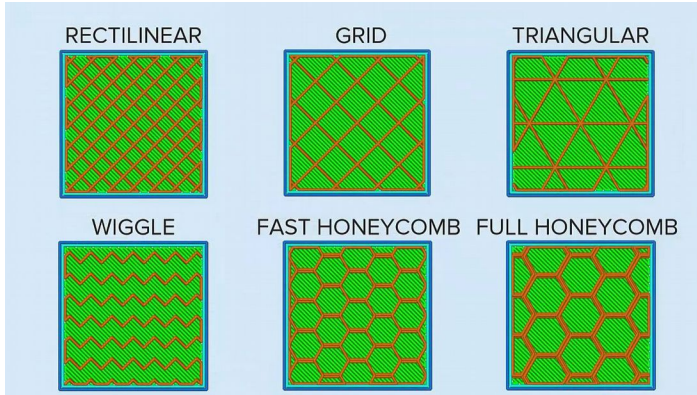
Slic3r



Cura

There are 2 other important jobs for the slicer, creating infill and supports.

Infill creates a matrix of plastic filament between the inner and outer perimeters. It supports the perimeters and reduces the amount of plastic needed to make a part as well as reducing print time. Each slicer allows one to specify the style of infill and its density.



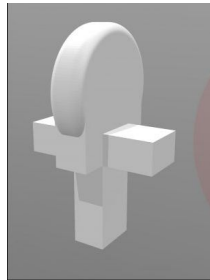
Infill Types

Some slicers allow different infill densities in different areas of a part as well as changing the wall thickness to better control part strength.

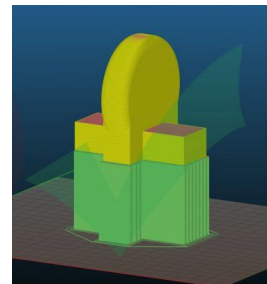
Supports are needed to allow printing over 'empty' space. While the printer can bridge small gaps it cannot print over large gaps or print around a corner above empty space. To allow this, the slicer generates sacrificial structure that is not connected to the desired print and allows enough space between the support and the underside of the desired print to minimize the print bonding to the support. Some of my pilot figures are almost unrecognizable until the supports are removed as supports are needed to print arms, chin, eye brows, ears and hair.



Supporting non-horizontal areas



Part to be printed

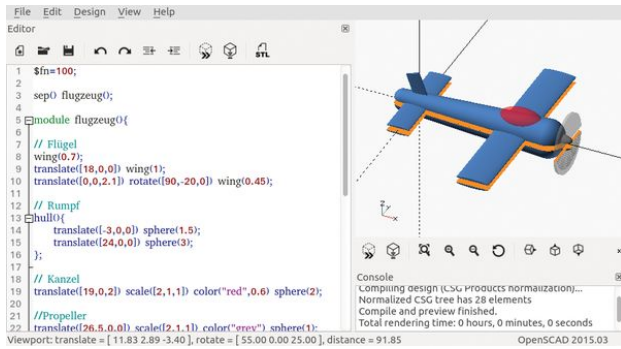


As printed with supports

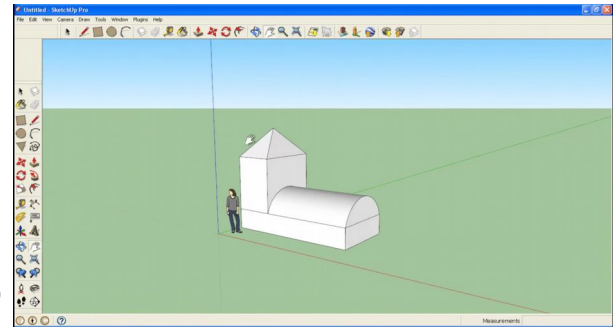
The area supported need not be parallel to the print bed but the slicer will begin to generate supports depending on the angle, wall thickness and whether the area to be printed is already attached to the desired print.

Where to get the computer model file? Many people get free files from Thingiverse (<https://www.thingiverse.com>) and Grabcad (<https://grabcad.com>). There are also pay sites that can supply the files. Many of the 3D printed planes come from such pay sites. These sites provide the G-code and setting for different printers as well as specifying what type and brand of filament to use (<https://3dprint.com/93709/3d-labprint-p51-d-mustang>).

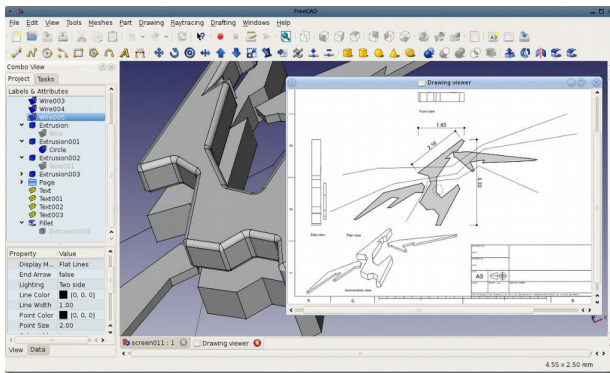
If you want of 'roll your own' there are free 3D computer graphics programs. If you are versed in computer programming try OpenSCad. If you are more visual you can try Sketchup, Fusion360, FreeCAD or even Blender.



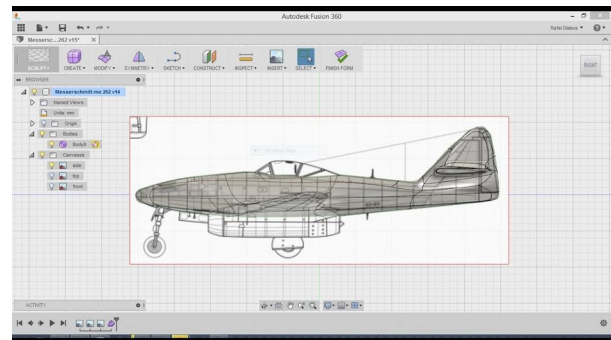
OpenSCad



Sketchup



FreeCAD



Blender

I hope this has given you an understanding what is involved in 3D printing from the hot end back through the system to the creation of the computer model. There is much more to learn and it is as different as stick and paper models to foam EDF jets. Being able to 3D print isn't only for making parts for flying models but also for making tools to make models and for making other shop accessories. I have 3D printed drill patterns, items for my magnetic building board, Caster attachments for shop equipment racks and fabrication tools for making other models.

Be sure to check out KCRC's Facebook Group. Just type KCRC into the FB search block. We now have 132 members, daily weather forecasts with aviation related pictures and announcements of area fly-ins and other activities.

Final reminder please vote for the by-law changes ASAP.

