Diode Laser Cutter - Gary Saxton

1. As dangerous as any power tool - you are the only safety feature
    1. Fry your eye balls
    2. 2.5 watt diode laser cuts 1/16 into hot dog
    3. No mechanical equipment protection
2. The laser cutter parts
    1. Laser cutter
    2. Laser driver
    3. Material selection
    4. CAD drawing
    5. Assembly and painting planning
3. References
    1. laser upgrade - https://www.youtube.com/watch?v=ZzO9skEYqwY
    2. Flawed unfavorable review - https://www.youtube.com/watch?v=kz0L-EpYiMk (Be sure to read the comments/discussion for flaws.)
    3. Favorable review - https://www.youtube.com/watch?v=1hFNj86L7sk
    4. Laser - Eleks web - https://eleksmaker.com
    5. Low Price Eleks - Banggood web -https://us.banggood.com. Search "eleks"
    6. Laser driver - T2 web - https://t2laser.wordpress.com
    7. Laser driver - Lightburn web - https://lightburnsoftware.com
    8. Bristol board - Art Supply - Dick Blick is convenient for me web - https://www.dickblick.com Also Michael's etc.
    9. Taskboard - https://www.dickblick.com and taskboard.com
    10. Free - QCAD - https://qcad.org/en/
    11. AutoCAD - https://www.autodesk.com - Look for free student/non-commercial
    12. Free - LibreCAD- https://librecad.org
    13. Shown today - TurboCAD - https://www.turbocad.com (only need 2D version)
    14. Popular with commercial laser kit makers - Corel Draw - https://www.coreldraw.com/en/
4. Materials
    1. Acceptable - Wood and wood products
        Basswood
        Paper, Card Stock, Taskboard, Bristol Board etc
        Limitations - Thickness
        Easy to work with generally max out at 0.05 +/-
    2. Problimatic - Glued wood - plywood and hardboard (No problems for CO2)
        0.1" to 0.2" Plywoods - 20 passes + hand work
        Rigid Styrene Foam - Melts and slight "V" kerf
    3. Unacceptable Materials
        Clear materials - Acrylics & Carbonates (CO2 lasers ok)
        Metals - ineffective and DANGEROUS reflection (CO2 lasers may etch)
        Styrene sheet (CO2 lasers with right settings ok)

Table 1 Three Laser Cutters

	Full Spectrum Hobby Series 40 W CO2	EleksLaser-A3 Pro 2.5W Diode	EleksLaser-A3 Pro 5.5W Diode
Base Cost (Delivered)	$3900	$220	$550
Auxulary Cost - Highly Variable	$1100	$50	$50
Aprox Starting Cost	$5000	$270	$600
Laser Replacement	$100	$115	$400
Interlock on Cover	Yes	No Cover	No Cover
Limit Switches on Motion	Yes	No	No
Partially Disassemble for storage	No	Yes	Yes
Need colored glasses	No	Yes	Yes
Drawing Format	.svg	.dxf	.dxf
Software Driver	Included. Internet connection required.	Primitive included T2 & Lightburn $40 Options	Primitive included T2 & Lightburn $40 Options
Wood, paper, cardboard etc.	Yes	Yes	Yes
Acrylics & Plastics	Yes	No	No
Metals	Etch only	Dangerous	Dangerous
Max wood product cut 5 passes - inch	~0.25	~0.06	?
Max wood cut 20 passes - inch	?	~0.2	?
Glue inhibits cutting	Yes	Yes	Yes

Table 2, 3 & 4

Cut Through Unless Noted	Z Scale (in)	Thick (in)	Power	Speed (mm/min)	Passes	sec/mm	sec/mm/in thickness
Mark Surface			70%	1000			
Copy Paper	1.100	0.005	70%	1000	1	0.060	12.000
Thick Paper	2.200	0.010	70%	550	1	0.109	10.909
Bristol Board	2.200	0.010	70%	380	1	0.158	15.789
Bristol Board	3.300	0.015	70%	300	1	0.200	13.333
Bristol Board	3.300	0.015	70%	375	1	0.160	10.667
Bristol Board	4.400	0.020	70%	450	2	0.267	13.333
Bristol Board	6.600	0.030	70%	325	2	0.369	12.308
Bristol Board	9.900	0.045	75%	250	3	0.720	16.000
1/16 Taskboard	12.540	0.057	70%	400	2	0.300	5.263
1/16 TB Score	12.540	0.057	70%	700	1	Score for motar	
Rigid Styrene Foam	110.000	0.500	70%	925	2	0.130	0.259
Luan Ply	24.200	0.110	100%	250	20	Lots of Char	
"1/4" Ply	48.400	0.220	100%	250	20	Lots of Char	
Black Styrere	4.400	0.020	65%	500	1	Cut	
Black Styrere	4.400	0.020	25%	2000	1	Score	
Start Excess Flame Bristol			70%	200 to 275			

Laser Settings		**Design Details**	
Power	0% to 100%	Kerf	0.005"
	Usually 75%	Minimum wi	Set at 0.020" which yields 0.015"
	30 minutes max at 100%	Frets?	~ 0.020"
Speed	Up to 2,400 mm/minute	Avoid glueing three parts at once	
		Label or mark parts if possible	
		Paint first or last?	
		Control paint induced curling	