

%Power

| | | | | | | | | | | |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------------|
| 100 | 1.000 | 0.500 | 0.333 | 0.250 | 0.200 | 0.167 | 0.143 | 0.125 | 0.111 | 0.100 |
| 90 | 0.900 | 0.450 | 0.300 | 0.225 | 0.180 | 0.150 | 0.129 | 0.113 | 0.100 | 0.090 |
| 80 | 0.800 | 0.400 | 0.267 | 0.200 | 0.160 | 0.133 | 0.114 | 0.100 | 0.089 | 0.080 |
| 70 | 0.700 | 0.350 | 0.233 | 0.175 | 0.140 | 0.117 | 0.100 | 0.088 | 0.078 | 0.070 |
| 60 | 0.600 | 0.300 | 0.200 | 0.150 | 0.120 | 0.100 | 0.086 | 0.075 | 0.067 | 0.060 |
| 50 | 0.500 | 0.250 | 0.167 | 0.125 | 0.100 | 0.083 | 0.071 | 0.063 | 0.056 | 0.050 |
| 40 | 0.400 | 0.200 | 0.133 | 0.100 | 0.080 | 0.067 | 0.057 | 0.050 | 0.044 | 0.040 |
| 30 | 0.300 | 0.150 | 0.100 | 0.075 | 0.060 | 0.050 | 0.043 | 0.038 | 0.033 | 0.030 |
| 20 | 0.200 | 0.100 | 0.067 | 0.050 | 0.040 | 0.033 | 0.029 | 0.025 | 0.022 | 0.020 |
| 10 | 0.100 | 0.050 | 0.033 | 0.025 | 0.020 | 0.017 | 0.014 | 0.013 | 0.011 | 0.010 |
| | 100 | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 mm/sec |

Chart showing energy distribution of fiber laser with various power vs scan speed

Maximum energy will be absorbed by material when %power is highest and scan speed is slowest

Note that same energy unit values can be produced with various power vs speed combinations as shown in the chart.

However, it doesn't necessary mean that you would end up with same marking quality on the surface of material.

Use the chart as an experimentation guide to produce best marking that you are looking for.

20W

| | 20 | 100 | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 |
|------|----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 100% | 20 | 0.200 | 0.100 | 0.067 | 0.050 | 0.040 | 0.033 | 0.029 | 0.025 | 0.022 | 0.020 |
| 90% | 18 | 0.180 | 0.090 | 0.060 | 0.045 | 0.036 | 0.030 | 0.026 | 0.023 | 0.020 | 0.018 |
| 80% | 16 | 0.160 | 0.080 | 0.053 | 0.040 | 0.032 | 0.027 | 0.023 | 0.020 | 0.018 | 0.016 |
| 70% | 14 | 0.140 | 0.070 | 0.047 | 0.035 | 0.028 | 0.023 | 0.020 | 0.018 | 0.016 | 0.014 |
| 60% | 12 | 0.120 | 0.060 | 0.040 | 0.030 | 0.024 | 0.020 | 0.017 | 0.015 | 0.013 | 0.012 |
| 50% | 10 | 0.100 | 0.050 | 0.033 | 0.025 | 0.020 | 0.017 | 0.014 | 0.013 | 0.011 | 0.010 |
| 40% | 8 | 0.080 | 0.040 | 0.027 | 0.020 | 0.016 | 0.013 | 0.011 | 0.010 | 0.009 | 0.008 |
| 30% | 6 | 0.060 | 0.030 | 0.020 | 0.015 | 0.012 | 0.010 | 0.009 | 0.008 | 0.007 | 0.006 |
| 20% | 4 | 0.040 | 0.020 | 0.013 | 0.010 | 0.008 | 0.007 | 0.006 | 0.005 | 0.004 | 0.004 |
| 10% | 2 | 0.020 | 0.010 | 0.007 | 0.005 | 0.004 | 0.003 | 0.003 | 0.003 | 0.002 | 0.002 |

30W

| | 30 | 100 | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 |
|------|----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 100% | 30 | 0.300 | 0.150 | 0.100 | 0.075 | 0.060 | 0.050 | 0.043 | 0.038 | 0.033 | 0.030 |
| 90% | 27 | 0.270 | 0.135 | 0.090 | 0.068 | 0.054 | 0.045 | 0.039 | 0.034 | 0.030 | 0.027 |
| 80% | 24 | 0.240 | 0.120 | 0.080 | 0.060 | 0.048 | 0.040 | 0.034 | 0.030 | 0.027 | 0.024 |
| 70% | 21 | 0.210 | 0.105 | 0.070 | 0.053 | 0.042 | 0.035 | 0.030 | 0.026 | 0.023 | 0.021 |
| 60% | 18 | 0.180 | 0.090 | 0.060 | 0.045 | 0.036 | 0.030 | 0.026 | 0.023 | 0.020 | 0.018 |
| 50% | 15 | 0.150 | 0.075 | 0.050 | 0.038 | 0.030 | 0.025 | 0.021 | 0.019 | 0.017 | 0.015 |
| 40% | 12 | 0.120 | 0.060 | 0.040 | 0.030 | 0.024 | 0.020 | 0.017 | 0.015 | 0.013 | 0.012 |
| 30% | 9 | 0.090 | 0.045 | 0.030 | 0.023 | 0.018 | 0.015 | 0.013 | 0.011 | 0.010 | 0.009 |
| 20% | 6 | 0.060 | 0.030 | 0.020 | 0.015 | 0.012 | 0.010 | 0.009 | 0.008 | 0.007 | 0.006 |
| 10% | 3 | 0.030 | 0.015 | 0.010 | 0.008 | 0.006 | 0.005 | 0.004 | 0.004 | 0.003 | 0.003 |

50W

| | 50 | 100 | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 |
|------|----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 100% | 50 | 0.500 | 0.250 | 0.167 | 0.125 | 0.100 | 0.083 | 0.071 | 0.063 | 0.056 | 0.050 |
| 90% | 45 | 0.450 | 0.225 | 0.150 | 0.113 | 0.090 | 0.075 | 0.064 | 0.056 | 0.050 | 0.045 |
| 80% | 40 | 0.400 | 0.200 | 0.133 | 0.100 | 0.080 | 0.067 | 0.057 | 0.050 | 0.044 | 0.040 |
| 70% | 35 | 0.350 | 0.175 | 0.117 | 0.088 | 0.070 | 0.058 | 0.050 | 0.044 | 0.039 | 0.035 |
| 60% | 30 | 0.300 | 0.150 | 0.100 | 0.075 | 0.060 | 0.050 | 0.043 | 0.038 | 0.033 | 0.030 |
| 50% | 25 | 0.250 | 0.125 | 0.083 | 0.063 | 0.050 | 0.042 | 0.036 | 0.031 | 0.028 | 0.025 |
| 40% | 20 | 0.200 | 0.100 | 0.067 | 0.050 | 0.040 | 0.033 | 0.029 | 0.025 | 0.022 | 0.020 |
| 30% | 15 | 0.150 | 0.075 | 0.050 | 0.038 | 0.030 | 0.025 | 0.021 | 0.019 | 0.017 | 0.015 |
| 20% | 10 | 0.100 | 0.050 | 0.033 | 0.025 | 0.020 | 0.017 | 0.014 | 0.013 | 0.011 | 0.010 |
| 10% | 5 | 0.050 | 0.025 | 0.017 | 0.013 | 0.010 | 0.008 | 0.007 | 0.006 | 0.006 | 0.005 |

| 20W | | | | | | | | | | | |
|-------------|-----------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|
| 100% | 20 | 0.200 | 0.100 | 0.067 | 0.050 | 0.040 | 0.033 | 0.029 | 0.025 | 0.022 | 0.020 |
| 90% | 18 | 0.180 | 0.090 | 0.060 | 0.045 | 0.036 | 0.030 | 0.026 | 0.023 | 0.020 | 0.018 |
| 80% | 16 | 0.160 | 0.080 | 0.053 | 0.040 | 0.032 | 0.027 | 0.023 | 0.020 | 0.018 | 0.016 |
| 70% | 14 | 0.140 | 0.070 | 0.047 | 0.035 | 0.028 | 0.023 | 0.020 | 0.018 | 0.016 | 0.014 |
| 60% | 12 | 0.120 | 0.060 | 0.040 | 0.030 | 0.024 | 0.020 | 0.017 | 0.015 | 0.013 | 0.012 |
| 50% | 10 | 0.100 | 0.050 | 0.033 | 0.025 | 0.020 | 0.017 | 0.014 | 0.013 | 0.011 | 0.010 |
| 40% | 8 | 0.080 | 0.040 | 0.027 | 0.020 | 0.016 | 0.013 | 0.011 | 0.010 | 0.009 | 0.008 |
| 30% | 6 | 0.060 | 0.030 | 0.020 | 0.015 | 0.012 | 0.010 | 0.009 | 0.008 | 0.007 | 0.006 |
| 20% | 4 | 0.040 | 0.020 | 0.013 | 0.010 | 0.008 | 0.007 | 0.006 | 0.005 | 0.004 | 0.004 |
| 10% | 2 | 0.020 | 0.010 | 0.007 | 0.005 | 0.004 | 0.003 | 0.003 | 0.003 | 0.002 | 0.002 |
| | | 100 | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 |

| 30W | | | | | | | | | | | |
|-------------|-----------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|
| 100% | 30 | 0.300 | 0.150 | 0.100 | 0.075 | 0.060 | 0.050 | 0.043 | 0.038 | 0.033 | 0.030 |
| 90% | 27 | 0.270 | 0.135 | 0.090 | 0.068 | 0.054 | 0.045 | 0.039 | 0.034 | 0.030 | 0.027 |
| 80% | 24 | 0.240 | 0.120 | 0.080 | 0.060 | 0.048 | 0.040 | 0.034 | 0.030 | 0.027 | 0.024 |
| 70% | 21 | 0.210 | 0.105 | 0.070 | 0.053 | 0.042 | 0.035 | 0.030 | 0.026 | 0.023 | 0.021 |
| 60% | 18 | 0.180 | 0.090 | 0.060 | 0.045 | 0.036 | 0.030 | 0.026 | 0.023 | 0.020 | 0.018 |
| 50% | 15 | 0.150 | 0.075 | 0.050 | 0.038 | 0.030 | 0.025 | 0.021 | 0.019 | 0.017 | 0.015 |
| 40% | 12 | 0.120 | 0.060 | 0.040 | 0.030 | 0.024 | 0.020 | 0.017 | 0.015 | 0.013 | 0.012 |
| 30% | 9 | 0.090 | 0.045 | 0.030 | 0.023 | 0.018 | 0.015 | 0.013 | 0.011 | 0.010 | 0.009 |
| 20% | 6 | 0.060 | 0.030 | 0.020 | 0.015 | 0.012 | 0.010 | 0.009 | 0.008 | 0.007 | 0.006 |
| 10% | 3 | 0.030 | 0.015 | 0.010 | 0.008 | 0.006 | 0.005 | 0.004 | 0.004 | 0.003 | 0.003 |
| | | 100 | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 |

| 50W | | | | | | | | | | | |
|-------------|-----------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|
| 100% | 50 | 0.500 | 0.250 | 0.167 | 0.125 | 0.100 | 0.083 | 0.071 | 0.063 | 0.056 | 0.050 |
| 90% | 45 | 0.450 | 0.225 | 0.150 | 0.113 | 0.090 | 0.075 | 0.064 | 0.056 | 0.050 | 0.045 |
| 80% | 40 | 0.400 | 0.200 | 0.133 | 0.100 | 0.080 | 0.067 | 0.057 | 0.050 | 0.044 | 0.040 |
| 70% | 35 | 0.350 | 0.175 | 0.117 | 0.088 | 0.070 | 0.058 | 0.050 | 0.044 | 0.039 | 0.035 |
| 60% | 30 | 0.300 | 0.150 | 0.100 | 0.075 | 0.060 | 0.050 | 0.043 | 0.038 | 0.033 | 0.030 |
| 50% | 25 | 0.250 | 0.125 | 0.083 | 0.063 | 0.050 | 0.042 | 0.036 | 0.031 | 0.028 | 0.025 |
| 40% | 20 | 0.200 | 0.100 | 0.067 | 0.050 | 0.040 | 0.033 | 0.029 | 0.025 | 0.022 | 0.020 |
| 30% | 15 | 0.150 | 0.075 | 0.050 | 0.038 | 0.030 | 0.025 | 0.021 | 0.019 | 0.017 | 0.015 |
| 20% | 10 | 0.100 | 0.050 | 0.033 | 0.025 | 0.020 | 0.017 | 0.014 | 0.013 | 0.011 | 0.010 |
| 10% | 5 | 0.050 | 0.025 | 0.017 | 0.013 | 0.010 | 0.008 | 0.007 | 0.006 | 0.006 | 0.005 |
| | | 100 | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 |

Colors in these chart are normalized so that all the equal energy unit values have similar color gradients

To use chart: Look for same (or nearly same) unit values to convert power vs speed for various settings.

For example: in 20W chart, if I use power of 30% and speed of 200mm/s, I can then also use power of 90% and speed of 600mm/s. They both have same unit values. Also in above example, I can use 30W with 40% power and speed of 400mm/s or with 50W I can use 30% and speed of 500mm/s

Please take note that these chart only work with given same lenses. Different lenses produce different spot sizes and they are not equivalent.

I'm still new to fiber laser marking and hasn't had time to actually verify the results.

In theory it should be usefull but at least it gives some starting point in experimentation.

And this spreadsheet doesn't address frequency. In order to convert correctly, frequency need to be same. Experiment and see what you get.