**Supplementary materials Tables SM1, SM2**

Table SM1: Values in the database containing each experimental chopper associated with its manufacturing quantified tempos, in seconds.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| xp1 | 1.15 | 2.30 | 3.50 | **4.70** | 6.20 |  |  |  |  |  |
| xp2 | 1.03 | 2.06 | 3.09 | 4.12 | 5.21 | 6.23 |  |  |  |  |
| xp3 | 1.15 | 2.30 | 3.50 | 4.70 | 5.85 | 7.00 |  |  |  |  |
| xp4 | 1.15 | 2.30 | 3.45 | 4.60 | 6.10 |  |  |  |  |  |
| xp5 | 0.90 | 1.80 | 2.70 | 3.60 | 4.28 |  |  |  |  |  |
| xp6 | 1.00 | 2.00 | 3.00 | 4.00 | 5.00 |  |  |  |  |  |
| xp7 | 1.03 | 1.98 | 2.93 | 3.88 | 4.83 | 5.86 |  |  |  |  |
| xp8 | 1.03 | 2.03 | 3.03 | 4.03 | 5.03 | 6.03 |  |  |  |  |
| xp9 | 1.00 | 2.00 | 3.00 |  |  |  |  |  |  |  |
| xp10 | 1.00 | 2.00 | 3.00 | 4.00 |  |  |  |  |  |  |
| xp11 | 1.00 | 2.00 | 3.00 | 4.00 | 5.00 |  |  |  |  |  |
| xp12 | 1.00 | 2.00 | 3.00 | 4.00 |  |  |  |  |  |  |
| xp13 | 1.00 | 2.00 | 3.00 |  |  |  |  |  |  |  |
| xp14 | 0.75 | 1.50 | 2.21 | 2.93 |  |  |  |  |  |  |
| xp15 | 0.75 | 1.50 | 2.25 | 2.93 | 3.68 | 4.43 |  |  |  |  |
| xp16 | 0.71 | 1.42 | 2.13 |  |  |  |  |  |  |  |
| xp17 | 0.68 | 1.36 | 2.04 |  |  |  |  |  |  |  |
| xp18 | 0.68 | 1.36 | 2.01 | 2.66 | 3.31 |  |  |  |  |  |
| xp19 | 0.65 | 1.30 | 1.95 |  |  |  |  |  |  |  |
| xp20 | 0.75 | 1.50 | 2.25 |  |  |  |  |  |  |  |
| xp21 | 0.71 | 1.42 | 2.13 |  |  |  |  |  |  |  |
| xp22 | 0.71 | 1.43 | 2.14 | 2.86 |  |  |  |  |  |  |
| xp23 | 0.68 | 1.36 | 2.04 |  |  |  |  |  |  |  |
| xp24 | 0.71 | 1.43 | 2.14 | 2.86 |  |  |  |  |  |  |
| xp25 | 0.68 | 1.36 | 2.04 |  |  |  |  |  |  |  |
| xp26 | 0.65 | 1.31 | 1.97 |  |  |  |  |  |  |  |
| xp27 | 0.62 | 1.24 | 1.86 |  |  |  |  |  |  |  |
| xp28 | 0.72 | 1.44 | 2.16 |  |  |  |  |  |  |  |
| xp29 | 0.68 | 1.36 | 2.72 | 3.40 |  |  |  |  |  |  |
| xp30 | 0.68 | 1.36 | 2.72 |  |  |  |  |  |  |  |
| xp31 | 0.65 | 1.30 | 1.95 |  |  |  |  |  |  |  |
| xp32 | 0.68 | 1.36 | 2.04 |  |  |  |  |  |  |  |
| xp33 | 0.71 | 1.42 | 2.13 |  |  |  |  |  |  |  |
| xp34 | 0.75 | 1.50 | 2.25 | 3.00 | 3.75 | 4.50 | 6.00 | 6.75 |  |  |
| xp35 | 0.71 | 1.43 | 2.14 | 2.86 | 3.57 | 4.28 | 5.71 | 6.43 | 7.14 |  |
| xp36 | 0.68 | 1.36 | 2.04 | 2.72 | 3.41 | 4.09 |  |  |  |  |
| xp37 | 0.66 | 1.33 | 1.99 | 2.65 | 3.31 | 3.97 | 5.29 | 5.95 | 6.61 |  |
| xp38 | 0.65 | 1.30 | 1.96 | 2.60 | 3.26 | 3.91 |  |  |  |  |
| xp39 | 0.60 | 1.20 | 1.80 | 2.40 | 3.00 | 3.60 | 4.80 |  |  |  |
| xp40 | 0.63 | 1.25 | 1.88 | 2.50 | 3.13 | 3.75 | 5.00 | 5.63 |  |  |
| xp41 | 0.60 | 1.20 | 1.80 | 2.40 | 3.00 | 3.60 | 4.80 | 5.40 | 6.00 | 6.60 |
| xp42 | 0.87 | 1.70 | 2.60 | 3.47 | 4.35 | 5.21 | 6.93 | 7.79 | 8.64 |  |
| xp43 | 1.03 | 2.06 | 3.09 | 4.12 | 5.12 | 6.12 |  |  |  |  |
| xp44 | 0.75 | 1.50 | 2.25 | 3.00 | 3.75 | 4.50 |  |  |  |  |
| xp45 | 0.68 | 1.36 | 2.04 | 2.72 |  |  |  |  |  |  |
| xp46 | 0.71 | 1.42 | 2.13 | 2.84 |  |  |  |  |  |  |
| xp47 | 0.60 | 1.20 | 1.80 | 2.40 | 3.00 | 3.60 | 4.92 | 5.58 | 6.24 | 6.90 |
| xp48 | 0.71 | 1.42 | 2.13 | 2.48 | 3.19 |  |  |  |  |  |
| xp49 | 0.71 | 1.42 | 2.13 | 2.84 |  |  |  |  |  |  |
| xp50 | 0.65 | 1.30 | 1.95 | 2.60 | 3.25 |  |  |  |  |  |
| xp51 | 0.65 | 1.30 | 1.95 | 2.63 | 3.31 | 4.09 |  |  |  |  |
| xp52 | 0.71 | 1.42 | 2.13 | 2.81 | 3.49 | 4.17 |  |  |  |  |
| xp53 | 0.65 | 1.30 | 1.95 |  |  |  |  |  |  |  |
| xp54 | 0.63 | 1.25 | 1.87 | 2.49 | 3.11 |  |  |  |  |  |
| xp55 | 0.65 | 1.30 | 1.95 | 2.60 |  |  |  |  |  |  |
| xp56 | broken |  |  |  |  |  |  |  |  |  |
| xp57 | 0.68 | 1.36 | 2.04 |  |  |  |  |  |  |  |
| xp58 | 0.75 | 1.50 | 2.25 | 2.96 | 3.67 |  |  |  |  |  |
| xp59 | 0.83 | 1.66 | 2.49 | 3.27 | 4.05 |  |  |  |  |  |
| xp60 | 0.68 | 1.36 | 2.72 | 3.40 |  |  |  |  |  |  |
| xp61 | 0.71 | 1.42 | 2.13 | 2.84 |  |  |  |  |  |  |
| xp62 | 0.65 | 1.30 | 1.95 | 2.60 | 3.25 |  |  |  |  |  |
| xp63 | 0.65 | 1.30 | 1.95 | 2.60 |  |  |  |  |  |  |
| xp64 | 0.71 | 1.42 | 2.13 |  |  |  |  |  |  |  |
| xp65 | 0.78 | 1.56 | 2.34 | 3.12 | 3.90 | 4.68 | 5.46 |  |  |  |
| xp66 | 0.71 | 1.42 | 2.13 | 2.84 | 3.55 | 4.26 | 4.97 |  |  |  |
| xp67 | 0.78 | 1.56 | 2.34 |  |  |  |  |  |  |  |
| xp68 | broken |  |  |  |  |  |  |  |  |  |
| xp69 | broken |  |  |  |  |  |  |  |  |  |
| xp70 | 0.85 | 1.70 | 2.55 | 3.40 |  |  |  |  |  |  |
| xp71 | broken |  |  |  |  |  |  |  |  |  |
| xp72 | 0.83 | 1.66 | 2.49 |  |  |  |  |  |  |  |
| xp73 | 0.83 | 1.66 | 2.49 |  |  |  |  |  |  |  |
| xp74 | broken |  |  |  |  |  |  |  |  |  |
| xp75 | 0.83 | 1.66 | 2.49 |  |  |  |  |  |  |  |
| xp76 | broken |  |  |  |  |  |  |  |  |  |
| xp77 | 0.75 | 1.50 | 2.25 |  |  |  |  |  |  |  |
| xp78 | 0.78 | 1.56 | 2.34 | 3.12 |  |  |  |  |  |  |
| xp79 | 0.87 | 1.74 | 2.57 | 3.40 |  |  |  |  |  |  |
| xp80 | 0.75 | 1.52 | 2.27 | 3.02 |  |  |  |  |  |  |
| xp81 | 0.75 | 1.52 | 2.27 |  |  |  |  |  |  |  |
| xp82 | 0.71 | 1.42 | 2.13 |  |  |  |  |  |  |  |
| xp83 | 1.20 | 2.40 | 3.60 | 4.80 | 5.40 | 6.00 |  |  |  |  |
| xp84 | 1.20 | 1.80 | 2.40 | 3.60 |  |  |  |  |  |  |
| xp85 | 1.20 | 2.40 | 3.00 | 4.02 | 5.40 | 6.60 | 8.40 | 9.60 | 10.20 | 10.80 |
| xp86 | 1.25 | 2.50 | 3.13 | 3.75 | 4.38 | 5.00 | 7.50 |  |  |  |
| xp87 | 1.20 | 2.40 | 3.60 | 4.80 | 6.00 | 7.20 | 8.40 | 9.00 | 9.60 |  |
| xp88 | broken |  |  |  |  |  |  |  |  |  |
| xp89 | 1.20 | 2.40 | 3.60 | 4.80 | 6.00 | 7.20 | 9.60 | 10.80 | 11.40 | 12.00 |
| xp90 | broken |  |  |  |  |  |  |  |  |  |
| xp91 | 1.15 | 2.30 | 3.45 | 4.03 | 4.61 | 5.76 | 6.92 | 7.50 | 8.08 |  |
| xp92 | broken |  |  |  |  |  |  |  |  |  |
| xp93 | 1.00 | 2.00 | 2.90 | 3.80 | 4.70 | 5.60 | 7.40 | 7.85 | 8.30 |  |
| xp94 | 1.00 | 2.00 | 3.00 | 4.00 | 5.00 | 6.00 | 8.00 | 9.50 | 10.00 | 10.95 |
| xp95 | 0.95 | 1.90 | 2.77 | 3.64 | 4.59 | 5.54 | 7.44 |  |  |  |
| xp96 | 0.95 | 1.90 | 2.85 | 3.35 | 3.85 | 4.60 | 6.41 | 7.31 | 8.14 | 8.97 |
| xp97 | 1.00 | 1.95 | 2.90 | 3.80 | 4.75 |  |  |  |  |  |
| xp98 | 0.90 | 1.80 | 2.63 | 3.46 | 4.29 |  |  |  |  |  |
| xp99 | 0.83 | 1.66 | 2.49 | 3.32 | 4.15 | 4.98 | 6.64 | 7.47 | 8.30 | 9.13 |
| xp100 | 0.90 | 1.80 | 2.70 | 3.53 | 3.94 | 4.84 | 6.57 | 7.40 |  |  |
| xp101 | 0.83 | 1.66 | 2.49 | 3.32 | 4.15 | 4.98 | 6.64 | 7.47 | 8.30 | 9.13 |

Table SM2: Values in the database containing inverse normal Gaussian distribution for HHR and experimental strikes of each one-sided chopper.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Times |  | Times |  | Times |  | Times |  | Times |
| Heartbeats |  | Heartbeats |  | Heartbeats |  | Heartbeats |  | Heartbeats |
| 0.8517 |  | 0.8826 |  | 1.0383 |  | 0.7661 |  | 0.8032 |
| 0.9619 |  | 0.9194 |  | 0.8542 |  | 0.8028 |  | 0.9617 |
| 0.8404 |  | 0.7873 |  | 0.8866 |  | 0.8393 |  | 1.2 |
| 0.8088 |  | 1.0233 |  | 0.9036 |  | 0.7677 |  | 0.9146 |
| 0.8541 |  | 1.0414 |  | 0.8293 |  | 0.8534 |  | 0.7851 |
| 0.8628 |  | 0.9265 |  | 1.2693 |  | 0.7946 |  | 0.7486 |
| 1.0055 |  | 0.9834 |  | 0.8277 |  | 0.9714 |  | 0.9279 |
| 0.9832 |  | 1.1956 |  | 1.4207 |  | 1.0128 |  | 0.7789 |
| 0.8473 |  | 0.769 |  | 0.7383 |  | 0.7275 |  | 0.7347 |
| 1.0266 |  | 0.8044 |  | 0.9318 |  | 0.8042 |  | 1.0497 |
| 0.9456 |  | 0.7587 |  | 0.8147 |  | 0.9712 |  | 1.0309 |
| 0.7695 |  | 0.8812 |  | 0.8745 |  | 0.7282 |  | 1.3714 |
| 0.7305 |  | 0.8232 |  | 0.7413 |  | 0.8153 |  | 0.9631 |
| 0.9432 |  | 0.957 |  | 0.8289 |  | 0.8481 |  | 0.841 |
| 0.8705 |  | 0.8665 |  | 0.742 |  | 0.8009 |  | 1.0614 |
| 0.8507 |  | 1.0426 |  | 0.92 |  | 0.8935 |  | 0.6642 |
| 0.9274 |  | 1.0238 |  | 0.8119 |  | 0.8092 |  | 0.978 |
| 0.9809 |  | 0.8915 |  | 0.7883 |  | 1.1596 |  | 0.989 |
| 0.7616 |  | 0.85 |  | 0.7321 |  | 1.0451 |  | 0.8944 |
| 0.7995 |  | 0.8721 |  | 0.8397 |  | 1.0001 |  | 0.7477 |
| 0.8269 |  | 0.7797 |  | 0.862 |  | 0.8388 |  | 1.0465 |
| 0.6479 |  | 0.8205 |  | 0.7242 |  | 0.9326 |  | 0.8169 |
| 0.9178 |  | 0.6811 |  | 0.8729 |  | 0.9647 |  | 1.1035 |
| 0.8831 |  | 0.7077 |  | 0.8614 |  | 1.1092 |  | 0.7568 |
| 0.9095 |  | 0.7948 |  | 0.8064 |  | 0.8781 |  | 0.9773 |
| 0.891 |  | 0.7726 |  | 0.9796 |  | 0.8916 |  | 0.7596 |
| 0.7803 |  | 0.9936 |  | 0.8371 |  | 0.7755 |  | 0.8644 |
| 0.7844 |  | 1.0629 |  | 0.7453 |  | 0.8878 |  | 0.9317 |
| 0.8421 |  | 0.8778 |  | 0.8105 |  | 0.8676 |  | 0.7357 |
| 0.7106 |  | 0.9814 |  | 0.8138 |  | 1.0374 |  | 0.9241 |
| 0.9286 |  | 1.2967 |  | 0.877 |  | 0.8201 |  | 1.0681 |
| 0.6817 |  | 0.8709 |  | 1.0223 |  | 0.8992 |  | 0.9456 |
| 0.8817 |  | 0.8079 |  | 0.9525 |  | 0.8507 |  | 1.0532 |
| 0.886 |  | 0.7671 |  | 0.6564 |  | 0.7207 |  | 0.7504 |
| 0.7635 |  | 0.8432 |  | 0.8471 |  | 0.9367 |  | 0.7015 |
| 0.9257 |  | 0.8013 |  | 0.9092 |  | 0.8318 |  | 0.9573 |
| 1.068 |  | 1.2486 |  | 0.861 |  | 0.8518 |  | 0.6451 |
| 1.0992 |  | 1.1148 |  | 0.898 |  | 0.7993 |  | 0.9436 |
| 0.904 |  | 0.9029 |  | 0.9043 |  | 0.6714 |  | 1.1712 |
| 0.936 |  | 1.1181 |  | 0.9399 |  | 0.9044 |  | 0.7778 |
| 1.0611 |  | 0.9922 |  | 0.7071 |  | 0.8277 |  | 0.8844 |
| 0.8479 |  | 0.8899 |  | 1.1083 |  | 0.8227 |  | 1.0038 |
| 0.6459 |  | 0.9904 |  | 1.1911 |  | 0.9188 |  | 0.6492 |
| 0.8765 |  | 1.0213 |  | 1.0257 |  | 0.8181 |  | 1.1864 |
| 0.8357 |  | 0.8312 |  | 0.7125 |  | 0.7908 |  | 1.2305 |
| 1.0166 |  | 0.7901 |  | 1.2419 |  | 0.783 |  | 0.8446 |
| 0.8594 |  | 0.8939 |  | 0.896 |  | 0.9098 |  | 0.9902 |
| 0.7751 |  | 0.8276 |  | 0.9311 |  | 0.9065 |  | 0.9068 |
| 1.041 |  | 0.7066 |  | 0.8227 |  | 0.9596 |  | 1.0549 |
| 1.012 |  | 0.7406 |  | 0.7149 |  | 0.925 |  | 0.8401 |
| 1.0934 |  | 0.7465 |  | 0.9343 |  | 1.2681 |  | 0.7877 |
| 0.8471 |  | 0.9257 |  | 0.835 |  | 0.7806 |  | 0.8613 |
| 0.7242 |  | 0.8463 |  | 0.8521 |  | 0.8954 |  | 0.9971 |
| 0.8003 |  | 0.9036 |  | 0.9836 |  | 0.9268 |  | 0.8945 |
| 1.0539 |  | 0.7105 |  | 0.7011 |  | 0.988 |  | 0.807 |
| 0.7647 |  | 0.7511 |  | 0.9705 |  | 0.9417 |  | 0.8537 |
| 0.919 |  | 0.9465 |  | 0.8097 |  | 0.9567 |  | 0.7609 |
| 1.007 |  | 0.7407 |  | 1.1449 |  | 0.8865 |  | 0.703 |
| 1.5055 |  | 0.8403 |  | 0.8336 |  | 0.6997 |  | 0.8731 |
| 0.8294 |  | 0.9335 |  | 1.0647 |  | 0.8884 |  | 0.7029 |
| 1.1009 |  | 0.8007 |  | 0.921 |  | 0.8533 |  | 1.1502 |
| 0.8803 |  | 0.809 |  | 0.9534 |  | 0.7808 |  |  |
| 0.853 |  | 0.9333 |  | 1.02 |  | 1.184 |  |  |
| 0.8464 |  | 0.8028 |  | 0.8386 |  | 0.8989 |  |  |
| 0.8387 |  | 0.6736 |  | 0.9046 |  | 0.8633 |  |  |
| 0.7986 |  | 0.7943 |  | 1.013 |  | 0.9099 |  |  |
| 1.2285 |  | 0.9281 |  | 1.169 |  | 0.8106 |  |  |
| 0.6903 |  | 0.8904 |  | 0.8287 |  | 0.8131 |  |  |
| 1.0115 |  | 0.9351 |  | 1.0912 |  | 0.6799 |  |  |
| 0.8837 |  | 0.9387 |  | 0.9038 |  | 1.0031 |  |  |
| 0.8183 |  | 0.7808 |  | 1.0465 |  | 0.7363 |  |  |
| 1.0458 |  | 1.1761 |  | 0.9088 |  | 1.1179 |  |  |
| 0.8159 |  | 0.6592 |  | 0.9089 |  | 0.9758 |  |  |
| 0.8497 |  | 0.8126 |  | 0.8316 |  | 0.9285 |  |  |
| 0.786 |  | 0.8446 |  | 0.8441 |  | 1.0512 |  |  |
| 0.7245 |  | 1.1898 |  | 1.017 |  | 0.7441 |  |  |
| 1.0125 |  | 0.957 |  | 0.8307 |  | 0.7695 |  |  |
| 0.7029 |  | 1.0115 |  | 1.0545 |  | 0.9545 |  |  |
| 0.7902 |  | 0.8887 |  | 0.9836 |  | 0.9867 |  |  |
| 0.9089 |  | 0.7185 |  | 0.685 |  | 0.9445 |  |  |
| 0.8635 |  | 0.9323 |  | 0.9016 |  | 0.9048 |  |  |
| 0.8772 |  | 0.9412 |  | 0.9637 |  | 0.7077 |  |  |
| 0.8728 |  | 0.9821 |  | 0.8805 |  | 0.7883 |  |  |
| 0.6971 |  | 0.8084 |  | 0.9661 |  | 0.7762 |  |  |
| 0.9528 |  | 0.8393 |  | 0.8874 |  | 0.7839 |  |  |
| 0.8156 |  | 0.7188 |  | 1.0112 |  | 0.7949 |  |  |
| 0.943 |  | 0.9831 |  | 1.1723 |  | 0.9587 |  |  |
| 0.706 |  | 0.7158 |  | 0.8708 |  | 0.7779 |  |  |
| 0.6112 |  | 1.0348 |  | 0.6665 |  | 0.7318 |  |  |
| 0.7216 |  | 0.8963 |  | 1.0293 |  | 0.8584 |  |  |
| 0.7815 |  | 0.8609 |  | 0.7159 |  | 0.9202 |  |  |
| 0.8258 |  | 0.922 |  | 0.8238 |  | 0.7865 |  |  |
| 0.9964 |  | 0.8516 |  | 1.1611 |  | 0.7645 |  |  |
| 0.9073 |  | 1.0998 |  | 1.1006 |  | 0.7758 |  |  |
| 0.828 |  | 1.2657 |  | 0.7611 |  | 0.7533 |  |  |
| 0.7962 |  | 1.0461 |  | 0.7591 |  | 0.8881 |  |  |
| 0.6267 |  | 1.0393 |  | 0.8054 |  | 0.8313 |  |  |
| 0.7899 |  | 0.7424 |  | 0.8596 |  | 0.836 |  |  |
| 0.7771 |  | 0.9551 |  | 0.8496 |  | 0.8174 |  |  |
| 0.8294 |  | 0.9619 |  | 1.0496 |  | 0.7994 |  |  |
| 0.9245 |  | 0.8919 |  | 0.7473 |  | 0.8772 |  |  |
| 1.019 |  | 0.9251 |  | 0.7815 |  | 1.0465 |  |  |
| 0.834 |  | 1.1073 |  | 0.9259 |  | 0.9096 |  |  |
| 0.9619 |  | 0.8688 |  | 0.8557 |  | 0.8713 |  |  |
| 0.9703 |  | 0.9656 |  | 0.95 |  | 0.8947 |  |  |
| 0.8279 |  | 0.983 |  | 1.0751 |  | 1.2365 |  |  |