**Cadbury’s chocolate**

One of the production lines of Cadbury Ltd turns out 100-g bars of milk chocolate at a rate of 20,000/hour. The start of this production line is a stainless feeding pipe that delivers the molten chocolate, at about 80oC, to a battery of 10 injection nozzles. These nozzles are set to inject a little over 100 g of chocolate into flat trays which pass underneath the nozzles. Afterwards these trays move along a conveyor belt during which the chocolate cools and hardens taking the shape of the mould. In this cooling process some of the water in the chocolate evaporates in order that the net weight of the chocolate comes down to the target value of 100 g. At about the middle of the conveyor line, the moulds are turned upside down through a reverse system on the belt after which the belt vibrates slightly such that the chocolate bars are ejected from the mould. The next production stage is the packing process where the bars are first wrapped in silver foil then wrapped in waxed paper onto which is printed the product type and the net weight. The final part of this production line is where the individual bars of chocolate are packed in cardboard cartons. Immediately upstream of the start of the packing process, the bars of chocolate pass over an automatic weighing machine that measures at random the individual weights. A printout of the weights for a sample of 1,000 bars, from a production run of 115,000 units is given in the table below. The production cost for these 100 g chocolate bars is ₤0.20/unit. They are sold in retail for ₤3.50.

吉百利有限公司的一条生产线能以每小时20,000块的速度生产100克的牛奶巧克力。这条生产线的起点是一条不锈钢进料管，它将融化的巧克力在大约80摄氏度的温度下输送到一个由10个注入喷嘴组成的电池中。这些喷嘴的作用是将100克多一点的巧克力注入从喷嘴下面经过的扁平托盘中。之后，这些托盘沿着传送带移动，在此过程中，巧克力冷却并变硬，形成模具的形状。在这个冷却过程中，巧克力中的一些水会蒸发，这样巧克力的净重就会降至100克的目标值。在传送带的中间位置，通过皮带上的反向系统将模具倒过来，之后皮带会轻微振动，这样巧克力棒就会从模具中弹出。下一个生产阶段是包装过程，棒材首先用银箔纸包裹，然后用蜡纸包裹，上面印上产品类型和净重。这条生产线的最后一部分是用硬纸盒包装巧克力。在包装过程开始的上游，巧克力棒经过一个自动称量机，自动称量每个巧克力棒的重量。下表给出了生产115,000个样品的1000条样品的重量打印结果。这100克巧克力棒的生产成本为每单位0.20英镑。其零售价为3.50英镑。

**Required**

From the statistical sample data presented, how would you describe this operation? What are your opinions and comments?

根据所提供的统计样本数据，您将如何描述此操作?你有什么看法和评论?

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 109.99 | 95.56 | 92.29 | 117.16 | 103.93 | 89.73 | 137.67 | 99.30 | 98.20 | 89.77 |
| 81.33 | 128.96 | 104.47 | 106.73 | 118.97 | 104.55 | 94.95 | 105.66 | 120.96 | 94.08 |
| 105.70 | 112.18 | 100.18 | 110.90 | 114.25 | 88.27 | 117.80 | 109.98 | 104.82 | 102.25 |
| 106.96 | 87.54 | 105.09 | 100.48 | 125.71 | 107.17 | 114.03 | 108.01 | 95.51 | 102.47 |
| 100.11 | 77.12 | 111.19 | 107.15 | 96.38 | 96.64 | 91.94 | 94.29 | 110.69 | 92.12 |
| 110.08 | 107.39 | 106.28 | 96.61 | 96.73 | 98.66 | 78.01 | 87.28 | 127.09 | 107.36 |
| 107.37 | 104.22 | 97.39 | 97.83 | 116.30 | 86.33 | 85.08 | 104.91 | 115.76 | 111.78 |
| 88.47 | 82.33 | 81.65 | 94.06 | 109.03 | 113.81 | 73.68 | 94.65 | 94.22 | 86.08 |
| 117.72 | 98.28 | 110.29 | 96.11 | 97.56 | 84.73 | 90.66 | 107.46 | 91.69 | 111.41 |
| 84.66 | 90.12 | 92.61 | 119.93 | 103.56 | 107.85 | 94.77 | 108.89 | 102.71 | 94.71 |
| 104.06 | 82.20 | 68.25 | 83.26 | 100.75 | 113.60 | 86.70 | 89.53 | 113.24 | 101.96 |
| 77.03 | 114.88 | 101.85 | 110.09 | 101.58 | 95.08 | 100.03 | 114.82 | 78.61 | 78.30 |
| 93.40 | 112.55 | 87.20 | 126.22 | 99.58 | 105.39 | 120.19 | 120.80 | 112.80 | 118.26 |
| 110.99 | 86.71 | 113.41 | 94.49 | 76.15 | 90.53 | 88.65 | 108.99 | 110.82 | 100.12 |
| 82.77 | 94.01 | 107.12 | 90.72 | 100.85 | 80.92 | 84.10 | 91.01 | 103.10 | 76.31 |
| 110.37 | 100.82 | 98.78 | 100.22 | 118.64 | 133.14 | 92.54 | 88.88 | 79.28 | 105.22 |
| 106.50 | 81.94 | 110.45 | 105.36 | 100.35 | 102.25 | 87.17 | 99.59 | 107.66 | 103.49 |
| 127.22 | 86.24 | 91.36 | 115.23 | 93.63 | 91.47 | 112.13 | 108.65 | 106.22 | 108.44 |
| 76.73 | 111.44 | 104.75 | 92.64 | 93.21 | 107.99 | 93.08 | 99.96 | 97.36 | 98.27 |
| 109.54 | 100.09 | 98.18 | 92.54 | 97.86 | 110.86 | 118.15 | 84.37 | 115.87 | 80.20 |
| 95.18 | 100.96 | 111.12 | 102.37 | 130.33 | 91.68 | 109.46 | 86.43 | 96.22 | 99.61 |
| 83.61 | 100.15 | 104.68 | 106.46 | 108.35 | 81.11 | 77.62 | 98.70 | 94.96 | 109.65 |
| 90.08 | 87.39 | 107.58 | 111.92 | 106.97 | 85.60 | 107.82 | 113.96 | 115.22 | 100.76 |
| 125.89 | 89.80 | 92.81 | 114.38 | 104.46 | 90.48 | 103.74 | 116.37 | 123.87 | 116.78 |
| 90.70 | 87.09 | 92.41 | 101.24 | 96.72 | 97.35 | 81.84 | 112.72 | 79.72 | 131.30 |
| 108.39 | 79.78 | 112.91 | 78.84 | 112.81 | 115.89 | 116.72 | 93.32 | 91.96 | 122.44 |
| 91.94 | 107.23 | 111.40 | 122.86 | 105.62 | 115.47 | 101.21 | 110.45 | 104.65 | 109.23 |
| 79.58 | 88.08 | 123.39 | 110.58 | 74.03 | 95.81 | 117.48 | 84.67 | 101.72 | 96.16 |
| 87.42 | 90.88 | 116.54 | 83.95 | 92.30 | 100.04 | 91.21 | 92.71 | 89.79 | 94.91 |
| 97.83 | 110.16 | 118.70 | 96.35 | 111.99 | 123.15 | 107.09 | 80.51 | 88.89 | 89.35 |
| 109.66 | 108.50 | 83.78 | 112.01 | 115.94 | 109.48 | 114.54 | 102.57 | 98.96 | 100.70 |
| 93.97 | 106.18 | 91.46 | 96.15 | 102.13 | 70.63 | 91.56 | 113.09 | 113.96 | 123.54 |
| 69.76 | 107.66 | 119.46 | 85.91 | 109.40 | 93.40 | 98.23 | 97.06 | 105.96 | 110.04 |
| 115.56 | 93.79 | 91.70 | 98.56 | 121.63 | 86.92 | 125.22 | 90.20 | 100.51 | 122.15 |
| 85.87 | 102.32 | 88.38 | 98.58 | 100.82 | 99.82 | 86.25 | 87.71 | 131.27 | 85.70 |
| 102.75 | 89.01 | 90.46 | 104.81 | 116.34 | 112.18 | 103.97 | 100.78 | 105.93 | 84.94 |
| 105.68 | 86.58 | 107.06 | 120.53 | 110.99 | 92.13 | 83.48 | 98.91 | 117.34 | 93.74 |
| 104.62 | 80.46 | 100.05 | 100.87 | 113.41 | 92.96 | 115.99 | 96.20 | 114.02 | 108.22 |
| 94.09 | 94.13 | 96.66 | 100.80 | 97.73 | 75.22 | 99.75 | 96.00 | 86.84 | 94.29 |
| 124.37 | 80.46 | 91.53 | 101.49 | 92.42 | 110.46 | 102.64 | 75.03 | 101.15 | 105.47 |
| 126.44 | 105.65 | 120.84 | 111.79 | 109.08 | 119.04 | 112.62 | 118.08 | 102.80 | 93.42 |
| 99.15 | 111.19 | 111.35 | 104.32 | 101.15 | 107.82 | 131.00 | 89.15 | 111.87 | 99.05 |
| 76.55 | 118.01 | 104.89 | 104.34 | 95.76 | 98.66 | 84.72 | 124.61 | 100.82 | 117.34 |
| 103.06 | 88.58 | 102.46 | 71.23 | 103.30 | 85.94 | 100.85 | 104.59 | 93.75 | 102.43 |
| 89.16 | 87.54 | 100.76 | 84.81 | 105.23 | 103.23 | 113.82 | 92.61 | 99.83 | 83.20 |
| 98.47 | 97.58 | 95.74 | 97.12 | 75.73 | 98.74 | 101.79 | 96.19 | 106.64 | 94.00 |
| 99.67 | 106.74 | 100.36 | 107.74 | 94.16 | 121.43 | 112.87 | 99.19 | 113.85 | 104.54 |
| 87.03 | 107.22 | 128.15 | 101.96 | 95.28 | 114.46 | 100.17 | 91.39 | 87.03 | 92.03 |
| 115.58 | 96.56 | 107.22 | 108.70 | 123.61 | 78.08 | 105.65 | 86.94 | 69.47 | 88.40 |
| 105.53 | 105.78 | 100.39 | 93.56 | 98.10 | 96.59 | 107.41 | 102.82 | 111.18 | 93.81 |
| 122.64 | 101.94 | 98.80 | 103.18 | 74.65 | 93.82 | 102.75 | 122.86 | 97.53 | 108.53 |
| 72.33 | 93.40 | 88.61 | 112.02 | 101.06 | 85.77 | 110.74 | 79.13 | 98.69 | 111.28 |
| 89.72 | 84.26 | 114.09 | 98.53 | 107.80 | 101.85 | 94.06 | 116.99 | 103.03 | 109.48 |
| 109.64 | 94.41 | 106.91 | 115.02 | 106.62 | 130.32 | 92.96 | 115.74 | 85.03 | 118.97 |
| 79.53 | 96.89 | 74.95 | 107.34 | 111.82 | 85.01 | 113.15 | 100.49 | 88.89 | 89.35 |
| 97.41 | 104.09 | 84.20 | 97.75 | 106.11 | 108.26 | 98.33 | 116.27 | 104.37 | 132.20 |
| 105.22 | 116.57 | 102.50 | 93.75 | 122.28 | 93.06 | 85.72 | 88.30 | 115.09 | 96.59 |
| 93.58 | 97.92 | 104.43 | 108.59 | 98.57 | 111.71 | 76.00 | 88.22 | 122.84 | 107.31 |
| 84.93 | 108.27 | 105.92 | 98.32 | 101.58 | 91.72 | 87.44 | 89.97 | 100.80 | 103.96 |
| 103.15 | 81.68 | 115.27 | 105.86 | 100.33 | 110.56 | 97.16 | 113.09 | 109.75 | 116.14 |
| 108.35 | 85.48 | 110.16 | 96.91 | 96.26 | 109.91 | 104.85 | 97.13 | 101.72 | 109.02 |
| 110.02 | 100.71 | 92.17 | 109.47 | 98.38 | 124.46 | 87.58 | 109.23 | 95.87 | 113.11 |
| 72.25 | 105.48 | 105.97 | 99.82 | 104.22 | 93.66 | 90.59 | 112.85 | 87.10 | 110.99 |
| 118.28 | 105.78 | 96.00 | 93.23 | 101.84 | 112.44 | 114.84 | 101.73 | 87.78 | 95.28 |
| 93.70 | 92.57 | 115.12 | 106.43 | 90.42 | 82.52 | 104.80 | 90.70 | 113.83 | 113.31 |
| 97.15 | 103.23 | 90.64 | 113.09 | 109.95 | 110.22 | 93.42 | 74.92 | 102.61 | 102.97 |
| 87.92 | 91.97 | 86.28 | 97.84 | 94.52 | 94.13 | 113.85 | 101.91 | 98.08 | 111.08 |
| 120.77 | 97.15 | 98.11 | 108.47 | 97.61 | 94.78 | 88.52 | 112.29 | 100.67 | 103.23 |
| 101.18 | 101.05 | 105.53 | 86.92 | 106.76 | 85.76 | 98.48 | 96.49 | 124.08 | 89.59 |
| 86.13 | 99.46 | 105.28 | 92.39 | 94.52 | 113.24 | 101.07 | 106.23 | 86.39 | 117.77 |
| 91.01 | 98.00 | 105.70 | 114.91 | 118.27 | 112.31 | 111.56 | 74.23 | 93.76 | 94.83 |
| 101.59 | 129.89 | 99.70 | 84.06 | 105.70 | 91.04 | 102.12 | 87.74 | 102.60 | 96.53 |
| 87.54 | 94.44 | 95.50 | 107.41 | 103.78 | 87.14 | 86.56 | 94.16 | 100.68 | 93.12 |
| 99.68 | 124.37 | 84.63 | 128.39 | 114.25 | 104.27 | 64.48 | 113.58 | 92.58 | 114.63 |
| 97.72 | 95.06 | 80.25 | 113.94 | 90.48 | 92.83 | 85.32 | 82.21 | 86.13 | 102.19 |
| 104.72 | 88.06 | 98.27 | 100.55 | 103.04 | 101.62 | 83.50 | 118.85 | 90.36 | 72.94 |
| 114.48 | 86.68 | 117.77 | 76.94 | 77.25 | 114.89 | 93.57 | 105.11 | 99.00 | 117.92 |
| 80.75 | 106.39 | 114.61 | 98.57 | 84.24 | 98.66 | 99.65 | 89.68 | 84.72 | 99.68 |
| 99.38 | 101.92 | 109.34 | 110.26 | 84.38 | 78.99 | 103.79 | 72.33 | 104.69 | 102.89 |
| 84.99 | 93.90 | 106.92 | 96.53 | 100.53 | 100.80 | 112.18 | 92.37 | 103.46 | 94.40 |
| 91.32 | 114.90 | 95.86 | 95.88 | 101.66 | 100.41 | 106.12 | 112.15 | 91.74 | 93.69 |
| 93.53 | 79.31 | 90.20 | 108.82 | 98.27 | 110.21 | 107.67 | 107.36 | 102.31 | 105.89 |
| 101.95 | 101.77 | 128.61 | 88.56 | 104.56 | 115.18 | 114.19 | 81.22 | 94.47 | 118.35 |
| 93.91 | 104.75 | 101.42 | 96.85 | 110.45 | 109.30 | 102.65 | 91.28 | 96.53 | 92.34 |
| 84.35 | 84.59 | 84.46 | 98.85 | 113.25 | 93.16 | 104.71 | 91.55 | 86.53 | 101.49 |
| 116.09 | 97.42 | 86.59 | 112.56 | 124.65 | 89.42 | 113.61 | 107.15 | 87.79 | 99.23 |
| 125.83 | 105.65 | 118.83 | 97.00 | 78.92 | 107.13 | 96.54 | 96.27 | 107.66 | 94.27 |
| 105.43 | 84.18 | 94.67 | 99.88 | 69.91 | 104.42 | 109.96 | 111.84 | 96.00 | 102.08 |
| 96.00 | 99.56 | 101.01 | 101.25 | 79.24 | 98.06 | 101.96 | 84.91 | 91.40 | 93.12 |
| 104.58 | 99.72 | 105.64 | 103.42 | 113.30 | 116.15 | 94.42 | 98.61 | 105.44 | 81.72 |
| 119.27 | 108.80 | 109.19 | 100.85 | 97.70 | 114.42 | 134.78 | 106.44 | 123.01 | 80.60 |
| 109.68 | 96.30 | 114.11 | 118.06 | 123.57 | 111.82 | 90.50 | 103.37 | 110.63 | 124.73 |
| 135.40 | 136.89 | 111.58 | 110.97 | 96.37 | 97.72 | 110.05 | 94.75 | 82.73 | 83.65 |
| 82.08 | 99.27 | 85.42 | 83.71 | 88.87 | 88.72 | 91.08 | 115.13 | 111.54 | 104.20 |
| 116.02 | 85.62 | 87.85 | 90.56 | 110.26 | 90.45 | 119.81 | 98.53 | 116.15 | 94.91 |
| 118.86 | 101.61 | 92.91 | 87.22 | 93.32 | 99.10 | 112.63 | 106.08 | 96.40 | 91.15 |
| 113.20 | 108.29 | 109.15 | 92.48 | 118.07 | 95.72 | 88.35 | 94.94 | 111.22 | 94.35 |
| 90.46 | 101.91 | 112.82 | 78.72 | 114.22 | 110.04 | 122.23 | 96.58 | 78.32 | 90.44 |
| 123.99 | 95.47 | 95.63 | 93.56 | 108.56 | 107.07 | 108.76 | 86.53 | 103.00 | 103.49 |
| 97.44 | 74.24 | 99.06 | 93.27 | 80.79 | 91.86 | 108.70 | 106.80 | 112.44 | 100.42 |