CASE

Dean Door Corporation

The Dean Door Corporation (DDC) manufactures steel and aluminum exterior doors for commercial and residential applications. DDC landed a major contract as a supplier to Walker Homes, a builder of residential communities in several major cities throughout the Upper Midwest. Because of the large volume of demand, DDC had to expand its manufacturing operations to three shifts and hire additional workers.

Not long after DDC began shipping doors to Walker Homes, it began receiving some complaints about excessive gaps between the door and frame.

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This problem was somewhat alarming to DDC, because its reputation as a high-quality manufacturer was the principal reason that it was selected as a supplier to Walker Homes. DDC placed a great deal of confidence in its manufacturing capability because of its well-trained and dedicated employees, and it never felt the need to consider formal process control approaches. In view of the recent complaints, Jim Dean, the company president, suspected that the expansion to a three-shift operation and the pressures to produce higher volumes and meet just-in-time delivery requests was causing a breakdown in their quality.

On the recommendation of the plant manager, DDC hired a quality consultant to train the shift supervisors and selected line workers in statistical process control methods. As a trial project, the plant manager wants to evaluate the capability of a critical cutting operation that he suspects might be the source of the gap problem. The nominal specification for this cutting operation is 30.000" with a tolerance of 0.125"; therefore, the upper and lower specifications are LSL = 29.875" and USL = 30.125". The consultant suggested inspecting five consecutive door panels in the middle of each shift over a ten-day period and recording the dimension of the cut. Table 15.8 shows 10 days' data collected for each shift.

Assignment

1. Interpret the data in Table 15.8, establish a state of statistical control, and evaluate the capability of the process to meet specifications. Consider the following questions: What do the initial control charts tell you? Do any out-of-control conditions exist? If the process is not in control, what might be the likely

TABLE 15.8 Production Data

			Observation				
Shift	Operator	Sample	1	2	3	4	5
1	Terry	1	30.046	29.978	30.026	29.986	29.961
2	Jordan	2	29.972	29.966	29.964	29.942	30.025
3	Dana	3	30.046	30.004	30.028	29.986	30.027
1	Terry	4	29.997	29.997	29.980	30.000	30.034
2	Jordan	5	30.018	29.922	29.992	30.008	30.053
3	Dana	6	29.973	29.990	29.985	29.991	30.004
1	Terry	7	29.989	29.952	29.941	30.012	29.984
2	Jordan	8	29.969	30.000	29.968	29.976	29.973
3	Cameron	9	29.852	29.978	29.964	29.896	29.876
1	Terry	10	29.987	29.976	30.021	29.957	30.042
2	Jordan	11	30.028	29.999	30.022	29.942	29.998
3	Dana	12	29.955	29.984	29.977	30.008	30.033
1	Terry	13	30.040	29.965	30.001	29.975	29.970
2	Jordan	14	30.007	30.024	29.987	29.951	29.994
3	Dana	15	29.979	30.007	30.000	30.042	30.000
1	Terry	16	30.073	29.998	30.027	29.986	30.011
2	Jordan	17	29.995	29.966	29.996	30.039	29.976
3	Dana	18	29.994	29.982	29.998	30.040	30.017
1	Terry	19	29.977	30.013	30.042	30.001	29.962
2	Jordan	20	30.021	30.048	30.037	29.985	30.005
3	Cameron	21	29.879	29.882	29.990	29.971	29.953
1	Terry	22	30.043	30.021	29.963	29.993	30.006
2	Jordan	23	30.065	30.012	30.021	30.024	30.037
3	Cameron	24	29.899	29.875	29.980	29.878	29.877
1	Terry	25	30.029	30.011	30.017	30.000	30.000
2	Jordan	26	30.046	30.006	30.039	29.991	29.970
3	Dana	27	29.993	29.991	29.984	30.022	30.010
1	Terry	28	30.057	30.032	29.979	30.027	30.033
2	Jordan	29	30.004	30.049	29.980	30.000	29.986
3	Dana	30	29.995	30.000	29.922	29.984	29.968

TABLE 15.9 Additional Production Data

Shift	Operator	Sample	Observation 1	2	3	4	5
1	Terry	31	29.970	30.017	29.898	29.937	29.992
2	Jordan	32	29.947	30.013	29.993	29.997	30.079
3	Dana	33	30.050	30.031	29.999	29.963	30.045
1	Terry	34	30.064	30.061	30.016	30.041	30.006
2	Jordan	35	29.948	30.009	29.962	29.990	29.979
3	Dana	36	30.016	29.989	29.939	29.981	30.017
1	Terry	37	29.946	30.057	29.992	29.973	29.955
2	Jordan	38	29.981	30.023	29.992	29.992	29.941
3	Dana	39	30.043	29.985	30.014	29.986	30.000
1	Terry	40	30.013	30.046	30.096	29.975	30.019
2	Jordan	41	30.043	30.003	30.062	30.025	30.023
3	Dana	42	29.994	30.056	30.033	30.011	29.948
1	Terry	43	29.995	30.014	30.018	29.966	30.000
2	Jordan	44	30.018	29.982	30.028	30.029	30.044
3	Dana	45	30.018	29.994	29.995	30.029	30.034
1	Terry	46	30.025	29.951	30.038	30.009	30.003
2	Jordan	47	30.048	30.046	29.995	30.053	30.043
3	Dana	48	30.030	30.054	29.997	29.993	30.010
1	Terry	49	29.991	30.001	30.041	30.036	29.992
2	Jordan	50	30.022	30.021	30.022	30.008	30.019

causes, based on the information that is available? What is the process capability? What do the process capability indexes tell the company? Is DDC facing a serious problem that it needs to address? How might the company ensure that the problems that Walker Homes found be eliminated?

2. The plant manager implemented the recommendations that resulted from the initial study. Because of the success in using control charts, DDC made a decision to continue using them on the cutting operation. After establishing control, additional samples were taken over the next 20 shifts, shown in Table 15.9. Evaluate whether the process remains in control, and suggest any actions that should be taken. Consider the following issues: Does any evidence suggest that the process has changed relative to the established control limits? If any out-of-control patterns are suspected, what might be the cause? What should the company investigate?