

## MINICASE: ILANA DESIGNS

Ilana Designs, headquartered in Rotterdam, manufactures a variety of high-quality clothing items. The company was started by Ilana Bloem in 1954 and has rapidly become a major force in the Common Market. Men's dress shirts are a major product line of the company. Currently, the Dresden shirt plant is several weeks behind on deliveries, causing Joakim Valsta, head of marketing, to be concerned that current customers may buy elsewhere.

The Dresden plant produces shirts on a make-to-order basis. An order consists of quantities of different types (cloth, color, and style) of shirts. Each type of shirt becomes a separate job. Jobs from different orders consisting of the same type of shirt can be combined, or the same type shirts can be broken into more than one job. The latter occurs when there are more shirts in a job than can be layered on the cutting table. Once a job is defined, it goes through a sequence of operations that transform cloth into packaged shirts. All jobs go through the operations in the same order: spreading, marking, cutting, fitting, sewing, buttoning, and packaging.

There are many cells to make shirts, all following the described process. Each operation will now be discussed.

**Spreading.** Bolts of the appropriate cloth for the job are brought to the cutting tables and spread. One, two, or many layers of cloth may be spread on the table.

**Marking.** A pattern is "marked" on the cloth spread on the table, usually through NC machinery but occasionally with a paper pattern. A cutting pattern can have multiple shirts of the same or different sizes. All parts of each particular shirt must be cut from the same layer.

**Cutting.** The cloth is cut in the shape of the pattern with a laser knife. This cut actually cuts out many shirts, because there are usually many layers of cloth on the table and each layer contains multiple shirts. When cutting is complete, the table is transferred to fitting.

**Fitting.** Here, all components of each particular shirt are bundled together. All bundles are then sent to sewing.

**Sewing.** Skilled sewers put together the components to make an almost-finished shirt. There are 20 sewing machines and operators in the sewing room. When all shirts are sewn, they go to buttoning.

**Buttoning.** Here, buttons are sewn on the shirt. This is done using a special purpose machine called a "buttoner." It also makes the button hole. Once the buttons are in place, shirts are put in a bin. When a job is completed, the bin is taken to packaging.

**Packaging.** Shirts are folded around cardboard, pinned and packaged in clear plastic, and placed in totes. When all shirts are packaged, they are sent to shipping where they are recombined into orders and shipped to customers.

Teodor Boctor, the plant manager, believes there are several long-term solutions to the problem, all involving new technology to increase capacity. Lise Madsen, vice president of manufacturing, believes new technology and changes in procedures may help in the long term, but wants something done now. The superintendent of one cell, Amar Crainic, thinks too much cell time is wasted between jobs. However, he has not had time to verify this, or to come up with better schedules for his cell.

Lise has hired you as a consultant to do a preliminary study on the situation. Amar provides data for his cell in the following table:

Job	Operation times (minutes)						
	Spread	Mark	Cut	Fit	Sew	Button	Package
1	8	1	7	45	7	41	8
2	6	1	8	25	13	27	12
3	8	1	5	36	7	31	10
4	4	2	10	49	6	37	9
5	9	1	5	33	13	27	13
6	7	2	7	25	11	36	11
7	4	1	8	36	15	29	11
8	12	2	9	25	9	22	8
9	13	2	11	32	13	25	12
10	5	2	10	48	7	34	9
11	10	2	10	28	6	37	8
12	12	2	5	27	12	22	8
13	9	2	8	30	10	35	13
14	6	1	11	46	16	28	13
15	15	1	9	34	8	37	8

Give your recommended schedule for the data. Discuss your measure of schedule goodness. What would you propose to do as a full study? What additional data would be necessary? List all assumptions you make.