



Exercise 1

Introduction Products and Volumes

Welcome to pTools Inc., manufacturers of specialty electric power tools. You have been assigned to complete a conceptual line design for a family of power tools. In the following exercises you will gather data, perform calculations, and prepare a Conceptual Mixed-Model Line Design for pTools' nine products.

Management expects the Mixed-Model Line to address and correct, to the degree possible, the following issues facing the current production design:

- **Lack of Flexibility:** The products are presently built in “Focused Factories” or dedicated areas. When one product is a hot seller, the line that builds it runs out of capacity, resulting in late shipments.
- **Poor Asset Utilization:** Dedicated lines are often idle during periods of low demand, causing low and uneven capacity utilization, especially of capital equipment.
- **Floor Space:** The duplication of resources per line has taken so much space that management is evaluating a building expansion at a cost of \$2.5 million. Factory floor space is also consumed by storage of excess work in process.
- **Quality:** Currently at each line, products are assembled by individuals provided with all the necessary subassemblies to complete a work order (“single-station build”). Inspectors use sampling techniques on entire production batches to monitor quality. Over 80% of the defects found by the Inspectors (at Test) and fixed by the “trouble-shooters” are workmanship-related defects. The troubleshooters are the most experienced operators.
- **Inventory Investment:** The amount of inventory on the shelves, floor, and warehouses is excessive. The inventory turns of 2.8 turns/year confirm this observation.
- **Employee Morale:** Because of the constant shortages (especially of molded parts), changes in schedule, and hot lists, the workforce has developed an attitude of pessimism.

A Mixed Model Flow Line can successfully address these problems to a significant degree. The Exercises will closely follow the Line Design Roadmap, and will provide you with all the necessary data to complete the assignment. As you complete the exercises you will gain an understanding of the data requirements, data interpretation and management judgements needed to design and implement a Mixed Model Flow Line at your facility. You will also learn how to use well-tested spreadsheet tools to compile data, sort products according to process commonality, determine batch sizes for molded parts, and calculate labor and machine processes required for smooth product flow of mixed models in the facility.



The Mixed Model Flow Line will be designed for the following products:

Part Number	Description
DR12	Drill
DR54	Drill
DR11	Drill
SD04	Belt Sander
CS87	Circular Saw
OS31	Orbital Sander
OS01	Orbital Sander
CH96	Chain Saw
CH09	Chain Saw

Task 1: Calculate Daily Volume by Product (*Designed Volume, or VOL*). A Mixed-Model Line Design is based on each product's *daily designed volume*. Since the line can adjust production mix and volume daily, you will divide each product's forecast annual volume by factory working days.

Calculate the VOL for each product in the table below, dividing the forecast annual volume by the number of working days in a year - in this Exercise, **240 days per year**. Your goal is to design the line to meet demand with one working shift wherever possible. Some resources will need to work more than one shift in order to meet demand. *Enter your results in the VOL Daily column; do not round results.*

Part Number	Description	Forecast Annual Volume	Designed Volume VOL (Daily)
DR12	Drill	13,440	
DR54	Drill	20,160	
DR11	Drill	15,600	
SD04	Belt Sander	768	
CS87	Circular Saw	15,360	
OS31	Orbital Sander	18,240	
OS01	Orbital Sander	1,920	
CH96	Chain Saw	12,960	
CH09	Chain Saw	11,040	



Task 2: Create Process Matrix Spreadsheet(s).

Open and build an Excel spreadsheet using the template below titled "Process Matrix". Column titles, left to right, will be: "Part #", "Description", "Daily VOL", plus nine open columns "P". These will be for Processes in Exercise 2. Populate Daily VOL column with your data. Save file!



PROCESS MATRIX

Part #	DESCRIPTION	Daily VOL									
DR12	Drill										
DR54	Drill										
DR11	Drill										
SD04	Belt Sander										
CS87	Circular Saw										
OS31	Orbital Sander										
OS01	Orbital Sander										
CH96	Chain Saw										
CH09	Chain Saw										
THROUGHPUT BY PROCESS											



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