ASSEMBLY LINE BALANCING

- The line balancing problem
- Mathematical programming models
- Heuristic algorithms

- An assembly line consists of a series of **work stations** along which a product moves.
- The product remains at each work station an amount of time called **cycle time**. While it is at a work station, one or more **tasks** are performed, each with a known **performance time**.
- **Precedence restrictions** may be imposed. That is, "task i precedes task j" (i→j) means that task i must be performed at the same or earlier station than j.

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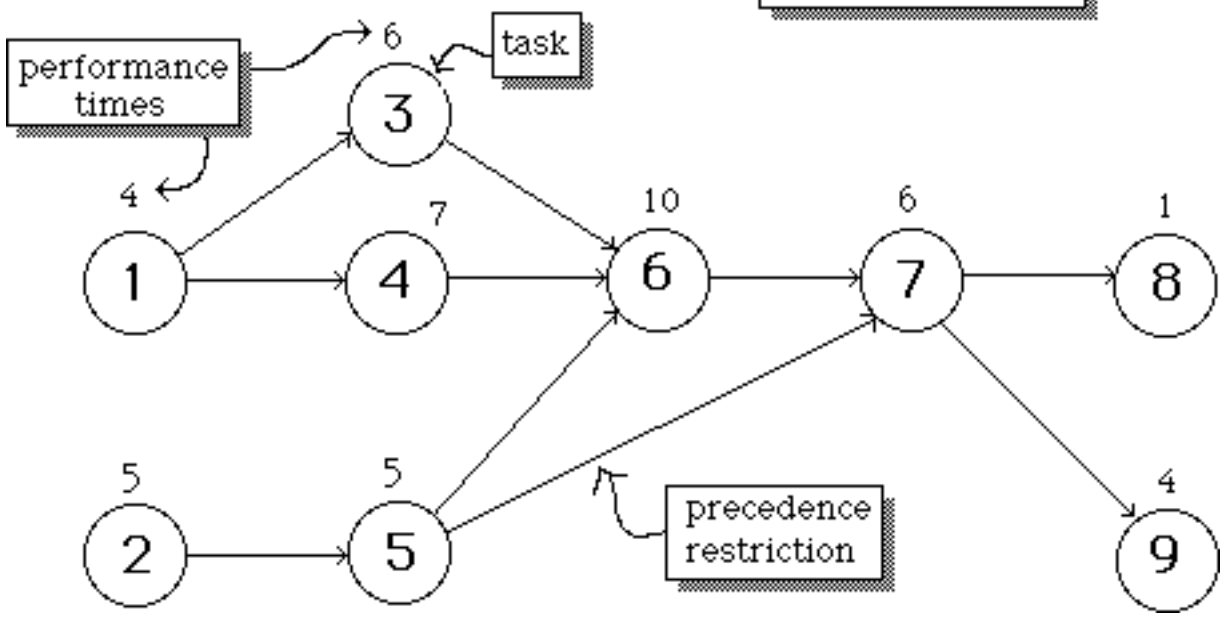
Example



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Task # i	Performance time P_i	Predecessor tasks
1	4	-
2	5	-
3	6	1
4	7	1
5	5	2
6	10	3,4,5
7	6	5,6
8	1	7
9	4	7
	48	

Total work content

If the cycle time is **c** and the number of work stations is **k**, then

$$kc \geq \sum_{i=1}^{n} P_i = \textit{work content}$$

Idle time: $I = kc - \sum_{i=1}^{n} P_i$

Balance delay:

$$d = \frac{kc - \sum_{i=1}^{n} P_i}{kc} = \frac{I}{kc}$$

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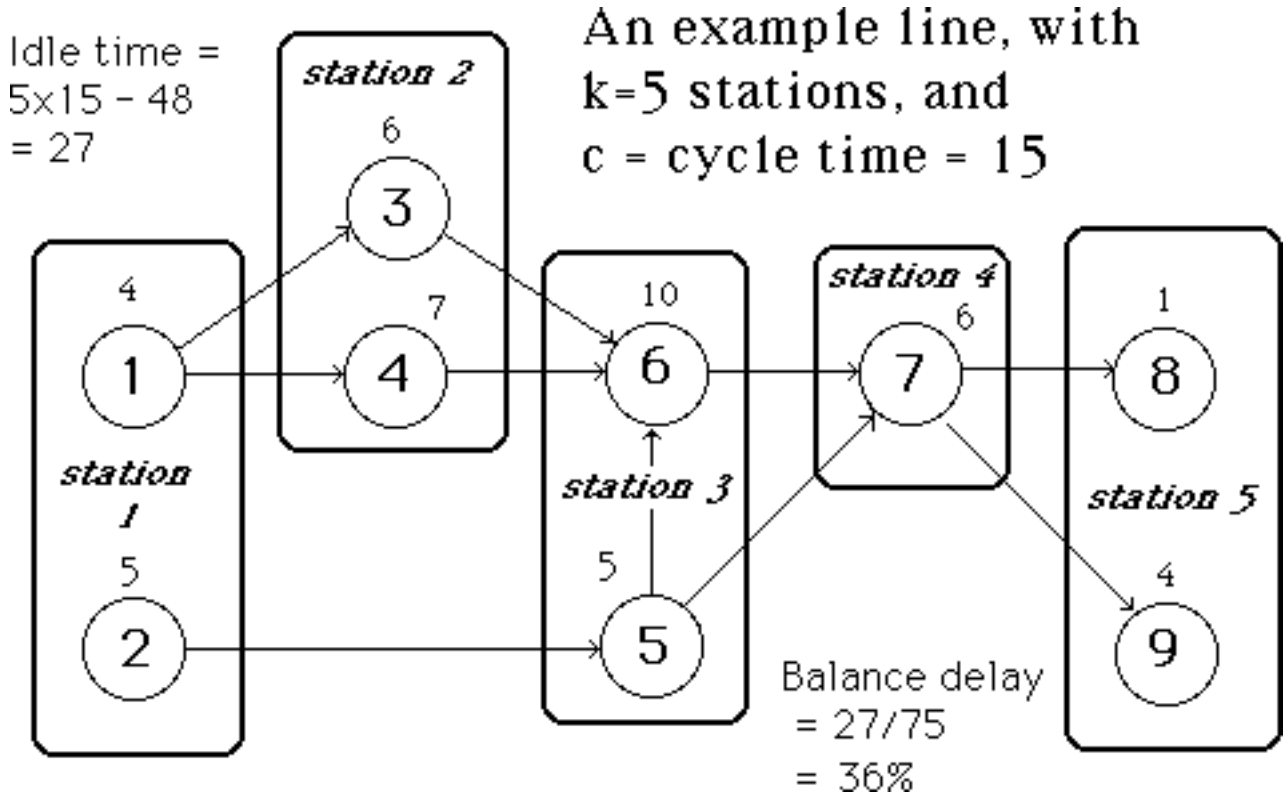

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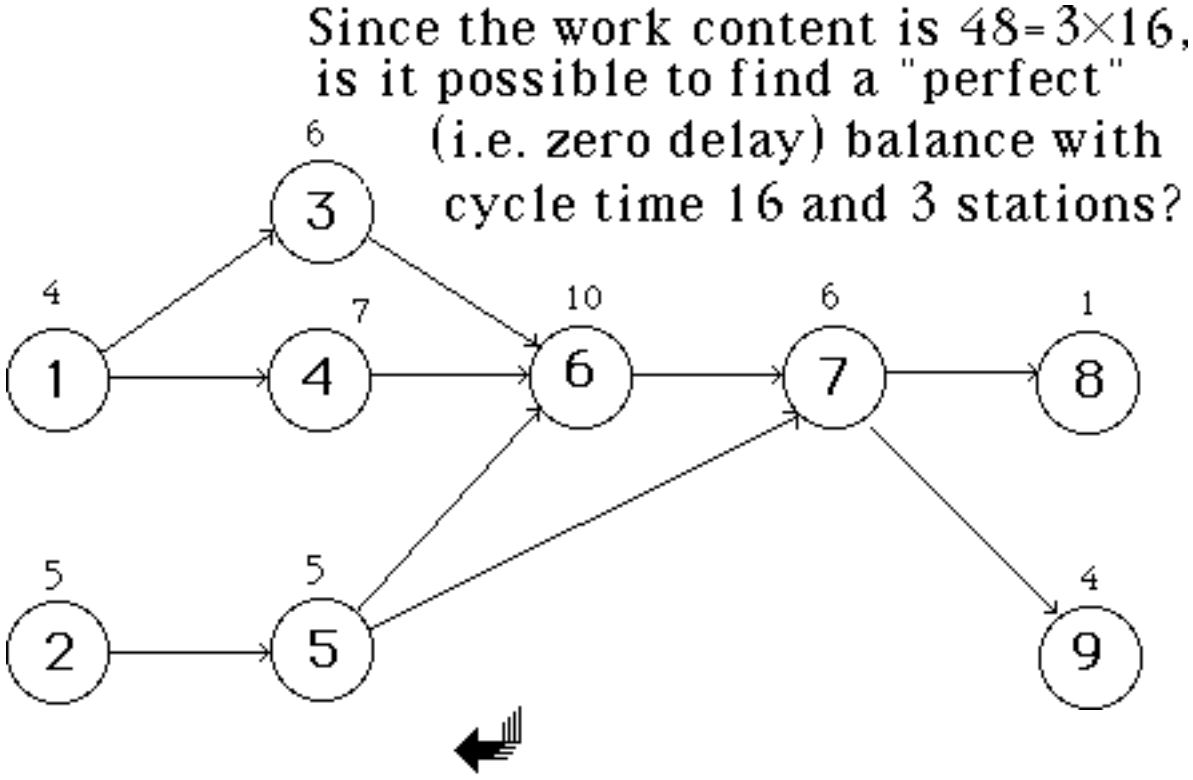

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Heuristic Algorithms for Assembly Line Balancing

- The Kilbridge & Wester Algorithm
- The Ranked Positional Weight Method (RPWM)
- The Reversed RPWM
- COMSOAL
- Genetic Algorithm

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