4. Factory Planning II

# Sets

* : set of products made by the factory {PROD 1, PROD 2, …}
* : set of machines used in the manufacture process {Grinding, Vertical Drilling, …}
* : set of months in the planning horizon {Jan, Feb, …, June}

# Parameters

* : contribution of product to the profit (£/unit)
* : production time of product in machine (hours/unit)
* : number of machines
* : demand of product in month
* : storage capacity per product (units/month)
* : cost of storing (£/unit\*month)
* : desired final stock of each product at the end of the planning horizon
* : productive hours in a month (hours/month\*machine) (24 working days, two 8-hour shifts)

# Variables

* : units manufactured of product on month
* units sold of product on month
* units stored of product at the end of month
* number of machines down for maintenance in month

# Objective

Maximize profit

# Constraints

1. The production policy of a month cannot surpass the production hours availability of any machine
2. The units sold in any month must be less or equal to the units demanded (upper bound constraint)
3. Relationship between units produced, sold and stored:
4. Storage capacity (upper bound constraint)
5. Each machine should enter maintenance once (exception: grinder only 2) in the six months
6. Variable types