

```
% Initialize the system
```

```
clear  
clear global  
close all  
clc
```

```
resources  
machines  
processes
```

```
% Construct our problem
```

```
% Set the desired output rate
```

```
%b = new_rate_vector({"electronic_circuit", 100});  
%b = new_rate_vector({"automation_science_pack", 10});  
b = new_rate_vector({"automation_science_pack", 10; "electronic_circuit", 100});  
disp("Model Desired Output:");
```

Model Desired Output:

```
display_rates(b);
```

Non-zero rates:

```
electronic_circuit: 100  
automation_science_pack: 10
```

```
% Limit the resource scope
```

```
resource_scope = ["copper_ore" "iron_ore" "copper_plate" "iron_plate"  
"copper_cable" "electronic_circuit" "iron_gear_wheel" "automation_science_pack"]';  
[resource_indices,~] = item_names_to_indices(resource_scope);
```

```
% Limit the process scope
```

```
[process_indices,~] = process_names_to_indices(["copper_mining" "iron_mining"  
"copper_plate_smelting" "iron_plate_smelting" "copper_cable_crafting"  
"circuit_crafting" "automation_science_pack_crafting" "iron_gear_wheel_crafting"]');
```

```
% Grab the subsets
```

```
A_ = A(resource_indices,process_indices);  
b_ = b(resource_indices);
```

```
% Solve the reduced system
```

```
x_ = A_\b_;
```

```
% x_ is the solution to the reduced system, so we have to expand it back up  
% to the full space.
```

```
x = zeros(size(A,2),1);  
for i=1:length(process_indices)  
    x(process_indices(i)) = x_(i);  
end
```

```
% With system solved based on the constraints, we can take that solution to
% the sub-system and compute it with the whole system. This is important to
% check the result.
```

```
a=A*x;
```

```
x2 = assign_default_machines_to_unit_processes(x);
```

```
disp("Model Output:");
```

Model Output:

```
display_rates(a);
```

Non-zero rates:

```
copper_plate: -5.5511e-16
iron_gear_wheel: -5.5511e-16
electronic_circuit: 100
automation_science_pack: 10
```

```
display_processes(x);
```

Non-zero UNIT processes:

```
iron_mining      120
copper_mining     160
iron_plate_smelting  384
copper_plate_smelting  512
copper_cable_crafting  75
circuit_crafting   50
iron_gear_wheel_crafting  5
automation_science_pack_crafting  50
```

```
display_processes(x2);
```

Non-zero processes:

```
iron_mining      electric_mining_drill  240
copper_mining     electric_mining_drill  320
iron_plate_smelting  electric_furnace    192
copper_plate_smelting  electric_furnace    256
copper_cable_crafting  assembling_machine_3  60
circuit_crafting     assembling_machine_3  40
iron_gear_wheel_crafting  assembling_machine_3  4
automation_science_pack_crafting  assembling_machine_3  40
```