DO YOU KNOW THE DIFFERENT HOURLY MEASURES IN THE PRECISION MACHINED PRODUCTS INDUSTRY?

In the Precision Machined Products Industry, there are never-ending discussions concerning definitions of different hourly measures as well as utilization measures based on these hours.

To assist in getting the thinking consistent throughout the Precision Machined Products Industry in regard to hour definitions and utilization, this document includes the following:

- Hour Reporting Definitions used in the Precision Machined Products Industry
- Examples of Utilization Measures in the Precision Machined Products Industry
- Flow Chart of Process Hour Measures

Keep this in an active, easy-to-get-at file, as this is one of those areas where you might want quick reference from time to time.

It is important that everyone in the Precision Machined Products Industry understands and utilizes hours at the same level. Remember this industry sells an hour on a piece of production equipment and not using the correct hourly measure in quoting, costing and analyzing of your efficiencies could have a dramatic impact on your shop operation and "bottom line". The definitions and examples in this document are offered to increase awareness of suggested industry use in regard to hours, but not necessarily procedures which must be explicitly followed.

This is provided to PMPA members under the direction of the Management Services Committee. These definitions should be considered when reviewing suggested procedures in PMPA manuals. Some of these manuals contain definitions already. We suggest the use of these current definitions, as they are clearer than those contained in some of the previously published manuals. As PMPA manuals are updated, these definitions (where applicable) will be added or replace those previous printings.

Any additional input or questions are important and should be directed to Art Langdon, Director of Statistics & Financial Management.

HOUR REPORTING DEFINITIONS
USED IN THE PRECISION MACHINED PRODUCTS INDUSTRY

Capacity Hour

Number of production machines under roof **x** scheduled hours (this could be based on partial shifts, greater number of shifts, or twenty-four hours a day).

Off-Line Hours

Number of machines off-line for rebuilding, etc. **x** the above scheduled hours.

Available Hours (also Scheduled Hours)

The number of hours available for production. Example: If you have 4 multiple spindles ACMES and 6 CNC machines and you are running a ten-hour shift, you have 100 AVAILABLE HOURS per shift.

Available Hours = Machine Hours + Management Downtime Hours (see below)

Process or Machine Hour – (Basis for Process Hour Cost Calculation)

The total of hours machine is either being set-up or producing parts, including operator downtime hours; but not including management downtime, also the sum of set-up hours and production (productive) hours (used in the Financial Measures Survey).

Process Hours (Machine Hours) = Set-Up Hours + Production Hours

Process Hours (Machine Hours) = Available Hours - Management Downtime Hours

Management Downtime Hours

The time when the machine is not running because of conditions beyond the control of the operator, i.e. waiting for tools or stock, major machine repair, inspection approval, no job available, no operator or setter, clean out, customer approval, tool smash up, etc.

Set-Up Process Hours

The total number of hours used on set-up during the shift (not including any downtime).

Production (Productive) Process Hours

The sum of Running Time + Operator Downtime (see below)

Running Time

The total number of hours the machine is producing parts (not including any downtime).

Operator Downtime Hours

Operator downtime is the non-producing time that is a result of sharpening tools, adjusting, oiling, warm-up, etc. This is the time the machine is not producing parts but is an integral part of production, as it should be anticipated in the form of efficiency. We keep track of this so we can analyze it by operator to see where we can help the operator, or where he may need further training.

Quoted Hours

The cycle time of a machine necessary to complete all the operations reduced by an "operator downtime" factor. Since "process hours (machine hours)" are used as a basis of the process hour cost rate calculated from data of the past period, "operator downtime" inefficiencies are already accounted for in the process hour cost rate.

Produced or Earned Hours

The hours that were necessary to produce an actual run of good parts, based on the standard (quoted) parts per hour.

$$\text{Produced or Earned Hours} = \frac{\text{Actual Good Parts Produced}}{\text{Quoted Parts Per Hour}}$$

Man-Hours Worked (Productive Man-Hours Worked – Direct Labor Employees Only)

The total skilled man-hours that machines are either being set-up or producing parts, including operator downtime hours; but not including management downtime (used in Financial Measures Survey).

Man-Hours Worked = Set-Up Man-Hours + Production Man-Hours

Man-Hours Worked = Payroll Hours less Management Downtime Man-Hours Reported

Management Downtime Man-Hours

The time when the operator is not running any machine(s) because of conditions beyond the control of the operator, i.e. waiting for tools or stock, major machine repair, inspection approval, no job available, tool smash up, etc.

Management Downtime Man-Hours = Payroll Hours less Man-Hours Worked

Payroll Hours

Time actually worked based on payroll records.

Payroll Hours = Man-Hours Worked + Management Downtime Man-Hours Reported

EXAMPLE OF UTILIZATION MEASURES
IN THE PRECISION MACHINED PRODUCTS INDUSTRY
(From Hypothetical Records)

		Results
Capacity Hour: (Number of Machines **x** Scheduled Hours)		
Off-Line Hours: 1 Machine being rebuilt	8 hrs.	
Available Hours	72 hrs.	80 hrs.
Available Hours:		
Machine or Productive Hours	64 hrs.	
Management Downtime	8 hrs.	72 hrs.
Process or Machine Hours:		
Set-Up Hours	12 hrs.	
Production Hours	52 hrs.	64 hrs.
Management Downtime Hours:		
Waiting for tools Waiting for stock Major machine repair Inspection approval No job available No operator or setter Clean out Customer approval Tool smash up	}	8 hrs.
Production (Productive) Hours:		
Running Time	46 hrs.	
Operator Downtime	6 hrs.	52 hrs.
Operator Downtime Hours:		
Tool sharpening Oil and warm-up Restocking	}	6 hrs.

EXAMPLE OF UTILIZATION MEASURES
IN THE PRECISION MACHINED PRODUCTS INDUSTRY
(From Hypothetical Records) (continued)

Capacity Utilization:

$$\frac{\text{Process or Machine Hours}}{\text{Capacity Hours}} = \frac{64}{80} = 80\%$$

Machine Utilization:

$$\frac{\text{Process or Machine Hours}}{\text{Available Hours}} = \frac{64}{72} = 89\%$$

Quoted Hours:

50 hrs. (based on Cycle Time Estimate, adjusted for operator downtime factor)
@ 100 pieces per hour

Produced or Earned Hours:

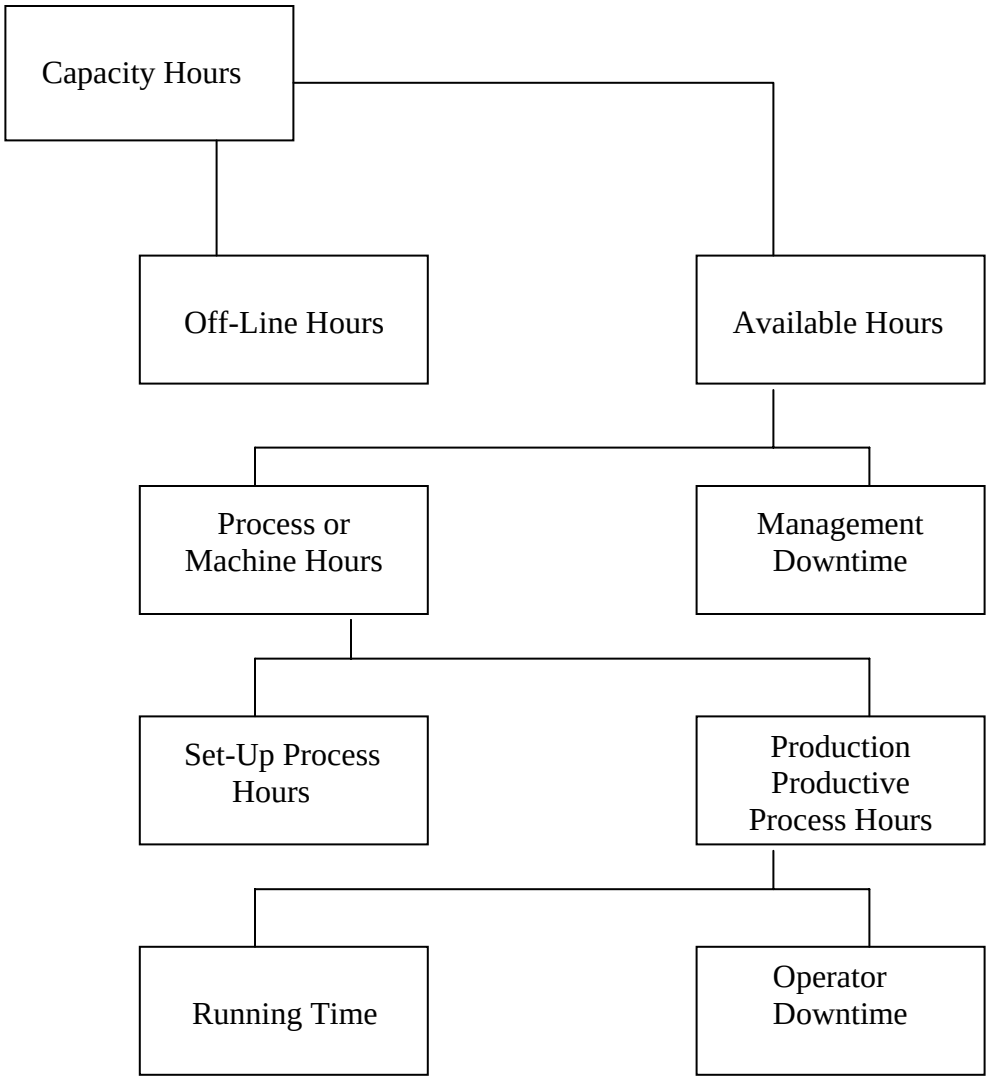
$$\frac{\text{Produced: (Actual)}}{\text{Quoted Pieces per Hour}} = \frac{5500 \text{ pcs.}}{100} = 55 \text{ Produced or Earned Hours}$$

Production Efficiency:

$$\frac{\text{Produced or Earned Hours}}{\text{Process Hours}} = \frac{55\text{hrs.}}{52 \text{ hrs.}} = 110\%$$

(NOTE: If quoted operator efficiency is same as actual efficiency incurred, then "Produced or Earned Hours" would equal "Quoted or Standard Hours".)

FLOW CHART OF PROCESS HOUR MEASURES
WITHIN THE PRECISION MACHINED PRODUCTS JOB SHOP



Quoted Hours = The calculated time necessary on the process (machine) to complete the part, less an operator downtime efficiency measure. Since "Process Hours" are used as the basis for the PHCR calculation from data of a past period, "Operator Downtime" inefficiencies are built into the PHCR

NOTE: PHCR = Process hour Cost Rate

J:Stats&FinMgt/Whitepapers/DefineHourMeasures