

ProHelp® EPM

Production & Process Monitoring System

**Basic Database Overview
For ProHelp® EPM, Release 7.5**

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ATTENTION

You can obtain service support by visiting Mattec's web site at **<http://www.mattec.com>**, by emailing the help desk at **helpdesk@mattec.com**, or by telephone at **(800) 966-1301**.

This manual is intended for advanced users only.

Table Of Contents

1	INTRODUCTION.....	4
1.1	DOCUMENT CONVENTIONS	5
1.2	TIME FORMATS	5
2	DATABASE TABLES	6
2.1	JOBDEFECT.....	6
2.2	JOBDOWN.....	7
2.3	JOBPROD	8
2.4	JOBQUEUE.....	11
2.5	LONGTERMENG.....	13
2.6	MACHCON.....	14
2.7	MOLDIDS	16
2.8	PARTIDS.....	18
2.9	PSENG.....	20
2.10	PSPROD	22
2.11	QCCYCLE	24
2.12	QCDEFECT.....	25
2.13	QCMEASURE	26
2.14	QCSAMPLE	27
2.15	QCSHEET	28
2.16	QCSPECS	29
2.17	SHIFTDEFECT	30
2.18	SHIFTDOWN	31
2.19	SHIFTENG.....	32
2.20	SHIFTPROD.....	33

1 Introduction

Mattec Corporation's ProHelp® EPM Production and Process Monitoring System is specifically designed for real-time monitoring of all types of production equipment. It is used extensively in the plastics injection molding, extrusion, blow molding, blown film, metal stamping, die casting, printing, painting, and assembly industries. The basis behind the benefits from the ProHelp® EPM system is the rationale that plant managers and operational people will take corrective actions to solve problems on production equipment when they are aware of such problems. ProHelp® EPM is the device to alert employees to problems immediately when the problems occur. Therefore, tremendous savings can occur in increased productivity and decreased scrap parts.

The ProHelp® EPM system combines computer hardware, computer software, and Machine Interface Units (MIUs) into an efficient system to provide real-time production and process monitoring, production reports, process alarms, job scheduling, preventive maintenance, and SPC/SQC process and part capability analysis. Floor personnel can make use of the machine-mounted terminals to signal different departments for help, to view production results at the machine site, and to enter downtime reasons or scrap reasons. Production, downtime, and scrap reports can be generated on a shift and daily basis, or the user can generate these reports for extended time periods by specifying a start and end date for the desired report. Job history data is continuously summarized and available for management's review.

ProHelp® EPM utilizes the Microsoft Windows Server 2003 operating system and the Microsoft SQL Server 2005 database. Users can connect to the system from most Microsoft Windows operating systems.

This document describes the most common database tables that are used in the ProHelp® EPM Production and Process Monitoring System. It will allow an advanced user to create their own custom reports using any compatible third-party report writer.

Information contained in this manual is subject to change without notice.

1.1 Document Conventions

Items that are not currently being used are labeled as **OBSOLETE**. These items should be ignored.

1.2 Time Formats

With few exceptions, all timestamps in the database are `time_t` values. This format stores the number of seconds since midnight, January 1, 1970 of GMT. It is a data type that is defined in the ISO C library.

Time zones offsets are only a *display phenomenon*. All database times are GMT. Thus, two events happening simultaneously at different points on Earth will have the same timestamp, regardless of their respective local time zone. These database timestamps will be one of three different user-defined types:

- `NormalTime_type`
- `NormalTimePlus0_type`
- `NormalTimePlusInfinity_type`

Each of these user-defined types uses the `int` type (32-bit long integer) as the underlying data type.

2.3 JobProd

This is the main production record for each job. It holds the basic production counts, run times, down times, as well as statistics for Cycle Time, for the job.

PRIMARY KEY: **MachNo, JobSeq**

MachNo	MachNo_type (int)
Machine Number. Index into MachCon and MachInfo .	
JobSeq	PositiveInt_type (int)
Job Sequence Number. Unique machine-specific job identifier. Along with MachNo , indexes into JobQueue .	
ShiftSeq	ShiftSeq_type (int)
Shift Sequence Number. Encoded date and shift index within day for applicable ShiftBounds set (defines shift time frame of data).	
TimeLogged	NormalTime_type (int)
Timestamp of last update.	
MinCycTm	real
Minimum value of Cycle Time parameter during the job.	
MaxCycTm	real
Maximum value of Cycle Time parameter during the job.	
SumCycTm	float
Sum of the cycle time parameter values during the job (used to calculate average).	
SumSqCycTm	PositiveFloat_type (float)
Sum of the squares of the cycle time parameter values during the job (used to calculate standard deviation).	
CycCnt	PositiveInt_type (int)
Total count of cycles within the job.	
CycOutSpec	PositiveInt_type (int)
Count of out-of-spec cycles within the job. Any cycle in which one or more process parameters are out-of-spec is said to be an out-of-spec cycle.	
ExpProdQty	float
Expected production quantity calculated from process sheet expectations for the job.	
CalProdQty	float
The MIU's total production made for the job.	
PakProdQty	float
Packed production reported for the job.	
DefectQty	float
Scrap production quantity reported for the job.	

TotTime Total time in seconds for the job.	PositiveInt_type (int)
WtTotTime Weighted total time in seconds for the job.	PositiveFloat_type (float)
DownTime Down time in seconds during the job.	PositiveInt_type (int)
WtDownTime Weighted down time in seconds during the job.	PositiveFloat_type (float)
NumDownTm Number of downtime occurrences during the job.	PositiveInt_type (int)
WtNumDownTm Weighted number of downtime occurrences during the job.	PositiveFloat_type (float)
LaborTime Unused.	PositiveInt_type (int)
WtLaborTime Unused.	PositiveFloat_type (float)
ShiftName The current shift name if the job is running.	Nchar(2)
WtCycCnt Weighted total count of cycles within the job.	PositiveFloat_type (float)
ActCavs The number of active cavities for the tool if the job is running.	PositiveReal_type (float)
ActPctReg The actual percent regrind for the materials in the Part ID if the job is running.	PositiveInt_type (int)
SetupCycCnt The number of setup cycles for the job. Setup cycles are accumulated if Downtime Reason #10 is configured as a "forced down (npc)" downtime code.	PositiveInt_type (int)
WtSetupCycCnt The weighted number of setup cycles for the job	PositiveFloat_type (float)
NonProductionCycCnt The non-production cycles for the job. Non-production cycles are accumulated if any Downtime Reason except Reason #10 is configured as a "forced down (npc)" downtime code.	PositiveInt_type (int)
WtNonProductionCycCnt The weighted non-production cycles for the job.	PositiveFloat_type (float)
PartQualCycCnt The number of machine cycles that were rejected for Part Qualification.	PositiveInt_type (int)

WtPartQualCycCnt

PositiveFloat_type (float)

The weighted number of machine cycles that were rejected for Part Qualification.

2.4 JobQueue

This is the list of completed, pending, or running jobs. It is the job descriptor record.

PRIMARY KEY: **MachNo, JobSeq**

MachNo	MachNo_type (int)
Machine Number. Index into MachCon and MachInfo .	
JobSeq	PositiveInt_type (int) [UNIQUE]
Job Sequence Number. Unique machine-specific job identifier. Along with MachNo , indexes into JobQueue .	
JobID	nchar (20)
Alphanumeric tag for a particular run of a job. This field is not required to be unique unless you intend to use the Data Import program.	
MoldNo	PositiveInt_type (int)
Mold Number. Index into MoldIDs .	
PartNo	PositiveInt_type (int)
Part Number. Index into PartIDs .	
StartTime	NormalTimePlus0_type (int)
Timestamp of actual job start time (0 for pending jobs) recorded at the MIU.	
StopTime	NormalTimePlus0_type (int)
Timestamp of actual end of job (0 for currently running jobs) recorded at the MIU.	
SchedStart	NormalTime_type (int)
Timestamp of the Desired Start Date/Time.	
SchedStop	NormalTime_type (int)
Timestamp of Desired End Date/Time.	
SchedQty	PositiveReal_type (real)
Lot size.	
CustomerID	nchar (18)
Alphanumeric customer ID field for user purposes.	
JobType	JobType_type (tinyint)
Job type. This value is currently always set to 3.	
MiscInto1	nchar (30)
Miscellaneous comment field for additional user information.	
MiscInfo2	nchar (30)
Miscellaneous comment field for additional user information.	
FatherJobSeq	PositiveInt_type (int)
Father JobSeq or NULL if this is a "bachelor" job. Index into FatherJobQueue .	

Status **JobStatus_type (int)**
A flag that indicates the job's status. Index into **JobStatus**.

JobDesc **nchar (50)**
Alphanumeric description of the job.

SequenceNumber **nchar (6)**
Alphanumeric sequence number of the job, used by CMS.

2.6 MachCon

This is the primary configuration table for machines. It is maintained by the Machine Configuration Edit facility.

Related tables include **MiuMach**, **MachAIU**, **MachInput**, **MachParm**, **MachSetupURL**, **SetupLinesMach**, **MachInfo**, and **MachOdometer**.

The tool and machine compatibility values and options serve to define the available resources (i.e., maximum dimension and capacity values available and options present). These can currently be manually intersected with the values and options defined for machines to determine compatibility for defining processes and subsequently scheduling jobs.

PRIMARY KEY: **MachNo**

MachNo Machine Number.	MachNo_type (int)
MachID Unique name for each machine.	nchar (6) [UNIQUE]
LoopNo Loop Number. Index into Loop .	LoopNo_type (tinyint)
StationID Loop address or station ID.	StationID_type (tinyint)
APName Obsolete.	nchar (10)
IMACType MIU type.	IMACType_type (tinyint)
MachDesc Alphanumeric description of machine.	nchar (50)
MachCost Cost of one hour of machine's time used for reporting.	PositiveReal_type (real)
LastUpdt Timestamp of last update.	NormalTime_type (int)
SampRate Obsolete.	SampRate_type (tinyint)
CycTmOutVal Obsolete.	PositiveReal_type (real)
CycTmOutFlag Obsolete.	OnOffFlag_type (tinyint)

DeptNo	DeptNo_type (tinyint)
Department Number. Index into Departments .	
OKOOS_LogFlag	OnOffFlag_type (tinyint)
Boolean flag for enabling Process Exception logging.	
GroupNo	tinyint
Obsolete.	
ShiftBoundsNo	ShiftBoundsNo_type (tinyint)
Shift Bounds Number. Index into ShiftBoundsInfo/ShiftBounds . If this has the special value of 255, then the Department default shift boundary definition will be used.	
GropuNo1-4	tinyint
The four machine groups that can be used as a filter on the Real-Time Display.	
MiscInfo1	nchar(30)
Miscellaneous comment field for additional user information.	
MiscInfo2	nchar (30)
Miscellaneous comment field for additional user information.	
MoldMachCompVal	real
0-11	
Numeric values for the 12 Tool and Machine Compatibility Values. The names of these items are defined in the System Configuration Edit facility.	
MoldMachCompOptions	smallint
Enables for the 12 Tool and Machine Compatibility Options. The names of these options are defined in the System Configuration Edit facility.	
OrderNo	MachNo_type (int)
Obsolete.	
IconType	PositiveInt_type (int)
The icon that will be used on the graphical Plant Floor display.	
PrinterNo	PositiveInt_type (int)
The Printer for On-Demand Barcode Printing. Index into Printer .	
PrintServerNo	PositiveInt_type (int)
The Printer Server for On-Demand Barcode Printing. Index into PrintServer .	
RemoteScrap	Bool_type (bit)
Enable flag for the Remote Scrap Pushbutton feature.	

2.7 MoldIDs

This is the primary Tool ID information table.

Related tables include **MoldSetupURL**, **SetupLinesMold** and **MoldOdometer**.

PRIMARY KEY:	MoldNo	
MoldNo		PositiveInt_type (int)
Mold Number.		
MoldID		nchar (20) [UNIQUE]
Unique name for each tool.		
MoldDesc		nchar (50)
Alphanumeric description of the tool.		
MachReq		char (20)
Alphanumeric field for user purposes.		
NumCavs		PositiveReal_type
Total cavities for the tool.		
Maker		nchar (20)
Alphanumeric field for user purposes.		
Location		nchar (20)
Alphanumeric field for user purposes.		
MoldFlag		MoldFlag_type
Obsolete.		
LastUpdt		NormalTime_type
Timestamp of last update.		
MoldMachCompVal0-7		real
Numeric values for the first 8 Tool and Machine Compatibility Values. The names of these items are defined in the System Configuration Edit facility.		
MoldMachCompOptions		smallint
Enables for the 12 Tool and Machine Compatibility Options. The names of these options are defined in the System Configuration Edit facility.		
GroupNo1		tinyint
The GroupNo for the group.		
GroupNo2-4		tinyint
Obsolete.		
MoldMachCompVal8-11		real
Numeric values for the last 4 Tool and Machine Compatibility Values. The names of these items are defined in the System Configuration Edit facility.		

MiscInfo1 **nchar (30)**
Miscellaneous comment field for additional user information.

MiscInfo2 **nchar (30)**
Miscellaneous comment field for additional user information.

SetupTime **PositiveInt_type (int)**
Setup time, in seconds, for the tool.

TearDownTime **PositiveInt_type (int)**
Tear down time, in seconds, for the tool.

RunnerWt **PositiveReal_type**
Runner weight, stored in the database in grams, displayed in SysCon selected units.

Active **Bool_type (bit)**
Active flag for the tool.

2.8 PartIDs

This is the primary Part ID information table.

Related tables include **PartKanban**, **PartLabel**, **PartMaterial**, **PartSetupURL**, and **SetupLinesPart**.

PRIMARY KEY:	PartNo	
	PartNo	PositiveInt_type (int)
	Part Number.	
	PartID	nchar (25) [UNIQUE]
	Unique name for each part.	
	PartDesc	nchar (50)
	Alphanumeric description for the part.	
	PctReg	PositiveReal_type (real)
	Percentage regrind of total material requirement.	
	PcsPerCtn	PositiveInt_type (int)
	Parts per Case.	
	Partcost	PositiveReal_type (real)
	Part cost used for reporting.	
	MatlCost	PositiveReal_type (real)
	Material cost used for reporting.	
	PartInfo	nchar (40)
	Miscellaneous comment field for additional user information.	
	LastUpdt	NormalTime_type (int)
	Timestamp of last update.	
	ColorID	char (25)
	Alphanumeric description of color material for part. This is a variable length field; a System Configuration item controls the active length between 4 and 25 characters long.	
	GroupNo1	tinyint
	The GroupNo for the group.	
	GroupNo2-4	tinyint
	Obsolete.	
	MiscInfo1	nchar (30)
	Miscellaneous comment field for additional user information.	
	MiscInfo2	nchar (30)
	Miscellaneous comment field for additional user information.	

SetupMaterial	PositiveReal_type (real)
The standard amount of setup material that is used for the part.	
MaterialColorRating	PositiveInt_type (int)
The color rating for the material list.	
EnableOnDemandBarcode	PositiveInt_type (int)
Flag that enabled On-Demand barcode printing.	
EnableAutomaticBarcode	PositiveInt_type (int)
Flag that enables automatic barcode printing.	
AutomaticCycleCount	PositiveInt_type (int)
The frequency to print barcode labels automatically.	
AutomaticBarcodeIndex	PositiveInt_type (int)
The index of the barcode label to print automatically.	
SerialTypeNo	PositiveInt_type (int)
The type of serial number mechanism to use when printing barcode labels automatically.	
Active	Bool_type (bit)
Active flag for the part.	

2.9 PSEng

This is the process parameter-specific portion of the process sheet. It contains the specification limits and related data.

PRIMARY KEY: **MachNo, MoldNo, PartNo, ParmNo**

MachNo	MachNo_type (int)
Machine Number. Index into MachCon and MachInfo .	
MoldNo	PositiveInt_type (int)
Mold Number. Index into MoldIDs .	
PartNo	PositiveInt_type (int)
Part Number. Index into PartIDs .	
ParmNo	PositiveInt_type (int)
Parameter Number. Index into ParmSet .	
UpperLim	real
Upper specification limit for a process parameter for a process sheet.	
NomVal	real
Nominal specification value for a process parameter for a process sheet.	
LowerLim	real
Lower specification limit for a process parameter for a process sheet.	
DelayVal	PositiveReal_type (real)
Delay value for a process parameter.	
CycValThold	real
Obsolete.	
SpcEnable	Bool_type (bit)
Flag that enables Automatic SPC for the process parameter.	
SpcControlAlarm	ControlAlarm_type (int)
Flag that enables Control Alarms for the process parameter.	
SpcRunAlarm	RunAlarm_type (int)
Flag that enables Run Alarms for the process parameter.	
ProcessSpecAlarm	Bool_type (bit)
Flag that enables Process Specification Alarms for the process parameter.	
ProcessControlAlarm	Bool_type (bit)
Flag that enables Process Control Alarms for the process parameter.	
PartQualSpecEnable	Bool_type (bit)
Flag that enables Part Qualification for specification limit violations for the process parameter.	

PartQualControlEnable

Bool_type (bit)

Flag that enables Part Qualification for control limit violations for the process parameter.

2.10 PSProd

This is the main table for the process sheet. It contains basic data.

PRIMARY KEY: **MachNo, MoldNo, PartNo**

MachNo Machine Number. Index into MachCon and MachInfo .	MachNo_type (int)
MoldNo Mold Number. Index into MoldIDs .	PositiveInt_type (int)
PartNo Part Number. Index into PartIDs .	PositiveInt_type (int)
SampNo Sample Sheet Number. Index into QCSheet .	PositiveInt_type (int)
ExpPctUp Expected Percent Uptime.	PositiveReal_type (real)
ExpCycTm Expected Cycle Time	PositiveReal_type (real)
ExpGood Expected Percent Good Parts.	PositiveReal_type (real)
HistPctUp Historical Percent Uptime.	PositiveReal_type (real)
HistCycTm Historical Cycle Time.	PositiveReal_type (real)
HistGood Historical Percent Good Parts.	PositiveReal_type (real)
LaborFactor Standard direct labor required.	PositiveReal_type (real)
LaborCost Cost per unit time of direct labor.	PositiveReal_type (real)
LastUpdt Timestamp of last update.	NormalTime_type (int)
Flags Obsolete.	tinyint
MiscInfo1 Miscellaneous comment field for additional user information.	nchar (30)

MiscInfo2	nchar (30)
Miscellaneous comment field for additional user information.	
NonProductionLimit	PositiveReal_type (real)
Non-production limit.	
CavityPsiTransfer	PositiveReal_type (real)
Cavity pressure transfer value if cavity pressure transfer is enabled in the Machine Configuration.	
AutoSpcEnable	Bool_type (bit)
Flag that enables Automatic SPC data collection.	
AutoSpcPeriod	PositiveInt_type (int)
The Automatic SPC sample period, in seconds.	
AutoSpcSubgroup	SubGroup2_type (int)
The Automatic SPC subgroup size.	
PartQualEnable	Bool_type (bit)
Flag that enables Part Qualification.	
IndirectLaborFactor	PositiveReal_type (real)
Standard indirect labor required.	
SetupLaborFactor	PositiveReal_type (real)
Standard setup time required, in seconds.	
ParameterRecordingFrequency	PositiveInt_type (int)
The Parameter Record Frequency, in cycles.	
Active	Bool_type (bit)
Active flag for the process sheet.	

2.11 QCCycle

This table holds the process parameter data ("Manual SPC Sample") that is automatically collected with each SQC sample.

PRIMARY KEY: **MachNo, JobSeq, SampSeq, CycleIndex, ParmNo**

MachNo	MachNo_type (int)
Machine Number. Index into MachCon and MachInfo .	
JobSeq	PositiveInt_type (int)
Job Sequence Number. Unique machine-specific job identifier. Along with MachNo , indexes into JobQueue .	
SampSeq	PositiveInt_type (int)
Sample Sequence Number. Unique machine-job-specific QC sample identifier. Along with MachNo and JobSeq , indexes into QCSample .	
CycleIndex	CycleIndex_type (tinyint)
Cycle Index for each QC sample (0 for first cycle up to N-1, where N is the specified subgroup size).	
ParmNo	PositiveInt_type (int)
Parameter Number. Index into ParmSet .	
ParmTime	NormalTime_type (int)
Timestamp of end of machine cycle.	
Value	real
The process parameter value in engineering units.	
Flag	TolFlag_type (tinyint)
Tolerance flag for the value (see TolFlag_range rule for valid values).	

2.12 QCDefect

This table holds the Attribute SQC data associated with a SQC sample.

PRIMARY KEY: **MachNo, JobSeq, SampSeq, CycleIndex, PartIndex, DefNo**

MachNo **MachNo_type (int)**

Machine Number. Index into **MachCon** and **MachInfo**.

JobSeq **PositiveInt_type (int)**

Job Sequence Number. Unique machine-specific job identifier. Along with **MachNo**, indexes into **JobQueue**.

SampSeq **PositiveInt_type (int)**

Sample Sequence Number. Unique machine-job-specific QC sample identifier. Along with **MachNo** and **JobSeq**, indexes into **QCsample**.

CycleIndex **CycleIndex_type (tinyint)**

Cycle Index for each QC sample (0 for first cycle up to N-1, where N is the specified subgroup size).

PartIndex **PartIndex_type (tinyint)**

Part Index for each part of a cycle of a QC sample (0 for the first part up to P-1, where P is the specified number of parts per cycle to capture – often corresponding to the cavitation).

DefNo **PositiveInt_type (int)**

Defect Code Number. Index into **DefCodes**.

NumDefects **PositiveInt_type (int)**

The number of defects for this **DefNo**.

2.13 QCMeasure

This table holds the Variable SQC data associated with a SQC sample.

PRIMARY KEY: **MachNo, JobSeq, SampSeq, CycleIndex, PartIndex, MeasIndex**

MachNo **MachNo_type (int)**

Machine Number. Index into **MachCon** and **MachInfo**.

JobSeq **PositiveInt_type (int)**

Job Sequence Number. Unique machine-specific job identifier. Along with **MachNo**, indexes into **JobQueue**.

SampSeq **PositiveInt_type (int)**

Sample Sequence Number. Unique machine-job-specific QC sample identifier. Along with **MachNo** and **JobSeq**, indexes into **QCSample**.

CycleIndex **CycleIndex_type (tinyint)**

Cycle Index for each QC sample (0 for first cycle up to N-1, where N is the specified subgroup size).

PartIndex **PartIndex_type (tinyint)**

Part Index for each part of a cycle of a QC sample (0 for the first part up to P-1, where P is the specified number of parts per cycle to capture – often corresponding to the cavitation).

MeasIndex **MeasIndex_type (tinyint)**

Measurement Index. Index into **QCSpecs**.

Measure **real**

The part variable characteristic value in engineering units.

Flag **TolFlag_type (tinyint)**

Tolerance flag for the value (see **TolFlag_range** rule for valid values).

2.14 QCSample

This table holds the header information for an SQC sample, including the timestamp.

PRIMARY KEY: **MachNo, JobSeq, SampSeq**

MachNo **MachNo_type (int)**

Machine Number. Index into **MachCon** and **MachInfo**.

JobSeq **PositiveInt_type (int)**

Job Sequence Number. Unique machine-specific job identifier. Along with **MachNo**, indexes into **JobQueue**.

SampSeq **PositiveInt_type (int)**

Sample Sequence Number. Unique machine/job-specific QC sample identifier. Along with **MachNo** and **JobSeq**, indexes into **QCSample**.

SampTime **NormalTime_type (int)**

Timestamp of the beginning of the QC sample.

SampFlag **OnOffFlag_type (tinyint)**

Boolean flag for QC sample's validity (1 for valid, 0 for ignore). This can be manually set in the QC Sample Data Edit facility.

LastUpdt **NormalTime_type (int)**

Timestamp of last update.

SampSize **SampSize_type (tinyint)**

Total sample size equal to the product of the number of cycles and the number of parts per cycle. Limited to a total of 320 parts for IMAC measurement entry.

InspectorID **char(18)**

An ID entered at the IMAC whenever a QC sample is taken. This is a variable length field. A System Configuration item controls the active length between 4 and 18 characters long.

SampCycle

"Cycle-stamp" of QC Sample within job, that is, the total cycle count for the job when the QC sample was initiated.

2.15 QCSheet

This is the primary record for a QC sample sheet and defines the details the QC sampling scheme as it pertains to the ProHelp® EPM system. It is pointed to (referenced by) the process sheet. Thus, it is indirectly linked to a scheduled job once the process sheet is specified.

PRIMARY KEY: **SampNo**

SampNo **SmallNo_type (smallint)**

Sample Sheet Number. Index into **QCSheet**.

SampID **char (18) [UNIQUE]**

Alphanumeric name of the QC sample sheet. This is a variable length field; a System Configuration item controls the active length between 4 and 18 characters long.

SampDesc **char (20)**

Alphanumeric description of the QC sample sheet.

SampPeriod **PositiveSmall_type (smallint)**

Sampling period value, either in machine cycles or in relative minutes.

NumParts **NumParts_type (tinyint)**

Number of parts to collect from each cycle.

SampPeriodFlag **OnOffFlag_type (tinyint)**

Boolean flag to indicate if the sampling period will be defined in machine cycles (0) or in relative minutes (1).

NumMeas **NumMeas_type (tinyint)**

Number of variable characteristics defined.

NumCycles **NumCycles_type (tinyint)**

Number of cycles for sample (number of cycles to automatically collect process parameter data for and the number of cycles from which **NumParts** parts will be captured).

LastUpdt **NormalTime_type (int)**

Timestamp of last update.

MiscInfo1 **char (20)**

Miscellaneous field for additional user information

MiscInfo2 **char (20)**

Miscellaneous field for additional user information

2.16 QCSpecs

This is the QCSheet's companion table to hold the specification limits and other information specific to each variable characteristic.

PRIMARY KEY: **SampNo, MeasIndex**

SampNo **SmallNo_type (smallint)**

Sample Sheet Number. Index into **QCSheet**.

MeasIndex **MeasIndex_type (tinyint)**

Measurement Index. Index into **QCSpecs**. This sequential index doubles as part of the key.

Prompt **char (20)**

Alphanumeric description of measurement.

Units **char (5)**

Alphanumeric string showing the desired units of the measurements. These will be used to interpret the values entered. The actual numeric values of the variable characteristic entered are stored in the database; thus, they must be entered in the units displayed in this field for the system to be consistent.

IMACEntry **OnOffFlag_type (tinyint)**

Boolean flag to determine if a measurement may be entered at the MIU or not (1 to allow entry at the MIU and optional entry via QC Sample Data Edit, 0 to preempt MIU entry, allowing entry only at the computer level via QC Sample Data Edit).

UpperLim **real**

Engineering upper specification limit for each variable characteristic of QC Sample Sheet.

NomVal **real**

Engineering nominal value for each variable characteristic of QC Sample Sheet.

asdf

LowerLim **real**

Engineering lower specification limit for each variable characteristic of QC Sample Sheet.

asdf

2.17 ShiftDefect

These are the defect reason code breakdown records for each shift of the machine job record. They hold the number of defects for each reason code within the shift of the machine job.

PRIMARY KEY: **MachNo, ShiftSeq**

MachNo **MachNo_type (int)**
Machine Number. Index into **MachCon** and **MachInfo**.

ShiftSeq **ShiftSeq_type (int)**
Shift Sequence Number. Encoded date and shift index within day for applicable **ShiftBounds** set (defines shift time frame of data).

Defno **PositiveInt_type (int)**
Defect Code Number. Index into **DefCodes**.

JobSeq **PositiveInt_type (int)**
Job Sequence Number. Unique machine-specific job identifier. Along with **MachNo**, indexes into **JobQueue**.

Qty **float**
Number of defects of **DefNo** reason code during shift.

2.18 ShiftDown

These are the down reason code breakdown records for each shift of the machine job record. They hold the amount of downtime and the number of downtimes for each reason code within the shift of the machine job.

PRIMARY KEY: **MachNo, ShiftSeq, DownNo, JobSeq**

MachNo **MachNo_type (int)**

Machine Number. Index into **MachCon** and **MachInfo**.

ShiftSeq **ShiftSeq_type (int)**

Shift Sequence Number. Encoded date and shift index within day for applicable **ShiftBounds** set (defines shift time frame of data).

DownNo **PositiveInt_type (int)**

Down Code Number. Index into **DownCodes**.

JobSeq **PositiveInt_type (int)**

Job Sequence Number. Unique machine-specific job identifier. Along with **MachNo**, indexes into **JobQueue**.

Qty **PositiveInt_type (int)**

Amount of downtime in seconds of **DownNo** reason code during job.

WtQty **PostiveFloat_type (float)**

Weighted amount of downtime in seconds of **DownNo** reason code during job.

NumOccur **PositiveInt_type (int)**

Number of occurrences of **DownNo** reason code during job.

WtNumOccur **PositiveFloat_type (float)**

Weighted number of occurrences of **DownNo** reason code during job.

2.19 ShiftEng

These are the parameter specific (engineering) records for each shift of each machine job record. They hold the statistics and cycle counts for each process parameter.

PRIMARY KEY: **MachNo, ShiftSeq, ParmNo, JobSeq**

MachNo **MachNo_type (int)**
Machine Number. Index into **MachCon** and **MachInfo**.

ShiftSeq **ShiftSeq_type (int)**
Shift Sequence Number. Encoded date and shift index within day for applicable **ShiftBounds** set (defines shift time frame of data).

ParmNo **PositiveInt_type (int)**
Parameter Number. Index into **ParmSet**.

JobSeq **PositiveInt_type (int)**
Job Sequence Number. Unique machine-specific job identifier. Along with **MachNo**, indexes into **JobQueue**.

ValMin **real**
Minimum value of the parameter during the shift.

ValMax **real**
Maximum value of the parameter during the shift.

ValSum **float**
Sum of the parameter values during the shift (used to calculate average).

ValSumSq **PositiveFloat_type (float)**
Sum of Squares of the parameter values during the shift (used to calculate standard deviation).

TotCyc **PositiveInt_type (int)**
Total count of cycles within the shift for which there was a valid parameter value calculated.

OutSpecCyc **PositiveInt_type (int)**
Count of out-of-spec cycles of the parameter within the shift.

LastVal **real**
Value of the parameter from the last cycle completed during the shift.

LastTolFlag **TolFlag_type (tinyint)**
Tolerance flag for the value (see **TolFlag_range** rule for valid values).

2.20 ShiftProd

This is the main production record for each shift. It holds the basic production counts, run times, down times, as well as statistics for Cycle Time for each job run during the shift.

PRIMARY KEY: **MachNo, ShiftSeq, JobSeq**

MachNo **MachNo_type (int)**
Machine Number. Index into **MachCon** and **MachInfo**.

ShiftSeq **ShiftSeq_type (int)**
Shift Sequence Number. Encoded date and shift index within day for applicable **ShiftBounds** set (defines shift time frame of data).

JobSeq **PositiveInt_type (int)**
Job Sequence Number. Unique machine-specific job identifier. Along with **MachNo**, indexes into **JobQueue**.

TimeLogged **NormalTime_type (int)**
Timestamp of last update.

MinCycTm **real**
Minimum value of Cycle Time parameter during the shift.

MaxCycTm **real**
Maximum value of Cycle Time parameter during the shift.

SumCycTm **float**
Sum of Cycle Time parameter values during the shift (used to calculate average).

SumSqCycTm **PositiveFloat_type (float)**
Sum of Squares of Cycle Time parameter values during the shift (used to calculate standard deviation).

CycCnt **PositiveInt_type (int)**
Total count of cycles within shift.

CycOutSpec **PositiveInt_type (int)**
Count of out-of-spec cycles within the shift. Any cycle in which one or more process parameters are out-of-spec is said to be an out-of-spec cycle.

ExpProdQty **int**
Expected quantity calculated from process sheet expectations for the shift.

CalProdQty **int**
The MIU's calculated total quantity (based on cycles monitored) for the shift.

PakProdQty **int**
Packed good quantity reported for the shift.

DefectQty **int**
Defect quantity reported for the shift.

TotTime **PositiveInt_type (int)**
Total time in seconds (excluding suspended time) for the shift.

WtTotTime **PositiveFloat_type (float)**
Weighted total time in seconds (excluding suspended time) for the shift.

DownTime **PositiveInt_type (int)**
Down time in seconds during shift.

WtDownTime **PositiveFloat_type (float)**
Weighted down time in seconds during the shift.

NumDownTm **PositiveInt_type (int)**
Number of downtimes that occurred during the shift.

WtNumDownTm **PositiveFloat_type (float)**
Weighted number of downtimes that occurred during the shift.

LaborTime **PositiveInt_type (int)**
Amount of labor time in seconds calculated for the shift.

WtLaborTime **PositiveFloat_type (float)**
Weighted amount of labor time in seconds calculated for the shift.

WtCycCnt **PositiveFloat_type (float)**
Weighted total count of cycles within the shift.

SetupCycCnt **PositiveInt_type (int)**
Number of setup cycles that occurred during the shift.

WtSetupCycCnt **PositiveFloat_type (float)**
Weighted number of setup cycles that occurred during the shift.

NonProductionCycCnt **PositiveInt_type (int)**
Number of non-production cycles that occurred during the shift.

WtNonProductionCycCnt **PositiveFloat_type (float)**
Weighted number of non-production cycles that occurred during the shift.

PartQualCycCnt **PositiveInt_type (int)**
Number of part qualification cycles that occurred during the shift.

WtPartQualCycCnt **PositiveFloat_type (float)**
Weighted number of part qualification cycles that occurred during the shift.