QEST Performance Monitor

Configuring Families

Document Control

Version	Author	Date	Comment
1.0	Krzysztof Kot	18/09/07	Original Document

Introduction

The QEST Performance Monitor is a software package which allows the user to keep track of changes in the performance of concrete mixes easily.

The software allows the user to specify mixes which should be analysed on a regular basis. Mixes are grouped together in "Families". This document specifies some guidelines which will aid the user in making decisions regarding the creation of these families. Most notably this document aims to outline the selection of mixes for analysis and their grouping with regard to the Boral system.

This document assumes a level of knowledge which the reader would possess after reading the user guide for the QEST Performance Monitor.

Recommendations are made in most of the sections below, these are preceded by the word '***Recommendation:***' in order to make it easier to skim this document.

Determining major mixes

The first step in setting up families within the QEST Performance is to determine which mixes should be chosen for analysis. A good first step is to use mixes which make up the majority of production for a plant.

Recommendation: *It is recommended that as a first step mixes which average 100m^3 of production per month are considered. There are a number of reports in the QESTLab production system which may be used for this purpose.*

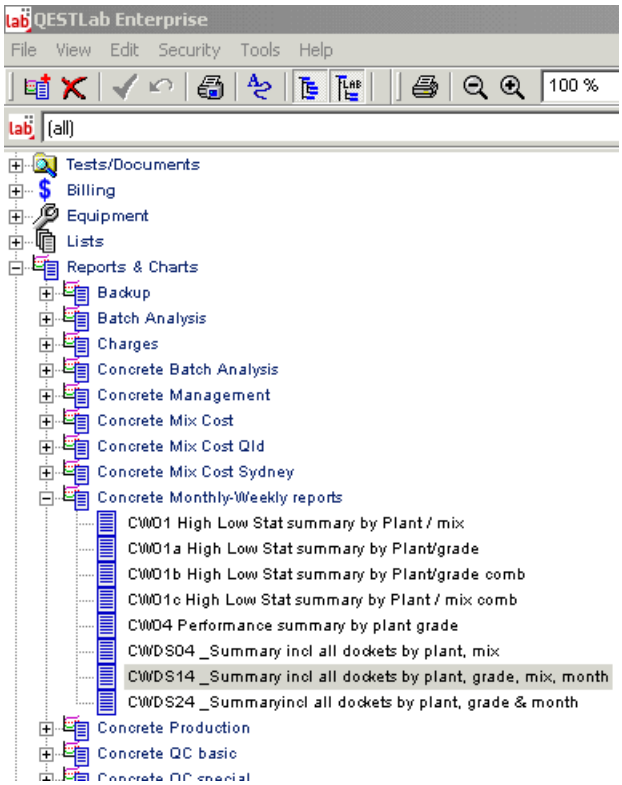
Selecting Plants and Grades

The first step to creating families of mixes to be assessed in the QEST Performance Monitor is to determine which plants and mixes should be analysed.

Recommendation: *Plants with higher production figures within a region should be used. A good starting point for the selection of grades is to select those which make up the majority of production in a given plant.*

QESTLab Reports – Production

Reports to aid in the selection of mixes are available through QESTLab in the production system under 'Management Reports' in the 'Concrete Monthly-Weekly Reports' group. This is pictured below.

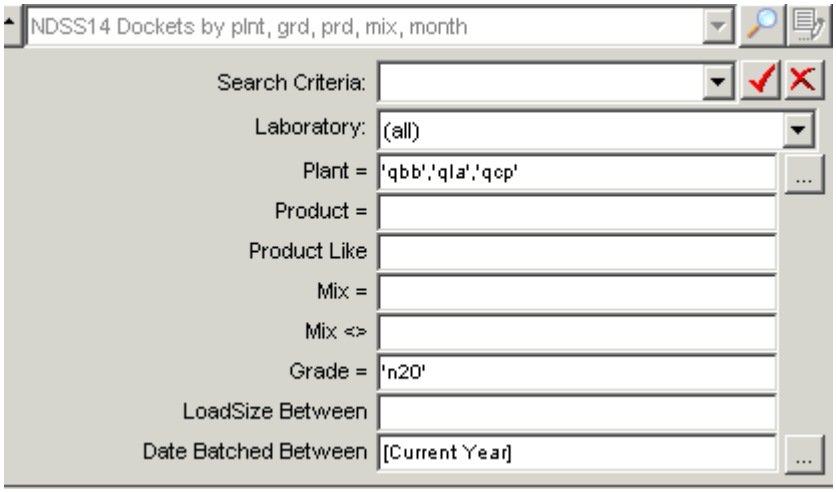


Of interest is the report 'CWDS14_Summary incl dockets by plant, grade, mix, month'. This report should be used to determine which mixes are produced in the greatest quantities.

Recommendation: *Good starting search criteria when running the report are as follows:*

- *Selected Grades*
  - *It is beneficial to run the report once per each grade for performance reasons*
- *Selected Plants*
- *Approximately a year between the earliest and latest batch date.*

An example of this sort of search criteria is shown below:



Production Data

Once the report has been generated the output given to the user is similar to the following:

Production quantities, costs, yield and test results by month

Search: Plant = qbb,qla,qcp, Grade = n20, Date Batched Between 01-Jan-07 And 31-Dec-07

Plant	Grade	Product	Mix	year/month	m3 Sum.	No No.	t cem. Avg.	cemnt Avg.	water Avg.	des $ Avg.	act $ Avg.	theo $ Avg.	n
QBB	N20	PU20-10-BS	Q5N201SA	200701	17.4	0	264.5	203.8	183	95.83	95.07	93.16	
QBB	N20	PU20-10-BS	Q5N201ST	200701	59.0	0	283.9	217.3	183	100.40	99.79	92.17	
QBB	N20	PU20-10-BS	Q5N201ST	200702	57.2	0	285.6	212.3	183	101.36	100.90	92.63	
QBB	N20	PU20-10-BS	Q5N201ST	200703	55.6	0	289.8	227.0	183	101.44	100.73	92.67	
QBB	N20	PU20-10-BS	Q5N201ST	200704	29.6	0	281.7	215.6	183	97.79	97.55	91.89	
QBB	N20	PU20-10-BS	Q5N201ST	200705	87.4	0	281.3	213.1	183	97.41	97.49	91.89	
QBB	N20	PU20-10-BS	Q5N201ST	200706	79.0	0	274.0	210.1	183	95.59	95.77	91.98	
QBB	N20	PU20-10-BS	Q5N201ST	200707	46.8	0	290.5	216.9	183	101.89	101.23	94.09	
QBB	N20	PU20-10-BS	Q5N201ST	200708	40.2	0	288.2	224.5	183	101.41	101.83	93.44	
QBB	N20	PU20-10-BS.01	Q5N201SA	200705	3.2	0	259.4	193.8	183	92.89	92.94	92.87	
QBB	N20	PU20-10-BS.01	Q5N201SA	200706	8.0	0	264.6	196.3	183	92.89	93.38	92.87	
QBB	N20	PU20-10-BS.01	Q5N201SA	200708	8.6	0	296.3	231.4	183	100.03	103.45	94.42	
QBB	N20	PU20-10-BS.02	Q6N201SB	200704	1.8	0	266.7	266.7	183	101.64	101.50	98.27	
QBB	N20	PU20-20-BS	Q1N202SA	200701	114.0	0	241.0	185.4	184	91.20	91.06	88.46	
QBB	N20	PU20-20-BS	Q1N202ST	200701	537.6	0	244.1	185.7	184	91.54	91.33	87.59	

Of interest are the 'Mix', 'year/month', 'm3 sum' and 'No. No' columns.

'Mix'

The mix code which the row of data relates to. For instance rows two through nine in the report above relate to the mix 'Q5N201ST'.

'Year/month'

This column represents the month to which the rest of the data row relates. For instance the first two rows above relate to production data for January 2007.

'm3 sum'

The amount of the given product batched in the given plant and month.

'No. No'

The number of samples present for this row.

Recommendation: *These reports should be exported as csv files for easier manipulation of the data within excel.*

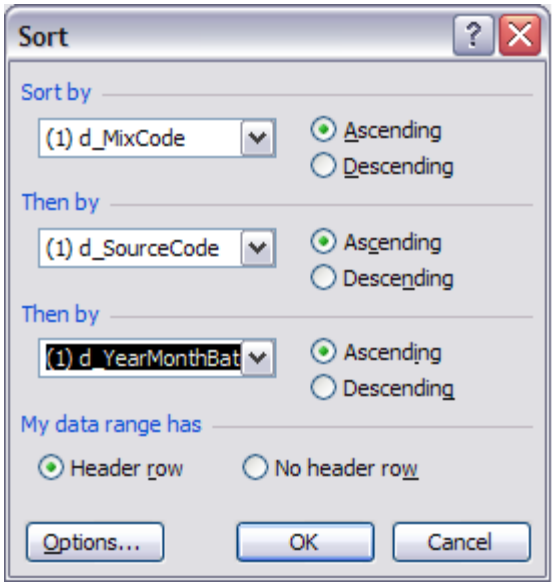
Reformatting of Reports

Once the reports have been generated the user should determine which mixes have, on average, the highest production volume. This can be done by analysis of reports, made easier if they are exported as csv files.

Recommendation: *It is recommended that mixes which have an average production volume of 100m^3 are used.*

The csv files should be opened within excel and the data sorted in descending order by the 'm3 sum' column. Note that the header for this column reverts to the name of the column in the database once in excel. It is now called 'd_loadsize'. Though the names change the ordering of the columns remains consistent thus they may be easily identified.

The rows with load sizes higher than 100m^3 should be highlighted. Note that the report groups rows by product it is possible the same mix code appears more than once in this report. The data should therefore be resorted by the mix code column followed by the source code column and finally the yearmonth batched column.



All of the highlighted mixes should now be checked to ensure that enough volume is batched in every month such that consideration of the mix is warranted. Consider the table below:

QBB	N25	Q1N252SA	200701	135.6
QBB	N25	Q1N252SA	200702	8
QBB	N25	Q1N252SA	200704	28.4
QBB	N25	Q1N252SA	200705	11
QBB	N25	Q1N252SA	200706	86.2
QBB	N25	Q1N252SA	200707	52.4
QBB	N25	Q1N252SA	200708	120.6
QBB	N20	Q1N202ST	200701	537.6
QBB	N20	Q1N202ST	200702	795.6
QBB	N20	Q1N202ST	200703	624.8
QBB	N20	Q1N202ST	200704	742.8
QBB	N20	Q1N202ST	200705	633.6
QBB	N20	Q1N202ST	200706	718
QBB	N20	Q1N202ST	200707	901.01
QBB	N20	Q1N202ST	200708	607.8
QBB	N20	Q1N202ST	200709	35.2

Q1N202ST should be considered as the average production is well over 100 m^3 while an argument could be made that the Q1N252SA *mix should not be used.*

The chosen mixes should be copied into a new workbook within the same spreadsheet for easy access.

QEST Performance Monitor

Grouping Families

Families can be grouped together. This is up to the user and is controlled through the 'group code' field on a family.

Recommendation: *It is recommended that families be grouped by grade and cementitious content.*

Setting up initial Families

Once the plants, grades and major mixes have been selected the user must create families from these. A summary such as that shown below can aid in this process.

Plant	Grade	Mix	Cementitious
QBB	N20	Q0N202ST	GP + 25% FA
QCP	N20	Q0S202SF	GP
QLA	N20	Q0W202SA	GP + 25% FA
QBB	N20	Q1N202SA	GP + 25% FA
QBB	N20	Q1N202ST	GP + 25% FA
QCP	N20	Q1S202SA	GP + 25% FA
QCP	N20	Q1S202ST	GP + 25% FA
QLA	N20	Q1W202SA	GP + 25% FA
QCP	N20	Q3S202SB	GP
QBB	N25	Q0N252SA	GP + 25% FA
QLA	N25	Q0W252SA	GP + 25% FA
QBB	N25	Q1N252ST	GP + 25% FA
QCP	N25	Q1S252SA	GP + 25% FA
QCP	N25	Q1S252ST	GP + 25% FA
QLA	N25	Q1W252SA	GP + 25% FA
QBB	N25	Q5N251ST	GP + 25% FA
QCP	N25	Q5S251SA	GP + 25% FA

The performance monitor allows the user to set up a family consisting of multiple mixes and plants and subsequently split it into multiple families containing one mix and plant automatically.

Recommendation: *The initial families should be set up containing all the relevant plants and mixes for a particular grade and cementitious content. The group code for the families should be set as [Business Prefix][Grade] [Cementitious].*

For example the initial two families from the table above would look as follows.

Group Code: QN20 GP+FA
Name: QN20 GP+FA all
Plants:

- *QBB*
- *QCP*
- *QLA*

Mixes:

- *Q0N202ST*
- *Q0W202SA*
- *Q1N202SA*

- *Q1N202ST*
- *Q1S202SA*
- *Q1S202ST*
- *Q1W202SA*

Group Code: QN20 GP
Name: QN20 all
Plants:
- *QBB*
- *QCP*
- *QLA*

Mixes
- *Q0S202SF*
- *Q3S202SB*

Checking Assessment Periods

The assessment periods of the created families should now be double checked to ensure enough data is returned.

Recommendation: *It is recommended that a period of 180 days be used for strength and 60 for other types of assessment.*

Setting up Parameter Values

Trigger parameter values for the families should also be set to sensible values. For more information regarding trigger parameters and their meanings please refer to the QEST Performance Monitor user guide.

Recommendation: *A number of global parameter sets have been provided for use. These have the prefix '+' in their name. These can be applied to the families created through the trigger setup screen and modified as required once applied.*

Splitting and Copying

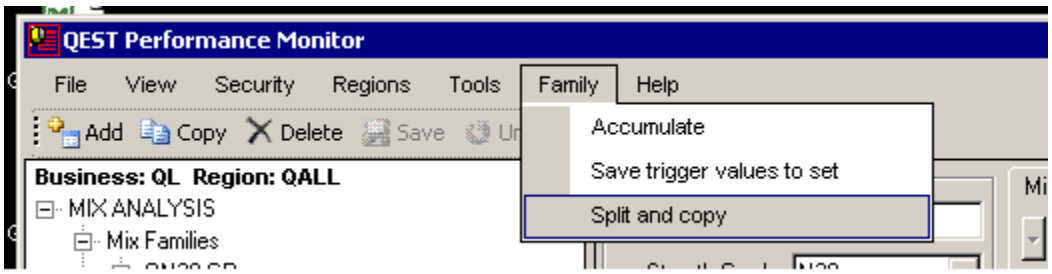
Families can be split into smaller families containing only one mix and plant from the original. For instance a family with the following mixes and plants below would be split into six separate families.

Original Family:

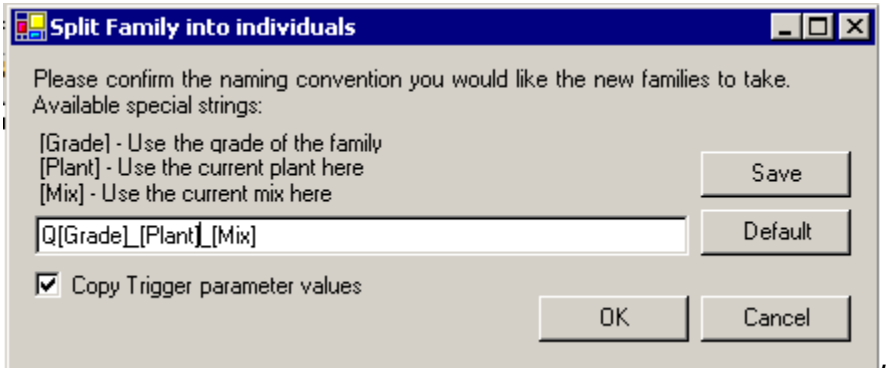
Plants
- Plant 1
- Plant 2
- Plant 3

Mixes
- Mix 1
- Mix 2

This functionality is available when on the family screen. It is accessed by clicking on 'Split and Copy' in the 'Family' menu item.



Recommendation: *It is recommended that users split the original families created for a grade and cementitious type created above. The recommended structure for naming of the new families is (Business Prefix)[Grade]_[Plant]_[Mix]. This string should be entered into the 'split and copy' form which is presented to the user once this option is selected. This will create individual families with a name and group code composed of these elements. An example for a Queensland family is shown below*



Ensure that the 'Copy Trigger parameter values' option is also ticked. The families created using the above structure will have names which look like:

QN20_QBB_Q0N202ST

Where Q is the business prefix, N20 is the grade, QBB is the plant and Q0N202ST is the mix code. It is suggested this naming convention is used such that it is easy to identify, at a glance, which plant and mix the family contains. This naming convention should only apply to families containing one plant and one mix.

Once copied, the new families will appear in their own nodes within the tree. The user should modify the group code accordingly to match that of the original family. This will ensure that the families all appear under the correct node in the tree.

Clean up

Once a family is split and copied any unnecessary families should be deleted and those which have been given an incorrect group code rectified.

Assessments and Feedback

Running Assessments

Once all required families have been set up the user can begin to run assessments on the associated data. To do this the user simply logs into the software and chooses the 'Run Assessments' menu item from the 'Tools' menu.

This brings up a form which allows the user to specify a date range within which the assessments should be run. This will simulate the situation where the performance monitor runs every night between these two dates, running assessments when required.

QESTLab Reports – R and D

Once assessment data is available it can be viewed through the QESTLab reporting engine in the R&D system.

The reports are located under the 'QEST Performance Monitor' group of the 'Management Reports' node.

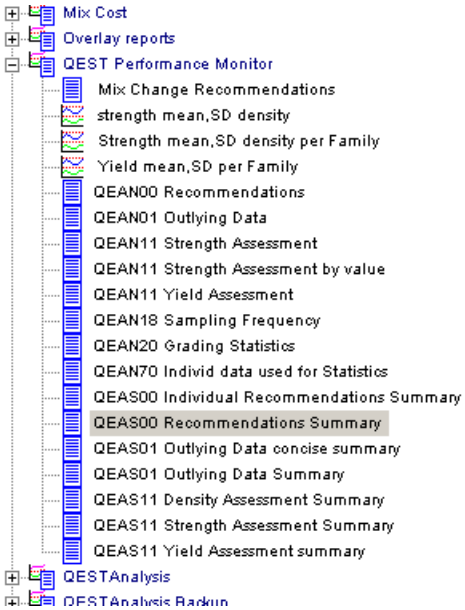
More information on analysing the data obtained from the QEST Performance Monitor assessments can be found in the document entitled 'QEST Performance Monitor Data Analysis'.

Summaries

Recommendations

Recommendations are made by the system depending on the triggers which are fired once generated statistics have been checked by the system in a second pass.
Summary reports are available for a reduced view of all the values generated by assessments.
Recommendation: *These reports could be used as an initial view of analysis output.*

As a first step the report pictured below should be checked.



This report gives the user, at a glance, the information they may wish to investigate further. A sample of the output generated by this report is shown below:

Group: Family = S10_N20 20mm 20%FA.

Family	FamilyClan	Grade	First Triggered On:	Last Triggered On:	#	Reason
S10_N20 20mm 20%FA	SADL	N20	5/07/2006	5/08/2007	217	High Actual Density
S10_N20 20mm 20%FA	SADL	N20	16/09/2006	5/08/2007	108	High predicted strength
S10_N20 20mm 20%FA	SADL	N20	2/06/2007	5/08/2007	10	No Data
S10_N20 20mm 20%FA	SADL	N20	5/07/2006	5/08/2007	160	High Slump Failure
S10_N20 20mm 20%FA	SADL	N20	20/10/2006	5/08/2007	75	High pred strength var
S10_N20 20mm 20%FA	SADL	N20	2/11/2006	1/08/2007	24	Low Sampling
S10_N20 20mm 20%FA	SADL	N20	3/09/2006	31/07/2007	60	Insufficient Data
S10_N20 20mm 20%FA	SADL	N20	2/11/2006	31/07/2007	178	High yield
S10_N20 20mm 20%FA	SADL	N20	2/11/2006	31/07/2007	199	High yield variation
S10_N20 20mm 20%FA	SADL	N20	27/08/2006	31/07/2007	851	Mix Changed
S10_N20 20mm 20%FA	SADL	N20	14/01/2007	17/04/2007	34	Low yield
S10_N20 20mm 20%FA	SADL	N20	2/11/2006	1/02/2007	20	No Target Grading

Assuming it is currently 06/08/2007 the user would only be interested in the first five rows of this table for this particular family. This is assuming that any recommendations generated earlier have been dealt with already.

Each row in the report above gives a count of how many times this recommendation has been generated. It is sometimes the case that two separate assessments used the same data set and thus generated the same recommendation. To get a better idea of whether or not this has occurred, the report 'Individual Recommendation Summary' may be used. A snapshot of this report, for the same family as the one above, is shown.

S10_N20 20mm 20%FA	SADL	N20	5/08/2007	STRENGTH	58	High Actual Density	Actual Density 2263.63
S10_N20 20mm 20%FA	SADL	N20	31/07/2007	STRENGTH	1	High Actual Density	Actual Density 2279.06
S10_N20 20mm 20%FA	SADL	N20	30/07/2007	STRENGTH	9	High Actual Density	Actual Density 2271.88
S10_N20 20mm 20%FA	SADL	N20	29/05/2007	STRENGTH	12	High Actual Density	Actual Density 2267.21
S10_N20 20mm 20%FA	SADL	N20	17/05/2007	STRENGTH	1	High Actual Density	Actual Density 2263
S10_N20 20mm 20%FA	SADL	N20	16/05/2007	STRENGTH	29	High Actual Density	Actual Density 2264.54
S10_N20 20mm 20%FA	SADL	N20	17/04/2007	STRENGTH	7	High Actual Density	Actual Density 2274.51
S10_N20 20mm 20%FA	SADL	N20	10/04/2007	STRENGTH	20	High Actual Density	Actual Density 2283.85
S10_N20 20mm 20%FA	SADL	N20	21/03/2007	STRENGTH	14	High Actual Density	Actual Density 2286.68
S10_N20 20mm 20%FA	SADL	N20	7/03/2007	STRENGTH	13	High Actual Density	Actual Density 2277.11

It can be seen that the same 'High Actual Density' values were obtained and used to calculate the statistics from the 31/07/2007 to 05/08/2007.

Statistics

Individual statistics can be viewed through these reports. Targets and limits should be present where applicable.

Summary reports can be viewed to determine the number of changes and when these occurred or individual statistic reports can be used for more in depth analysis.

Due to the large amount of data available the user should identify which families as well as which assessment date they are interested in before running the filters. These reports should be used as a source of very specified information once the user has identified an errant value from the recommendation reports.

Charts

Charts are available for a graphical view of assessment data. These charts can be used to determine any trends that the statistical values might be taking.