COATING
ADVIES
NEDERLAND

User manual Rev. 8005

Process control

COATING
ADVIES
NEDERLAND

Content

1 **Preface**

1.1 **Purpose**

This program has been developed to register and control process values, and to analyze processes using statistical algorithms.

Using this program will give you a good insight in your processes, their manageability and predictability.
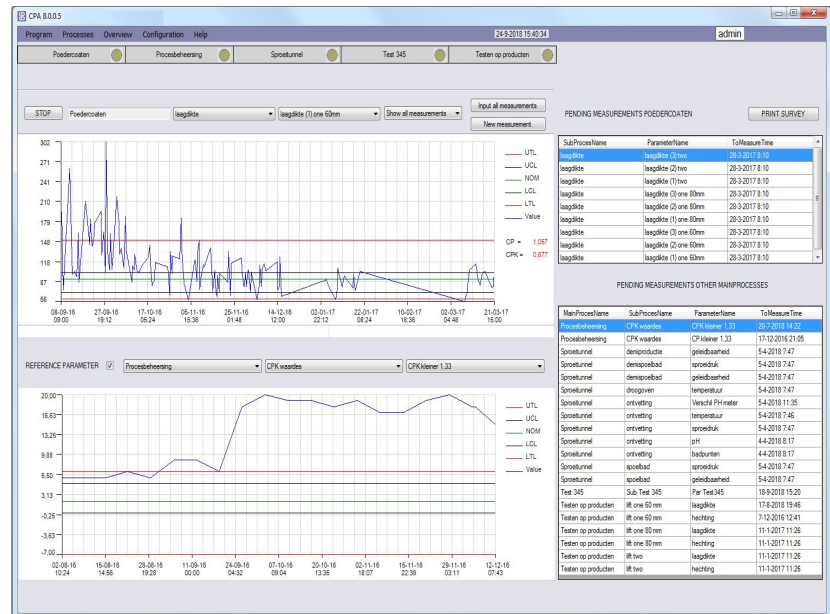
1.2 **Measuring frequency assurance**

For each parameter following time intervals are defined, time after start of process, time interval between two measurements and time after (corrective) action has been taken. The system will alert you after these times to perform a new measurement .

1.3 **Overview of processes**

As the process operator inputs measurements, graphs will be created to display a historical overview of the running processes. In the background statistical algorithms will be run on the processes to generate CP / CPK indexes.. These indexes can furthermore be used to determine stability and predictability e.g. what will be the change of large fluctuations in product quality that can lead to rejection of products.

2 Program
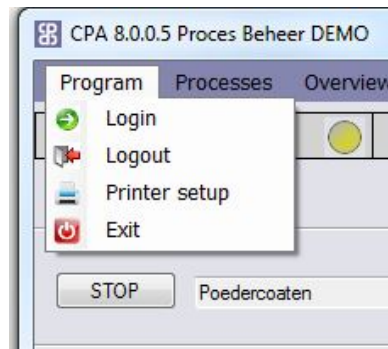
2.1 Login

When you run the program for the first time please login with default username / password (admin / cpa). See section "user management" for adding new users. Language can be selected for the specific user.

2.2 Logout

To start using the program as a different user / language please select program -> logout. Processes will continue to run.

2.3 Printer setup

Configure the printer setting. Reports generated by the program will all be in "landscape" mode. Change your printer setting accordingly.

2.4 Exit

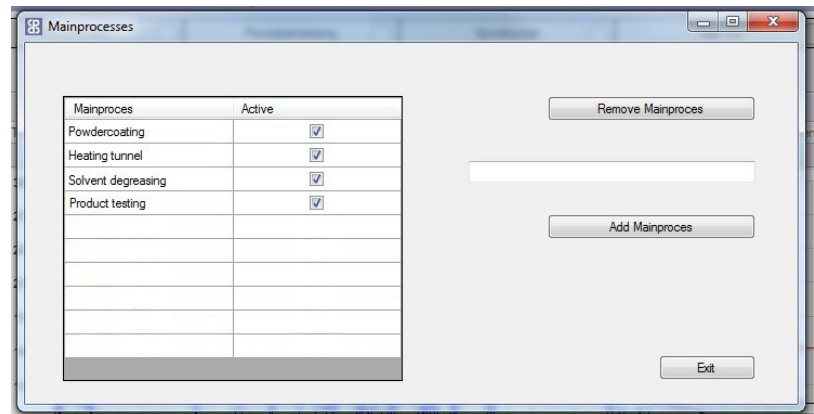By choosing exit the program will be closed and data will be saved to the database.

3 Processes

Menu item processes, view and define main processes, subprocesses and parameters.

3.1 Main processes

3.1.1 Add Main processes

To add a mainprocess please provide name and select button " add mainprocess". Name has to contain at least 5 characters.

3.1.2 Remove Mainprocess

! Main processes can only be removed if no subprocesses are associated. Please remove these subprocesses before removing main processes. !

**COATING
ADVIES**
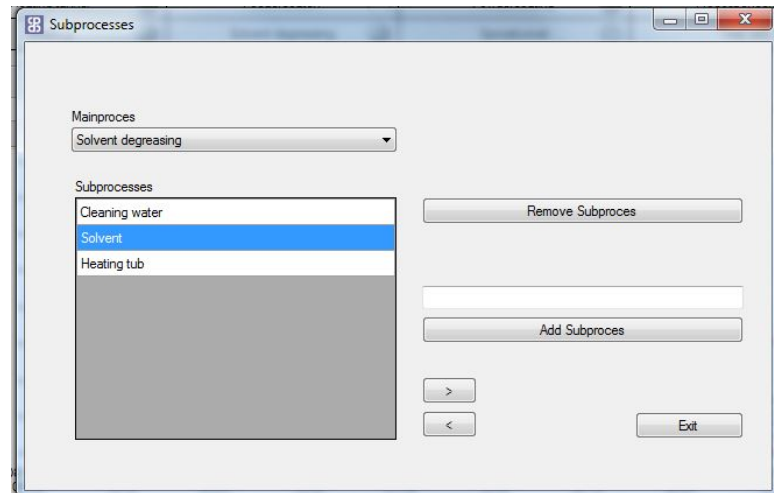NEDERLAND

3.2 Subprocesses

3.2.1 Add Subprocesses

To add a subprocess select mainprocess and provide name, select button " add subprocess".

! Name subprocess has to contain at least 5 characters. !

3.2.2 Remove Subprocess

To remove a subprocess, select subprocess in left panel, select button "Remove subprocess".
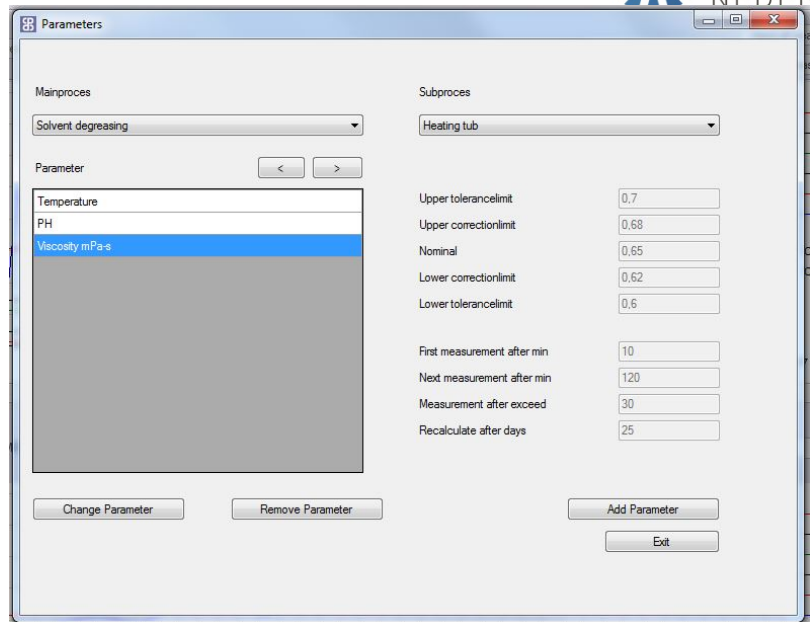

3.3 Parameters

In the submenu parameters multiple process parameters can be defined. Furthermore different aspects of the parameter can be defined like tolerance limits, correction limits and nominal value. Also time schedule of measurement has to be defined.
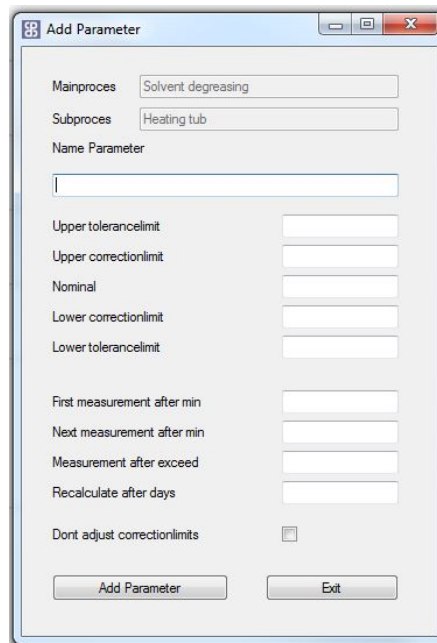
3.3.1 Add Parameters

Select mainprocess / subprocess to which parameters has to be added. Select button add parameter.

Push button "Add Parameter"

3.4 Reference parameter

By selecting checkbox reference parameter a second graph will be displayed so correlation between processes can be determined. E.g. thickness of paint layer related to temperature of material.

COATING ADVIES NEDERLAND

4 Input measurements

4.1 Input only one measurement

To input just one measurement:

- Double click on pending measurement in table view pending measurements.
- Click on button "New Measurement"

In both cases following window will be shown.

COATING
ADVIES
NEDERLAND

If value exceeds the limits a remarks has to be given, otherwise value won't be committed.

4.2 Input multiple measurements

To input multiple values, (e.g. after process operator has filled the survey list) , select "Input all measurements". However, no different measurement times can be given !

COATING
ADVIES
NEDERLAND

Input all measurements

Hoofdproces	Subproces	Parameter	Waarde	Opmerkingen
Powdercoating	Layer thicknes	thicknes (1) two		
Powdercoating	Layer thicknes	thicknes (2) two		
Powdercoating	Nozzles	Gap		
Powdercoating	Nozzles	Cleaning		
Powdercoating	Voltage	Ground difference		
Powdercoating	Voltage	Left plug		
Product testing	Layer thicknes	Inside		
Product testing	Layer thicknes	Outside		
Heating tunnel	Load area (2)	Temp		
Heating tunnel	Load area (2)	Humidity		
Solvent degreasing	demi	Voltage		
Solvent degreasing	demi	Resistance		
Solvent degreasing	droogoven	Temp		
Drying oven	demi	geleidbaarheid		
Powdercoating	Nozzles	Gap		
Powdercoating	Nozzles	Cleaning		
Powdercoating	Voltage	Ground difference		
Powdercoating	Voltage	Left plug		
Product testing	Layer thicknes	Inside		
Product testing	Layer thicknes	Outside		
Heating tunnel	Load area	Temp		
Heating tunnel	Load area	Humidity		
Solvent degreasing	Heating tub	Temperature		
Solvent degreasing	Heating tub	PH		
Solvent degreasing	Heating tub	Viscosity mPa-e		

Input measurements   26-09-2018 12:09   Exit

5 Overview

CPA 8.0.0.5 Proces control DEMO

Program   Processes   Overview   Configuration   Help

Drying oven
Product testing

Overview processes parameters
Overview CP/CPK values
Details measurements in database
Recalculate Sigma CP CPK values

START   Heating tunnel   Load area
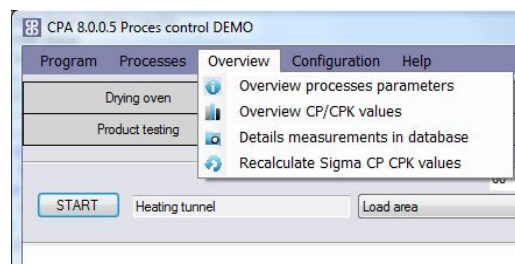
5.1 Overview processes parameters

Overview of processes and parameters, clicking the "+" sign will expand the tree view.

COATING ADVIES NEDERLAND

5.1.1 Print survey

Select menu "print survey". By printing to a PDF printer a pdf file will be generated containing all process info.

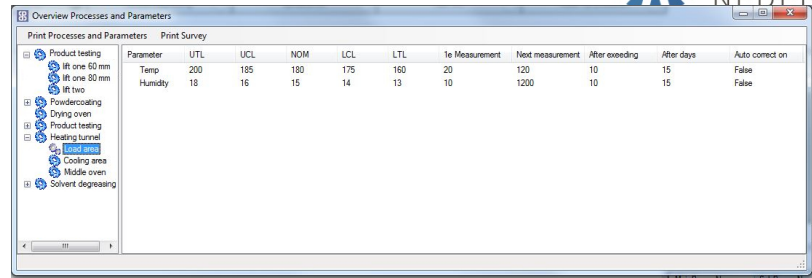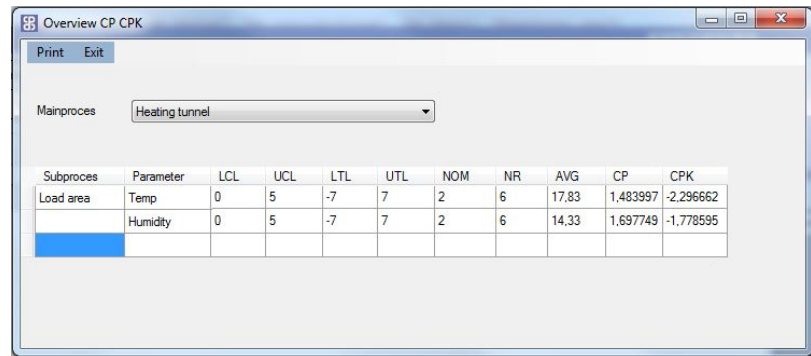Report overview Processes Subprocesses Parameters 26-9-2018 14:47:43   Page 3-4

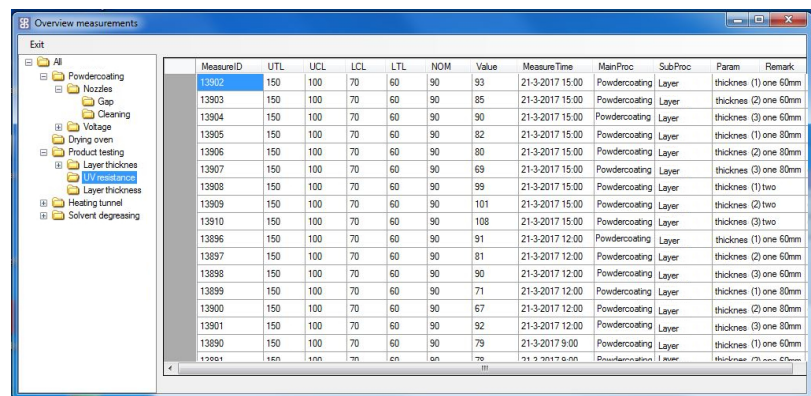|										
Gap	10	9	8	7	6	1	1	1	15	False
Cleaning	3	2	1	0	-1	10	11	11	11	False
Subproces Voltage										
Parameter	UTL	UCL	NOM	LCL	LTL	1e input	Next input	After exeeding	After days	Auto correct on
Ground difference	3	2	1	0	-1	1	1	1	1	False
Left plug	5000	4800	4600	4400	4200	1	1	1	1	False
Mainproces Drying oven										
Mainproces Product testing										
Subproces Layer thicknes										
Parameter	UTL	UCL	NOM	LCL	LTL	1e input	Next input	After exeeding	After days	Auto correct on
Inside	45	20	15	10	0	10	20	1200	15	False
Outside	65	60	55	50	45	10	20	1200	15	False
Subproces UV resistance										
Parameter	UTL	UCL	NOM	LCL	LTL	1e input	Next input	After exeeding	After days	Auto correct on
Subproces Layer thickness										
Parameter	UTL	UCL	NOM	LCL	LTL	1e input	Next input	After exeeding	After days	Auto correct on
Mainproces Heating tunnel										
Subproces Load area										
Parameter	UTL	UCL	NOM	LCL	LTL	1e input	Next input	After exeeding	After days	Auto correct on
Temp	200	185	180	175	160	20	120	10	15	False
Humidity	18	16	15	14	13	10	1200	10	15	False
Subproces Cooling area										
Parameter	UTL	UCL	NOM	LCL	LTL	1e input	Next input	After exeeding	After days	Auto correct on
Subproces Middle oven										
Parameter	UTL	UCL	NOM	LCL	LTL	1e input	Next input	After exeeding	After days	Auto correct on
Mainproces Solvent degreasing										
Subproces Cleaning water										
Parameter	UTL	UCL	NOM	LCL	LTL	1e input	Next input	After exeeding	After days	Auto correct on
Subproces Solvent										

COATING ADVIES NEDERLAND

5.2 Overview CP/CPK values

Selecting this menu option will give you a quick overview of the CP/CPK values of the parameters. Every industry has it is own standard, in de Coating industry CPK-values smaller then 1,3 are considered too low !

5.3 Detailed overview measurements

5.4 Recalculate Sigma CP CPK values

CP/CPK values are calculated immediately when inputting a new value. However if measurements are inserted instead of appended or parameter settings have been changed this will ensure that all CP/CPK values are recalculated. This won't be necessary in normal operating mode !
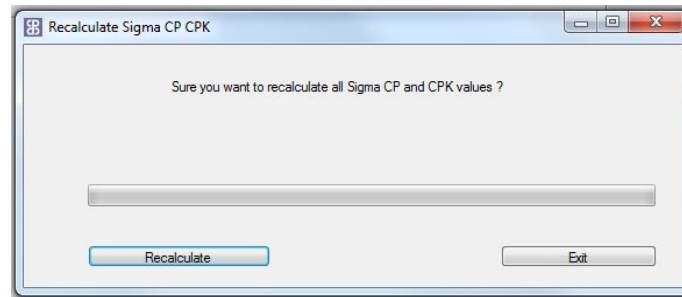
6 Configuration

6.1 General

General configuration like database location, scheduling of backup and log levels.

6.2 Users

To administer users of the system, add, change and delete users.

User can be one of the following user types :

User type	Permissions
Operator	Insert measurements on actual date, view and print. Change own password.
Admin	Delete measurements, change time of measurements, recalculate CP/CPK , add change all users.

6.3 Registration

Registration of license.

6.4 Save database

Save database to location given in Configuration -> General. Before making large changes to the database best practice will be to backup the database.

6.5 Input measurement

Input only one measurement.

6.6 Clean database

Remove inconsistencies in database like multiple measurements on same time, measurements for non-existing / removed parameters. Remove all measurements before given date thus reducing the size of your database.

6.7 External output, CSV

Generate a file containing measurements in a Comma Separated Values (CSV) format.

File generated will contain the following 8 columns

Measurement time, Mainprocess, Subprocess, Parameter , Value ,CP , CPK , Remark

7 Restore database backup

Open Configuration -> registration write down / copy license numbers. The database contains the registration keys and will reinstalled in case you are restoring a database with old registration keys.

Stop the program , Program -> exit.

The file c:\spc\spc.spf contains the database, before overwriting it would be good practice to copy the file to a save place !

Next rename or copy the backup file (e.g. spc201808221030.bak) to c:\spc\spc.spf

Start the program and if needed adjust Program -> Configuration -> Registration.

In case of problems please contact info@coatingadvies.nl

8 Glossary

Mainprocess	An production installation like powder coating machinery or an end product like bumpers.
Subprocess	Part of the mainprocess like heating oven or the subpart of a product e.g. bolts of a bumper.
Parameter	Values of a subprocess to be measured like temperature or diameter.
Nominal	The most ideal value of a parameter.
Correction limits	When a measurement exceeds these limits, the chances that this is a value normally to be expected within process, are so slim to action needs to be taken. According to the statistical algorithm $RG = NOM \pm (\sigma * 1.88)$
Tolerance limits	Whenever a measurement exceeds this limits the quality of the end product can no longer be guaranteed. I t would be best to stop the processes related to this measurement and to register all products made during the arising of these values. Tolerance limits have to be determined in accordance with supplier and process manager (e.g. tolerance limits of chemicals may vary based upon supplier and used machinery)
1e measurement after	Time in minutes between start of process and first measurement.

Next measurement after	Time between consecutive measurements after first measurement has been succeeded.
Measurement after exeeding limits	Time between two measurements of which the first has exceeded the correction / tolerance limits. After exceeding these limits process has be adjusted and therefor next measurement has to be shortly after exceed occurred.
Recalculate after	Number of days upon which the CP and CPK values will be calculated. Please notice that when with time interval number of measurements is less than 30 no CP / CPK value will be calculated.
CP value	This number represents how much the process is expected to operate between the tolerance limits. If this number is below 1,3 the process isn't predictable enough. The CP value determined by the following algorithm: $CP = (UTL - LTL) / (6 * \sigma)$
CPK value	This number represents how much the process will operate between the tolerance limits. Goal is to keep this value above 1,3. The CPK value is determined by the following algorithm: $CPK = (min (x' - LTL), (UTL - x')) / (3 * \sigma)$

9 Liability

This Process control software will help you administer and improve the manageability of your process(parameters). However, the liability for checking these parameters and their tuning will still be the responsibility of the process controller or process manager. Therefore, unless we specifically agree in writing to do so, we do not accept any liability whatsoever or howsoever arising out of the use of this software.