# CUTS – CRUDE OIL DATA MANAGER

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## GENERALITIES

**CUTS** is the tool of Prometheus DSS focused on crude oil characterization.

It handles crude oil data permitting to keep raw material information reliable and updated and builds a detailed characterization database useful for refinery processing calculations.

The information generated by this tool is used by planning and scheduling models to determine the yields and the properties of the oil fractions produced by the crude as well as by rigorous thermodynamic simulators to perform Vapour Liquid Equilibria Calculations useful for process design calculations.

# MULTIDIMENTIONAL REGRESSION

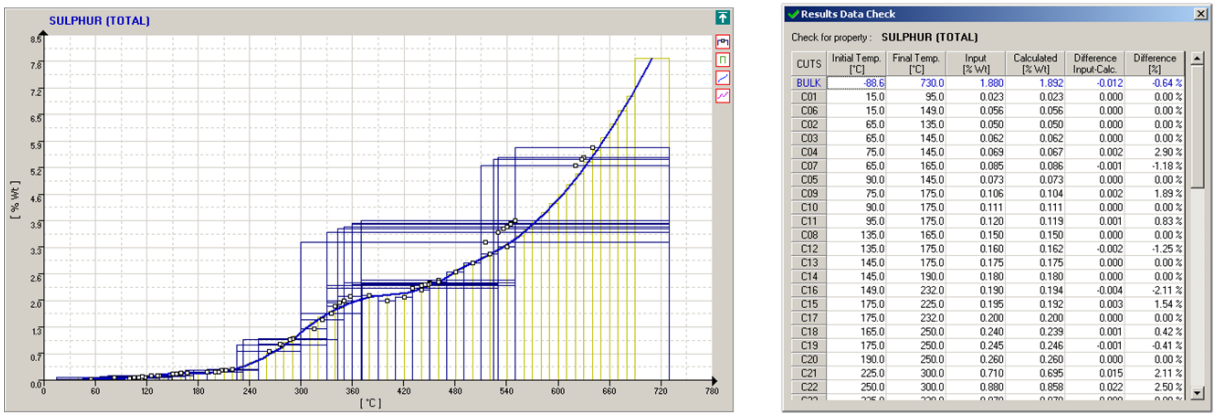
For an effective planning of Refinery operation it is necessary to dispose of reliable models calculating the actual yields of refinery units as well as the chemical physical properties of the intermediates produced by crude processing: then, the good characterisation of crude oils and intermediates fed to the refinery is fundamental to reach results adherent to reality.

CUTS makes available to its users a proprietary technology (multidimensional regression) specifically developed to elaborate Crude Assay data in order to produce a library of congruent data that can be queried for all the properties of any fraction, irrespective of the original source, form and consistency of the input assay.

CUTS characterises every Crude Oil as a mix of pure components (C5 minus) and “pseudo-components” (C6 plus), which overall cover the entire crude boiling range. Each pseudo component envelops pure components boiling in a narrow range of 10 °C.

Creating a distribution curve by multidimensional regression on assay data, CUTS calculates the values of appropriate quality characteristics for each pseudo component. The software distributes properties of the original assay, finding the best agreement between the natural curve shape and the input data. The algorithm is designed to calculate consistent values for contiguous pseudo components, while special operating parameters are available to harmonise the shape of the resulting curve, if necessary.

The multidimensional regression defines the property distribution curve accounting for the reliability assigned to each property value, applying endorsed blending rules (blending indexes are applied when necessary), considering the crude oil components yields and the shape of the resulting distribution.




| CUTS | Initial Temp. [°C] | Final Temp. [°C] | Input [% Wt] | Calculated [% Wt] | Difference Input-Calc. | Difference [%] |
|---|---|---|---|---|---|---|
| BULK | -88.6 | 730.0 | 1.880 | 1.892 | -0.012 | -0.64 % |
| C01 | 15.0 | 95.0 | 0.023 | 0.023 | 0.000 | 0.00 % |
| C06 | 15.0 | 149.0 | 0.056 | 0.056 | 0.000 | 0.00 % |
| C02 | 65.0 | 135.0 | 0.050 | 0.050 | 0.000 | 0.00 % |
| C03 | 65.0 | 145.0 | 0.062 | 0.062 | 0.000 | 0.00 % |
| C04 | 75.0 | 145.0 | 0.069 | 0.067 | 0.002 | 2.90 % |
| C07 | 65.0 | 165.0 | 0.085 | 0.086 | -0.001 | -1.18 % |
| C05 | 90.0 | 145.0 | 0.073 | 0.073 | 0.000 | 0.00 % |
| C09 | 75.0 | 175.0 | 0.106 | 0.104 | 0.002 | 1.89 % |
| C10 | 90.0 | 175.0 | 0.111 | 0.111 | 0.000 | 0.00 % |
| C11 | 95.0 | 175.0 | 0.120 | 0.119 | 0.001 | 0.83 % |
| C08 | 135.0 | 165.0 | 0.150 | 0.150 | 0.000 | 0.00 % |
| C12 | 135.0 | 175.0 | 0.160 | 0.162 | -0.002 | -1.25 % |
| C13 | 145.0 | 175.0 | 0.175 | 0.175 | 0.000 | 0.00 % |
| C14 | 145.0 | 190.0 | 0.180 | 0.180 | 0.000 | 0.00 % |
| C16 | 149.0 | 232.0 | 0.190 | 0.194 | -0.004 | -2.11 % |
| C15 | 175.0 | 225.0 | 0.195 | 0.192 | 0.003 | 1.54 % |
| C17 | 175.0 | 232.0 | 0.200 | 0.200 | 0.000 | 0.00 % |
| C18 | 165.0 | 250.0 | 0.240 | 0.239 | 0.001 | 0.42 % |
| C19 | 175.0 | 250.0 | 0.245 | 0.246 | -0.001 | -0.41 % |
| C20 | 190.0 | 250.0 | 0.260 | 0.260 | 0.000 | 0.00 % |
| C21 | 225.0 | 300.0 | 0.710 | 0.695 | 0.015 | 2.11 % |
| C22 | 250.0 | 300.0 | 0.880 | 0.858 | 0.022 | 2.50 % |

**Figure 1 - Multidimensional regression of Sulphur content data**

# CHARACTERIZATION PROPERTIES

Table 1 lists the fundamental properties (e.g. with property values estimated for each pseudo component through the above mentioned methods) managed by the current release, the relative blending rule and meaningful boiling range:

| CUTS FUNDAMENTAL PROPERTIES | | | |
|---|---|---|---|
| **PROPERTY** | **UNIT** | **Blending Rule** | **Boiling Range** |
| Weight TBP Yield | % weight | Linear weight | Whole Crude |
| Volume TBP Yield | % volume | Linear volume | Whole Crude |
| Density@15°C | kg/dm3 | Linear volume | Whole Crude |
| Sulphur Content | % weight | Linear weight | Whole Crude |
| Mercaptan Sulphur Content | % weight | Linear weight | Whole Crude |
| Kinematic Viscosity @50°C | cst | Index weight | Whole Crude |
| Kinematic Viscosity @100°C | cst | Index weight | Whole Crude |
| Acidity | mg KOH/gr | Linear weight | Whole Crude |
| Aromatics Content [FIA] | % volume | Linear volume | Gasoline |
| Naphthenic Content [FIA] | % volume | Linear volume | Gasoline |
| Paraffin Content [FIA] | % volume | Linear volume | Gasoline |
| Aromatics Content [Gas chromatography] | % weight | Linear weight | Gasoline |
| Naphthenic Content [Gas chromatography] | % weight | Linear weight | Gasoline |
| Paraffin Content [Gas chromatography] | % weight | Linear weight | Gasoline |
| Octane Number Motor Method (MON) | | Linear volume | Gasoline |
| Octane Number Research Method (RON) | | Index volume | Gasoline |
| RON + Tetra Ethyl Lead 0.5 | | Index volume | Gasoline |
| RON + Tetra Methyl Lead 0.5 | | Index volume | Gasoline |
| Reid Vapour Pressure | PSIA | Index volume | Gasoline |
| Cyclopentane Content | % weight | Linear weight | Gasoline |
| Cyclohexane Content | % weight | Linear weight | Gasoline |
| i-Hexanes Content | % weight | Linear weight | Gasoline |
| n-Hexane Content | % weight | Linear weight | Gasoline |
| Benzene Content | % weight | Linear weight | Gasoline |
| Methylcyclopentane Content | % weight | Linear weight | Gasoline |
| CC5 Content | % weight | Linear weight | Gasoline |
| Freezing Point | °C | Index volume | Mid Distillates |
| Cloud Point | °C | Index volume | Mid Distillates |
| Pour Point | °C | Index volume | Mid Distillates |
| Refraction Index @20°C | | Index volume | Mid Distillates |
| Refraction Index @70°C | | Index volume | Mid Distillates |
| Aniline Point | °C | Linear weight | Mid Distillates |
| Total Nitrogen Content | ppm weight | Linear weight | Mid Distillates and Residua |
| Basic Nitrogen Content | ppm weight | Linear weight | Mid Distillates and Residua |
| Ash Content | ppm weight | Linear weight | Mid Distillates and Residua |
| Asphaltenes Content | % weight | Linear weight | Mid Distillates and Residua |
| Conradson Carbon Residue | % weight | Linear weight | Mid Distillates and Residua |
| Nickel Content | ppm weight | Linear weight | Mid Distillates and Residua |
| Vanadium Content | ppm weight | Linear weight | Mid Distillates and Residua |
| Wax Content | % weight | Linear weight | Mid Distillates and Residua |

**Table 1 - CUTS Fundamental Properties**

Figure 2 shows some examples of property distribution curves calculated applying the multi-dimensional regression method to typical crude assay data:

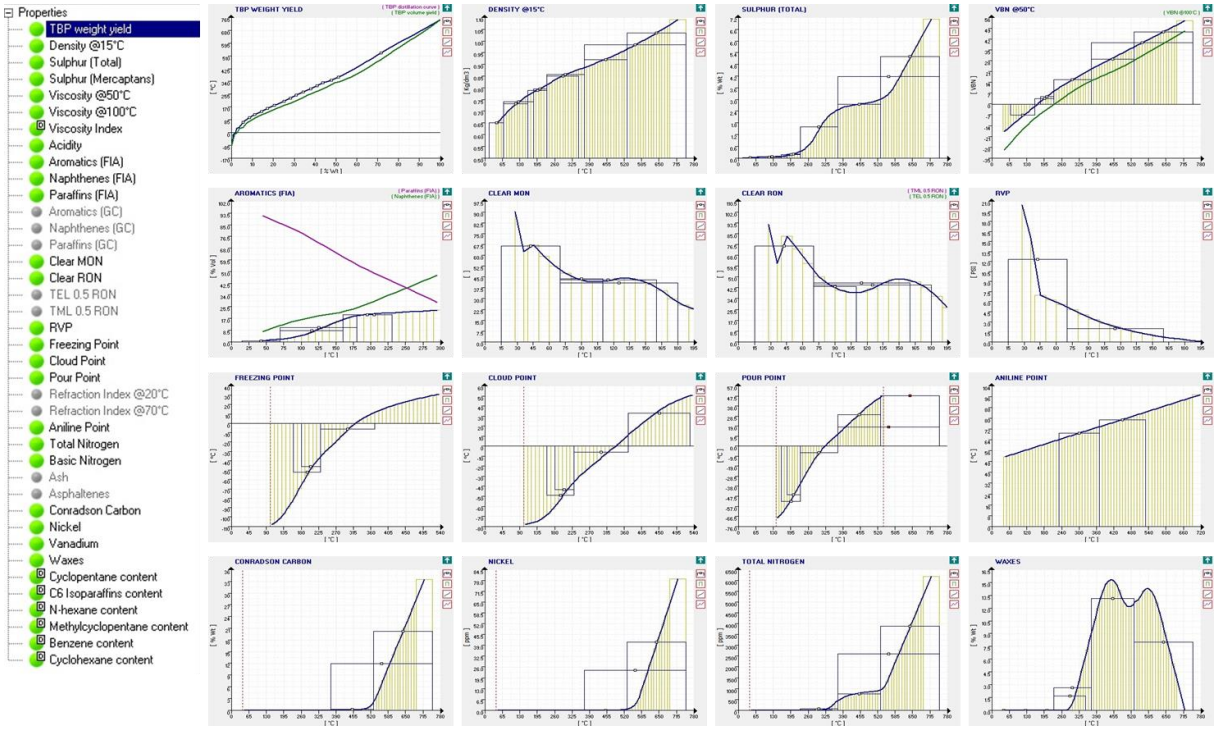



**Figure 2 - Calculated distributions for various properties**

The properties listed in Table 2 are estimated from the fundamental properties (through proprietary or published correlations) during the re-cutting process:

| CUTS DERIVED PROPERTIES | | |
|---|---|---|
| **PROPRIETY** | **UNIT** | **Boiling Range** |
| Characterisation Factor UOPK | | Whole Crude |
| Molecular Weight | | Whole Crude |
| ASTM D86 Recovered @ 7 Test Temperatures | % volume | Whole Crude |
| ASTM D86 Distillation Curve Volume Basis | °C | Whole Crude |
| ASTM D2892 Distillation Curve (TBP) Volume Basis | °C | Whole Crude |
| ASTM D2892 Distillation Curve (TBP) Weight Basis | °C | Whole Crude |
| Refraction Index | | Gasoline and Mid Distillates |
| Aromatics Content [ndM Method] | % weight | Mid Distillates |
| Naphthenic Content [ndM Method] | % weight | Mid Distillates |
| Paraffin Content [ndM Method] | % weight | Mid Distillates |
| Cetane Index | | Mid Distillates |
| Smoke Point | millimetres | Mid Distillates |
| Viscosity Index | | Mid Distillates and Residua |
| Flash Point | °C | Mid Distillates and Residua |

**Table 2 - CUTS Derived Properties**

# CRUDE DATA SOURCES

CUTS foresees four alternative Crude characterization modes, depending of the type of data available:

- standard input from a crude assay;
- elaborate Field Data (recombining the analysis carried out on a distillation column of any kind);
- calculate crude blends;
- estimate crude properties from few data (applying an innovative data mining approach).

Furthermore the program can automatically import data from external databases and offers many utilities permitting to import data from other crude oils and elaborate them (for example for viscosity data elaboration and estimation).

CUTS permits to add to the database the oil fractions generated by crude re-cutting calculations (for example long residue or Vacuum Cuts). Resulting oil fractions data are therefore saved and treated like any other Crude Oil in the library.

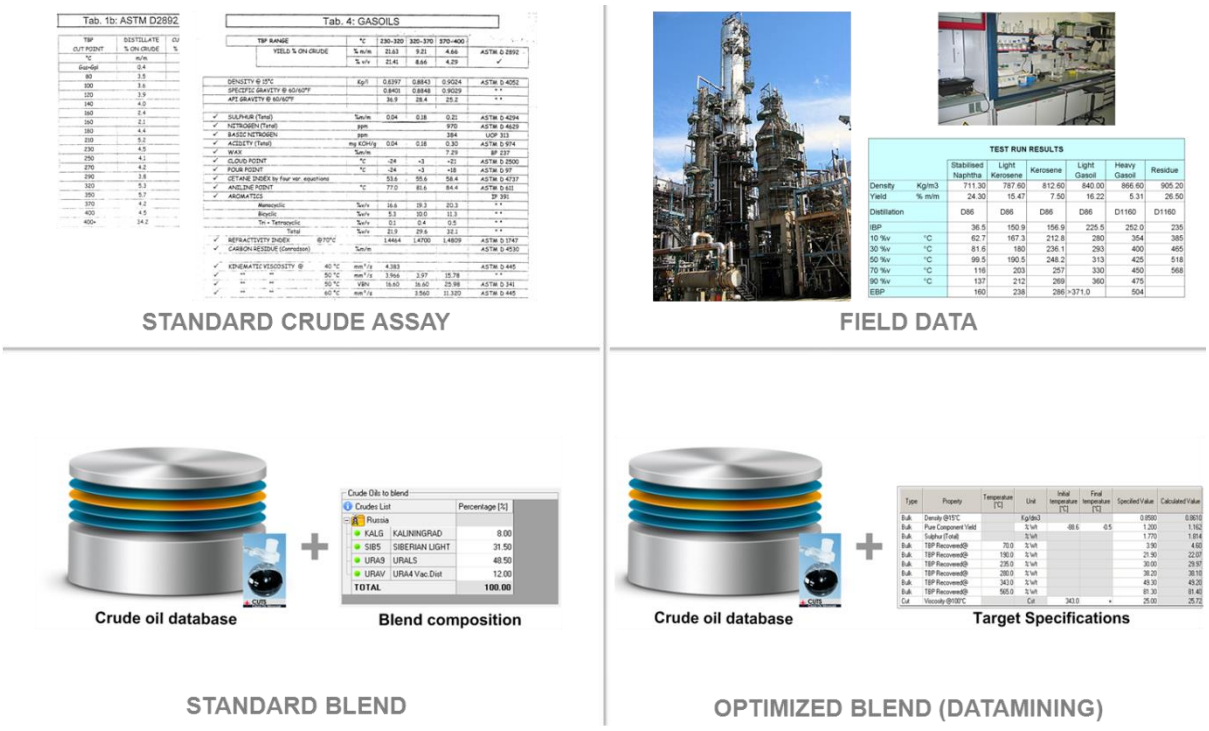



**Figure 3 - Alternative Crude Oil Data Sources**

## CRUDE ASSAY ESTIMATION

CUTS is able to generate a complete crude assay starting from a limited set of characterization data with the “Optimized Blend” feature.

The process is carried out through two steps:

- Selection of the set of crude oils contained in the database that will provide information during the data mining analysis. This step must be handled carefully since it determines the quality ranges that will be allowed for each specification during the analysis. The crude oils of the library must be properly filtered in order to assure a feasible range for any input specification and to control at the same time the degrees of freedom left to the algorithm.
- Run of the data mining analysis targeting the characterization data available (e.g. Density, Sulphur Content, TBP distillation) and production of the set of pseudo-components best representing the current feedstock.

The result is a comprehensive set of congruent data ready to reproduce exhaustively the behaviour of the feedstock in the following calculation modules (planning, scheduling, process design).

The consistency of the characterization data produced by this approach is assured by the integrity of the information associated to each crude oil (or crude oil fraction) represented in the database that has been previously pre-processed by CUTS multidimensional regression.

Figure 4 summarises the results of a test carried out to check the algorithm: the results obtained inputting few specifications of a known crude assay are compared with the crude assay itself.

The table on at the left hand side compares the estimated results with the original assays. The seven values highlighted in the “base” column (Bulk Density, Sulphur, TBP Points, Atmospheric Residue Viscosity) constitute the algorithm input. The radar chart on the right hand side shows, for each input specification the ranges of the crude oils used for the analysis, the input value and the corresponding results.

The library which have been selected to carry out this exercise based on URAL crude oil was composed of 12 components and precisely of 9 crude oils from the same country (Russia) and three oil fractions.

| PROPERTY | UNIT | | BASE | RESULT |
|---|---|---|---|---|
| **Bulk** | | | | |
| Initial temperature | °C | | -88.6 | -88.6 |
| Final temperature | °C | | 700.0 | 710.0 |
| Density @15°C | Kg/dm3 | > | 0.8682 | 0.8679 |
| Sulphur (Total) | % Wt | > | 1.343 | 1.334 |
| Sulphur (Mercaptans) | ppm | | | |
| Viscosity @50°C | Cst | | 5.62 | 5.59 |
| Viscosity @100°C | Cst | | | 1.93 |
| Acidity | mg KOH/g | | 0.170 | 0.169 |
| Total Nitrogen | ppm | | 1804 | 1799 |
| Basic Nitrogen | ppm | | 500 | 500.0 |
| Ash | ppm | | | 131.0 |
| Asphaltenes | % Wt | | | 0.64 |
| Conradson Carbon | % Wt | | 1.79 | 1.67 |
| Nickel | ppm | | 18.0 | 17.7 |
| Vanadium | ppm | | 41.4 | 42.5 |
| Waxes | % Wt | | 10.2 | 8.2 |
| TBP Recovered@100°C | % Wt | | 6.62 | 6.92 |
| TBP Recovered@150°C | % Wt | > | 12.73 | 12.95 |
| TBP Recovered@200°C | % Wt | | 21.58 | 21.78 |
| TBP Recovered@250°C | % Wt | > | 30.77 | 31.27 |
| TBP Recovered@300°C | % Wt | | 40.15 | 40.53 |
| TBP Recovered@350°C | % Wt | | 49.14 | 49.23 |
| TBP Recovered@370°C | % Wt | > | 52.60 | 52.60 |
| TBP Recovered@420°C | % Wt | | 61.07 | 60.77 |
| TBP Recovered@475°C | % Wt | | 69.41 | 69.26 |
| TBP Recovered@525°C | % Wt | > | 76.41 | 76.41 |
| TBP Recovered@565°C | % Wt | | 81.33 | 81.59 |
| **FR Naphtha [C5-150]** | | | | |
| Density @15°C | Kg/dm3 | | 0.707 | 0.709 |
| **Kerosene [150-250]** | | | | |
| Density @15°C | Kg/dm3 | | 0.807 | 0.807 |
| Sulphur (Total) | % Wt | | 0.22 | 0.22 |
| Freezing Point | °C | | -52 | -51 |
| **Diesel [250 - 370]** | | | | |
| Density @15°C | Kg/dm3 | | 0.866 | 0.866 |
| Sulphur (Total) | % Wt | | 1.03 | 1.04 |
| Cloud Point | °C | | -0.1 | -0.4 |
| Viscosity @50°C | Cst | | 3.95 | 3.94 |
| **Atm.Residue [370 + ]** | | | | |
| Density @15°C | Kg/dm3 | | 0.961 | 0.960 |
| Sulphur (Total) | % Wt | | 2.28 | 2.27 |
| Viscosity @50°C | Cst | > | 613.6 | 610.9 |

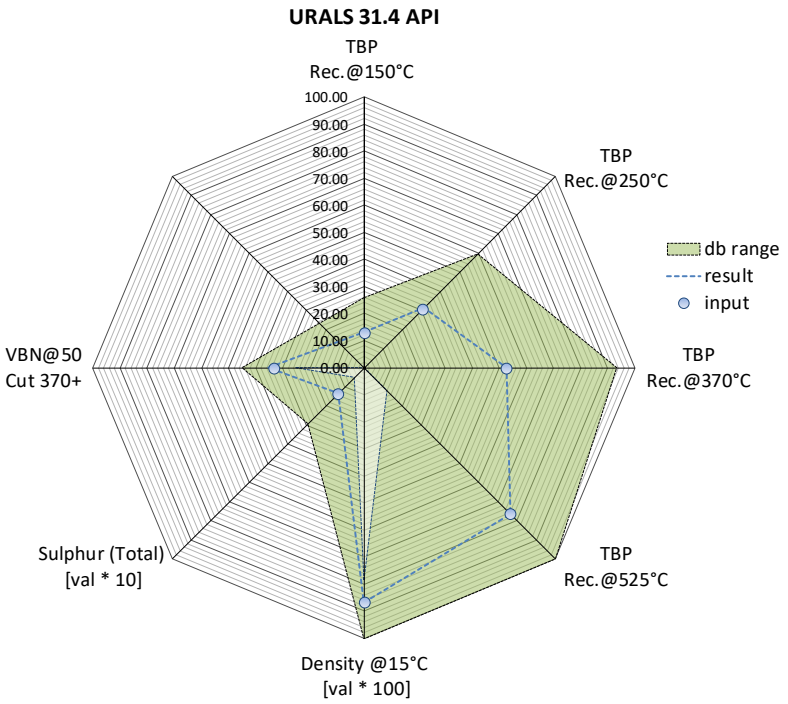



**Figure 4 - Estimation of Ural 31.4 API Crude Assay**

## CRUDE RECUTTING

The narrow cuts characterisation permits reliable re-cutting of crude assay to any requested format: during this process it is possible to set the desired degree of fractionation reproducing either the quality obtainable in the laboratory and in the real unit.

The CDU Simulation feature permits to calculate the quality of the streams produced by complex distillation systems accounting for the real fractionation capability experienced in each distillation column.

The calculation permits to consider the actual fractionation performance of the modelled fractionation system (setting the fractionation indexes) and to specify quality targets (like viscosity or cold properties) instead of End Points.

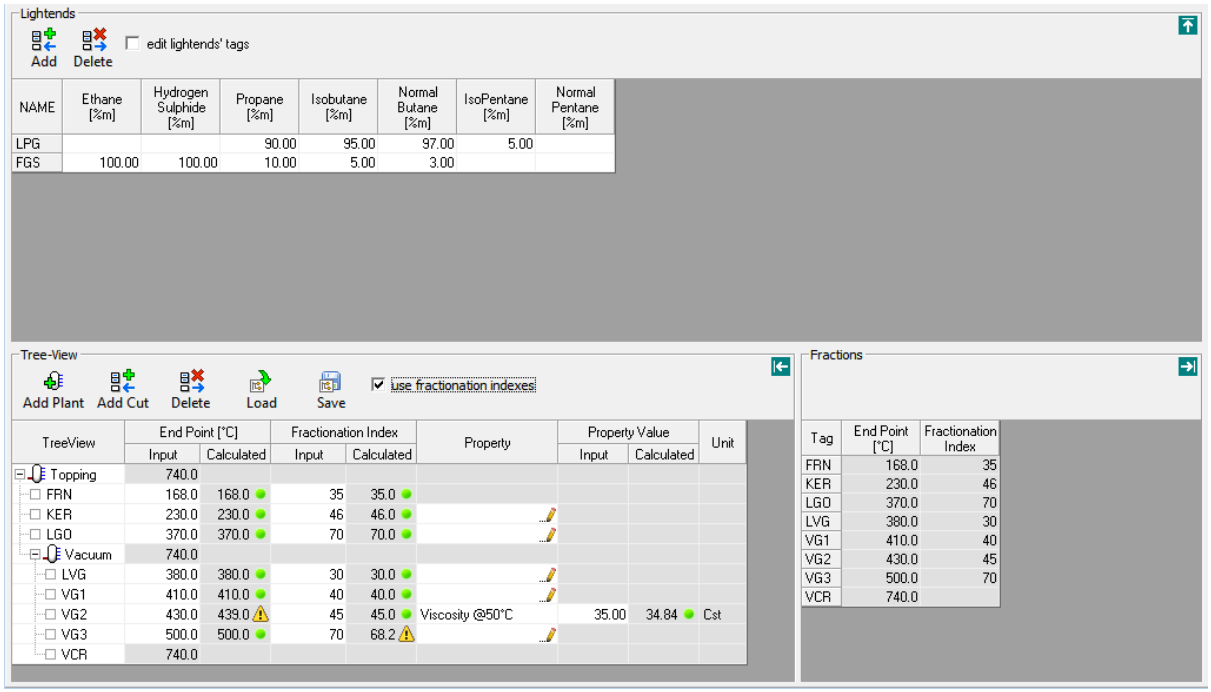



**Figure 5 - CDU Simulation Input Panel**

Basing in the fractionation indexes values CUTS calculates how pseudo component are distributed over the oil fractions produced by the distillation system and calculates yields and qualities accordingly.

This approach permits to fine tune the results of the calculation to the actual performance of existing units in order to produce more reliable planning and scheduling predictions.

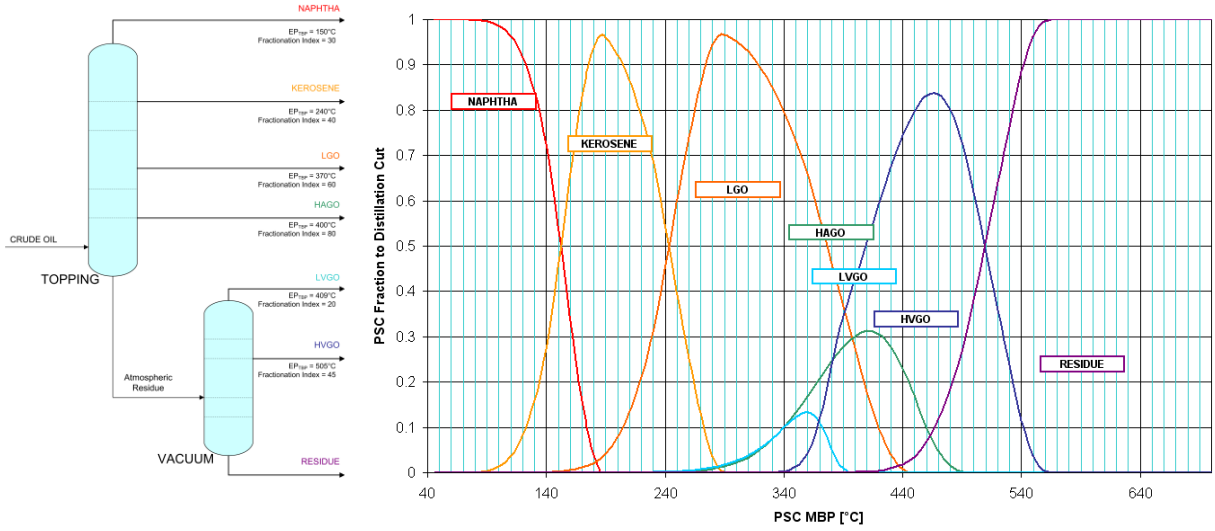



**Figure 6 – Pseudo component distribution over cuts in CDU Simulation**

The crude re-cutting feature permits to calculate the properties of a set of oil fractions for a group of selected crude oils. In this case the re-cutting profile is completely free and it is possible to calculate during the same run also overlapping boiling fractions.

Through the same intuitive panel (see Figure 7) the user selects the crude oils, defines the list of target cuts and the reporting options.

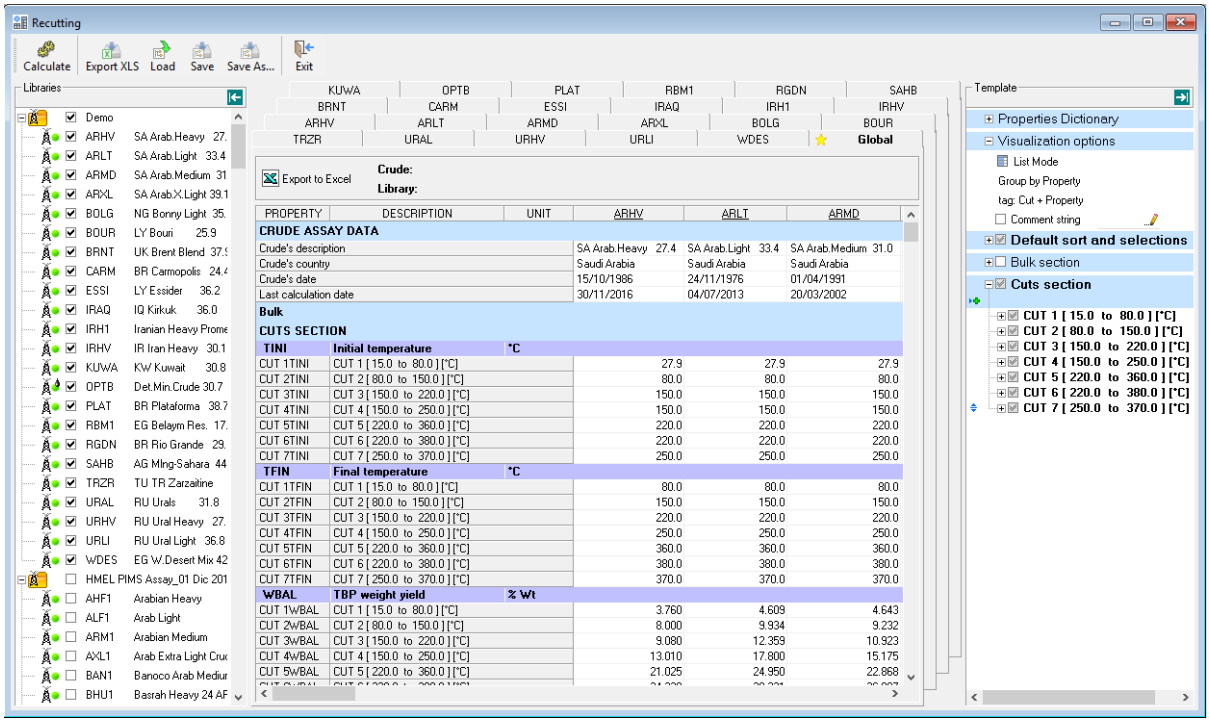
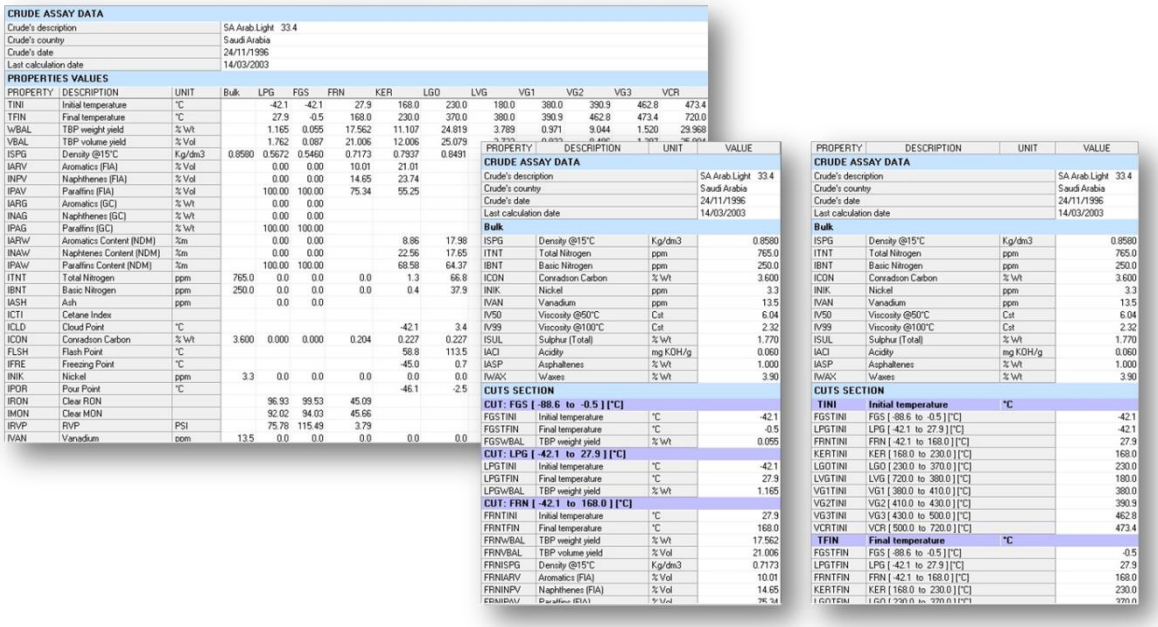



**Figure 7 – Crude re-cutting Input Panel**

# REPORTING

Either program Input (Crude Assay) and Output data (Distribution Curves, Re-Cutting Results, Crude Oil Mixtures Characterisation) can be exported to MS Excel workbooks and used for further elaboration; the format of the output is fully customizable in order to release data in the format required by the client application.



| CRUDE ASSAY DATA | |
|---|---|
| Crude's description | SA Arab.Light 33.4 |
| Crude's country | Saudi Arabia |
| Crude's date | 24/11/1996 |
| Last calculation date | 14/03/2003 |

PROPERTIES VALUES

| PROPERTY | DESCRIPTION | UNIT | Bulk | LPG | FGS | FRN | KER | LGO | LVG | VG1 | VG2 | VG3 | VCR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TINI | Initial temperature | °C | | -42.1 | -42.1 | 27.9 | 168.0 | 230.0 | 180.0 | 380.0 | 390.9 | 462.8 | 473.4 |
| TFIN | Final temperature | °C | | 27.9 | -0.5 | 168.0 | 230.0 | 370.0 | 380.0 | 390.9 | 462.8 | 473.4 | 720.0 |
| WBAL | TBP weight yield | % Wt | | 1.165 | 0.055 | 17.562 | 11.107 | 24.819 | 3.789 | 0.971 | 9.044 | 1.520 | 29.968 |
| VBAL | TBP volume yield | % Vol | | 1.762 | 0.087 | 21.006 | 12.006 | 25.079 | 3.733 | 0.932 | 8.496 | 1.307 | 25.904 |
| ISPG | Density @15°C | Kg/dm3 | 0.8580 | 0.5672 | 0.5460 | 0.7173 | 0.7937 | 0.8491 | | | | | |
| IARV | Aromatics (FIA) | % Vol | | 0.00 | 0.00 | 10.01 | 21.01 | | | | | | |
| INPV | Naphthenes (FIA) | % Vol | | 0.00 | 0.00 | 14.65 | 23.74 | | | | | | |
| IPAV | Paraffins (FIA) | % Vol | | 100.00 | 100.00 | 75.34 | 55.25 | | | | | | |
| IARG | Aromatics (GC) | % Wt | | 0.00 | 0.00 | | | | | | | | |
| INAG | Naphthenes (GC) | % Wt | | 0.00 | 0.00 | | | | | | | | |
| IPAG | Paraffins (GC) | % Wt | | 100.00 | 100.00 | | | | | | | | |
| IARW | Aromatics Content (NDM) | %m | | 0.00 | 0.00 | | 8.86 | 17.98 | | | | | |
| INAW | Naphtenes Content (NDM) | %m | | 0.00 | 0.00 | | 22.56 | 17.65 | | | | | |
| IPAW | Paraffins Content (NDM) | %m | | 100.00 | 100.00 | | 68.58 | 64.37 | | | | | |
| ITNT | Total Nitrogen | ppm | 765.0 | 0.0 | 0.0 | 0.0 | 1.3 | 66.8 | | | | | |
| IBNT | Basic Nitrogen | ppm | 250.0 | 0.0 | 0.0 | 0.0 | 0.4 | 37.9 | | | | | |
| IASH | Ash | ppm | | 0.0 | 0.0 | | | | | | | | |
| ICTI | Cetane Index | | | | | | | | | | | | |
| ICLD | Cloud Point | °C | | | | | -42.1 | 3.4 | | | | | |
| ICON | Conradson Carbon | % Wt | 3.600 | 0.000 | 0.000 | 0.204 | 0.227 | 0.227 | | | | | |
| IFLSH | Flash Point | °C | | | | | 58.8 | 113.5 | | | | | |
| IFRE | Freezing Point | °C | | | | | -45.0 | 0.7 | | | | | |
| INIK | Nickel | ppm | 3.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | |
| IPOR | Pour Point | °C | | | | | -46.1 | -2.5 | | | | | |
| IRON | Clear RON | | | 96.93 | 99.53 | 45.09 | | | | | | | |
| IMON | Clear MON | | | 92.02 | 94.03 | 45.66 | | | | | | | |
| IRVP | RVP | PSI | | 75.78 | 115.49 | 3.79 | | | | | | | |
| IVAN | Vanadium | ppm | 13.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | |

| PROPERTY | DESCRIPTION | UNIT | VALUE |
|---|---|---|---|
| CRUDE ASSAY DATA | | | |
| Crude's description | | | SA Arab.Light 33.4 |
| Crude's country | | | Saudi Arabia |
| Crude's date | | | 24/11/1996 |
| Last calculation date | | | 14/03/2003 |
| Bulk | | | |
| ISPG | Density @15°C | Kg/dm3 | 0.8580 |
| ITNT | Total Nitrogen | ppm | 765.0 |
| IBNT | Basic Nitrogen | ppm | 250.0 |
| ICON | Conradson Carbon | % Wt | 3.600 |
| INIK | Nickel | ppm | 3.3 |
| IVAN | Vanadium | ppm | 13.5 |
| IV50 | Viscosity @50°C | Cst | 6.04 |
| IV99 | Viscosity @100°C | Cst | 2.32 |
| ISUL | Sulphur (Total) | % Wt | 1.770 |
| IACI | Acidity | mg KOH/g | 0.060 |
| IASP | Asphaltenes | % Wt | 1.000 |
| IWAX | Waxes | % Wt | 3.90 |
| CUTS SECTION | | | |
| CUT: FGS [ -88.6 to -0.5 ] [°C] | | | |
| FGSTINI | Initial temperature | °C | -42.1 |
| FGSTFIN | Final temperature | °C | -0.5 |
| FGSWBAL | TBP weight yield | % Wt | 0.055 |
| CUT: LPG [ -42.1 to 27.9 ] [°C] | | | |
| LPGTINI | Initial temperature | °C | -42.1 |
| LPGTFIN | Final temperature | °C | 27.9 |
| LPGWBAL | TBP weight yield | % Wt | 1.165 |
| CUT: FRN [ -42.1 to 168.0 ] [°C] | | | |
| FRNTINI | Initial temperature | °C | 27.9 |
| FRNTFIN | Final temperature | °C | 168.0 |
| FRNWBAL | TBP weight yield | % Wt | 17.562 |
| FRNVBAL | TBP volume yield | % Vol | 21.006 |
| FRNSPG | Density @15°C | Kg/dm3 | 0.7173 |
| FRNIARV | Aromatics (FIA) | % Vol | 10.01 |
| FRNINPV | Naphthenes (FIA) | % Vol | 14.65 |
| FRNIPAV | Paraffins (FIA) | % Vol | 75.34 |

| PROPERTY | DESCRIPTION | UNIT | VALUE |
|---|---|---|---|
| CRUDE ASSAY DATA | | | |
| Crude's description | | | SA Arab.Light 33.4 |
| Crude's country | | | Saudi Arabia |
| Crude's date | | | 24/11/1996 |
| Last calculation date | | | 14/03/2003 |
| Bulk | | | |
| ISPG | Density @15°C | Kg/dm3 | 0.8580 |
| ITNT | Total Nitrogen | ppm | 765.0 |
| IBNT | Basic Nitrogen | ppm | 250.0 |
| ICON | Conradson Carbon | % Wt | 3.600 |
| INIK | Nickel | ppm | 3.3 |
| IVAN | Vanadium | ppm | 13.5 |
| IV50 | Viscosity @50°C | Cst | 6.04 |
| IV99 | Viscosity @100°C | Cst | 2.32 |
| ISUL | Sulphur (Total) | % Wt | 1.770 |
| IACI | Acidity | mg KOH/g | 0.060 |
| IASP | Asphaltenes | % Wt | 1.000 |
| IWAX | Waxes | % Wt | 3.90 |
| CUTS SECTION | | | |
| TINI | Initial temperature | °C | |
| FGSTINI | FGS [ -88.6 to -0.5 ] [°C] | | -42.1 |
| LPGTINI | LPG [ -42.1 to 27.9 ] [°C] | | -42.1 |
| FRNTINI | FRN [ -42.1 to 168.0 ] [°C] | | 27.9 |
| KERTINI | KER [ 168.0 to 230.0 ] [°C] | | 168.0 |
| LGOTINI | LGO [ 230.0 to 370.0 ] [°C] | | 230.0 |
| LVGTINI | LVG [ 720.0 to 380.0 ] [°C] | | 180.0 |
| VG1TINI | VG1 [ 380.0 to 410.0 ] [°C] | | 380.0 |
| VG2TINI | VG2 [ 410.0 to 430.0 ] [°C] | | 390.9 |
| VG3TINI | VG3 [ 430.0 to 500.0 ] [°C] | | 462.8 |
| VCRTINI | VCR [ 500.0 to 720.0 ] [°C] | | 473.4 |
| TFIN | Final temperature | °C | |
| FGSTFIN | FGS [ -88.6 to -0.5 ] [°C] | | -0.5 |
| LPGTFIN | LPG [ -42.1 to 27.9 ] [°C] | | 27.9 |
| FRNTFIN | FRN [ -42.1 to 168.0 ] [°C] | | 168.0 |
| KERTFIN | KER [ 168.0 to 230.0 ] [°C] | | 230.0 |
| LGOTFIN | LGO [ 230.0 to 370.0 ] [°C] | | 370.0 |

**Figure 8 - Customized report example**