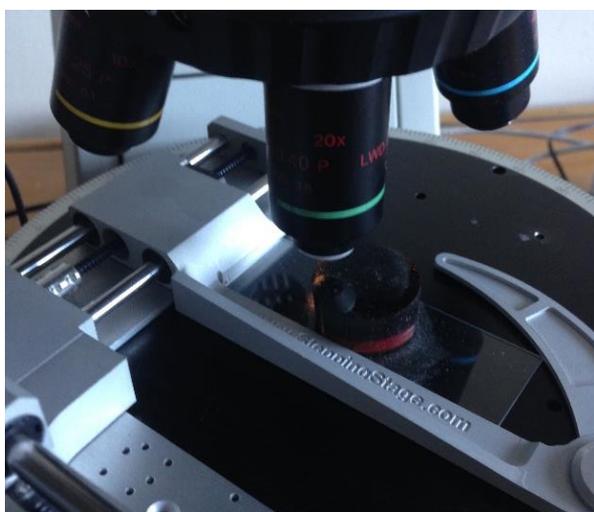
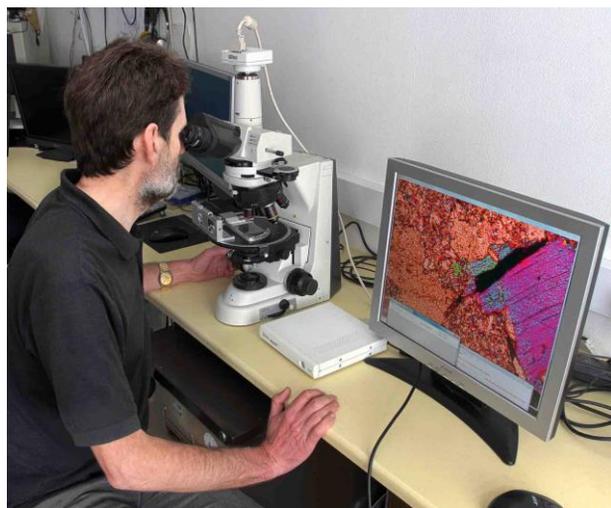


PETROGTM for Coal

Microscopical methods for quantitative determination of phase percentages based on point counting, although time consuming, are the most reliable techniques available. **PETROG** reduces the time required for analysis, increases the reliability of data collection and provides an audit trail by combining repeatability (re-mounting a slide and returning to any previously logged position) with cross-reference of images to visual analysis.

Point counting is performed at the mine, for QC and grading purposes, and prior to use, for instance in steel manufacture for accurately controlling the feed rate and relative proportions of coal and other constituent materials. **PETROG** is the world's foremost point counting tool, across all types of analyses and for all materials, and is used for coal quality analysis in all of the major coal-producing areas, including Australia, South Africa and North America, and in the main steel-producing plants in India and elsewhere.



PETROG supports both reflected light microscopy and transmitted light microscopy, and can be used to accurately locate points previously analysed, or later to be analysed, by other methods, such as scanning electron microscopy. **PETROG** primarily supports manual analysis, with images used to allow logging directly from a monitor and/or for subsequent quality assurance or re-analysis, but the availability of images for every point also allows image analysis and **PETROG** uses patented methods for analysing composition based on a training set provided by the user.

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PETROG

TM

and Standards

Point counting standards that are supported by **PETROG** include:

- ISO 7404, and in particular parts 1 to 5 referring to methods for petrographic analysis, determining maceral group composition, microlithotype, carbominerite and minerite composition and determining microscopically the reflectance of vitrinite.
- ASTM D2799 Standard Method for Microscopical Determination of Volume Percent of Physical Components of Coal and D7708 Standard test method for microscopical determination of the reflectance of vitrinite dispersed in sedimentary rocks.
- Australian Standard 2856, which is based on ICCP & ISO with additional contributions by coal petrographers in Australia, including particularly incident light microscopy for Maceral analysis and microscopical determination of reflectance of coal macerals.



PETROG is recognised by the ICCP and APG (Applied Petrography Group of the British Geological Society) as meeting and exceeding all relevant standards and protocols. The large number of points required by most international standards requires a systematic and automated tool. The Prior/Swift point counter was originally designed for this purpose but ceased production in 2002, by which time **PETROG** was already established as the next generation of point counting tool, bringing the method fully into the digital age with database support, and the SteppingStage removed the manual mechanical element of the process, fully automating the movement in both x and y directions. The SteppingStage has been significantly improved since 2002 and the software has continued to innovate, maintaining the position of **PETROG** as the automatic choice for petrographers in all industries, throughout the world.





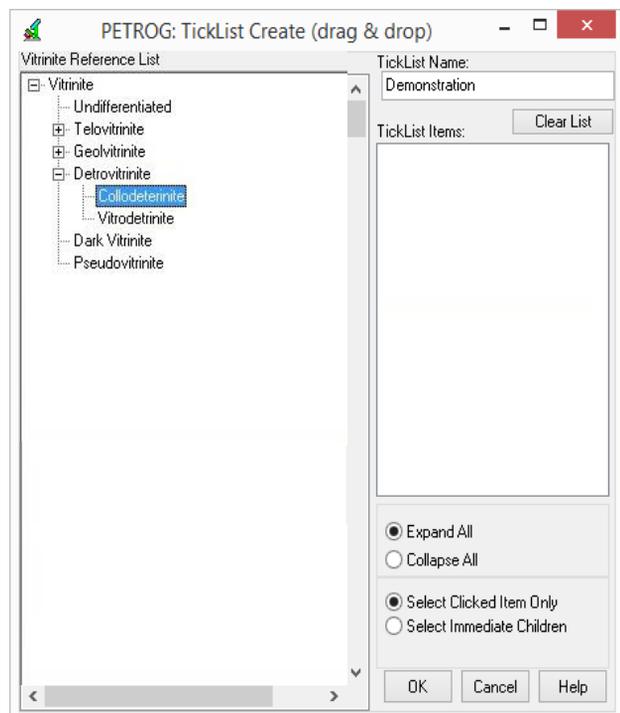
for Quality Assurance

Key advantages of PETROG for point counting include:

- Complete control over the number of points to count (including adaptively changing the number of points during counting, based on, for example, amount of material skipped),
- Ability to specify the stepping pattern, including the shape and size of the sample,
- Options to restart an analysis which is interrupted for any reason (power failure, end of working day, microscope needed for a different purpose, etc.) with no loss of work, re-starting at the correct point on the sample;
- Remembering where on the slide the logged points are located, allowing a position to be re-gained, e.g. for Quality Assurance / Quality Control or for teaching purposes;
- Association of data with images at each point logged;
- Additional analysis of images for reflectance, composition, identification of specific objects, etc.

The SteppingStage forming a part of the **PETROG** system is the most practical way of performing point counting. With the large number of points required for compliance with the standards, it is essential to have a system that:

- maximises the value of the sample material by optimising the stepping pattern;
- protects against data loss in case of power failure or other interruption, and allows logging to be temporarily halted then re-commenced as many times as desired;
- allows subsequent checking, against both a captured image of the point and the slide itself by remounting and accurately returning to the required point;
- ensures data integrity through dictionary-controlled data input and storage in a relational database.

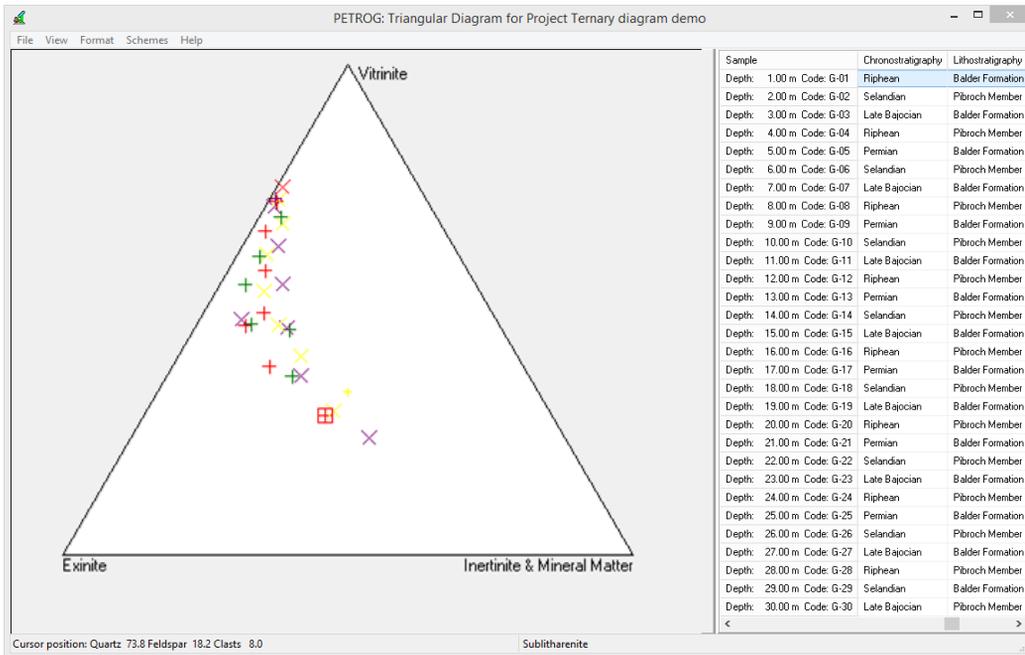




for Data Analysis

PETROG performs statistical analyses and provides reports directly into spreadsheets (e.g. Excel) and word processors (e.g. Word) with high levels of confidence. Pre-programmed reports, interspersing images with text descriptions, can easily be set up and re-used for other samples or projects.

Collection and storage of images for every point described allows later quality control and editing. Relocating points on a re-mounted slide builds a teaching library of type examples, and projection of images supports teaching while logging. These same photos are available for image analysis, including using each point description as a training set for expanding the description to the whole slide and for building a virtual image of the entire slide which can be panned and zoomed.



Graphical and statistical analysis can be performed on textural and compositional data, together or separately, on a sample or project basis. Graphical displays available in PETROG include using any ternary scheme, as well as many simple graphical displays and some advanced displays to highlight secondary features. Together these help provide the complete toolbox for all geologists looking at material in thin section or polished block.



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