



Making Ash Analysis Simpler In The Field

White Paper



ENGINEERING YOUR SUCCESS.



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Traditional coal ash sampling and analysis using a laboratory facility can take a few hours if there is an on site lab or days if the samples are sent away for analysis. Using the Parker Bretby Gammatech portable Ash Probe, the results are available in a few minutes by probing the coal pile with no special training required by the operator. All the data is collected during the shift and can be downloaded onto a memory stick or direct USB cable to a PC in CSV format for analysis and reporting. The unit comes with the Parker Bretby Gammatech utility software for ease of download.

The article below describes the journey the Parker team made in producing the new AshGraffix controller for the Ash Probe.



Ash Probe and AshGraffix complete system



Old QWERTY keyboard display unit with LCD display in English only

During the latter part of 2012 we were advised by our supplier that the micro processor used in the Ash Probe system was being made obsolete, this gave us two choices:

- a) Incorporate the new processor and modify the software for the existing display unit
- b) Or develop a new design display unit based on our customers feedback using the latest processor.

To support sales of the Ash Probe while we developed the completely new unit we chose to write the new software code for the existing display unit as the old processors were getting harder to obtain, this was essential so we did not leave customers waiting for the upgraded version of the display unit and gave us the opportunity to upgrade older

units coming back for repair. Our customers gave us some important clues as to what features they would find useful in a new unit:

- A smaller, lighter more ergonomic unit for daily use in the stockpile areas and trains
- Increased number of calibrations that can be stored
- Multi language support
- Must be IP65 rated
- Colour touch screen
- Improved download capability from RS232 and Hyperterminal utility
- Easy to navigate through menu options
- Customised settings through password protection levels

During 2014 we set out to design the new product and software called AshGraffix with the customer needs

in mind. The project timeframe was 12 months from concept so we would be able to demonstrate the first unit at Mining shows in 2015.

The design for hardware, electronics and software was all done in house by the Parker team. Support from our local suppliers was critical as we went through several iterations of the printed circuit board design as this was the first time we had used surface mount components and touch screens. Finding low power components was key to the end result as the unit needed to work a full shift in some very harsh conditions from the heat and humidity of India and Vietnam to the low temperatures and dry conditions in Mongolia and Siberia.

Component list

Neil Jenkinson, our mechanical Engineer, selected an aluminium extrusion for the outer case that was rugged and could hold the printed circuit board and touchscreen. He found a superb membrane protector product that would sit on top of the touchscreen preventing scratching and potential failure if sharp items hit the screen by accident or in daily use, e.g a pen tip to tap the screen.

The industrial cable connectors were retained as they had given good service over 20 years and readily available for after market sales. Different types of battery packs were tested for durability and full function duration with industry standard Metal Halide rechargeable

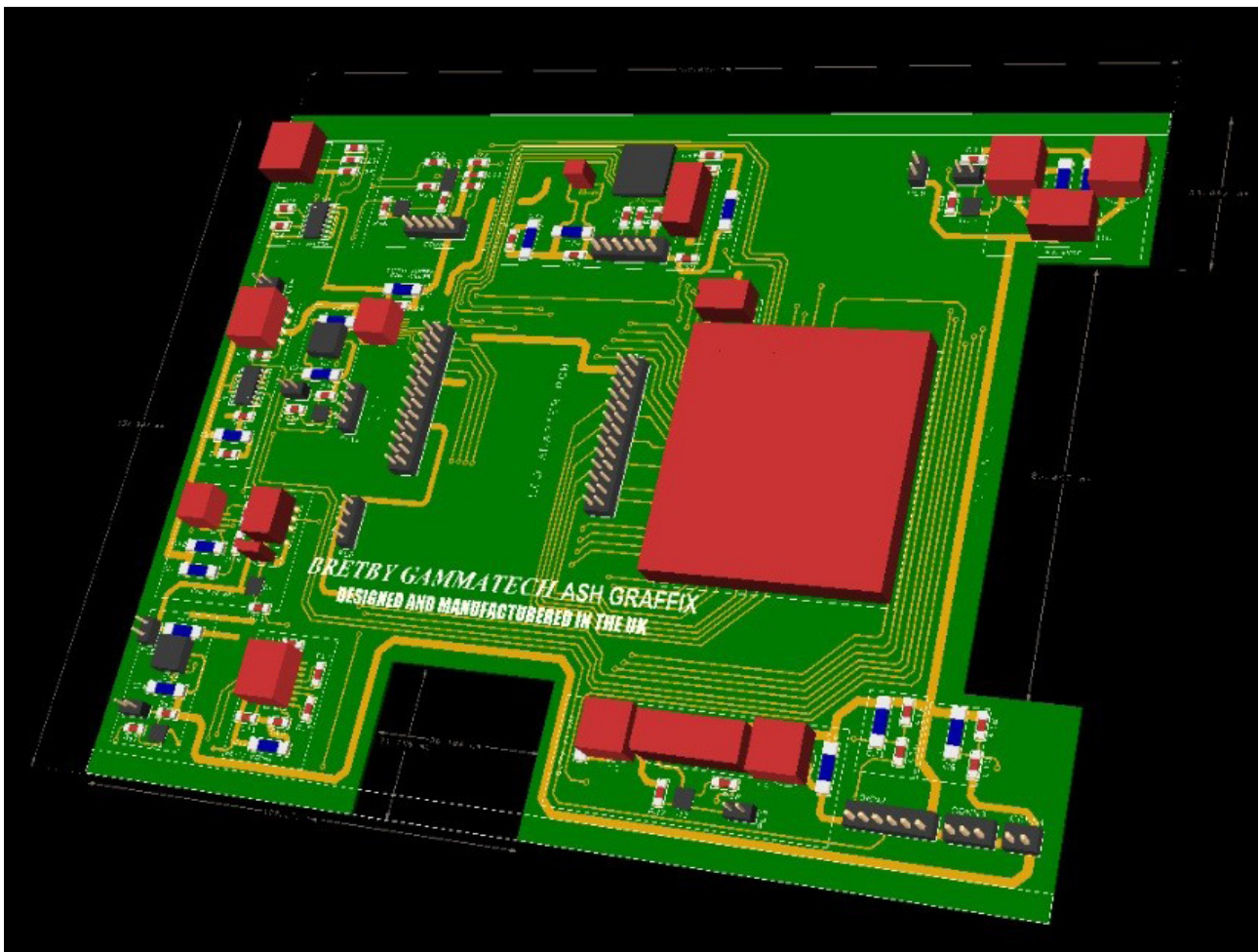
cells coupled with an intelligent charger selected as the best all round option for the AshGraffix.

As Human Machine Interfaces (HMI) have become more prevalent in the industrial world and availability for colour touchscreens has increased, we had a good choice of suppliers knocking on our door to show us their ranges. In the end a choice was made and the quality has remained high during the last two years of sales.

The multi layered printed circuit board was the most difficult item to develop as we wanted all the electronic components and connections to the outside world

on a single board only slightly larger than the touchscreen. This task did not phase Chris Knight, our electronics engineer, who put in many hours working on the pcb design software to get the SMT components and tracks right on the multi layered design before it went out to proto type manufacture. The end result below was a triumph for the design team.

New AshGraffix multi layered single printed circuit board with new processor and using many surface mount components (SMT).



The next task that faced Kevin Corcoran, our intrepid software engineer, was to incorporate all our ideas into code. After many discussions and updates during 2014 (usually accompanied with tea and some form of cake - this was before the Great British Bake Off was aired to the nation, as we found this was the best way to inspire creativity), we designed the home screen, menus and navigation through the system with the question to the operator:

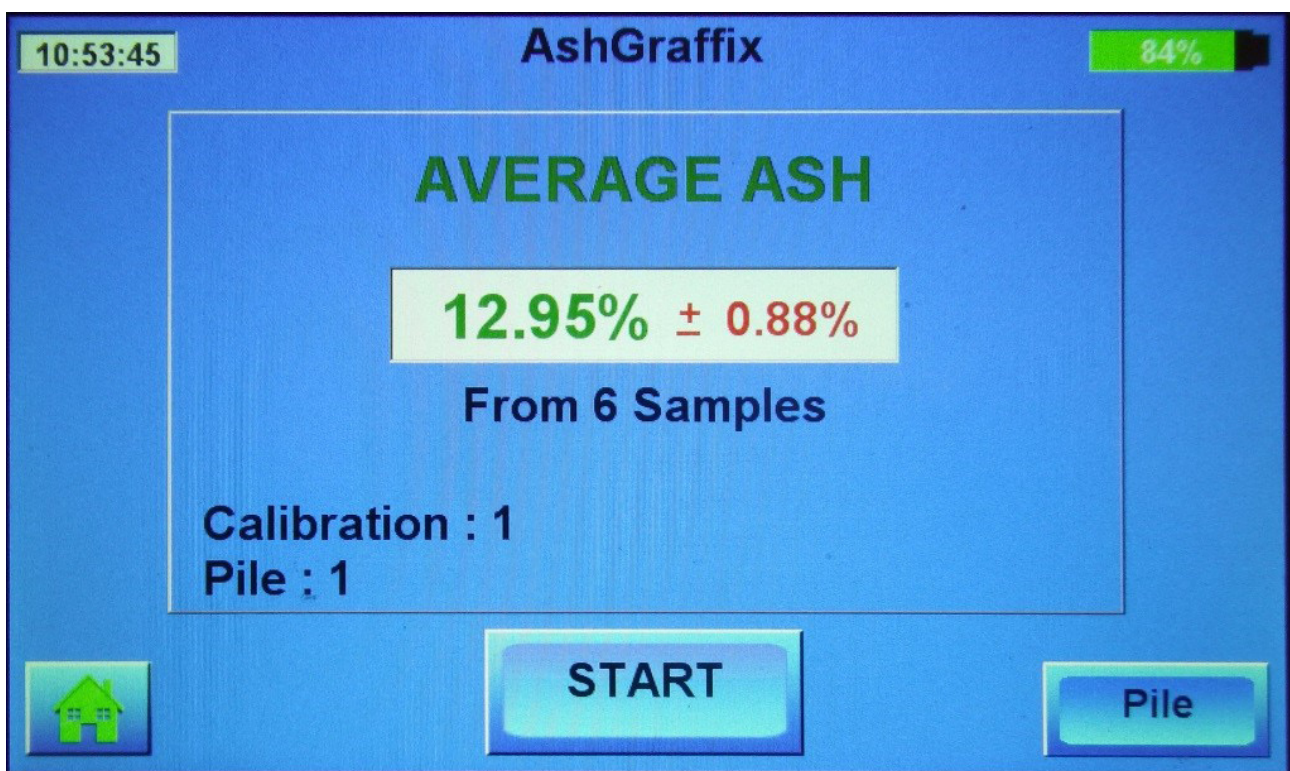
What do you want to do today?

The concept was to give the operator access to commence ash sampling with two taps from power up screen and standard icons used for configuration and saving files to the unit itself or to USB output.

With additional processing power, came new features:

- Ability to store up to 100 calibrations (from 9 in the old system)
- Graphically represent the days ash analysis on screen
- Multi language support which is so important for our overseas customers
- USB connection for transferring data
- Supports transfer of data across multiple versions (Windows XP/7/8/8.1 compatible).

During the first half of 2015 we were happy with the final design; software bugs had been eliminated and some test users had put the unit through its paces; only then did we go to the mining shows and offer the unit to the market.



In conclusion the key take aways for updating the display unit were:

- Do it for the right reasons, not just because technology allows it
- Listen to the customer and put the key features into the product
- Be open to new ideas and allow staff to be creative
- Make something as a team you can be proud of and can sell!