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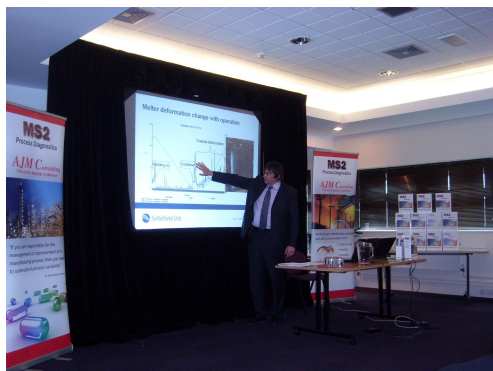
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Advanced Process Diagnostics

World Leading Innovation is Launched

It has been an interesting six months. Following on from the substantial investment of public funds in the development of the new real time process diagnostics capability now built into MS2, our advanced data mining system for process manufacturers, the completed system was shown for the first time at the international APACT 09 conference in Glasgow on May 5 - 7, and demonstrated in depth at the highly successful User Group Meeting held at our Europarc headquarters on May 8.

This development is the largest single step forward for MS2 ever and is the most significant in our company history, which celebrates its 20th year with yet another highly successful User Group Meeting.



Dr Carl Steele from Sellafield Ltd (formerly British Nuclear Fuels) gave the keynote speech at the 2009 MS2 User Group Meeting and described how MS2 has provided benefits in many applications at the Cumbria site.



AJM Consulting's Alan Mason and ABB's Geoff Artley demonstrate the interface between ABB's System 800xA DCS and MS2 at APACT09.

Photo courtesy of Natalie Driscoll, CPACT

Suddenly, it seems, we have changed gear. With major pharmaceutical, petrochemical, nuclear, advanced materials and other manufacturers listed as clients - and most now investing further - it is obvious that the high degree of innovation we have built into MS2 is both appreciated and, more importantly, is generating real benefits for its users.

One major advance during the last six months has been integration with real time systems including distributed control from ABB and Emerson, and historians from OsiSoft and WonderWare. These systems hold massive quantities of data but can do comparatively little with it, and MS2 can transform that data into that most valuable asset - knowledge. Our users are improving their profitability and sustainability by taking the advantage and gaining that knowledge.

FINALIST

INNOVATOR/08

The Yorkshire and Humber Innovation Awards

The MS2 Project received funding assistance from the European Regional Development Fund.



The 2009 MS2 User Group Meeting

MS2 Version 5.1 - by far the most flexible, innovative and powerful MS2 process diagnostic system yet - was launched on May 8 at our annual MS2 User Group meeting, held at our Europarc headquarters in Grimsby.

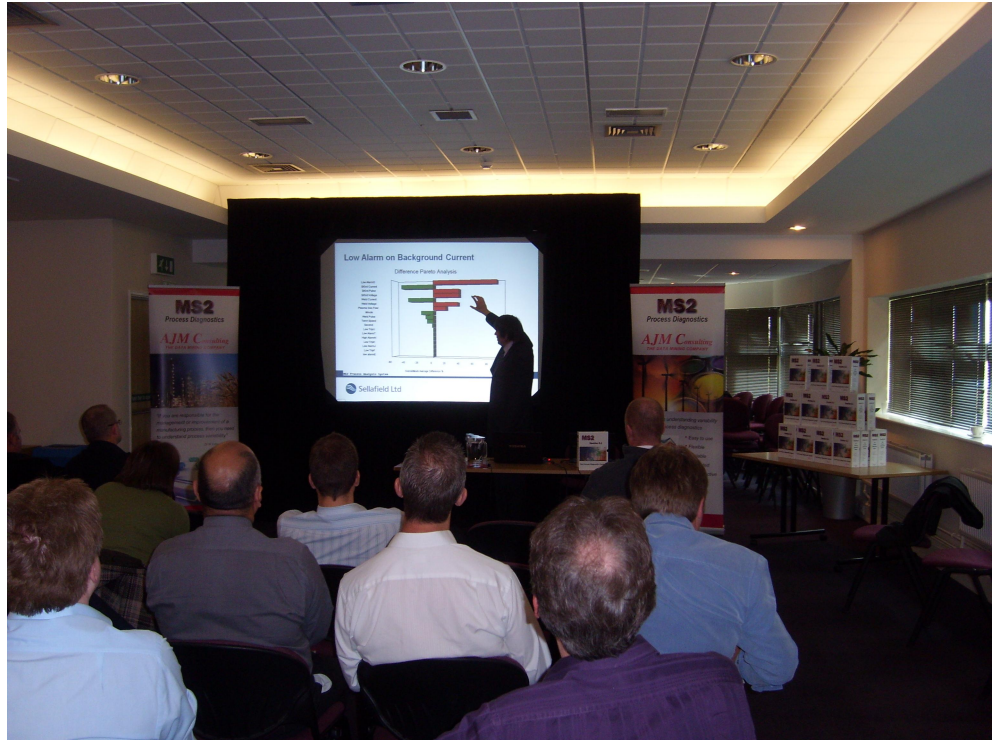
Version 5.1 is the latest release of the highly innovative MS2 process diagnostics system which has been supported with substantial development funding from both our local Regional Development Agency, Yorkshire Forward, and the European Union. Attendees travelled from the South West, Cumbria, the North West, North East, Scotland and elsewhere in the UK to see the new features which are available in MS2 Version 5.1.

The keynote speaker was Dr Carl Steele of Sellafield Ltd (formerly British Nuclear Fuels) who described how MS2 has been adopted within the company, and described six of the many applications where MS2 has been successfully implemented on the massive Sellafield site.

Also on show for the first time at a user group meeting was the real time link between MS2 and ABB's System 800xA distributed control system (see page 5). The cutting edge innovation embedded in the real time MS2 represents the culmination of many years of development, which was selected in 2007 by our Regional Development Agency, Yorkshire Forward, for substantial funding support.

Now it is reality, developed on time and on budget, and is generating much interest amongst potential users who have identified early and beneficial applications.

This innovation is so powerful that it provides the ability for manufacturers to create a knowledge base of unusual process faults within MS2, so that, in the event of a process fault occurring for the first time in many years, the operator, who has probably no experience of the fault at all, can be alerted to the likelihood of its presence and be presented with relevant advice on its effective handling.



The MS2 User Group keynote speaker, Sellafield's Dr Carl Steele, discussed a wide range of MS2 applications which have been implemented at the Sellafield site.

Obviously a user group meeting such as this is must provide the facility for users to communicate freely on their experiences in using MS2 so far. There was no shortage of this discussion at the event, and it was universally agreed that the advances in functionality shown on the day would be much appreciated by all. Many guests who were present have been users of MS2 since the very early days - when MS2 was very definitely in its early stages - and it is most gratifying to see its progress towards a mature system being recognized, and contributed to, by so many people.

Further discussions concentrated on future needs and "WIBNI's" (wouldn't it be nice if...), which were avidly noted and will become part of the content of the next release of MS2's rapidly developing functionality. It is the feedback from our users in a wide range of globally important companies and industries which fuels the pace and direction of progress with our MS2 Process Diagnostics System. We very much appreciate it, and indeed all comments regarding our client's needs and expectations.

'We approached AJM Consulting initially to evaluate the advantages of using multivariate process analysis. Following a successful trial using the software we were able to demonstrate the business benefit through the knowledge gained. So far the software has provided enough information to support a justification to make changes within our process operations for acceptance of batch composition. It has also made it easier to interrogate non-numerical databases and gain a better understanding in equipment performance and reliability.'

Further work is ongoing to develop the use of multivariate techniques to support continuous improvement activities within the business.'

Dr Carl Steele, Sellafield Ltd

The Benefits of MS2

As the MS2 user list continues to grow, so does the range of benefits it enables those users to achieve. The examples shown here are drawn from a wide range of industries including;

- Nuclear
- Catalyst manufacture
- Speciality chemicals
- Biofuels
- Pharmaceuticals
- Biotechnology
- Advanced materials

As expected, many of the reported benefits are based on improved understanding of process complexity. MS2's ease of use has also been popular with many users.

With such a wide range of industries, it is not surprising that the topics addressed by these clients also vary widely, and this is why MS2 is designed with flexibility in mind. Its ability to include non-numeric data in its analysis of process data has been found useful in several applications, for example in identifying operator training requirements. The seamless visualisation of both univariate and multivariate issues is also much appreciated because of the faster completion of an analysis project which this enables. The fully integrated data pre-screening functionality is another aspect which has been proven to increase the efficiency of data analysis substantially.

We are very grateful to the companies which have kindly provided us with quotes and allowed us to publish case studies describing their successes with MS2. Copies of these case studies are available on our website.



"Following a successful trial we were able to demonstrate the business benefit through the knowledge gained "

BNFL Sellafield



"...assists us to improve our understanding of the innovative processes we have developed, and upon which much of our business depends"

Johnson Matthey



"...has enhanced our understanding of our processes, enabling us to focus our improvement efforts on significant areas "

Ciba



"There were substantial opportunities for performance improvement to be achieved by identifying the causes of process variability "

pxBiodiesel



"It is the ability to analyse diverse data sets in a user-friendly format which yields significant benefit to our many processes "

Aesica Pharmaceuticals



"...allows CPI to deliver better and faster services to our clients"

Centre for Process innovation



"MS2 was able to manipulate data from a large number of databases. Subsequent multivariate analysis has yielded valuable information about Key Process Parameters."

Bluestar Fibres

MS2's New Functionality

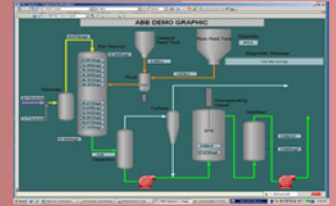
We have now decided on the “identity” of the new real time process diagnostics functionality which has previously been referred to as Project Hawk. In the last newsletter we announced a competition to find the best name for what has now become the flagship of the MS2 range of editions. Previously there were three levels of functionality, from Express, through Professional to Premier. Now there is a fourth level, and its name is Pinnacle. The bottle of Moët & Chandon champagne was duly presented to the winner at the user group meeting!

The real-time system therefore comprises a Pinnacle edition of MS2, plus the appropriate interface software for the data source. Currently we have developed links to four sources; the ABB System 800xA DCS, the DeltaV DCS from Emerson, the PI Historian from OSIsoft and ActiveFactory from Wonderware.

Pinnacle also provides further advanced functionality in addition to the real time aspects. For instance, it provides the PLS algorithm for multivariate predictive analysis (the acronym PLS refers to Partial Least Squares and is also commonly known as Projection to Latent Structures).

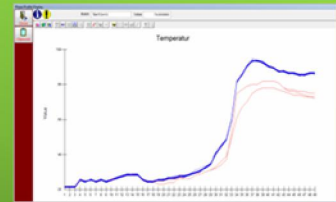
PINNACLE

- Real time analysis
- History replay
- 5 analysis sets
- Multivariate phase analysis



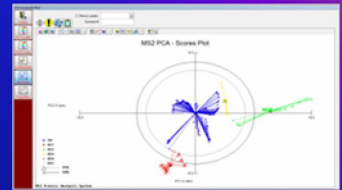
PREMIER

- Multivariate batch analysis
- 3 analysis sets
- Manhattan change analysis



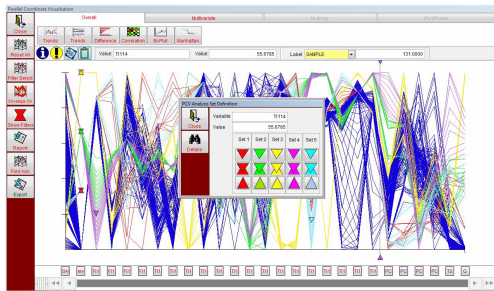
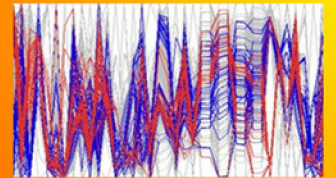
PROFESSIONAL

- Multivariate analysis

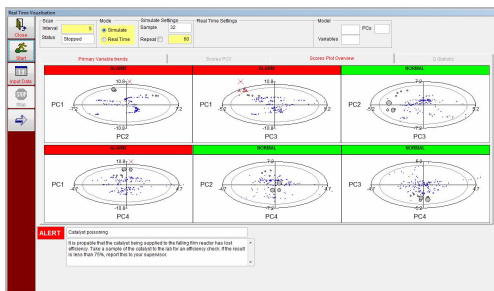


EXPRESS

- Data pre-screening
- Univariate analysis
- Parallel coordinates



Pinnacle provides 5 analysis sets



Real time multivariate analysis provides early event detection and identification

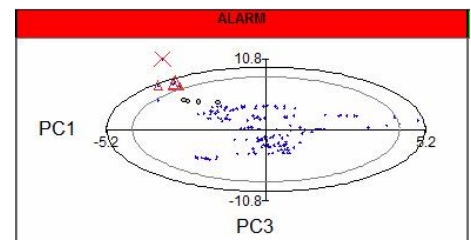
Each level of MS2 adds to the functionality of lower levels

Since many process analyses identify that, rather than a single problem, poor quality results from several different causes, MS2 now handles multiple process faults, with the Premier version allowing three analysis sets and Pinnacle five.

The new real time functionality (which can also be used to replay historic data in Simulate mode) includes Principal Component Analysis and pattern recognition techniques to detect when the overall process characteristics move from a normal state to one which indicates a process problem. A knowledge base holds details of previously identified process problems, such as poisoned catalysts or fouled heat exchangers, together with the multivariate

“signatures” which indicate an instance of the fault. Hence MS2 can detect the process fault and alert the operator accordingly, including providing advice on handling the problem.

Other new features include confidence bounds on PCA score plots and on the T^2 and Q statistics, a variable significance analysis and much more.



Confidence bounds can indicate when a sample moves into a warning (95%) or alarm (99%) state.

Advancing Continuous Improvement at Johnson Matthey



Johnson Matthey is a speciality chemicals company focused on catalysis, precious metals, fine chemicals and process technology. For almost 200 years it has continuously developed its technology, and retains world leadership by adapting constantly to changing customer needs. With operations in over 30 countries and over 8,700 employees, its products are sold around the world to a wide range of advanced technology industries. It is a world leading manufacturer of catalysts for vehicle exhaust emissions control.

The company has a worldwide reputation for excellence in catalysis and precious metals technology, and has received the Queen's Award no less than ten times, for Export, Technology, Environment and Innovation.

Having assessed the applicability of MS2 to its complex and highly innovative processes, the Company has now invested in no less than eight MS2 systems, all of which include the new, advanced real time multivariate technologies.

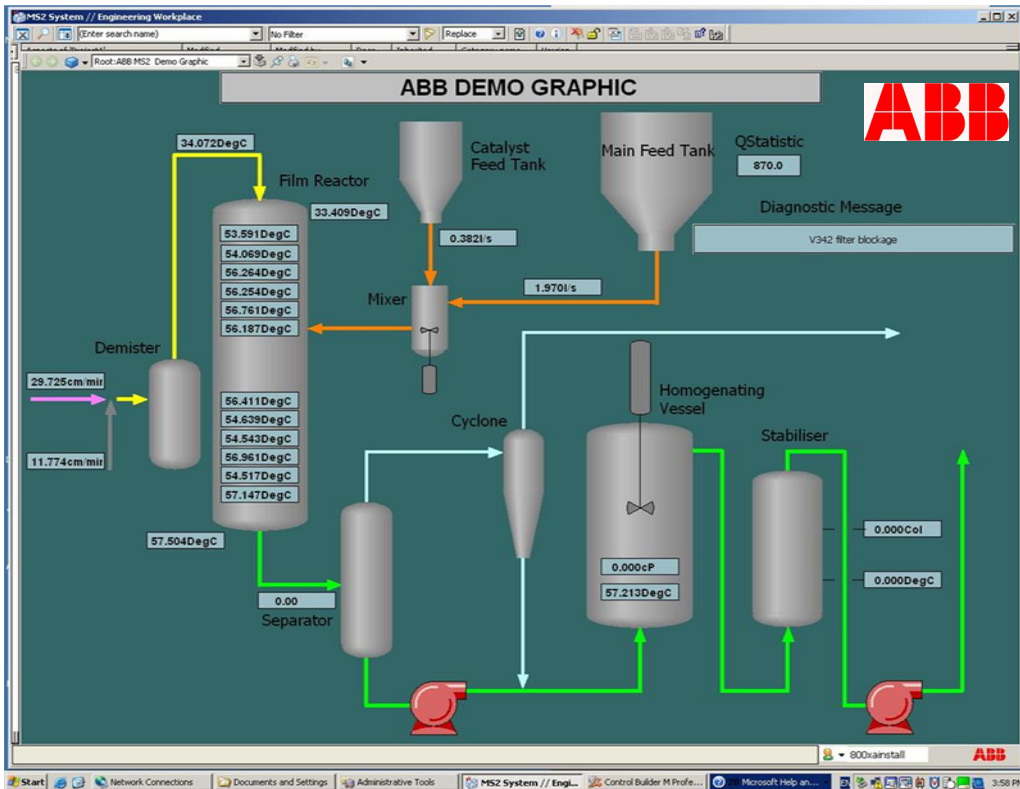


"Our complex processes and continuous advancement in technology lead to a need for rapid and comprehensive understanding of our wide-ranging processes. To facilitate this we investigated the opportunities presented by the MS2 Process Diagnostics System from AJM Consulting. An initial trial on a single plant section proved its applicability to our business.

We have now invested in more powerful versions of the system and are implementing it in various areas of our business where its ability to visualise the interactions between many variables assists us to improve our understanding of the innovative processes we have developed, and upon which much of our business depends."

Mike Child, Johnson Matthey Limited

Interfacing MS2 with ABB's System 800xA



ABB's 800xA Distributed Control System can now be interfaced to MS2, enabling real time multivariate fault detection and identification.

We are now able to demonstrate a link between MS2 and ABB's System 800xA distributed control system, adding to the DeltaV, PI and Wonderware links previously announced.

Demonstrated for the first time at the AFACT09 exhibition and conference in Glasgow on May 5 - 7, the interface enables MS2 to import real time process data, perform multivariate analysis on it and export results back to the ABB control system. According to AJM Consulting's CEO, Alan Mason:

"The plant data held by users of control systems and data historians is a major asset but is usually not fully utilised. The wealth of knowledge hidden in process data can be used to reduce variability, leading to substantial benefits including higher quality and yield. In addition to detecting early shifts in process characteristics, technologists can utilise this knowledge to increase their



Multivariate results such as the Q statistic, an indicator of overall process stability, together with likely causes of process abnormality, can be shown on the System 800xA operator display.

understanding of reasons for poor performance. The theme of this AFACT conference, at which we first publicly demonstrated the MS2/System 800xA integration was "Process Analysis and Control for Profit", and we are delighted to be working with ABB to make these benefits available".

"ABB considers being able to offer a direct communication link to AJM Consulting's MS2 to be an enhancement to the service applications that ABB can offer their clients for process optimisation and improved process understanding.

ABB's System 800xA, like any other DCS, is able to collect and store reams of data, and MS2 is able to turn that data into information"

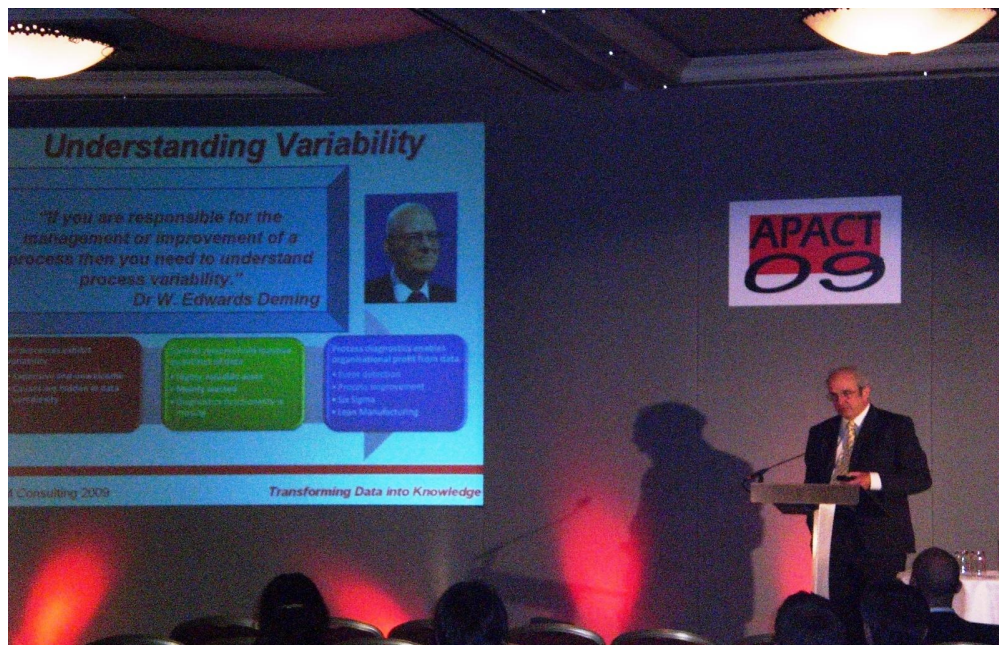


Photo courtesy of Natalie Driscoll, CPACT

We are particularly pleased to be working closely with the Centre for Process Analytics and Control Technology at Newcastle University and are grateful for the assistance we receive from this renowned centre of multivariate research and development.

The APACT 09 conference (Advances in Process Analytics and Control Technologies), held at the Glasgow Hilton in May, is the UK's premier forum for the presentation and discussion of innovation and further advances in engineering and scientific topics relevant to process analytics and control technologies. Over 100 delegates from the UK, Europe and beyond attended the three day event.

AJM Consulting exhibited both the latest version of MS2, 5.1, and the new real time functionality which is generating so much interest. Of particular interest was the demonstration of the interface to

the ABB 800xA distributed control system, with ABB having the adjacent exhibition stand.

Once again, Alan Mason was invited to present a paper to a large audience of academics and industrialists. His paper, "Development of an innovative process diagnostics system for real-time detection and cause identification", generated much discussion both at the end of the paper and in subsequent discussions. We are pleased to have supported these conferences for several years, including APACT 07, held in Edinburgh, and EuroPact 08, held in Frankfurt.

APACT conferences are organised by CPACT (Centre for Process Analytics and Control Technology), see the panel on right.

Organisational Membership

We place great emphasis on understanding the industries which we serve and are fortunate that several effective regional chemical cluster development organisations exist to foster advancement and innovation, which is the essential core of our business. We are delighted to be members of them all. **If your company is a member of any of these and you are interested in using MS2, talk to us because discounts may be available.**



MS2 PILOT PROJECTS

Many companies know they could potentially gain real benefits by utilising the powerful variability cause analysis facilities which MS2 provides.

However, it may be difficult to justify investment unless the practicality of applying MS2 to their process can be confirmed without the significant cost of purchasing a licence.

For this reason we are offering a pilot project scheme. This addresses a problem of the client's choice and we build a model within MS2, ending with a workshop session at which the conclusions are demonstrated and

the client has an opportunity to query the model.

We then provide a restricted licence copy of MS2, including the study model, for the client's own use. This has all the analysis and visualisation functions of the full system except that no other data sets can be imported.

Should the client then wish, part of the cost of the pilot project can be offset against licence purchase. This approach to starting to apply process diagnostics has proven to be very popular with clients.

Contact us for more information.

MS2 CONSULTANCY

As more people hear about the opportunities for understanding their variability, and how this can be used to improve consistency of quality and yield, we are now being asked increasingly for consultancy.

Sometimes, companies simply want a specific problem solving, and do not want to implement a permanent MS2 system. To meet this need, we now provide assistance to investigate the problem, using MS2. No licence

purchase is required and, unlike a Pilot Project, a restricted licence copy is not provided. In this way, a problem can be solved at very low cost, sometimes in as little as a day or two. This can be a particularly effective approach where the client can provide a process expert (who has the plant knowledge) to work alongside our process diagnostics expert (who has the MS2 knowledge).

Contact us for details.

MS2 TRAINING

The training courses we provide for MS2 users have proved very popular indeed throughout the year; every one has been fully booked. Delegates are limited to 5 per course and are very "hands on", with a PC provided for each person.

All the basic functions of MS2 are covered, and at the end of the course delegates should be able to import and screen a data set, create a process analysis model, and analyse it using the tools provided within the MS2 system.

A very comprehensive tutorial guide is provided, together with copies of all the tutorials used during the course.

A full schedule of courses is planned for 2009; these will be announced on our website; <http://training.ajm.co.uk/>. The next course, in mid-June, is now fully booked.

Because of the ever-increasing complexity of MS2 and feedback from previous delegates, we will be offering an advanced course in addition to the basic course. Contact us for more information.



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