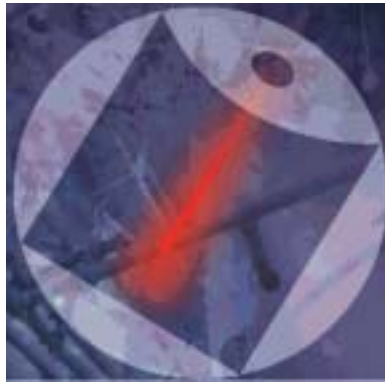


## On-line Particle Sizers



Achieving your  
process vision

Each Malvern Insitec makes more than a million measurements every year

Information provides the key to better processing decisions and to improving operational efficiency. For particulate processing, the Malvern Instruments range of on-line particle sizing systems delivers the intense, high quality information necessary for effective decision making and control. High frequency sampling and analysis, direct from the process line and using large non-destructive sample throughputs, ensure the superior measurement repeatability and real-time data generation that only on-line systems can bring.

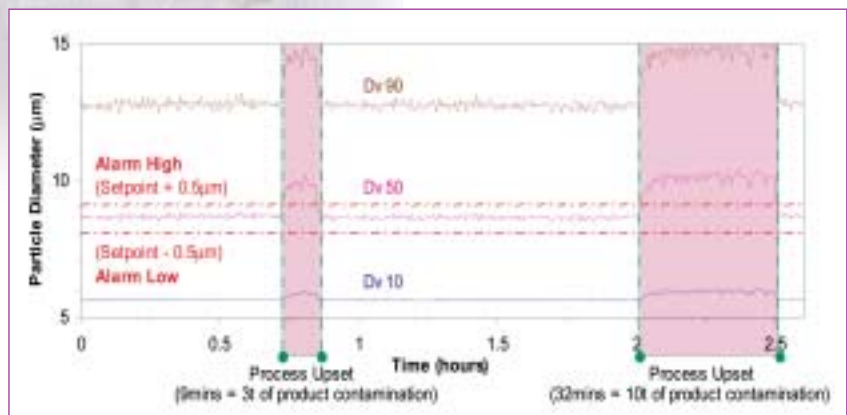


## No more running blind



### Capture the moment 24/7

In contrast with traditional off-line analysis where samples are taken at infrequent intervals, Malvern's on-line particle sizers generate particle size distribution information every second. When fed directly into the plant control system this allows control actions to be taken almost instantaneously. Streaming feedback from the process allows the identification and diagnosis of short duration, transient, or cyclic process upsets, which could contaminate a batch of material, but would go undetected in off-line analysis.



Graph 1: Mineral process running at 20t/h. Previously undetected process upsets were caused when the bed height in the classifier feed hopper fell below a critical point. The problem was resolved by increasing the level of the low alarm.

*"Insitec contributed to our record production year",*

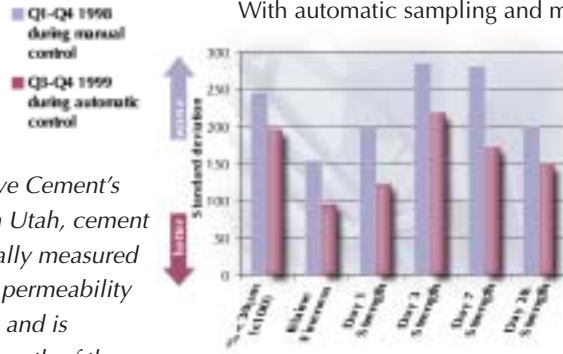
*Bill Siemering, Vice-President, Ashgrove Cement Company, Inc*

### Increase sample throughput

Analyzing large amounts of material improves the statistical significance of the information. In off-line analysis, it may be that samples as small as 5 grams are taken just once every shift. Using Malvern process systems, sample throughput over the same period can be up to 10,000 times greater, giving a much more accurate representation of the process. The sample technique leaves particles unaltered, allowing the sample to be returned to the process.

### Tighten process confidence limits

With automatic sampling and measurement, configured to meet the needs of specific processes and lines, measurement representativity and repeatability are typically far better than using classical manual sampling techniques. With so much less uncertainty, confidence limits can be tightened and the process can operate closer to its specification limits.



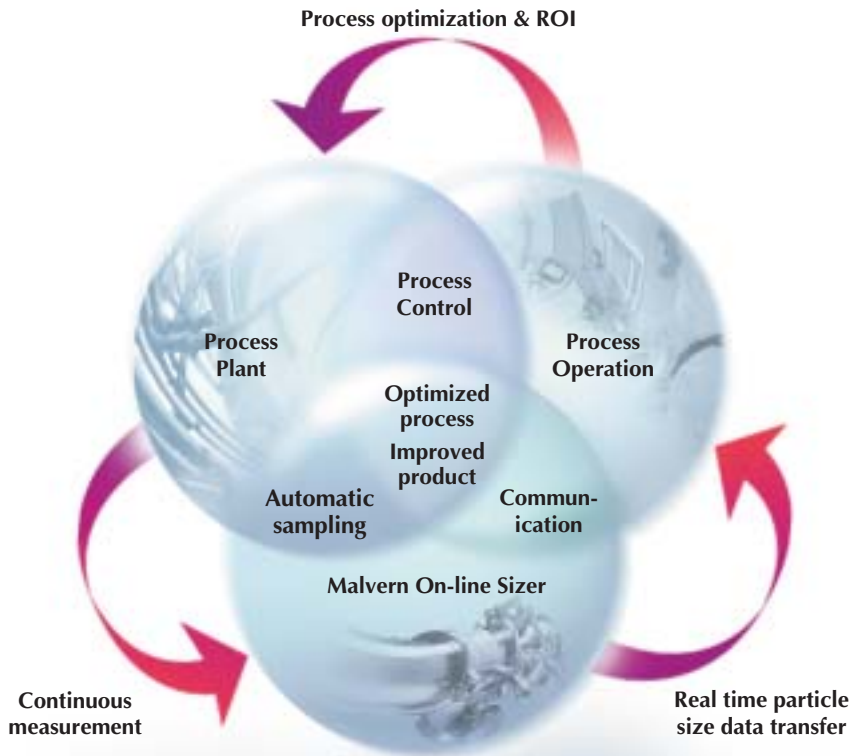
Graph 2: At Ashgrove Cement's Leamington plant in Utah, cement fineness is traditionally measured off-line using an air permeability technique ("Blaine") and is correlated to the strength of the cement at 1, 3, 7 and 28 days after setting. Variability in the cement fineness and strength has decreased significantly since the installation of Malvern Insitec for automatic separator control.

### Off-line. At-line. In-line. On-line.

Malvern can provide the same measurement technique for the laboratory (off-line) and for use at-line, as well as in the process.



Silica production at Grace-Davidson GmbH, Worms, Germany.



Toner manufacture at NexPress Solutions Ltd., Kirkby, England

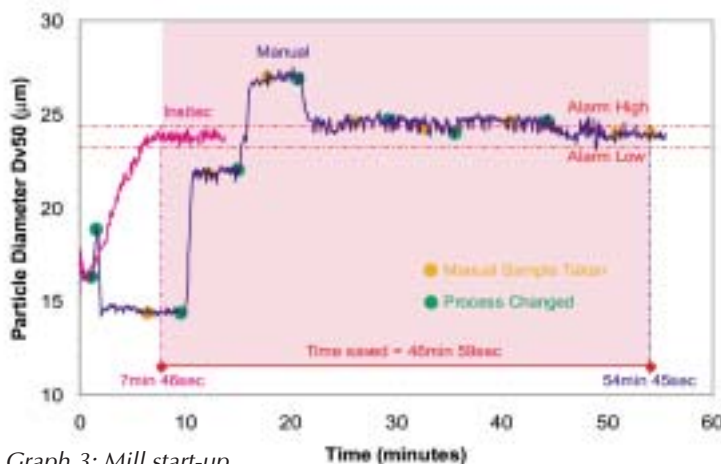
## Getting a good production run for your money

Current particulate processing trends, focused on maintaining industrial competitiveness, include improving product selectivity, increasing productivity, and intensifying the process. Plant automation helps in achieving these goals, but depends on access to reliable real-time information. Only Malvern's continuous on-line sizing systems

enable true process control and optimization. Malvern systems deliver tried and tested solutions across sectors that include cement, powdered metal and mineral production, through to the manufacture of pharmaceuticals, toners, powder paints, polymers and foodstuffs.

### Increase productivity Sweat the assets

Off-line particle size measurement makes mill start-up a time consuming, iterative exercise. Sampling, waiting for the measurement results, changing the process parameters and then waiting for the mill to reach a steady state before sampling again wastes both material and time. With on-line particle size analysis, start-up times can be reduced to within a single iteration of the 'sample-measure-change-wait' cycle of the off-line procedure (see graph 3).



## Improve product selectivity

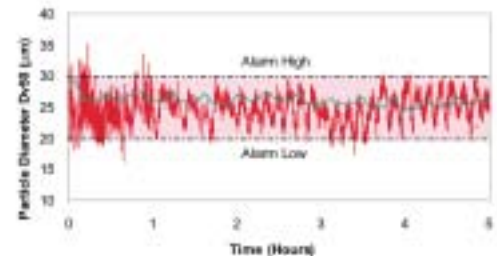
On-line particle sizing facilitates real time optimization of the parameters and configuration for each process stage, allowing plant to work closer to operational limits. Reducing overgrinding enables the manufacture of acceptable product while working closer to specification limits. Improved yield, consistency and throughput are achieved alongside a reduction in energy costs. Malvern process systems provide data so accurate that some product release criteria are based solely on on-line QC measurements.

*“Our Insitec instruments have contributed to saving over a hundred thousand US dollars per year in operation costs”*

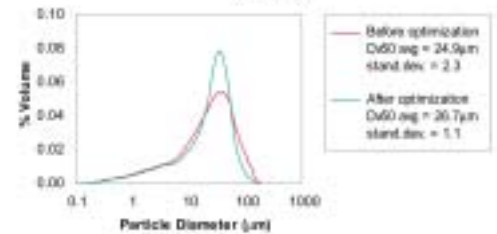
*Tom McHugh, Managing Director, NexPress Solutions Ltd*

*Sovitec S.A., Belgium—leading glass bead manufacturer. Insitec’s high measurement frequency revealed a fluctuating particle size, with a period of about 1 minute. By optimizing the filter shakedown, the product size distribution over time was stabilized (graph 4a) and product selectivity was improved significantly (graph 4b).*

Graph 4a



Graph 4b: Particle size distribution (5h average)



*Pharmaceutical milling at Siemens Axiva GmbH, Frankfurt, Germany*

*“Each gram saved is a real gain and we can now perform much better in a sector where high quality is crucial.”*

*Hubert Müller, Process Engineer, Siemens Axiva GmbH*

## Process intensification

The drive today is towards processes that are smaller, faster and less expensive, but have the same (or better) throughput as larger, older plant. Building quality into products in upstream unit operations is increasingly important—for example at the mill or spray drier stage, using on-line particle sizing as a tool. By improving the product selectivity early in the process, downstream operations such as classification, can be reduced and potentially completely eliminated.

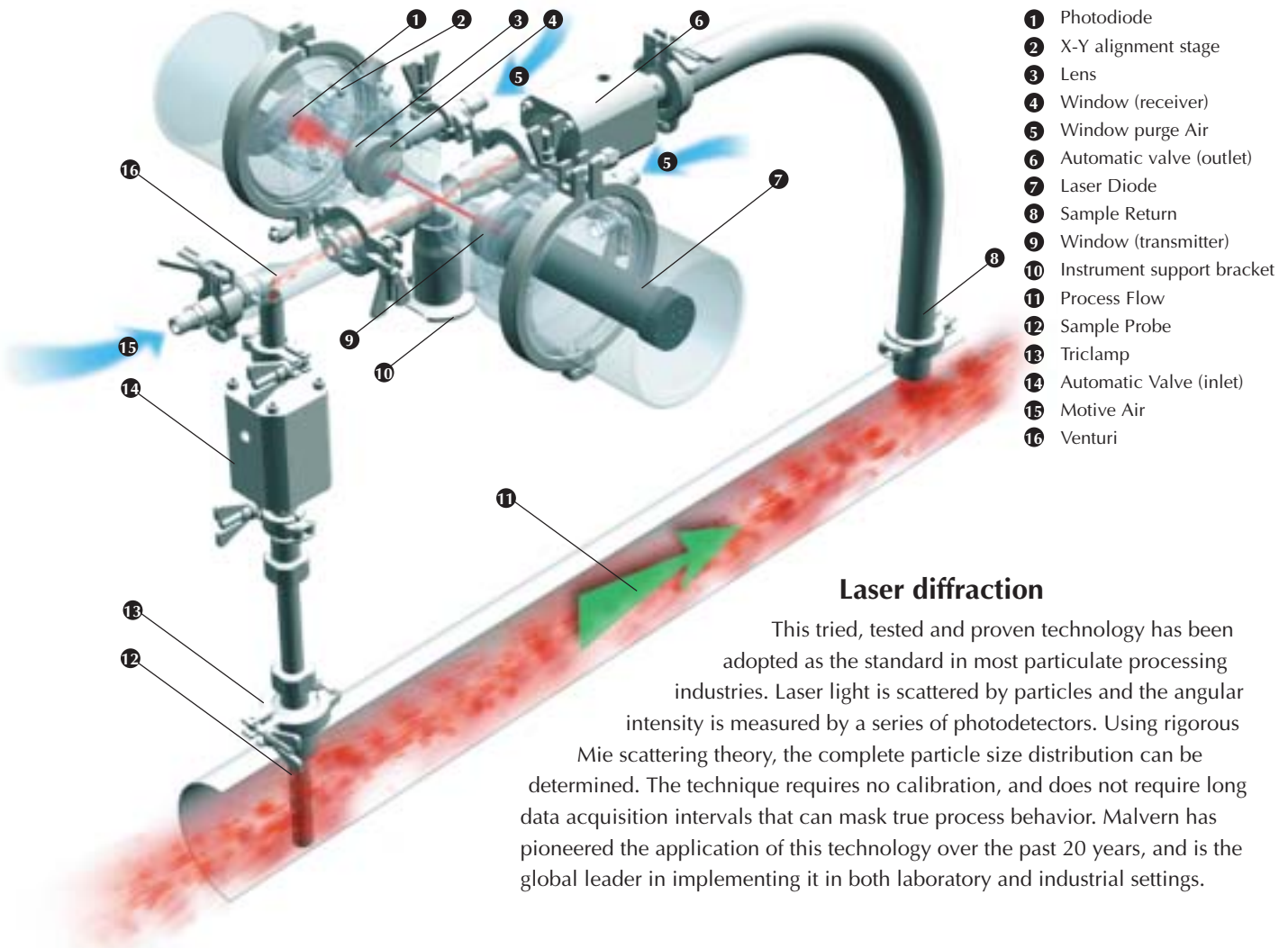


*Cement grinding at Calcia S.A., Rombas, France*

## Plant automation "Lights-out" operation

Realizing the goal of the complete automation of particulate processing facilities is fast becoming a reality. Many Malvern clients have already closed the loop between on-line particle size measurement and a plant control parameter, the classifier speed for example. This reduces manpower for both plant control and for off-line sampling/measurement, ensuring a more consistent product.

## Insitec Eductor System



- 1 Photodiode
- 2 X-Y alignment stage
- 3 Lens
- 4 Window (receiver)
- 5 Window purge Air
- 6 Automatic valve (outlet)
- 7 Laser Diode
- 8 Sample Return
- 9 Window (transmitter)
- 10 Instrument support bracket
- 11 Process Flow
- 12 Sample Probe
- 13 Triclamp
- 14 Automatic Valve (inlet)
- 15 Motive Air
- 16 Venturi

### Laser diffraction

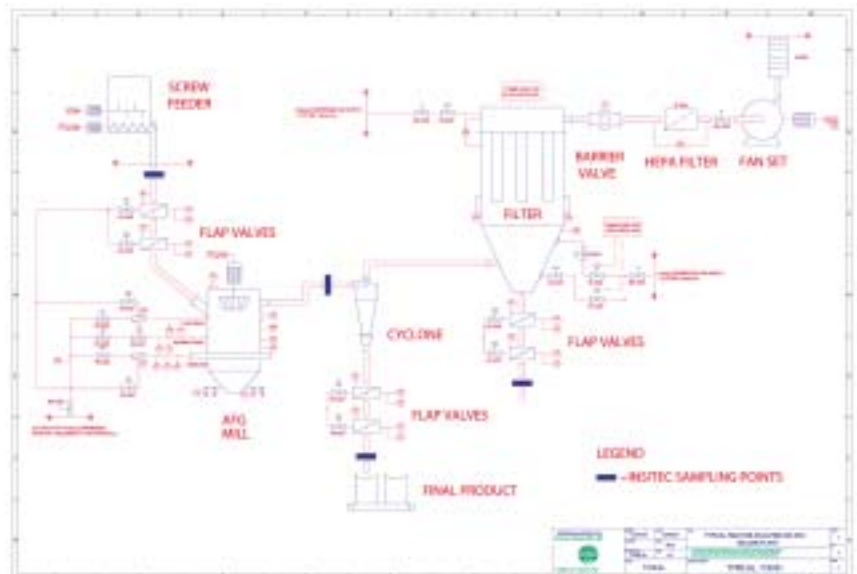
This tried, tested and proven technology has been adopted as the standard in most particulate processing industries. Laser light is scattered by particles and the angular intensity is measured by a series of photodetectors. Using rigorous Mie scattering theory, the complete particle size distribution can be determined. The technique requires no calibration, and does not require long data acquisition intervals that can mask true process behavior. Malvern has pioneered the application of this technology over the past 20 years, and is the global leader in implementing it in both laboratory and industrial settings.

# Particulate measurement engineering

*experts in custom size solutions*

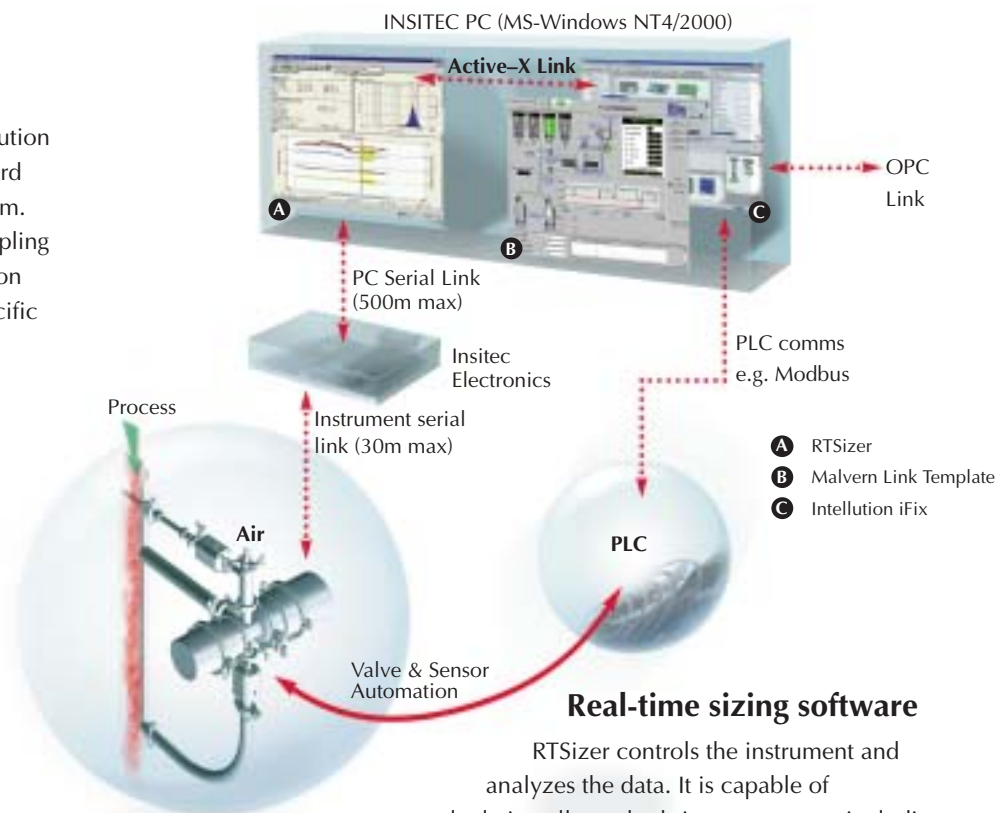
*“Insitec is the perfect tool for increasing process yield, saving up to a ton of silica on each product changeover”*

Torsten Krause, Process Engineer,  
Grace-Davidson GmbH, Germany



## Malvern Link System integration

Malvern Link is based on an industrial SCADA package, Intellution iFix, which is delivered as standard with every Malvern process system. Automated process interface (sampling and valve control), communication with plant DCS, and context-specific user interfaces are all possible.



### Real-time sizing software

RTSizer controls the instrument and analyzes the data. It is capable of calculating all standard size parameters, including  $Dv_{10}$ ,  $Dv_{50}$ ,  $Dv_{90}$ ,  $\% < X \mu m$  and  $D[4,3]$ , which are displayed in standard model-independent particle size distributions and as trend charts. It is a real-time NT-based system that allows the viewing of historical data while measurement is underway. Security levels can be set for different user grades. RTSizer is an open application, interfacing to most modern plant control packages directly, or through the intermediary of Malvern Link.

### High concentration measurements

Unique to the Malvern Insittec range of process instruments, is a patented (US 5,619,324) multiple scattering algorithm that enables reliable operation at high concentration (see graph 5). The use of this algorithm is crucial to ensuring that particle size measurements are accurate regardless of the instantaneous process loading. This is particularly important during plant start-up, shutdown, and process changes.



Graph 5: Correcting for multiple scattering effects at high concentration

### Robust, repeatable, representative sampling

A range of process interfaces can be tailored to meet the needs of different applications. The most widely adopted sampler uses an air venturi to aspirate powder from the process line and to disperse the sample for accurate measurement. Such an interface, which has no moving parts, is possible only because of Malvern's patented high concentration measurement technique. Dynamic samplers are available for high tonnage abrasive solid streams and in-line flow cells for lean phase convey.

### Designed for process use

Insittec process measurement systems are designed from the beginning for industrial use. The units are compact, IP65 certified (dusttight and waterproof), and vibration proof. The instrument forms part of a very flexible system configuration, both for the process and for the automation interface. An intrinsically safe option is also available.

# What is the next step?

## The Process

Register your interest with Malvern and a representative will arrange to visit so that we fully understand your objectives, requirements and time-scales. Our appointed project manager will co-ordinate installation with your input, and conduct a survey to agree the optimal location for the instrument. We ask you to undertake site preparation and the addition of sample ports to the process line in advance of Malvern engineers installing and commissioning the measurement system.

## The Team

Malvern's engineers work directly with suppliers, systems integrators and end-users to configure products to clients' needs. Malvern employs a team of specialists—process and automation engineers, particulate scientists and field service technicians—to provide support and maintenance after purchase, and sets the industry standards for flexible service programs, extended warranties and on-site training.

## The Company

Malvern Instruments characterizes particulate systems using laser diffraction, ultrasonics, photon correlation spectroscopy and zeta potential measurement.

Malvern Process Systems, a wholly-owned division of Malvern Instruments Ltd., specializes in the application of these technologies to on-line solutions, and is expert in automated particulate sampling and measuring.

- Global network of sales and service personnel
- World-wide multiple project co-ordination for multinational companies using our global application database
- Quality service before, during and after the sale
- On-call technical support and helpdesk
- Custom engineering for your specialist measurement needs
- Responsive customer service
- Sampling and automation consultancy
- On-site training and web seminars
- Certification and conformance to quality standards including ISO9001 and CE badging
- Compact, high speed, accurate and durable process instrumentation

## spectris

Malvern Instruments is part of Spectris plc, the precision instrumentation and controls company.

[www.spectris.com](http://www.spectris.com)



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