

### Features and Benefits

- **Real Time Key Performance Indicators (KPIs):** Provides real time production efficiency data to understand the true performance and realize the full potential of production lines.
- **Automatic Detection and Recording of Production Losses:** Identifies and provides the ability to react to possible problems based on deep Root Cause Analysis (RCA) and deliver consistent information to all levels of the organization.
- **Advanced Analysis:** Identifies and presents production improvement opportunities securing Return On Investment (ROI) decisions. The configurable ready-to-use reports and displays eliminate inaccurate, inconsistent, defective, and laborious manual logs reducing time to decision and action.
- **Universally Applicable:** Flexible adaptation and configuration allow scalability and implementation in a wide range of industries while complementing production planning, production tracking, and financial systems.
- **Openness and Standards:** Integrates with a broad variety of PLCs, DCSs, miscellaneous data sources on control, and CMMS (Computerized Maintenance Management System) at the enterprise level. System 800xA and web-enabled features provide remote viewing of analysis results for informed decision-making on a multi-plant level.



### Optimizing Plant Asset Availability and Performance

One of the most difficult issues facing manufacturers today is optimizing existing production operations. Companies are striving to meet business objectives while facing an estimated 40% waste of productivity through unplanned stops, interruptions, speed losses, and quality defects. These undetected losses comprise a company's "hidden plant" productivity opportunities.

Leveraging "hidden plant" opportunities requires intimate knowledge of the factory's true performance. Only through consistent, real time measurement and analysis of the business's Key Performance Indicators (KPIs) is true performance measured and improved.

System 800xA Real Time Production Intelligence (Real-TPI) is a real time performance measurement and analysis software solution that improves plant productivity by identifying ways to increase Overall Equipment Effectiveness (OEE), a crucial business KPI. This user-friendly software automates data-collection and analysis, and provides customized reports tailored to plant management's needs.

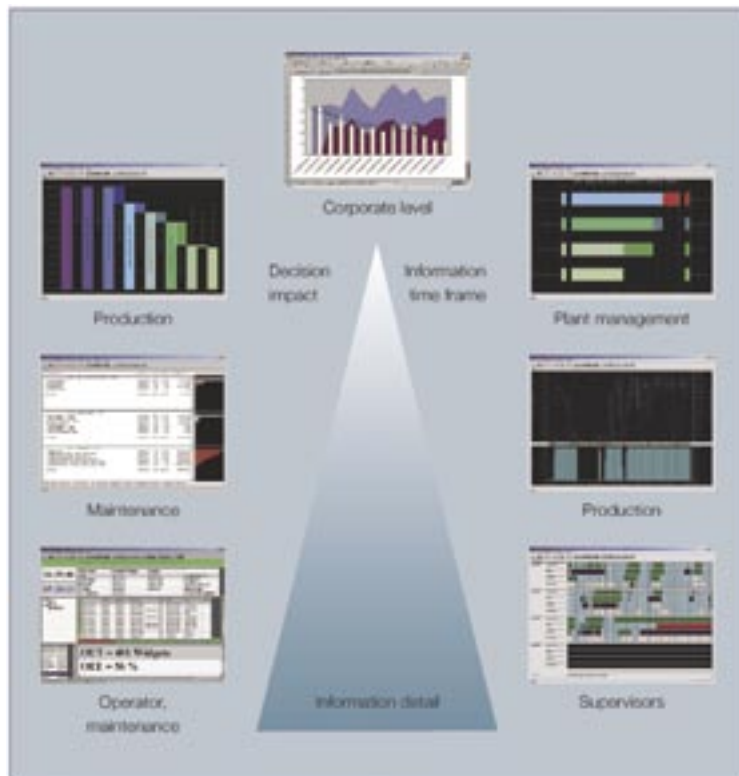
## Overview

System 800xA's Real-TPI application harnesses the analytical power of three of the standard production evaluation processes: OEE, Root Cause Analysis (RCA), and Total Productive Maintenance (TPM). When OEE indicates poor plant performance, RCA is utilized to determine what the problem is and where it is located so the corrective action can be taken. TPM is a process to adjust production equipment procedures with the aim of improving efficiency.

Real-TPI is designed to improve efficiency and positively influence ROI by facilitating the elimination of failures in the early stages. It also supplies maintenance departments with critical information regarding equipment behavior, accelerating the transition to preventive maintenance.

Real-TPI benefits include the following:

- Provides solid real time performance data and advanced tools for analysis
- Complements production planning, production tracking, and financial systems with real-time production efficiency data
- Easily tracks the daily progress and identifies possible problems in the production line
- Eliminates inaccurate, inconsistent, defective and laborious manual logs
- Enables the plant to perform smarter and at substantial cost savings, resulting in sustainable advantage over the competition



**Figure 1.** Real-TPI is a software solution for measurement and analysis of equipment effectiveness, for use at all levels of an organization.

## Real Time Performance Measurement

Determining the real effectiveness of a production line is far from simple. It is even more difficult to calculate production line effectiveness on-line, based on a combination of data from different applications and operator input. But operators and supervisors need such up-to-the minute information in order to optimize production.

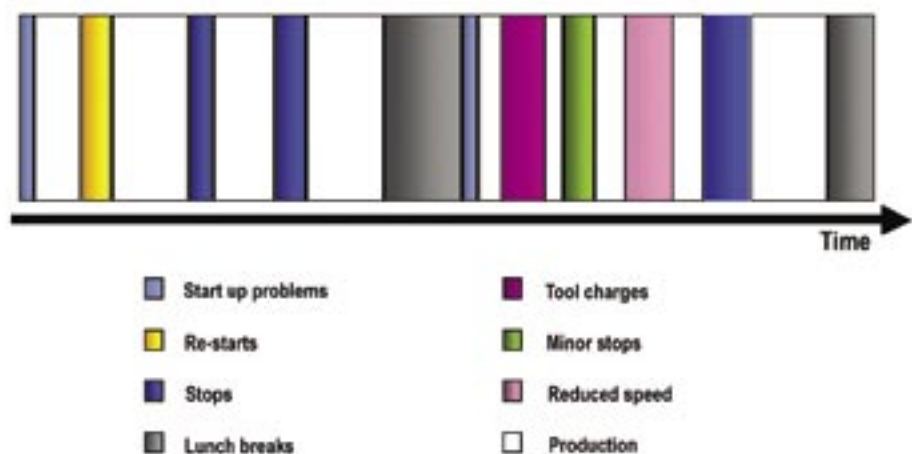
The inherent versatility of Real-TPI enables a variety of viable configurations that ensure on-line data is easily available to decision makers via its central data collection, characterization, segregation, and storage capabilities. These areas are highly configurable to accommodate various data acquisition methods. The configurable nature of the predefined Real-TPI functional modules ensures the universal applicability of the system for all industries in a multitude of application settings.

System components supporting the modular distribution structure are:

- Data acquisition
- Data manipulation and storage
- Visualization
- Reporting
- Web interface

Collectively, these components can be easily adapted to plant equipment, standard plant communication networks, and a multitude of machine and operator topologies to provide fast and accurate operations efficiencies. Real-TPI's Client/Server architecture, together with an available web-based reporting module, provides users access to the performance indicators anywhere in the world.

### Losses in a Production Process



**Figure 2.** Accurate OEE measurement makes it possible to select improvements with the greatest impact on the bottom line.

## Real Time Key Performance Indicators (KPIs)

OEE is a Key Performance Indicator of how machines, production lines or processes are performing. It is a “best practices” way that includes continuous monitoring, analyzing and identifying problem areas to improve the performance of manufacturing processes.

Real-TPI is a specialized software tool developed for plant engineers and production managers for use in online determination of OEE of production equipment and processes. In equipment improvement activities, OEE is one of the best measures of performance.

OEE is simple and practical. It takes the most common and important sources of manufacturing productivity loss and places them into three primary categories: Availability, Performance and Quality, and distills them into metrics that provide an excellent gauge for measuring current state of productivity and where improvements can be made. Constant analysis of this data will point to problem areas and demonstrate magnitude and priorities.

This allows the focus to be placed on the priority issues and implementing improvements, which lead to major efficiency gains. Raising OEE reduces cost per product, raises capacity, and leads to better overall control and realization of the full potential of the production lines.

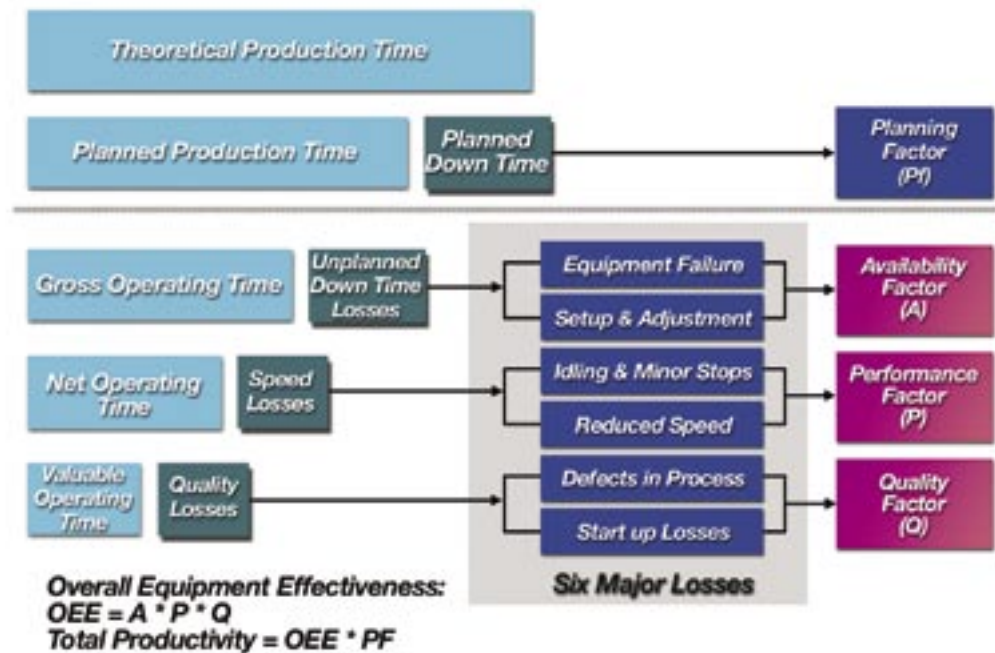
Real-TPI provides an accurate picture of plant or equipment performance efficiency and improvement opportunities. It can:

- Measure how current equipment is performing
- Identify all losses and weaknesses in existing equipment
- Track daily progress visually using key performance indicators
- Reduce data entry time and paperwork
- Eliminate the needs for inefficient stopwatch studies
- Avoid inaccurate and inconsistent floor reporting caused by manual data collection (high potential error level)

**Defining the Six Major Losses:** One of the major goals of Real-TPI's OEE and TPM components is to reduce and/or eliminate what are called the “six major losses” – the most common causes of efficiency loss in manufacturing. Equipment effectiveness is maximized through efforts to control or eliminate these losses. Figure 3 lists the “six major losses” and shows how they relate to the OEE loss categories.

Benefits of reducing or eliminating the six major losses include:

- Increased productivity or production efficiencies
- Reduced labor, stoppages, machine hours, maintenance, quality issues
- Postponed or reduced equipment investments
- Capacity improvements via production efficiencies
- Improved control over production cycle
- Pinpointing bottlenecks & performance degradations
- Corporate wide common measurement standard



**Figure 3.** OEE is an indicator of how machines, production lines and processes perform in terms of availability, production rate and quality. OEE is the best yardstick for understanding current performance and locating areas for potential improvement in a manufacturing environment.

## Integrating Information for Improved Performance Analysis

Every user has unique requirements for the information they require and how they would like to view it. System 800xA Process Portal provides the ability to create personalized workplaces with adjustable layouts optimized to users' preferences and needs with individualized menus, toolbar contents and display locations. This intuitive and easy-to-use system interface gives direct access to relevant information facilitating timely and accurate decisions critical for improving production performance.

One of the most difficult performance issues is identifying the root causes of production losses. Frequently the repeated problems are distributed over time so one does not always realize they are actually recurring. Real-TPI's Root Cause Analysis automated problem resolution capability easily provides the ability to determine which situations are recurring and with what frequency.

Real-TPI automatically collects all relevant signals at every event in real time. A complete set of predefined mathematical functions and modeling tools facilitate the calculation and analysis of these collected signals. It totalizes values based on measurements and counters, and performance parameters and presents the individual machine and combined process availability, performance and product quality factors. This allows for meaningful analysis and identification of the weakest link in the production line.

Any time period, such as the previous night's shift, may be viewed with possible problems becoming immediately visible. Different analysis and reporting tools are used to identify typical problem types, when and where they occur, and what impact they have on overall OEE. This is where Real-TPI provides its greatest value.

Accurate OEE measurement makes it possible to select improvements with the greatest impact on the bottom line. Selecting 20% of the failures that represent 80% of the total production losses results in cost reductions, improved quality, output increases, and better utilization of plant resources.

## Graphic Reporting

Graphic reports are one of the most effective methods to convey qualitative information. Real-TPI's configurable, ready-to-use reports and displays eliminate inaccurate, inconsistent, defective, and laborious manual logs. Real-TPI incorporates an extensive range of such reports including Chronograms, OEE Displays, Pareto Charts, Waterfall Diagrams, Penalty Charts, Machine Views, and Production Reports as well as the ability to create customized reports. These reports interpret process data into meaningful information that the plant engineer or production manager can use in reducing time to decision and action.

Operators can view reports from their Process Portal workplaces by simply browsing report archives via the Plant Explorer. Other personnel can view these standard reports from their desktops. Using standard office applications to extract relevant information from the automation system, personnel can also create customized reports from their desktop.

Real-TPI's modular, distributed structure also includes a web interface providing a variety of read-only standard graphics as well as customizable reports. Web-based reporting via an intranet supplies the information over the company network to the plant manager, plant engineer, production manager, and to all other authorized users regardless of their geographical locations. Web-based reporting via the Intranet is accessible via a secure, password-protected link that supports informed decision-making on a multi-plant level.

**Machine View:** The machine view, one of many views, is a graphic display that mainly contains a list of all events associated with disruptions to normal planned production. It provides an overview complete with totalized results of the defined equations, durations spent in various states, production quantities, and other productivity details. A representative sample is shown in Figure 4.

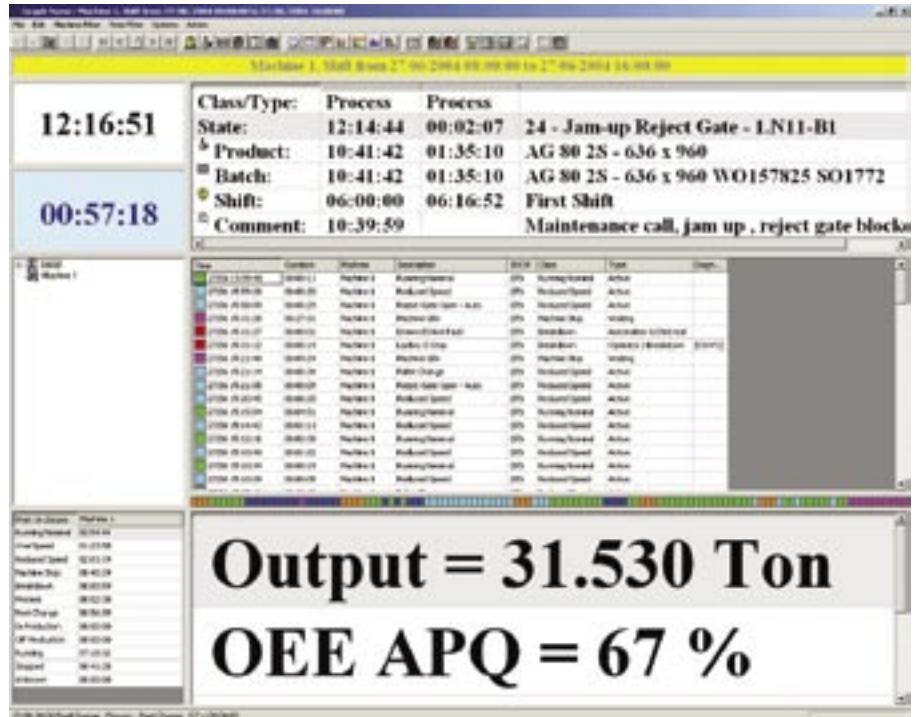


Figure 4. Machine view

**Chronogram View:** A chronogram is a visual illustration highlighting the sequence of events (chronology). The graphic is composed of rows with small colored rectangles for different machines. The colors relate to the various states during the displayed time period. In the case of multiple machines, it is possible to observe the effects of one machine versus another. A Chronogram displayed in System 800xA's Engineering Workplace is shown in Figure 5.



Figure 5. Chronogram view

**Production View:** The production view combines many types of information into one comprehensive display. The display can depict the real production and efficiency plotted against the potential optimums as a function of time. An example displaying multiple machine views is shown in Figure 6.

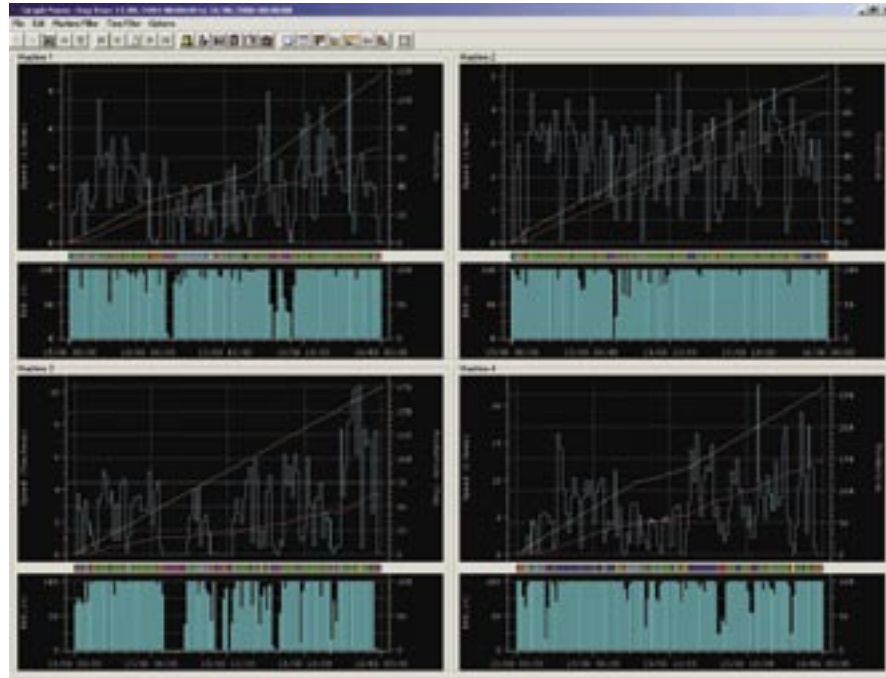


Figure 6. Production view

**Overall Equipment Effectiveness:** These graphics present both a qualitative and quantitative representation of the key components used to calculate OEE. The OEE view provides planned production, planned and unplanned downtime, gross, net, and valuable operating time as effected by the unplanned downtime, speed and quality losses. An example displaying Real-TPI's Web-based reporting capabilities is shown in Figure 7.

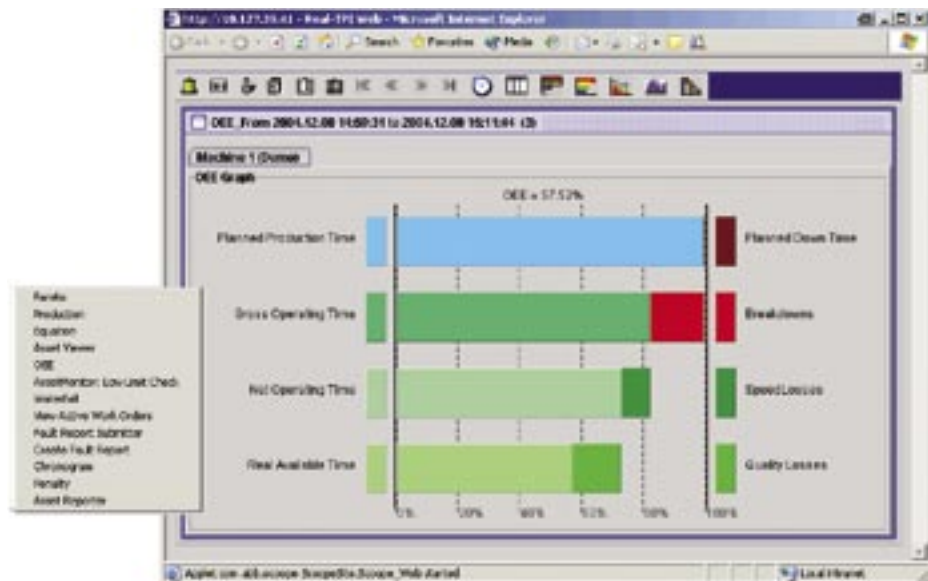


Figure 7. OEE view

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## Achieving Continuous Production Improvements

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Many methodologies, including TPM and Six Sigma, aim at productivity improvement. These methodologies all rely on a strategy of continuous measurement of the actual situation, analysis of the information, and then improvement oriented action based upon it. Real-TPI's software solution for real time measurement and analysis of equipment effectiveness makes the implementation and execution of these methodologies possible.

By developing a better understanding of the production potential of existing plant equipment, corrective actions can be taken in shorter periods of time. This leads to OEE improvement, a Key Performance Indicator. Real-TPI provides the plant engineer or production manager with a world-class real time tool for determining OEE and presenting the results in a variety of easy-to-use displays and reports. Whether the topic of interest is production plans, maintenance time, gross production, wasted production, nonscheduled stoppages, speed losses, quality metrics, or other production issues, Real-TPI easily provides the insight for meaningful and precise understanding of process conditions and any associated decisions and production planning.

ROI is reduced directly by production costs, time and capital investments. Conversely, it dramatically increases by improving OEE. An increase of 1% OEE can improve profit dramatically, with an increase of several thousand dollars per machine to millions of dollars per plant or production possible.

### **System 800xA Extends Features**

System 800xA provides extended features for Real-TPI by providing a platform with a flexible way to combine, structure, and exchange information between different sources. Real-TPI is designed to be an "aspect" inside the System 800xA workplace. This aspect can be linked and dedicated to other objects in the system optimizing workflow and reducing time to action.

In System 800xA, Real-TPI aspects are created automatically. Advanced KPI analysis is completed and displayed using these aspects in ready-to-use graphics and reports. System 800xA monitors the KPI information with Asset Monitors. The Real-TPI Asset Monitor will trigger an alarm and message. Fault reports can then be submitted to a fully integrated CMMS which in turn creates required work orders. Maintenance personnel and improvement teams analyze in depth the circumstances of where, what, and when process changes happened. It is extremely valuable to focus on the right cause of performance loss and failures. Most systems provide limited ability to fully understand causes of performance losses due to missing information and lack of communication between production and maintenance. 800xA Real-TPI changes all that by using production, process, and maintenance information in a seamless way.

Real-TPI provides the scalability to start small and grow as needs evolve. It can be implemented on one or more machines, a production line or a whole plant. Real-TPI can be installed as either a stand-alone application or as part of System 800xA where it can be used in a multi-plant environment. Real-TPI provides the tools needed to continue achieving optimal production capacity through continuous follow-up and improvement regardless of the size of the factory.

Whatever type of production equipment is involved, in whatever industry, 800xA Real-TPI provides the information and visualization required to optimally manage assets and increase return on investment.

Real-TPI is already operational in the life sciences, chemical, consumer, manufacturing, process, oil and mining industries.





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Automation Technologies  
Västerås, Sweden  
Phone: +46 (0)21 34 20 00  
Fax: +46 (0)21 13 78 45  
[www.abb.com/controlsystems](http://www.abb.com/controlsystems)  
e-mail: [processautomation@se.abb.com](mailto:processautomation@se.abb.com)

Automation Technologies  
Wickliffe, Ohio, USA  
Phone: +1 440 585 8500  
Fax: +1 440 585 8756  
[www.abb.com/controlsystems](http://www.abb.com/controlsystems)  
e-mail: [industrialitsolutions@us.abb.com](mailto:industrialitsolutions@us.abb.com)

Automation Technologies  
Mannheim, Germany  
Phone: +49 (0) 1805 26 67 76  
Fax: +49 (0) 1805 77 63 29  
[www.abb.de/controlsystems](http://www.abb.de/controlsystems)  
e-mail: [marketing.control-products@de.abb.com](mailto:marketing.control-products@de.abb.com)

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