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PSI 
Logistics

**PSI Logistics –
Solutions that pay off**

PSI 
Logistics

PSI Logistics – the partner by your side

Business context



„Outstanding expertise in logistics and innovative technologies form the basis of our solutions and projects.“
Wolfgang Albrecht,
Graduate Engineer,
Managing Director of PSI
Logistics GmbH

PSI AG is one of Germany's largest software companies, with more than 1,100 employees worldwide and sales revenue of over 115 million. The group is also one of the leading international independent providers of instrumentation and control systems for network, production and information management in logistics, energy supply and telecommunications.

Knowledge of its customers' business processes has given PSI extensive sector- and process-related expertise. This detailed expertise has gone into the products developed, which thus have a significantly greater depth of optimisation than comparable competing products. The group uses state-of-the-art software technology as a basis for new sector-specific software developed exclusively by PSI.

The group company PSI Logistics GmbH has become a specialist supplier of innovative software, with the support and interdisciplinary transfer of technology within this group network. Operations focus on warehouse management, logistics network management and airport solutions. Developments and innovative solutions in these areas and knowledge of its customers' business processes acquired over many years are the company's main competitive advantages, which play a significant role in securing its future.

PSI is a strong partner, supporting customers with its group administrative and financial background, even for highly-complex major projects. Famili-

arity with its customers' business processes, a wide spectrum of tried and tested functionalities and the use of cutting-edge technology such as RFID allow the company to generate innovative solutions to meet current market demands quickly, flexibly and proactively.

As an IT supplier, PSI Logistics contributes to specialist for such as the Intralogistics Forum. As a founder member, PSI Logistics is represented on the go-verning body of the forum and chairs the "Innovations and Standardisation" working party. This working party concentrates on creating uniform technological standards in order to harmonise interfaces between various components. The intralogistics/handling technology and logistical systems research association was established in July 2005 with the prime aim of supporting academic chairs in the field of intralogistics/handling technology and logistical systems. PSI Logistics is represented here too as a founder member.

PSI Logistics' engagement in the intralogistics

Progress through technology

PSI Logistics Software

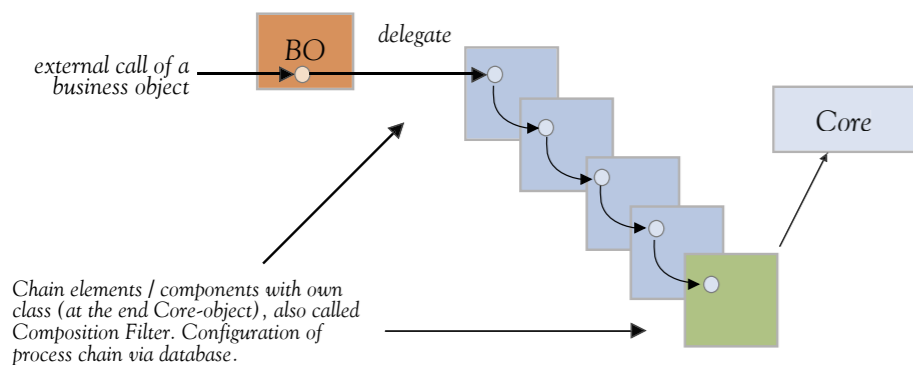
An increasingly complex business world always involves logistics. Consequently, it must be possible to integrate adaptable, logistical software into a diverse IT environment, in order to be able to keep up. PSI Logistics software products are structured for maximum flexibility and scalability. This adaptability is achieved partly through parameterisation. However, the architecture and technology used are far more important in this respect. PSI Logistics software can be assembled and configured analogously to the business process chains, with database mechanisms being used for configuration. Flexibility is also maintained beyond

the roll-out of the system, because change is an integral feature of logistics. Adaptability to change is supported by PSI Logistics software products throughout their whole life cycle and beyond. This also creates total cost of ownership (TCO) advantages.

Object-oriented development is widespread in software technology and the development of component libraries is becoming increasingly common in software. Aspect-oriented development, which is expected to make a major breakthrough in the coming years, has provided additional impetus. However, PSI Logistics has already taken it to its technological peak and has already been using these fundamental design techniques in completely novel product designs for some time. This requires not only technical expertise, but also thorough practical experience in logistics.

A tailor-made development process is the key to enhancing quality despite increasing demands. For this reason, flexible aspects of highly-efficient development processes have been integrated more and more into the development process in recent years.

- Automated tests
- Iterative development in accordance with the „business value first“ principle
- Short iteration times, for rapid feedback
- Consistent, controlled integration of modifications into the test system
- Constant reflection of the project status



New development procedures

Prototyping

- Monitoring of all modifications in version management

The combination of technology and development process produces significant advantages for the projects implemented. Substantial modifications, which had not originally been foreseen, can be integrated if necessary and processes can be completely restructured. The automated tests enable developers to test functions and interfaces of the respective application automatically in an early project phase. The advantages lie primarily in objectively measurable progress of the project and enhanced product reliability. For customers, product reliability has resulted in cost advantages, partly as a result of faster commissioning of a system which has already been tested intensively by the automatic test generator after every modification. It is also beneficial to new releases of the core product.

PSI Logistics has developed a new procedure for the development, configuration and implementation of software solutions for logistical processes, using its iterative procedure. Advantage of the iterative procedure: A workable prototype of the PSI system is used in a very early project phase and gradually expanded to create the customer's system. The processes required for development and implementation can be significantly simplified and shortened by focusing specifically on the most important user-specific requirements. This reduces

project costs, shortens production times and enables far greater reliability to be achieved for the customer by prototyping.

In intralogistics, flexibility and



quality are the key requirements in the selection of suppliers, because of changing business partners, customers or products.

Solutions that pay off

Corporate logistics in the spotlight

PSI Logistics solutions can be divided into two categories. Corporate logistics delivers solutions for operators and users of logistical networks. This includes solutions for intralogistics and solutions for optimisation of logistical processes throughout the company. In contrast, airport solutions primarily involves passenger, baggage and cargo handling.

Corporate logistics

Logistics are becoming increasingly important as an element connecting a variety of corporate departments and a connecting link to the customer. Constantly increasing pressure on costs and continued globalisation, including global sourcing and worldwide sales networks, are the major influencing factors. Furthermore, a highly efficient logistical system is a crucial distinguishing



feature for many businesses. This can mean “A new world every week” and also logistical networks optimised to a high degree for despatching spare parts all over the world in order to guarantee maxi-

mum availability of customers’ machinery or plant.

Modern logistical systems can no longer dispense with IT support nowadays. However, it is common knowledge that more fundamental IT support is necessary for the operation of optimised logistical networks. Flexibility, scalability and integrability are key factors in the assessment of IT systems in logistics, in addition to a holistic consideration of the business processes.

Warehouse management

The warehouse is and remains the hub of a modern intralogistical system. In this sense, warehouses nowadays are also more than pure stores of goods. Accordingly, the product *PSIwms* is also much more than a pure warehouse management and control system. *PSIwms* naturally contains all the functions which reproduce the business processes in a warehouse, whereby it is immaterial whether a production warehouse or a distribution centre is involved. Even the standard version of *PSIwms* supports all relevant warehouse types and technologies. The warehouse management system also offers comprehensive management and planning functions which enable sustained stock reduction to be achieved.

*Flexibility, Scalability,
Integrability*

*Aspect orientation secures
investment for the long
term*

Agent technology in operation

Monitoring processes

Aspect-oriented system architecture makes the standard product highly flexible and adaptable by means of parameterisation, without outlay for programming. This, and also integrated, automatic test procedures, enable extremely high quality to be achieved. For a specific project, this means short roll-out periods, a high degree of reliability throughout the project and thus a quick return on investment.

Change is a significant aspect of corporate logistics. The dynamic which makes markets change also affects businesses. Consequently, the logistical business processes are constantly reviewed and adapted. Such changes in logistical business processes demand modifications of the IT systems. In this case, it is advantageous if the software product used offers maximum flexibility. *PSIwms* has aspect-oriented architecture, rather than a component-based structure. On the basis of this technology, the system can be adapted analogously to the process chains without modification of the software, securing the investment for the long term.

Supply Chain Event Management

Early detection of exceptional situations expands the scope of action for accomplishing logistical tasks. This also leads to smooth information flows

and reduces the outlay for dealing with exceptional situations.

Observing supply processes on the basis of the business as a whole is more effective if the focus is on the process required, not the individual goods. In this respect, PSI Logistics depends completely on PSI’s own agent technology. Intelligent software agents constantly observe the procedures in complex logistical networks and trigger defined activities independently if there are temporal deviations or deviations from standard.

The logistical control system *PSI-control* enables all internal logistical processes and also processes throughout the business to be displayed. This gives the user a comprehensive picture of the material flows in its logistical network and other relevant processes, such as orders, jobs and orders from stock. The logistical control system flags bottlenecks automatically. In order to detect trends at an early stage, definable codes are constantly monitored and condensed in statistical analyses.

*Software artefacts monitor
supply chains independ-
ently and proactively.*

Airport-Solutions

Smooth operations on the ground

Competition between airlines is increasingly being fought out on the ground. Passenger and freight traffic, and thus also the demands on airport IT systems, are growing, as a result of globalisation, advances in technology and sustained mobility. Meeting these challenges requires intelligent systems and optimum processes. The priorities of reliability and efficiency are given equal consideration by targeted networking and round-the-clock availability of all crucial data.

The integration of future-oriented IT and systems technology accelerates and optimises the handling processes in new or existing terminals. Airport systems are among the most demanding projects, with their complex demands on security, reliability and availability. Airport solutions therefore have to be designed with precision, be optimally integratable and be designed to allow the networking of information from upstream and downstream systems. PSI Logistics offers the requisite expertise in logistics, and consultancy and IT services. This creates the basis for comprehensive system, network and all-in solutions from planning to services, depending on what is required. All from a single source.

Consultancy

Years of experience of airport-related projects in conjunction with sophisticated methods enable the consultants

and project managers at PSI Logistics to analyse processes and identify optimisation potential for projects and commissions. Business processes, IT solutions and the requisite infrastructure are optimally matched, in consultation with the user, whether for baggage, passenger or freight systems. Despite increasing passenger figures, airport operators, handling agents and airlines are under enormous pressure of costs. The question of the return on investment thus plays a role in the decision on which IT solutions should be used and which business processes should be integrated, because adapting software and business processes can cost money, as well as produce savings.

System solution

Round-the-clock operation. Airports must be available at all times. Down times of IT systems entail substantial costs and doubts about quality for all those involved in processes at airports.

Delays, baggage missing at the airport. These are only two of the lapses in quality which passengers are no longer prepared to tolerate. This makes the smooth roll-out and operation of the right IT system more important than ever. PSI Logistics, supported by many experts, has developed a range of products for this, which have a variety of applications.

PSIairport / BHS, the baggage handling system of PSI Logistics, is responsible for optimum baggage flow at airports and integrates the systems of the airlines, airports and other parties involved. PSIairport / BRS, the baggage reconciliation system, ensures that no item of baggage ends up on a plane without the relevant passenger. A load sheet must be issued for every flight. PSIairport / W&B Weight and Balance was developed to ensure that this happens transparently, quickly and, if required, with automatic interfaces. With PSIairport / DCS, state-of-the-art architecture, user-friendliness and drag and drop features are appearing in allocation of seats, printing of receipts and boarding cards for check-in, boarding and the associated administrative processes. Seasonal scheduling, daily scheduling, inbound, outbound and connecting flights are just a taste of the complex world of flight plan management. PSIairport / FPMS provides the

user with a clear tool for the management, updating and distribution of flight plans. PSI Logistics also supports the maintenance team in the planning, implementation and documentation of their work. With PSIairport / M&S, PSI Logistics has developed PSIairport / EAI Enterprise Application Integration, so that all airport systems can be linked simply and transparently. It allows interfaces to be configured flexibly, new systems to be integrated and information to be filtered and distributed under control.

Services

100% availability and continuous improvement process. PSI Logistics remains at the users' disposal even after successful installation, with all kinds of services. Trained maintenance and on-call staff react quickly and competently to customer requests, round the clock if required.

Efficient no-read processing. A further module in the PSIairport product suite



Service and quality

Project reliability

PSI Logistics focuses on the customer's business processes. Software products alone are insufficient for their optimisation. The service concept is always a constituent part of the solution. The service concept of PSI Logistics guarantees constant readiness for operations, optimum support of the business processes and thus lower operating costs, even after acceptance, in other words, maximum benefit.

Service comes first

Innovative roll-out concept

Return on investment is the major deciding factor in investment decisions. It is not only important that an investment adds up, but that it is certain to work out. Project reliability is thus required, i.e. achieving a solution which supports the business processes, by the agreed deadline. The aspect-oriented system architecture of PSI Logistics creates the basis for this. Building on this technology, PSI Logistics has de-



veloped an iterative roll-out concept.

The concept anticipates early generation of a prototype of the subsequent system, using standard software components. Business processes are reflected in this prototype and discussed with the customer. The final system is developed through further iteration stages on the basis of this first prototype. The advantage of this approach is obvious. A system is available to the customer at an early stage, reducing the degree of abstraction and preventing misunderstandings. The operating and maintenance staff can also be trained at an early stage, so that the integration and mass tests take place with trained staff. Another important aspect of the roll-out concept is the test generator integrated into the standard software, generating automated system tests of functions and interfaces of the application in question. This is a major advantage, particularly with the iterative approach with the associated intermediate versions.

Automated tests guarantee high-quality software

Training

Increasing efficiency

Quality

PSI Logistics is certified under ISO 9001. PSI Logistics does not merely pay lip service to quality but has made it a crucial part of its corporate philosophy.

Certified under ISO 9001



Solutions from PSI Logistics are generally required at critical points in the customer's value-adding chain. Consequently, the quality of the software is extremely important and contributes in no small measure to cost reduction. However, not only the quality of the software is important, but also the quality of the services (advice, issue of the specification and service). PSI Logistics constantly assesses these areas. For example, customer surveys are conducted regularly after projects, to gauge customer satisfaction.

Training

The individual is and remains the key element in optimisation of business processes. Despite graphic user interfaces and intuitive operating concepts, the users and administrators must be introduced to the IT solution. This is done by intense involvement of the key users in the various iteration stages of the overall project. PSI Logistics offers a tried and tested training concept for direct training of the operating and maintenance staff, tailored to a variety of target groups. This forms a constituent part of every PSI Logistics solution. The training gives the customer's employees an impression of the overall system and makes them familiar with the functions relevant to them. A wide range of media is used. PSI Logistics also offers training opportunities in its own training centre which do not relate to the specific project. The training courses regularly offered cover the operation and administration of PSI Logistics software products.

Training in PSI's own training centre

HERMA GmbH

Reference project

HERMA GmbH, which has its registered office in Stuttgart, is a leading supplier of self-adhesive products on the European market. The company employs around 800 staff on three sites in the Stuttgart area. Its turnover in 2004 totalled 165.5 million euros. HERMA is divided into three independently-operating divisions for adhesives, labelling systems and stationery. The opening of a logistics centre cost-



ing 15 million euros means that the company is entering into new dimensions in terms of delivery times, flexibility and quality, with ever-decreasing delivery volumes and faster delivery times.

The system is based on an 11-aisle automated small parts warehouse with 100,000 bays, an upstream conveyor system with order picking and packing bays added to the existing warehouse, and the introduction of a warehouse management system with pick-by-voice

and transport-by-voice support in the pallet warehouse with bays for 5,700 bulky items.

Requirements

In addition to the planned operational requirements, HERMA had made further demands in the specifications, such as a variety of detailed analyses, medium-term resource scheduling and archiving functions. Another special feature was the establishment of a control station which detects future demands on the system by simulated runs, with data support from the upstream system. Moreover, it was not only to be possible to integrate the software into the existing IT landscape without any problem. The requirement for flexibility was crucial. Adaptability of the software to meet operational demands was the key. In addition, the voice control software was to be installed for order-picking and transport in the pallet warehouse.

HERMA uses not only pick-by-voice, but also transport-by-voice



Performance trebled

By a high level of flexibility

Scope of PSIwms

- Interface with SAP/R3 and subordinate control system
- Master data management
- Stock information by Transport unit and total
- Entry of goods received
- Voice-controlled stacker control system
- Order processing
- Pick-by-voice order picking in the pallet warehouse on the man to goods principle
- Order picking in accordance with the goods to man principle in the automated small parts warehouse
- Display of print files and messages from SAP at the workstations
- Scheduling control panel
- Archive server
- Reports and statistics
- Constantly updated inventory

Roll-out

A comprehensive roll-out concept developed jointly by all the main partners in the project was intended to minimise the risks of roll-out while operations continued. This included detailed lists of points which formed rules for introducing the components and the second-stage roll-out of the whole system. In an initial stage, the new software was tested in real operations, including SAP integration, but excluding the

new components of the system. In a second stage, the warehouse management system and material flow computer communication system was activated, the new components of the system switched on and the container warehouse filled under warehouse management system control. Operating and interface tests at an early stage by the automated test procedure ensured a smooth changeover to the new system.

Hardware configuration

A highly-available computer system running under Windows 2000 was selected as the server for the warehouse management system. The server guarantees system performance and availability and has dual configuration as a so-called rack solution.



„Since the roll-out of the new logistics centre based on logistical deliverability and efficiency, we have been selected more frequently as „Supplier of the Year“ by our customers.“ (Frank Baude, Logistics Manager at HERMA)

Volkswagen utility vehicles

Reference project

The Volkswagen Group is one of the world's leading automotive manufacturers and the largest producer of cars in Europe. The Hanover factory, built in 1956, is the second-largest of the six VW plants in Germany, after the main plant in Wolfsburg, and also the largest van factory in Europe. Commercial vehicles in the T5, Transporter, Multivan and LT2 ranges are built on the 1.1 million square metre site. Up to 750 new T5s and 140 new LT20s roll off the Hanover production lines daily.

Our brief



An automatic buffer and supply warehouse and an efficient warehouse management system were to be implemented by PSI Logistics to enhance, optimise and display sequential production supply in the group control mechanism for commercial vehicles.

Implementation

The individual components for the various types of vehicle are obtained from suppliers, or from in-house production, i.e. internal warehouses. The sides and roofs are manufactured in Hanover.

The crossbar press produces bodywork side components from steel sheet. A special downstream batch accumulator was installed to supply the crossbar press with so-called cassettes and to remove the finished parts. It is used as a buffer store for rapid supply and removal of components to and from roof production, feeding cassettes to production supply and delivery to the assembly plant in Poznan, Poland.

At the same time, a side component cassette store was established, supplied from the batch accumulator. Its purpose is to store and provide all the side components for bodywork. The side component cassette store is on two levels, which accommodate automatic order picking. The storage capacity of the two levels comprises 740 bays, plus 60 for order picking. Around 18,000 side components are thus stored here.

In the dialogue between the VW vehicle information system and the warehouse management system, the PSI Logistics warehouse management system retrieves orders automatically from the vehicle information system and controls the downstream sub-systems.

The processes

The control

- Optimum supply to and removal from the crossbar presses and their transport and storage in the batch accumulator
- Codes for labelling of the side component cassette store stored in the warehouse management system
- If the quantity falls below the minimum, the warehouse management system will ensure transfer from the batch accumulator
- Removal from storage in accordance with the "last in – first out" (lifo) principle
- Transfer of cassette stacks and the return of empty cassettes from the side component cassette store to the batch accumulator and crossbar press
- Stored parts are then withdrawn from the side component cassette store in accordance with the



- vehicle components list and fed to the production lines in sequence
- The warehouse management system detects which production line needs which side sections, on the basis of the 16-character communication number from the vehicle information system
- The warehouse management system orders downstream subsystems in dialogue with 20 SPCs to remove the relevant cassette from storage and initiates transport of the parts directly to the production line
- Subsystems acknowledge the task as completed.
- The warehouse management system acknowledges this and transfers completion of the process to the vehicle information system
- In parallel, parts are checked, identified, allocated to production sites at checkpoints and acknowledged to the vehicle information centre

Hardware configuration

The system has a high level of availability and consists of two IBM Windows 2000 clusters and external hard drive RAID systems. Win-CC provides the display.



„A glance at the availability, speed and production versatility of the stored goods in their complexity confirms that this is a unique project in the automotive industry,“ says Jan Compte, a developer in the department for planning, material flow and materials handling technology at VWN, which was commissioned with the restructuring of the plant at Hanover.

Cologne/Bonn Airport

Reference project

When Cologne/Bonn Airport built Terminal 2, Vanderlande Industries was commissioned with installation of a baggage conveyor and sorting system. As sub-contractor, PSI Logistics supplied the host computer level, the network and the chute displays with an autonomous bus system for connection of the so-called traffic light (red/yellow/green) scanner for handling the baggage reconciliation system.

The system is designed for 24/7 operation. It currently sorts up to 3,000 items of baggage per hour at peak times for 51 destination chutes. The early baggage store integrated into the baggage conveyor and sorting system has a capacity of around 200 items of baggage, thus facilitating smooth check-in on the evening before travel.

Brief and implementation

The main task to be accomplished consisted of guaranteeing a high level of availability during 24/7 operation. This was achieved using a SUN Microsystems HA cluster in conjunction with customised software by PSI Logistics. In addition, peripheral components such as the chute displays and the traffic light scanners were connected as redundant.

Items of baggage checked in at the counters in the island check-in areas are fed automatically to the sorting destinations in accordance with the



parameters entered by the agent, after undergoing a 100% check by the host computer. The host sorting computer receives the requisite information from the connected systems.

- The host computer receives details of the baggage to be despatched from the check-in airlines through a central redundant SITA interface (Cubes/MDS).
- Data on the relevant departures is transmitted through a flight plan management system (FPMS) interface.
- The host computer transmits the results from the X-ray inspection stages to the Federal Border Police system for matching passengers and baggage.

Passenger figures up by 18 %

Hub for Low Cost Carrier

Allocation of the final sorting destinations by the officials is supported by an information dialogue from the host computer, particularly by displaying the allocation as a Gantt chart. Special workstation functions such as so-called „no-read processing“ enable the operators to handle special cases easily.

For reasons of security, all items of baggage at Cologne/Bonn Airport are only released for loading when the passengers board, on request by the airline in question. This is guaranteed by the traffic light scanners specially designed for PSI Logistics. If the green LED lights when the items of baggage are scanned (possible at all 51 destination chutes), the baggage may be loaded. If the red LED lights, loading is prohibited.

Configuration

The high availability system (HA cluster), consisting of two SUN Microsystems Enterprise 450 systems, guarantees smooth operation 24/7, even in the event of failure of one of the two Enterprise 450 systems. The chute displays and traffic light scanners are connected through a redundant CAN bus system with two data concentrators working autonomously.

The data is held in an Oracle database on the external Raid systems. This guarantees the availability of all current data on the other system, should one system fail.

Client applications running under Windows NT are used at the workstations.

The conveyor control systems and connected third-party systems are linked through TCP/IP telegram interfaces.



Customer orientation

Focusing on the customer

Customer satisfaction is very important at PSI Logistics, with the focus on the customer's business processes. The primary objective is to find the optimum solution for these business processes. This is why PSI Logistics is still there for the customer long after the project has ended. This partnership-based, solution-oriented approach is the reason why so many customers are satisfied. The systems which the customers have been using successfully for many years and the resultant close customer relationships prove that this approach has been successful. Customer orientation is an important aspect, in addition to customer satisfaction. This concerns the strategic alignment of the businesses.

Customer orientation is firmly anchored in the corporate strategy of PSI Logistics, particularly in quality management. This demands intensive communication with the customer. For example, following on from a project, a customer survey is conducted to determine potential for improvement with regard to the products, services and project management of PSI Logistics. As already mentioned, this measure constitutes part of PSI Logistics' own quality management procedure, which guarantees that the information obtained is also analysed internally because, in addition to communication with the customer, analysis of the information obtained and taking the necessary steps is of prime importance. This is why responsibilities at PSI Logistics are

strictly laid down. PSI Logistics also places great value on dialogue with the customers for further development of the products and services, with customer interviews forming the basis for internal decisions.

