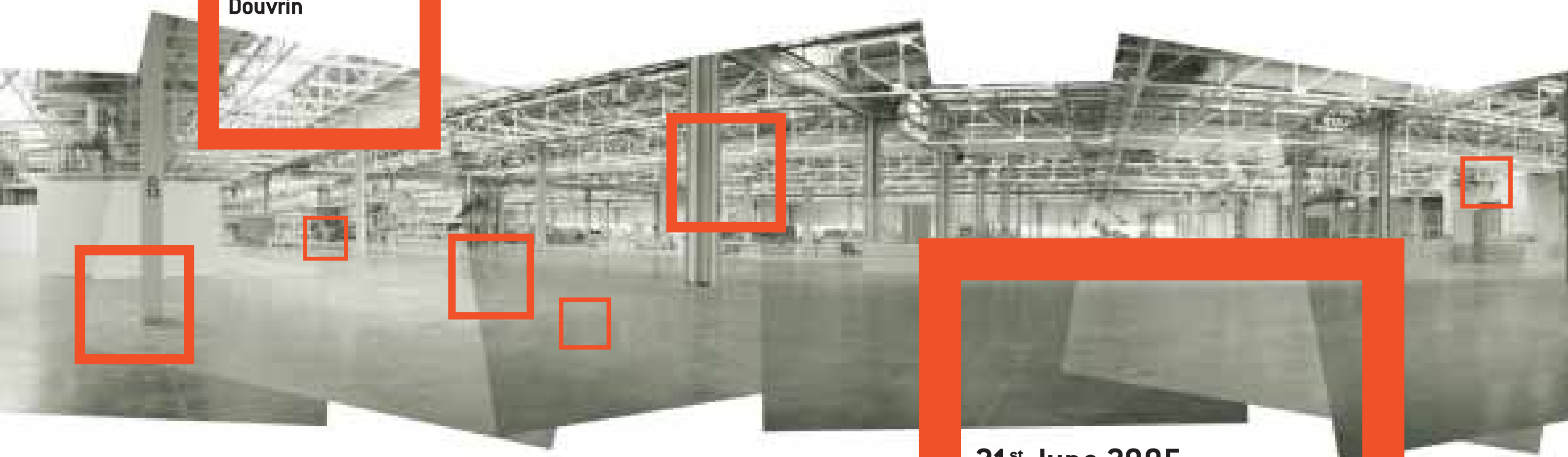
FRANÇAISE DE MECANIQUE
Douvrin

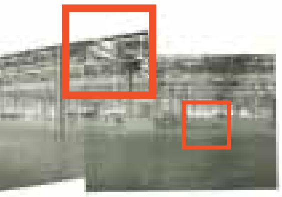


21st June 2005

INDUSTRIAL COOPERATION DAY

CONTENTS

COOPERATION BETWEEN PSA PEUGEOT CITROËN AND BMW GROUP



In 2002, PSA Peugeot Citroën and BMW Group officially announced their intention to join forces in developing and producing a new family of small gasoline engines for use in vehicles in both groups.

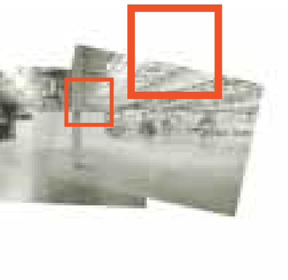
This agreement has made it possible to develop a new range of small high-tech gasoline engines in large volumes and in competitive economic conditions. The aim is to share development costs and to combine the expertise and facilities of the partners in applying the economies of scale that are essential for the operation to succeed.

This cooperation also benefits from access to different company cultures and industrial techniques. The two basic principles underlying an agreement of this kind are joint organizational decisions (a steering committee with a balanced number of representatives as well as a balanced exercise of powers; a single project manager and joint project teams involving engineers from both Groups) and sharing the costs : 50-50 for the development costs, then apportioned to the volumes for the industrial investments, engineering and launching costs.

To make that partnership program successful, both Groups had to share common objectives in terms of timing. As of 2006, these new engines will be used in small and medium-size cars produced by Peugeot and Citroën. The engines will also be used for future models of the Mini. They will have a power output ranging from 55 kW (75 hp) to 125 kW (170 hp) and will set new standards both in performance and drivability, as well as reducing fuel consumption and carbon dioxide (CO_2) emissions.

In a first time, the Project team responsible for the engine development was based in Münich as part of the BMW Group's Research & Development Division. As of today, the PSA Peugeot Citroën Group is in charge of manufacturing engineering, manufacturing and purchasing. Once at its maximum production capacity, the overall annual engine production will reach 1 million units.

This cooperation makes use of the technological know-how of both groups and their expertise in mass production methods.



TWO ENGINES WITH DIFFERENT TECHNOLOGIES

At the occasion of a “Technology Day” that was held in Munich at the BMW Group’s Research & Development Center, management representing both Groups outlined the technical features used for the development of those two following engines :

- A 1.6 liter naturally aspirated engine with fully variable valve timing and a power output of 85 kW (115 hp),
- A 1.6-liter direct injection, turbocharged engine with a power output of 105 kW (143 hp).

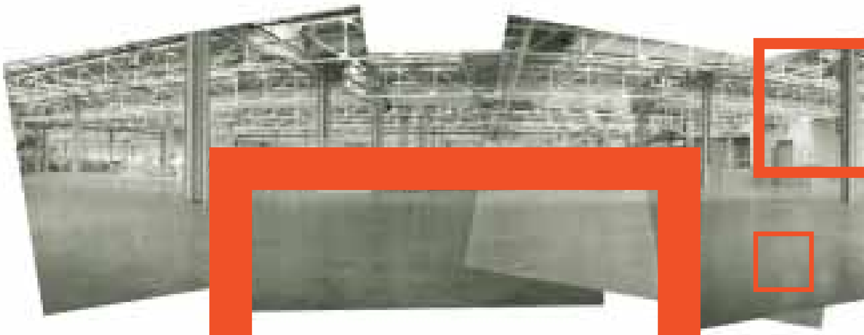
These engines are the two first products of a complete family that will eventually comprise engines with a power output ranging from 55 kW (75 hp) to 125 kW (170 hp).

These new engines will incorporate many top of the range solutions benefiting from each Group expertise :

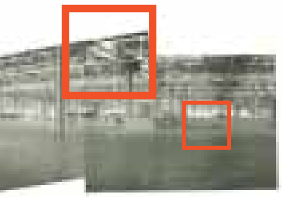
- Fully variable valve timing for reduced fuel comsumption
- Volume controlled oil pump
- Single-belt drive for all ancillary components
- Cylinder heads cast by the “lost foam” process.

Moreover several other innovations have also been developed, including:

- Direct injection to optimize power
- Twin-Scroll turbocharger to improve response time and driving comfort
- Self-disengaging water pump to reduce fuel consumption and emissions.



THE INDUSTRIAL ASPECTS OF THE COOPERATION



I - AN EFFICIENT INDUSTRIAL ORGANIZATION

The cooperation is managed on the so called “concurrence engineering” basis. One single dedicated team spread over two different sites has managed the three constituents of the Project : Product Development, Manufacturing and Purchasing.

The PSA Peugeot Citroën Project Management Method involved the project team working closely with the industrialization and purchasing groups to ensure dual involvement. Leadership of the engine engineering and development was BMW Group responsibility involving a high degree of commitment from PSA Peugeot Citroën engineers. The core of the engine engineering team is based at BMW Group Research Center (FIZ) in Münich and gathers a staff of fifty members out of which fifteen are PSA Peugeot Citroën engineers. They work closely with the manufacturing engineering and purchasing groups based at PSA Peugeot Citroën La Garenne-Colombes Technical Center, on the outskirts of Paris, which involve a complete staff of 150 people. In other words, this is an integrated team spread over two geographical locations, managing the project by exchanging the maximum number of files, methods and calculations by means of a high-speed EMX link.

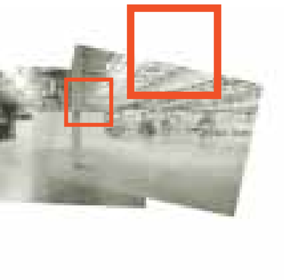
AN AMBITIOUS INDUSTRIAL BASE IN WESTERN EUROPE

The production and manufacturing aspect is the responsibility of PSA Peugeot Citroën. The main engine components are machined exclusively at Française de Mécanique in Douvrin (Pas-de-Calais, in Northern France). Assembly operations are shared between each of the manufacturers: Française de Mécanique in the case of PSA Peugeot Citroën and Hams Hall in England for the BMW Group to accommodate the logistics of supplying each manufacturer’s car plants.

The way roles between the 2 car manufacturers are distributed maintains a high level of industrial know-how in Western Europe. It has required the introduction of an efficient and flexible organization structure in order to adjust two different and geographically separate engine assembly processes.

PURCHASING AND LOGISTICS

PSA Peugeot Citroën is responsible for identifying and selecting suppliers. These were selected on the basis of ambitious quality and competitiveness criteria.



Upstream logistics is organized so as to ensure that the two engine assembly plants at Hams Hall (BMW Group) and Française de Mécanique (PSA Peugeot Citroën) are supplied directly and separately by all the different suppliers.

One of the fundamental principles set up in logistics is the implementation of the so called RECOR system (REnouvellement des COnsommations Réelles or Renewal of Actual Consumption). In other words, the entire manufacturing process is structured on the basis of pull flows. The logistics system is also managed on a FIFO basis – First In, First Out – where the first components to enter are the first to be used.

As far as engine assembly is concerned, there is limited diversity at the workstation at any given moment in time. This means engine assembly is processed in batches, each batch corresponds to one single engine specification being replicated in lot that reflects the best economical compromise. This involves only to feed the assembly line with the required components that are necessary to support the assembly of a given engine.

These principles apply to production scheduling and to the procurement of components from the suppliers. For example, a specific system is set up whereby large components are delivered directly from the truck to the assembly line, thus bypassing all usual intermediate stages (warehouse) and speeding up the production and stock replenishment process.

Outbound logistics is organized independently by each partner to supply each group's destination plants.

Information is exchanged on a daily basis between the two manufacturers and suppliers by means of an EDI interfaces (central server).

A "MODULAR" INDUSTRIAL ORGANIZATION STRUCTURE

This project forms part of the so called industrial module concept that was initiated by PSA Peugeot Citroën in 2001 when the 1.4 l HDi common rail diesel engine was launched. The module concept is based on the development of a very homogenous and autonomous production structure, which can easily be reproduced and which combines within a common structure both the machining lines for the main engine components – cylinder head, crankcase, crankshaft and connecting rod – and the assembly lines.

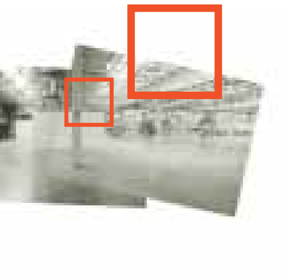
In this modular type of production system, PSA Peugeot Citroën can apply the experience gained from the three DV modules already set up as part of its mechanical facilities. This is an efficient industrial setup based on the production of 2500 units per day (640,000 engines per year), i.e. the best possible balance in terms of efficiency and investment yield.

For the purposes of this cooperation, a complete new module is currently taking shape at Française de Mécanique and this will be up and running by the end of 2005.

THE PSA PEUGEOT CITROËN MANUFACTURING SYSTEM: CONVERGENCE

The manufacturing process that is set up the Douvrin plant uses the benefits of the PSA Peugeot Citroën manufacturing system known as "Convergence". This company Project targets manufacturing performances by implementation a production system combining all the best internal and external practices across all the PSA Peugeot Citroën production sites as part of an ongoing system of improvements.

In order to set up this manufacturing system, the PSA Peugeot Citroën group has established fifteen expertise networks covering the full range of production skills (management, quality, reliability, logistics, etc.) as well as all sites. It is



up to each network to identify the best practices and their application rules. Once these standards have been drawn up, they are applied across all sites. Distribution and suitability are largely based on intensive use of New Information and Communication Technologies (NICT).

The Basic Work Unit (UET in French) is at the heart of the PSA Peugeot Citroën manufacturing system. Basic work units are teams comprising a unit manager and 25 to 40 operators. The aim is to promote a participative approach, a listening ear and leadership by direct and regular exchanges. This innovative approach involving participation and accountability is intended to increase staff motivation with respect to the activities of their plant and to make it possible to achieve the performance targets set and agreed for each plant. For example, at the new plant set aside for the cooperation at Française de Mécanique, there will be 40 Basic Work Units assigned to mass production of the new gasoline engines.

II - PLANTS USING THE STATE OF THE ART TECHNOLOGIES

FRANÇAISE DE MÉCANIQUE (PSA PEUGEOT CITROËN)

PSA Peugeot Citroën will produce the new family of small gasoline engines developed in a joint venture with the BMW Group in Française de Mécanique from the end of 2005.

Established en 1969, Française de Mécanique in Douvrin specializes in the mass production of engines. Over 8,000 units per day are manufactured for PSA Peugeot Citroën with a workforce of over 4,500.

The new production unit will have a capacity of 2,500 engines per day. Covering a surface area of approx. 60,000 m^2, this initial module required an investment amounting to 330 million euros. It is set to employ 1,120 staff members in four shifts who will be offered 152,000 hours of training.

The cooperation engine production plant was designed by different partners:

- The buildings were designed by BEI (PSA Peugeot Citroën's industrial engineering and design department)
- The equipments involved in the manufacturing process were engineering and designed by PCI (Process Conception Ingénierie) (cylinder heads) and by the usual partners associated with the two groups.

From the beginning of the Project until release of the first engines out of the production lines, all the work leading up SOP (Start Of Production) will take 24 months, thus complying with the timescales originally scheduled. During this period up to 250 people from the Group and from some 60 external companies will be involved with the construction of this plant.

Great care was taken to ensure strict compliance with risk prevention procedures in order to achieve the target of zero industrial accidents involving both internal staff and suppliers of equipment and goods working on the site.

Production ramp up phase will progress gradually so as to reach full production capacity in late 2007.

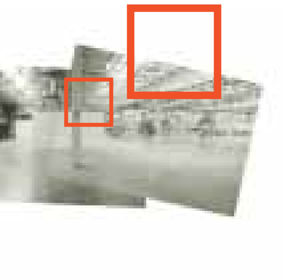
The modular plant dedicated to the production of these engines will incorporate the main machining and assembly lines in the same building.

The vast majority of raw casting are internally sourced from PSA Peugeot Citroën sites such as the foundry in Charleville and the Mulhouse Metallurgical Group of Activities , which covers activities such as the aluminum die cast pressure foundry and forging plant.

MACHINING

Machining will cover an area measuring 30,000 m^2. It brings together best practices from the machining sector to ensure the best possible balance between investment and flexibility with respect to product diversity and any changes required over the course of the plant's lifetime.

Quality is an ongoing concern.



Machining processes

• 2 flexible cylinder head lines

From an industrial point of view, the cylinder head is the core of this new engine family, playing a key role in the engine's performance.

This is a highly technical component requiring the use of equipment with stricter design guidelines than is usually the case in the PSA Peugeot Citroën group's industrial structure.

Each of the lines will thus comprise 54 machines (high speed machining centers and special machinery) to comply with the required geometric precision and diversity associated with the two engine families.

• 1 connecting rod line

This flexible line makes it possible to produce three different types of connecting rod at a rate of 4 connecting rods every 30 seconds. It consists of 3 transfer machines (13 machining stations) and 5 special machines.

• 1 crankcase line

Machining centers are used for the first time for high volume crankcase production.

In this way, high-speed machining centers (18 in total) are responsible for 50% of the machining time for functions that are liable to change over the engine's series life, thus incorporating an element of flexibility in the process when necessary.

In the case of unchanging engine functions, i.e. noble operations that are not subject to change or change only slightly, machining is performed on transfer machines.

Bi-material machining (cast iron / aluminum) of the combustion face of the engine unit represents another major industrial innovation, leading to a change in the machining methods used to date and thus permitting a crankcase technology compatible with the high stresses generated by the engines.

• 1 crankshaft line

The crankshaft production line incorporates experience obtained with the DV engine line whilst taking account of the increased diversity of the new gasoline engine family covered by the cooperation.

This diversity takes the following form:

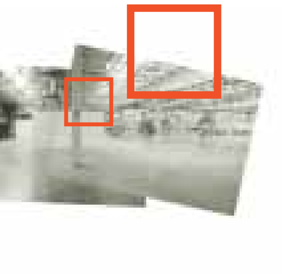
- 3 different crankshafts
- 2 different materials, cast iron and steel, which are optimized to suit the respective engines.

This line comprises transfer machines, special machines and machining centers and is designed to achieve a maximum production capacity of one crankshaft every 30 seconds.

Industrial challenges for machining

One of the major aims when designing this industrial tool was to ensure that it offered **maximum flexibility** from the outset so as not to impose any industrial constraints on the design process, whilst maintaining a high level of productivity. This large-scale flexibility has allowed the production team to design high-tech engines in a systems engineering context.

The industrialization team has also had to face the challenge presented by **the diversity** associated with two engines, which are very different in technological terms, and with two virtually simultaneous launch dates. The response has been to make increased use of machining centers in view of their increased industrial flexibility.



The project team is primarily concerned with quality. A "**zero reworking**" policy was thus introduced in this machining plant. In this demanding system, unsatisfactory components are automatically rejected, leading to a high level of involvement and reactivity of all the operators and resulting in perfect mastery of the process in a very short time.

As in the case of the HDi diesel engine, which represented a major technological advance both as a product and a process, these new gasoline engines may be regarded as a significant step forward with respect to the required machining precision and process control, with tolerances which are on average half of those used for previous engines.

■ ASSEMBLY

Assembly covers an area of 22,000 m^2. The plant comprises three assembly line sections with a total usable length of 1,400 meters, **making it possible to produce one engine, irrespective of the model, every twenty-six seconds.**

□ A new assembly philosophy

The assembly line makes it possible to assemble both turbo engines and normally aspirated engines at the impressive rate of one engine every 26 seconds. The engines are assembled in the traditional stages, with assembly of the bottom end, the cylinder head line and the ancillaries line. There is an average automation level of 50% of workstations, representing a compromise between flexibility, productivity and ergonomics.

Yet again quality is of paramount importance thanks to the implementation of a so-called "RED CARD" policy, preventing the engines from being altered after assembly.

As far as management of logistics flows is concerned, this new assembly plant incorporates a new development – an improvement to the "pull flows" known as supply in RECOR R1 (renewal of actual consumption) for large components. In this case, the truck will unload the components directly in the line without passing via the warehouse. This process leads to higher processing speeds and increased overall efficiency.

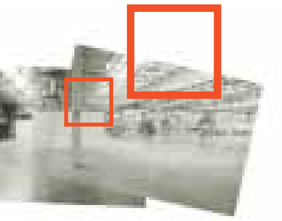
□ Industrial challenges for assembly

There are three types of challenge as far as assembly is concerned: **diversity, quality and ergonomics**.

On the one hand, the challenge with regard to **diversity** entailed launching two engines, which were technically very different, in two stages, six months apart, on the same production line. The tools and methods used to resolve this problem were based on increased flexibility and versatility. The men and women employed in the plant have thus been trained to prepare them for increased versatility. The workstations have been designed to assemble all the engines resulting from this cooperation without discrimination. Supply of components alongside the assembly line takes account of the diverse nature of the components required in the assembly process (250 components) in an organized and optimum manner that is easy for operators to understand and the computer systems used ensure that operations and components can be traced back to their origins.

The **quality** requirement, as one of the major aims of the project, also needed to be combined with an industrial throughput rarely achieved in the automobile industry.

To this end, the so-called "RED CARD" policy introduced by PSA Peugeot Citroën in its



mechanical plants in 2001 was relaunched and optimized thanks to the experience gained since it was first used.

In concrete terms, an electronic chip placed on each engine pallet records all relevant data to ensure the traceability of the assembly process. Monitoring screens in the line control system show that the engine does not comply with the specification. As soon as an incident becomes apparent, whether this is detected automatically or by an operator, the engine continues along the line so as not to disrupt the process flow, but no further components are assembled. This demanding system prevents any alterations during the assembly procedure and thus ensures maximum process control and immediate response in the event of incidents. This "RED CARD" policy entails a cultural change that leads, in turn, to a different vocabulary and practices. The repair areas at the end of the assembly lines are thus replaced by expertise areas, as experience has shown that repair operations inevitably cause more problems than series flows.

Quality comes down to minor details. By way of example, **100%** of screwing operations are monitored in real time and **100%** of client functions (gasoline, water, oil circuits, etc.) are monitored over the course of the process.

Finally, **ergonomics** has been a priority throughout the project. For many years the PSA Peugeot Citroën group has been conducting an ambitious policy with a view to improving working conditions. This policy is specifically concerned with ensuring that all salaried employees have a working environment and working conditions that correspond to the best international standards and also with facing up to an aging workforce by implementing solutions to help keep people employed.

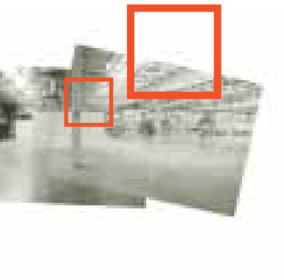
The task of improving working conditions and ergonomics takes effect right at the start, in car project and industrial project stages. It is based on a series of actions described in the operational plans for car development. This process is also based on a tool for evaluating work and organizations, known as METEO (Méthode d'Evaluation du Travail Et de l'Organisation). This is in place across all the group's industrial sites throughout the world and is used by the project teams.

In 2004, additional efforts were made in all plants to improve the existing workstations and facilities. In the automobile division, priority was given to reducing the number of so-called "high risk" workstations (workstations presenting pathogenic risks if they are manned over long periods). The proportion of these workstations amounted to 19% in 2004, as compared with 35% in 1999. The number of high-risk workstations has been virtually halved since the launch of the ergonomic initiative in 1999. The target is to have 8% of workstations be high risk. In addition, the number of low risk workstations that can be manned by any employee has increased, standing at 37% in 2004 as compared with 26% in 1999. These efforts will be continued with the ultimate aim of achieving a target of 60% low risk workstations.

It seemed appropriate that the new assembly plant at Française de Mécanique dedicated to the cooperation should benefit from these advances that make operators' lives easier whilst helping to achieve improved process quality and higher productivity.

In the new plant dedicated to the cooperation, a numerical model has enabled PSA Peugeot Citroën to study all the assembly workstations and to create an **optimum balance between staff and workstations**.

High-risk workstations have thus been reduced in order to ensure that all salaried workers are



able to work in easier conditions whilst coming to terms with the problems associated with an aging workforce.

The creation of this plant has also provided an opportunity to supply workstations specially adapted for use by persons with restreint capacities, thus enabling them to play a full role in the world of work.

On a more general scale, the project has tended to use ergonomic solutions such as supports making it possible to work in a seated or semi-seated position, electropneumatic systems with a view to reducing or eliminating the effort needed to lift or screw components and the installation of elevating and rotating platforms to avoid the need for twisting movements when moving components on and off the production line.

HAMS HALL (BMW GROUP)

The role of the Hams Hall plant is to assemble the engines required by the BMW Group for future variants of Mini. The proximity of Hams Hall to plant Oxford enables the "just in sequence" delivery process to be managed extremely accurately and flexibly, reducing stock levels and minimizing the lead time. The assembly of the engines in Hams allows the BMW Group to ensure that they can be produced to meet the exact requirements of Mini brand products.

III - INNOVATIONS AT EVERY STAGE OF PRODUCTION

THE LOST FOAM PROCESS IN CHARLEVILLE

Two different casting processes are used to manufacture cylinder heads. While the cylinder head on the direct-injection power unit is manufactured in an aluminum low-pressure permanent mould, the innovative lost-foam casting method is used for the naturally-aspirated engines.

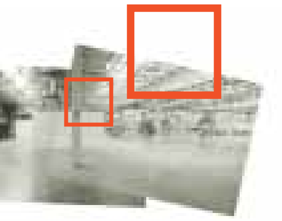
This technique applied to the casting of light alloys at BMW's Landshut plant was used for the first time in mass production on a six-cylinder engine. The new small gasoline engines produced under the cooperation therefore benefit from the contribution of high-end industrial technology.

For PSA Peugeot Citroën, use of the lost-foam process (LFP) on large, sophisticated, top-of-the-line parts manufactured at a rapid pace, such as cylinder heads, is an industrial first for the PSA Peugeot Citroën foundry in Charleville.

This use of the lost-foam process demonstrates particularly well the idea of a "win-win" cooperation. Indeed, the BMW Group's expertise in this sector was an essential contribution, while PSA Peugeot Citroën has drawn from its supplier base to develop this technology at a low cost, thereby making it affordable for the production of high-volume small-cylinder engines.

The lost-foam process is particularly appropriate for perfectly configuring the complex interior contours together with their cavities for the air ducts as well as the oil and coolant circuits. Unlike conventional casting technologies, lost-foam casting is a process that helps reduce the weight of the engine. More specifically, the weight gained on the cylinder head is 1 kg compared with the usual process, for a gain of roughly 8% on the total weight of the part.

The lost-foam process is as follows: an identical cylinder head model made of polystyrene is coated, shaken into a bed of sand and completely covered by sand, with the exception of the runner. During the automated casting operation, the fluid aluminum passes through the runner, replaces the polystyrene model and takes on the shape of the cylinder head. Given the high precision of this



casting process, very "fine" details such as water holes, oil return ducts and blow-by channels can be integrated, thus eliminating the need for numerous machining processes (diagram attached). It also allows features such as electric engine mounts, deflectors in the cooling chamber and chain cases to be incorporated into the definition of the casting.

The Charleville foundry has completely overhauled the LFP production line, which was previously used only for small lost-foam parts. This line has been up and running since November 2004 and will produce 1,150 cylinder heads per day. Two new lines are scheduled to be set up by the end of 2005, with another of the same size by the end of 2007.

The lost-foam process is proving to be economically attractive, resulting in a 15% gain compared with a conventional permanent mould process. The investment, in turn, is 30% lower than the previous process.

Lastly, the ground surface used by this process is 15% less than that of the permanent mould process.

Overall, this new plant will raise cylinder head production to more than 25% higher than the highest level in the plant's history, thus ensuring the development of long-term skills at the Charleville facility.

For example, under this partnership, 86 tons of metal will be cast each day, resulting in the production of one cylinder head per minute.

A total of 6,300 hours of training will be offered to the 116 employees at the Charleville LFP plant.

THE MULHOUSE METALLURGICAL GROUP OF ACTIVITIES

The Mulhouse Metallurgical Group of Activities is involved in this project as a supplier of raw castings, including crankcase, crankshaft and connecting rods. There are countless innovations in this area.

Crankcase (Foundry):

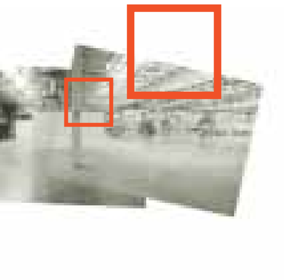
The PSA Peugeot Citroën – BMW Group cooperation has given rise to a totally new patented solution: pressurized aluminum crankcase, with cast-iron open liners inserted into the cylinder head face within a reduced in-between liners shaft space. This innovation involves finding a liner pattern that will make it possible to join two materials - the cast-iron liner and the aluminum - in order to reinforce the structure and enable it to withstand the constraints of temperature and mechanical friction in a small 7 mm space by using simple technical solutions.

The design of both the equipment and the process had to take this new architecture into account. This was accomplished using the same budget allowance. The unit therefore provides a very superior product at a comparable price.

One of the primary objectives of the project was the flexibility of the production plant. Thus, the casing production line at the Mulhouse foundry is completely multi-functional and can be used to produce crankcase, for both small gasoline engines and small diesel engines from different families. This line will be up and running in September 2005 and will produce 2,500 crankcase, per day.

Crankshaft (Forge)

The crankshaft is an opportunity for a new first for PSA Peugeot Citroën and the BMW Group in terms of small gasoline engines. Steel was chosen over casting with a view to optimizing weight and cost. Thanks to this choice, first-rate product performance has been achieved at a price barely higher than that of a conventional gasoline crankshaft.



Another process innovation has grown out of this cooperation: the crankshaft counterweights are left rough and do not require machining. As a result, the tolerances allowed during forging are more restrictive. This required significant improvement in the design of the forging equipment.

The crankshaft line is also multi-functional and is used to produce parts for gasoline and diesel engines alike. It will have a production capacity of 200 units/hour.

☐ Connecting rods (Forge)

In terms of connecting rods, innovation lies in the forging of parts based on the double impression method, i.e. two at a time. Modification of the Mulhouse forge line led to a 10% improvement in the price of the part.

A painstaking effort was made to fine-tune the equipment in order to obtain two geometrically identical parts.

This connecting rod line will be up and running in early 2006. It is currently in the industrial validation phase and is expected to produce 800 parts/hour.

IV - A LONG-TERM COMMITMENT TO QUALITY AND THE ENVIRONMENT

QUALITY

In the cooperation project, quality management is a high priority for both partners. As a result, quality is managed based on **criteria common** to BMW Group and PSA Peugeot Citroën in terms of both machined parts and purchased parts.

To this end, PSA Peugeot Citroën and BMW Group are equally committed to implementing a coordinated operating procedure aimed at achieving full, immediate transparency between the two engine plants with regard to any type of quality issue that might arise.

Clear policies have been adopted along these lines to ensure a common, integrated approach on the part of PSA Peugeot Citroën and BMW Group toward suppliers. This approach is currently being developed so as to be applied consistently at both engine production sites once mass production begins.

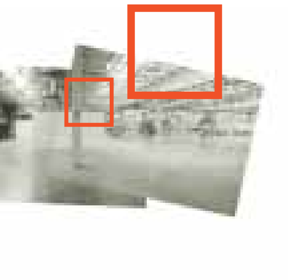
A common “life cycle” platform will be set up with a dedicated PSA Peugeot Citroën – BMW Group team charged with monitoring the engines mass-produced under the cooperation and installed on vehicles. This platform will be jointly responsible for quality management with a view to improving responsiveness, making continuous progresses in quality and ensuring long-term gains.

The project’s extensive quality objectives benefit from the experience collected from other engine projects carried out, and particularly with the renewal of the “RED CARD” policy. According to this policy, reworking on the assembly line is permitted only for a limited number of authorized repairs; in all other cases, the engine is automatically scrapped and the parts are not recovered.

This method has been processed based on the observation that, for most defects reported from the field by the end customers, the defective engine had been subject to rework at the plant. The benefit of this radical approach was clearly demonstrated on DV engines and has been actually confirmed trough the statistics collected from the field since that “Red Card Policy” was implemented in 2001.

ENVIRONMENTAL PROTECTION

Although the automotive industry is not regarded as particularly environmentally-unfriendly, industrial nuisances are a concern for a large portion of the population in two respects: on a daily basis, with regard to the quality of life in areas surrounding the plants



and, more generally, with regard to the real or perceived risk of environmental accidents. For this reason, the PSA Peugeot Citroën Group has implemented a global policy at its industrial sites aimed at ensuring environmental safety at all times in terms of both protecting the region and ensuring the quality of life in the neighboring areas.

The project's objective since its inception has been to improve current conditions and to help reduce the environmental impact of **Française de Mécanique**, which has already been awarded ISO 14001 certification. ISO standard 14001, introduced in 1996, requires that companies take steps involving operational control, monitoring, and control and measurement of the effects of their processes on the environment. To fulfill these objectives, application of the standard requires that all personnel receive appropriate training. This system is designed to achieve the environmental targets set for each site and is valid worldwide.

At **Française de Mécanique**, industrial risk studies were conducted during the process and plant definition phases and were approved by the appropriate administrative authorities.

The project was undertaken along the lines of zero waste by carefully analyzing the plant's industrial waste and treatment. Thus, water for cleaning parts and used cutting fluids will be treated by evapoconcentration. Recovered clean water will be returned to the process and final residues will be destroyed by authorized centers. Française de Mécanique's treatment plant is therefore not involved. In addition, most parts are packed in reusable containers, thus reducing the volumes to be recycled.

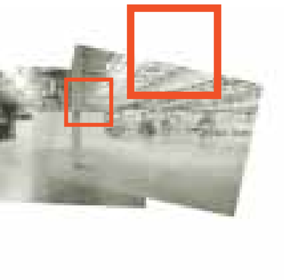
The **Charleville** foundry has also fulfilled its obligations under ISO certification 14001 since 2002 and will embrace this new process in the same spirit through its continued efficiency in the areas of waste treatment and the involvement of all those employed at its sites.

The **Hams Hall** engine plant is extremely modern in its design and construction, having only been launched in January 2001. In line with the international standards of the BMW Group production network, the Hams Hall plant has invested, and continues to invest, in the best available technology in order to minimize its impacts on the natural environment.

To achieve this goal, the actual or potential impacts of all business activities on the environment are regularly evaluated and measures are continuously implemented to improve the plant's environmental performance by avoiding pollution and eliminating, minimizing or recycling waste. The plant's environmental targets go beyond mere compliance with environmental regulations and are designed to exceed wherever possible national Environment Agency guidelines.

The Hams Hall engine plant was awarded ISO 14001 certification in June 2001, within just six months of starting production. The plant undergoes an annual BMW Group internal audit and also conducts additional local environmental audits to ensure compliance with all relevant legislation and identify opportunities for improvement. Every project that takes place on site has to undergo an environmental impact assessment at the planning stage and during implementation to ensure all potential issues are identified and addressed.

In 2004, as a result of these policies and procedures, no less than 94% of all waste on site was segregated and recycled. In 2004, water consumption was reduced by 17% and the amount of dry waste sent to landfill sites was reduced by 17%. Rainwater collected on the roof above the production hall and main office buildings is sent to "balancing lakes" on the factory site to ensure the flow into the local river



is accurately controlled, thereby eliminating the potentially adverse impact of grossly fluctuating water volumes from the plant's surface water drainage system. Storm water and ground water are strictly monitored on a monthly basis to identify any changes that could potentially have an adverse environmental impact.

In 2004, the plant's energy consumption was reduced by 28% per engine produced compared with 2003. This was achieved by several means, including the installation of inverter technology (variable speed drives), increasing the efficiency of air-handling units, improving the control systems for the compressed air, heating and lighting systems and involving the workforce in an energy awareness communications campaign. The energy reduction measures implemented in 2004 represent a total saving in CO_2 emissions of 4,346 tons.

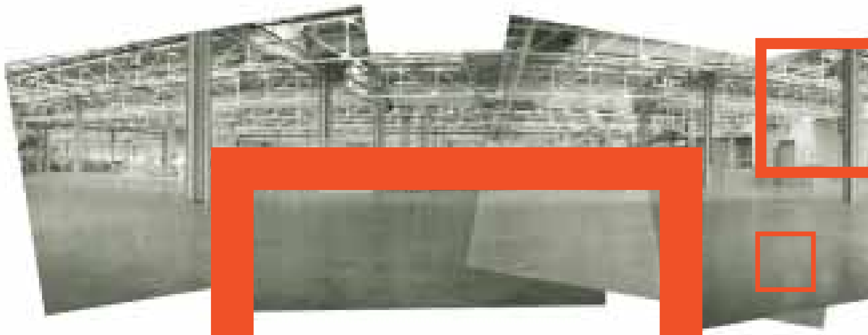
The Hams Hall plant has no major processes that could have an impact on air quality. Fuel usage in the test cells, however, is continuously monitored to measure emissions and minimize consumption. The test cells are all equipped with catalytic converters. All air-handling units, including those installed in production areas, are fitted with filters to remove any particulates before being expelled into the atmosphere.

Far from being an object of criticism or attack from environmental protest groups, the Hams Hall plant has established excellent credentials in the West Midlands for its high standards of environmental responsibility and is widely acknowledged by relevant commentators and organizations as an example of best practice.

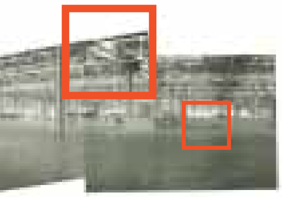
In 2003, the Hams Hall plant was awarded the power-sponsored Conservation Award by the West Midlands Wildlife Trusts in recognition of the measures taken to protect wildlife and enhance the local environment. In 2003, the plant received a regional Civic Trust Award in recognition of the high architectural standards of the buildings, the excellent landscaping and the success of the factory's visual impact on the local environment. In 2003, the plant became the first 'Gold Standard' member of the Warwickshire Wildlife Trust, the leading regional organization for the protection of wildlife.

These achievements and awards reflect the success of the measures taken to recreate an environment that is in harmony with the peaceful countryside that still characterizes much of the local area surrounding the plant. In addition to more formally landscaped garden areas and water features, the provision of an island in the middle of the largest of the lakes on the factory site provides a sanctuary for nesting birds. Planting has been left to mature and visits by the landscape maintenance team are strictly limited. The lake itself, which teems with fish, contains 12.5 million gallons of water. The extensive woodland and 'wild flora' areas on the factory site provide refuge for all kinds of wildlife.

The West Midlands Biodiversity Partnership, the West Midlands Regional Assembly and Warwickshire County Council have all recently held conferences at Hams Hall because of its appropriateness as a venue to discuss and promote responsible environmental behavior amongst other companies and organizations in the areas of wildlife conservation, waste management and energy use.



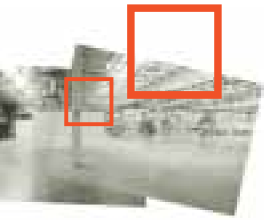
APPENDICES



I - THE LOST FOAM PROCESS: HOW IT WORKS

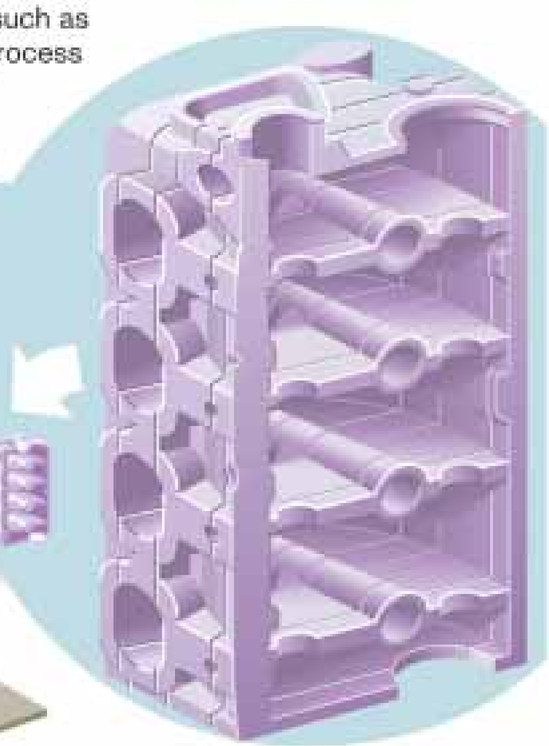
II - PLANTS INVOLVED IN THE PROJECT

- **Française de Mécanique**
- **Charleville**
- **The Mulhouse Metallurgical Group of Activities**
- **The BMW Group plant: Hams Hall**



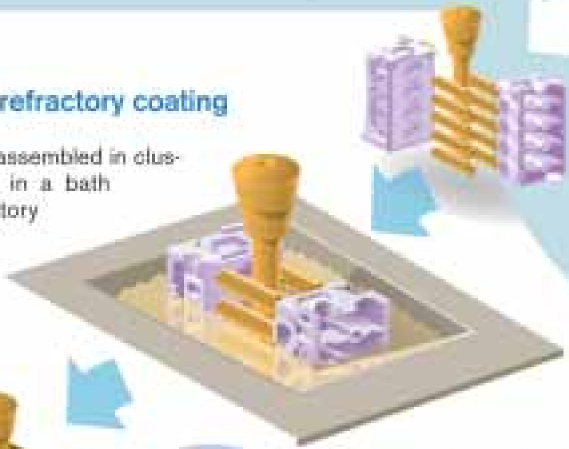
The lost **foam process**

The lost foam process is an innovative technique used in foundries. It offers a number of advantages over more conventional foundry techniques such as shell moulding. Economical and efficient, the lost foam process can be used to produce complex parts such as cylinder heads, with a high degree of precision.



1 Producing the model

An exact replica of the part to be smelted is produced in expanded polystyrene, which melts when heated. For parts with more complex shapes (including internal cavities, and light or reinforced parts), different sections can be assembled and bonded together to form the model.

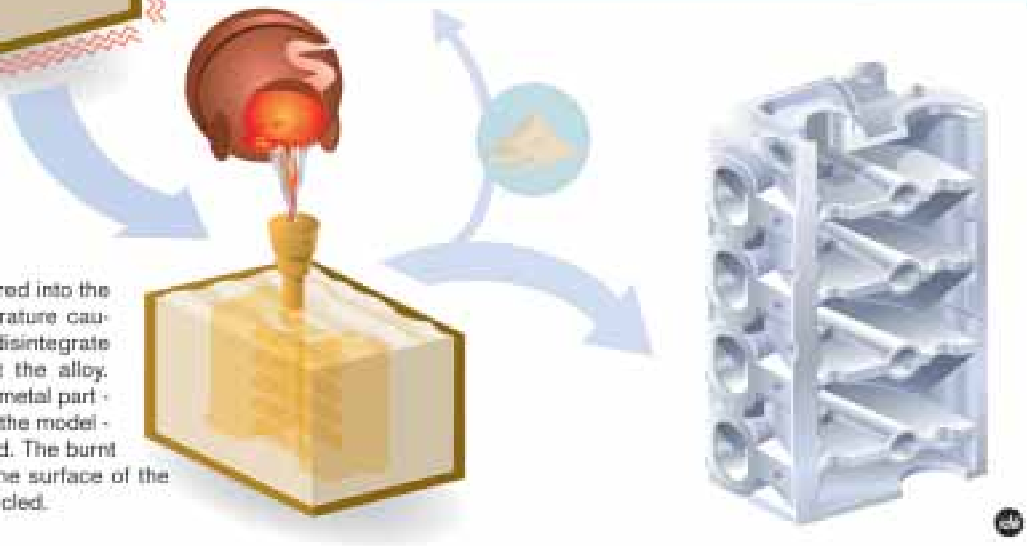


2 Applying the refractory coating

Several models are assembled in clusters and immersed in a bath containing a refractory coating that hardens when it dries.

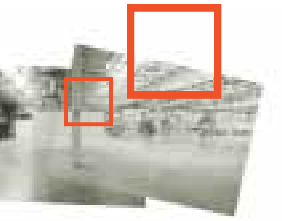
3 Moulding

Next, the cluster is packed in graded sand that is vibrated to fill all the hollows in the models and become more compact. The sand thus forms the mould in which the part will be cast.



4 Producing the part

The molten metal is poured into the mould. The high temperature causes the polystyrene to disintegrate (pyrolysis), leaving just the alloy. Once it has cooled, the metal part - now a perfect replica of the model - is removed from the sand. The burnt layer is removed from the surface of the part and the sand is recycled.



PLANTS INVOLVED IN THE PROJECT

FRANÇAISE DE MÉCANIQUE (PSA PEUGEOT CITROËN)

Founded in 1969, Française de Mécanique is located in Douvrin and is equally owned by the PSA Peugeot Citroën Group and Renault. It is one of the largest engine production plants in the world and employs 4,500 people.

Its mechanics divisions – machining and assembly – manufacture engines at a rate of more than 8,000 units per day (TU and DV for PSA Peugeot Citroën, D for Renault, ES/L for PSA Peugeot Citroën and Renault).

This site is also equipped with a foundry unit, which will discontinue operations in late 2005.

By the end of 2005, Française de Mécanique will produce the new family of small gasoline engines – a product of the cooperation between the Group and BMW – at a new production facility (capacity of 2,500 engines per day).

CHARLEVILLE (PSA PEUGEOT CITROËN)

Founded in 1974 at the base of the Ardennes massif, the Charleville foundry produces raw castings and metal castings in spheroidal graphite and aluminum alloy (power train and suspension parts) to be used by the group's machining and assembly units.

Charleville also features a prototype plant that manufactures metal castings for the group's future engines and vehicles. Each day, the foundry produces 300 tons of metal castings (steering pivots, side-rails, cross-member supports and A arms) and 166 tons of aluminum alloy parts (cylinder heads, engine mounts, V6 engine casings and suspension parts). It has 2,680 employees.

THE MULHOUSE METALLURGICAL GROUP OF ACTIVITIES (PSA PEUGEOT CITROËN)

In September 2003, the Aluminum Die Cast foundry, the Forging Plant and the Tool Workshop, all these operations being geographically located on the same site, merged under the responsibility of one single management so as to form the so called Pôle Métallurgique de Mulhouse (PMM standing for Mulhouse Metallurgical Group of Activities), this in the purpose of deploying common synergies throughout the 3 operations.

The **Forge** plant produces 70% of the steel forging (250 types) used by the Group. These are sophisticated parts that ensure the safety and endurance of engines, transmissions and drive train and axle components. A variety of processes are used, including conventional stamping, medium-hot and cold forging, heat treatment and part finishing. The forge produces more than 400 tons per day, which are delivered to PSA Peugeot Citroën's machine plants.

The **Foundry** plant is a pressurized aluminum foundry that supplies cylinder casings and bearing caps for engines containing inserts, fulfilling roughly 35% of the Group's requirements. The foundry pours more than 100 tons of aluminum per day.

The role of the **Tool division** is to design, manufacture and market forge, foundry and drawing tools intended mainly for the Group's blanks plants, as well as outside customers.

The MMGA has a total workforce of 1,440 people.

BMW GROUP PLANT HAMS HALL

Launched in January 2001, the Hams Hall engine plant is the centre of competence in the BMW Group international production network for BMW four-cylinder petrol engines (1.6, 1.8 and 2.0 liters). The engines built Hams Hall were the first to employ BMW Valvetronic technology.

The 500,000th engine to be built at the Hams Hall plant since production started came off the assembly line in January 2005. Engines from the UK factory are shipped to the BMW vehicle plants in Germany (Munich, Regensburg and Leipzig), Rosslyn (South Africa) and Spartanburg (USA) and power the four-cylinder petrol versions of the BMW 1 Series, 3 Series and Z4 Roadster. 650 people are currently employed at the plant.