The Launch of the
JAGUAR XK8
Luxury Sports Car

MANUFACTURING EXCELLENCE FOR XK8
THE CHALLENGE FOR JAGUAR

1
Advanced Product Engineering Design Concepts to Meet Market Requirements and Customer Expectations

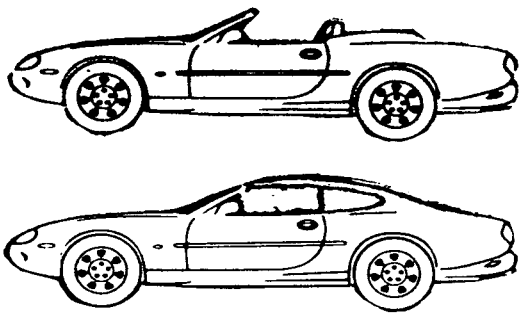
2
Integrated Cross-Functional Team Working Throughout Project Lifetime at Every Level

3
Advanced Quality Tools and Techniques and Trained People to Ensure Effective Team Working

4
World Class Quality Suppliers Participating as Full Partners

5
Integrated Manufacturing Quality & Vehicle Launch Process,

MANUFACTURING EXCELLENCE FOR XK8



XK8 —
A WORLD CLASS PRODUCT

SELLING IN 70 MARKETS WORLD WIDE

THE LAUNCH OF THE JAGUAR XK8 LUXURY SPORTS CAR

Overview

The new Jaguar XK8 Luxury Sports Car demonstrates the highest standards of excellence in British Engineering and represents a further significant advance for Jaguar, building on the foundation established for the XJ6 saloon car project.

Jaguar's engineering expertise, working in close collaboration with its suppliers, has enabled a world class-leading product to be launched which demonstrates all the attributes of 'Manufacturing Excellence'.

The Company's competitive performance in world-wide markets is expected to be much enhanced by the launch of the XK8 with significant improvements in quality and process efficiency throughout manufacturing operations. Customer satisfaction levels are planned to surpass leading German and Japanese competitors.

This submission by Jaguar Cars Limited for the 1996 Manufacturing Excellence Award identifies five key elements which, taken together, constitute the extent of the challenge to the Company and therefore the basis for this application.

These five key elements are:

1. **The XK8 advanced product engineering and design concepts** necessary to meet and exceed customer expectations across highly competitive world-wide markets with an emphasis on profitable growth for the business.

2. **Integrated team working at every stage of the project** and across all functions in the Company to ensure consistency in working methods, and to optimise programme objectives for cost, timeliness and quality.

3. **The introduction of creative quality tools and techniques**, including computer aided information technologies in order to achieve high levels of design and process assurance, with a strong emphasis on training people in new skills.

4. **The selection of a world class supplier base** and their involvement throughout the project lifetime to achieve world class standards of quality and delivery.

5. **The manufacturing, quality and launch processes** applied to ensure consistent delivery of product in line with design specifications and quality objectives using appropriate metrics.

The chart opposite provides an overview of the XK8 challenge. Sections 1 to 5 which follow, provide a fuller explanation of the way in which all engineering and technical areas of Jaguar have responded to the challenge to achieve Manufacturing Excellence for its new XK8 Luxury Sports Car.

Functional / Mechanical

- 4.0L Na AJ-V8 Engine
- 5 Speed Electronic Auto Transmission
- Speed Sensitive Power Steering
- Traction Control
- Seatbelt Pretensioners (front)
- Superlocking
- Power Latching Hood
- Auto Dropping Glass With One Shot Down
- Steering Wheel Mounted Switches
- Variable Ratio Steering
- Adaptive damping

Exterior

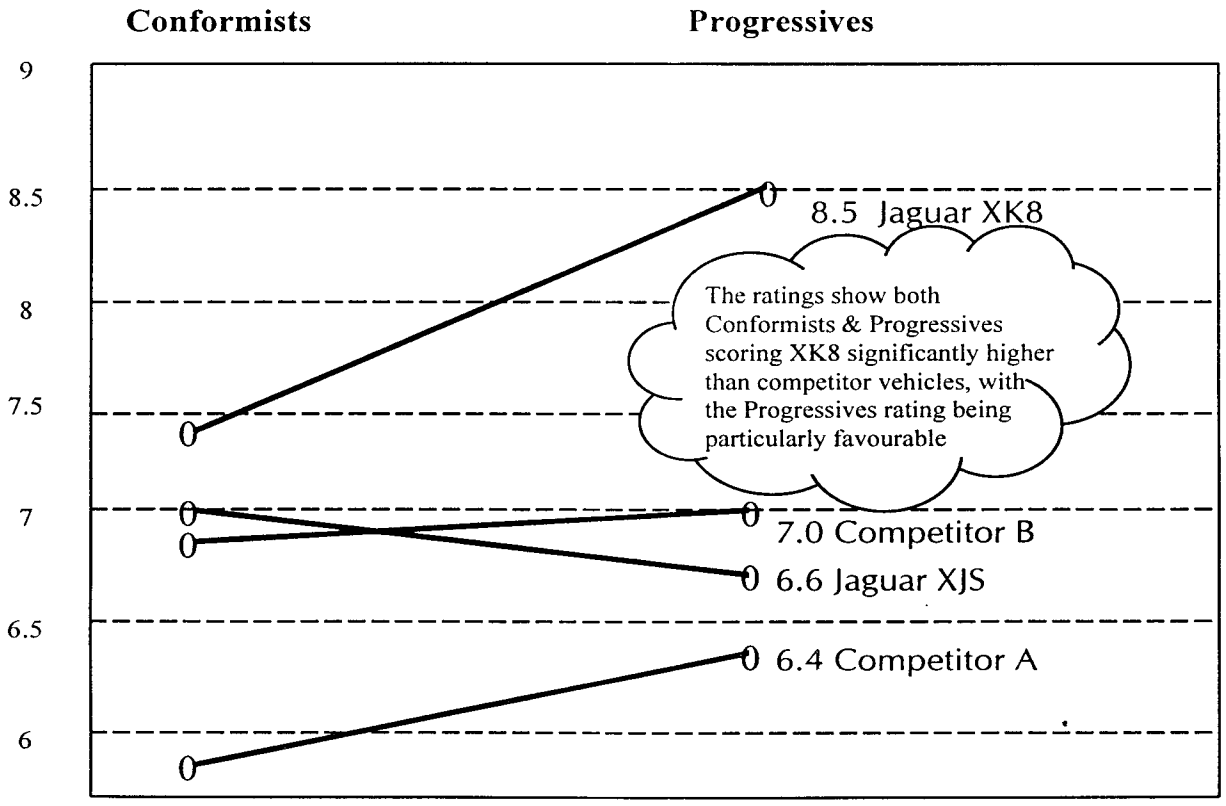
- Body Side Mouldings
- Telescopic Headlamp Powerwash System
- Electrochromic Exterior Mirrors

Comfort and Convenience

- Garage Door Opener
- Electric Foldback Mirrors
- Particle Filtration in Air Con. System
- Illuminated Entry
- Entry/Exit Tilt Away Elec. Adj. Column With Memory
- Glass Mounted Electrochromic Interior Mirror
- Removable driver Footrest
- Blade Mounted Washer Jets
- Heated Windshield
- 4 Button Remote With Headlamp Convenience/Panic & Boot Unlock Feature
- Cup Holder
- Height Adjustable Front Seat
- Coin Stowage
- Sports/Classic Trim

XK8 New Features

Overall Exterior Ratings: Coupe



Styling Clinic Results

1. Advanced Product Engineering Design Concepts

The XK8 programme was conceived during a difficult trading period for Jaguar following take-over by Ford when the focus was on protecting the saloon core business to maintain volumes and revenue.

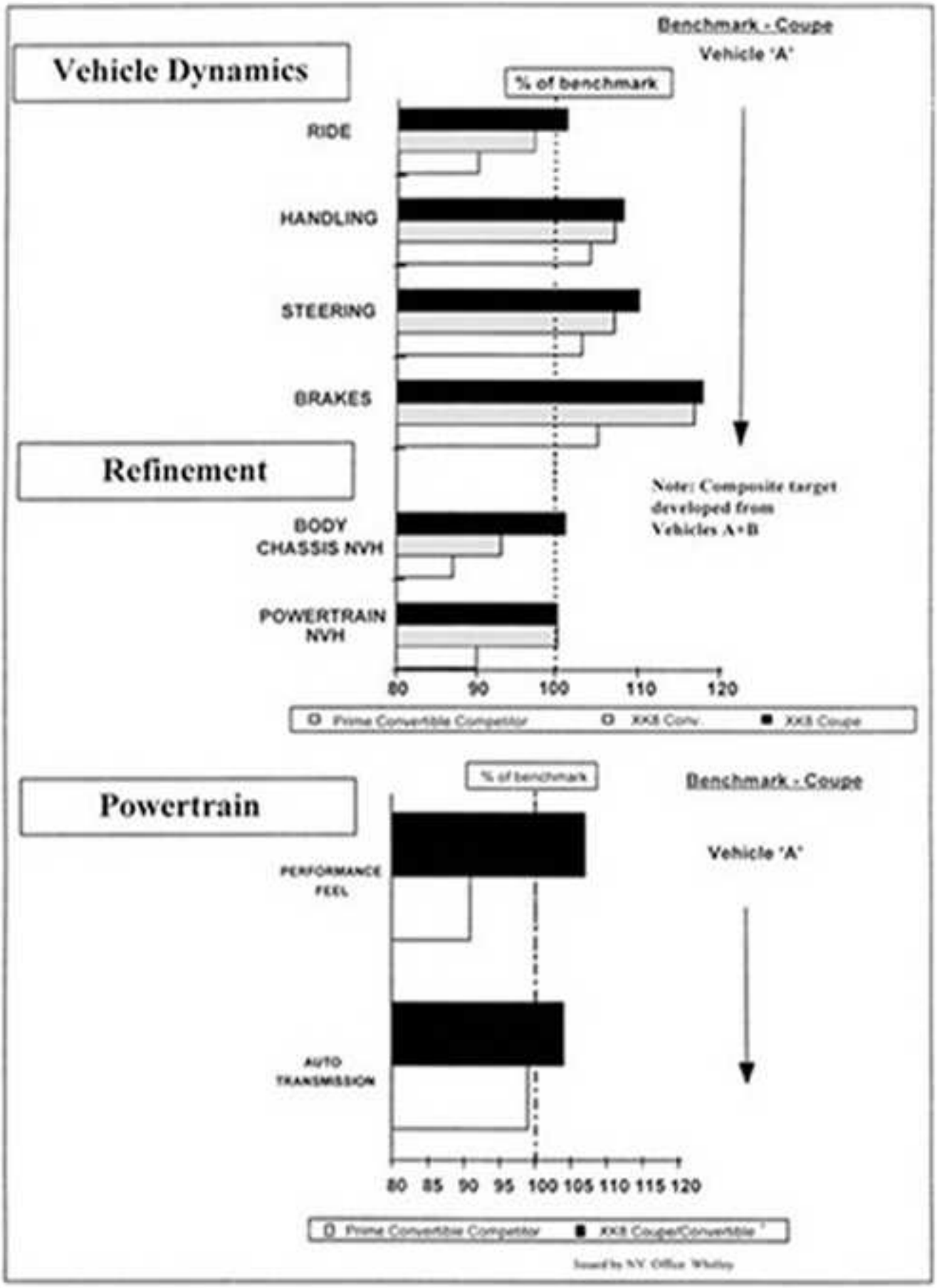
The challenge therefore for the XK8 team was to convince management to invest heavily in a relatively small volume sports car project to build on the success of the XJ6 saloon programme and relaunch Jaguar as a producer of high quality, exciting, technically innovative cars to compete fully against Japanese/German manufacturers. The brief was simple: to produce a car that would meet or exceed customer expectations and achieve high levels of customer satisfaction.

XK8 being the first new sports car to be introduced by Jaguar for over 21 years required extensive up front planning to understand the market environment and establish the 'voice of the customer' in support of the market positioning and programme/product definition. This included competitor ride and drives/benchmarking to establish key vehicle attributes and market research clinics in America/United Kingdom to select the all important style concept.

The result is the most complex programme ever undertaken by Jaguar Cars, with over 1700 new parts, which protects Jaguar's traditional strengths of style, refinement and craftsmanship, responding to the world market need for quality, feature levels. At launch the line up will include two bodystyles, coupe and convertible, with a class leading exciting style, an all new Jaguar 4.0 litre AJ-V8 engine with 5 speed automatic transmission and numerous new features, including a power latching convertible hood operable on the move , power tilt steering column with memory tilt away, global closing locking system, variable ratio steering and adaptive damping to provide XK8 with a class leading product specification to satisfy the requirements of 70 markets across the world.

The luxury sports sector is very susceptible to new product action and changes in economic climate. XK8 market research showed that the class leading style and product image would increase appeal beyond the current owner body and put Jaguar in a strong position to exploit the projected segment growth. XK8 scored very high absolute clinic ratings which were significantly higher than facing competition supported by high buying interest. Respondents stating that they were over 3 times as likely to buy the XK8 than XJS and 50 % more likely to buy XK8 than the next best competitor.

New technology has been introduced to meet the demanding product specification and package constraints imposed by the low sleek style including multiplexed wiring systems with low and high speed communication networks and the use of lightweight alloys for the front suspension crossbeam, propshaft and hood frame to meet the weight targets.



XK8 Functional Image Results

Aggressive programme objectives were established for key vehicle attributes including quality, ride and handling, performance and economy, weight and aerodynamics by benchmarking the 'Best in Class' competitors and projecting stretched job 1 targets based on agreed product/technological advancements. Buy in to and monitoring of the target status via the '18 panel chart metric' was achieved through the 'heavyweight' Project Team who were empowered to make decisions on behalf of their base department. Functional images are set to provide a significant uplift over XJS to all of the key dynamic attributes of the vehicle. The AJ-V8 engine and new 5 speed automatic transmission provide best in class performance feel coupled with high levels of refinement. Overall ride and handling balance, a traditional Jaguar strength also achieves BIC. All other attributes are amongst class leaders at launch.

A key driver for XK8 was to achieve significant improvements in all aspects of quality through fundamental changes to the design and manufacturing philosophy by ensuring greater emphasis on quality planning throughout the programme. Process improvements also formed an integral part of the quality improvement plan.

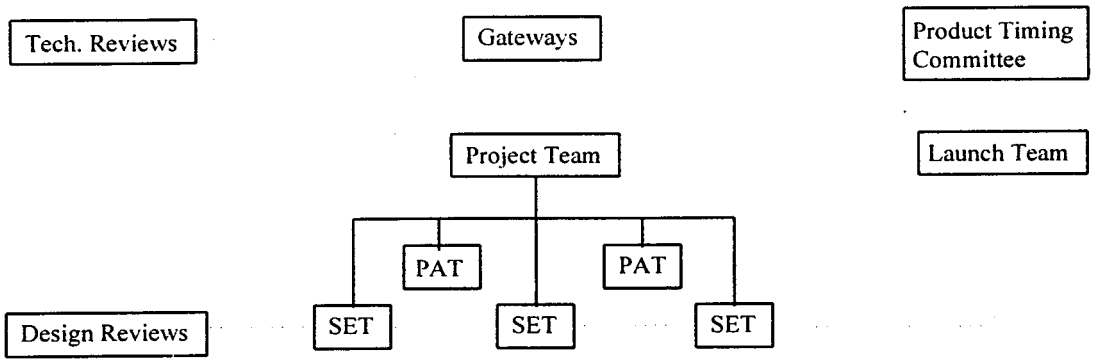
XK8 projections for 'Things Gone Wrong' and 'Repairs' reflects an improvement of 44% over last job XJS and is fully competitive with facing competition. The ultimate measure of XK8 success in improving quality will be the customer satisfaction rating which is for 95% of customers not experiencing 'TGW' and 90% of customers with 'TGW' to be very or completely satisfied at 3 months in service.

The XK8 programme was constructed against a background of falling XJS sales but favourable clinic results forecasting sales well above peak XJS volumes based on the exciting style/product/feature package being proposed.

Aggressive investment costs for tooling, in house facilitisation and engineering costs were set to protect programme profitability. The profitability of the programme was most sensitive to volume fluctuations and was therefore approved against a conservative volume forecast.

The variable cost of the vehicle was determined by the affordability of the investment in relationship to the pricing; the target was to achieve all of the quality, feature, function and regulatory requirements for a cost no greater than the out going XJS.

The Structure



Representatives

	Product Eng.	Manuafct. Eng.	Production.	Styling	Prog. Office.	Finance.	Supply.	Vehicle Eng..	Compon. Supplier	Quality	Timing	Project Team	SET Leader
Project Team	○	○	○	○	○	○	○	○	○	○	○		○
Gateways	●	●	●	●		●	●	●		●	●	○	
Tech. Reviews	●	◎										○	○
Product Timing Committee	●	●	●			●	●	●		●	●	●	
Design Reviews	●											○	○
SET	○	○	○	○	○	○	○		○	○	○		○
PAT	○	◎	○	○	○	○	○	○	○	○	○	○	○
Launch Team	●	●	◎				◎	◎	◎			●	○

Key :- ● = Senior Management, ○ = Empowered Representative, ◎ = As Required

Processes & Computerised Systems

WCT / Gateways	New/Developed
ICEM Surf.	Developed
Surface Verification	New
Design Reviews	New
PROMPT	New
SPRINT	New
Targets to Objectives	Developed
DVPSOR	Developed
Early Supplier Initiatives.	Developed
PTIS	Developed

Programme Health Metrics

Parts status for next build
Functional Images
DVPSOR (Design Verification and Sign-Off Report)
Open Concerns
18 Panel objectives
Deliverables - Last Gateway
- Next Gateway
SET status.

NB: Details and evidence shown in the Evidence book

Integrated Cross Functional Teams

2.Integrated Cross-Functional Team Working

Given the extremely challenging product and timing objectives outlined, Jaguar needed to extend its thinking on programme management. A Cross-functional team was set up consisting of managers or empowered representatives from all key disciplines. Their objective was to complete the detailed product definition for formal approval and take the programme from approval to job 1 in 32 months. A challenge finally achieved in just 30 months.

Team Structure: The Project Team was structured in line with Jaguar World Class Timing Process (JWCT) with each representative responsible for their functions deliverables. Deliverable achievements were measured at gateways held at key intervals. By aligning the empowered team with the new product process flow (JWCT) cross-functional barriers were removed and a more simultaneous approach was promoted.

The design of the product was split into key systems and components, each of which had a Simultaneous Engineering Team (SET). Each SET was allocated a sub-set of the programme objectives for which it was responsible and progress was monitored monthly at a Design review. Here the Project team joined with Design management to resolve any cross-SET issues and to guide the design. In a similar way the Project management responsibility was devolved to Programme Action Teams (PAT) which took responsibility for specific disciplines or problems. These continued the Cross-functional empowered theme particularly during the early stages of the programme.

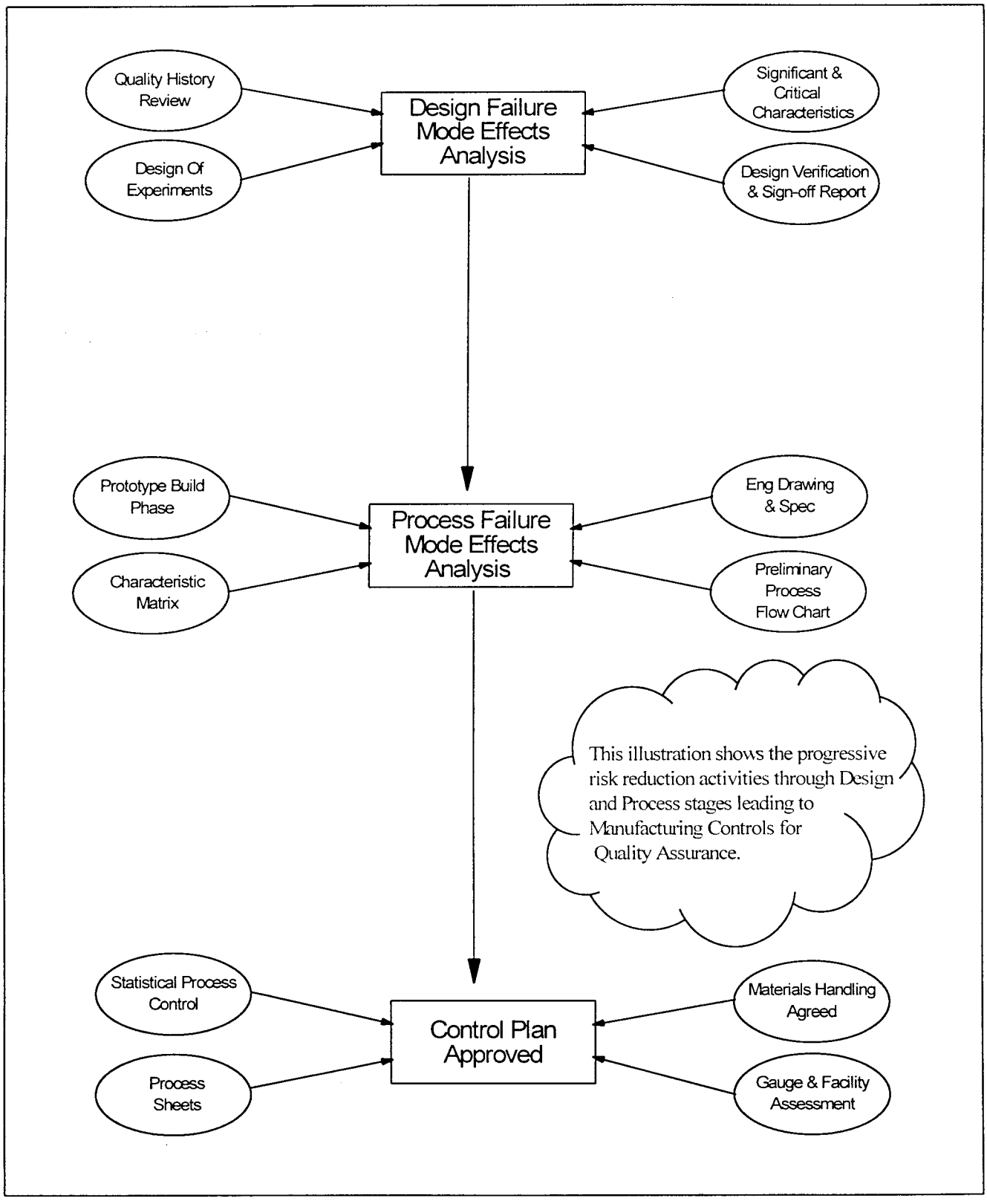
16 months from Job 1 a Launch Team was formed. This team had responsibility for ensuring the project went into production on time, on budget and most importantly achieving the required quality objectives.

The Process: The timing challenge required a delivery time which was shorter than previously achieved by Jaguar and was consistent with Bench marked world leaders. At all levels of the company there was a need to adopt changed and new processes. Starting at the company level with JWCT new processes were developed and integrated to ensure delivery was achieved. Processes have been documented for ISO 9001 approval (achieved Dec '94).

Computerised Information Technology has been utilised to provide tools to achieve the programme goals and cross functional communication. PROMPT and SPRINT provided prototype material control and production specifications, whilst PTIS provided metrics and detail status reports by linking five individually dedicated systems. The advantage of having single source data available to all, ensured common understanding and focus.

Metrics were used at all levels in the programme structure and at all stages to measure progress toward objectives. These ranged from SET status sheets to Programme objectives to problem resolution. A selection of these are listed opposite.

Summary:
The innovative and interactive team and process development has achieved the required objectives and puts Jaguar amongst the worlds leaders for quality, product and timing. The Project Team model developed for XK8 has been further adopted and developed for later Jaguar Product changes.



Key Advanced Quality Planning Activities

3. Advanced Quality Tools and Techniques

Product quality is no longer a source of competitive advantage. It is a prerequisite for sustaining a position in the market. The introduction of advanced quality tools and techniques were therefore critical to the success. of the programme.

Initiatives new to XK8 are described below :-

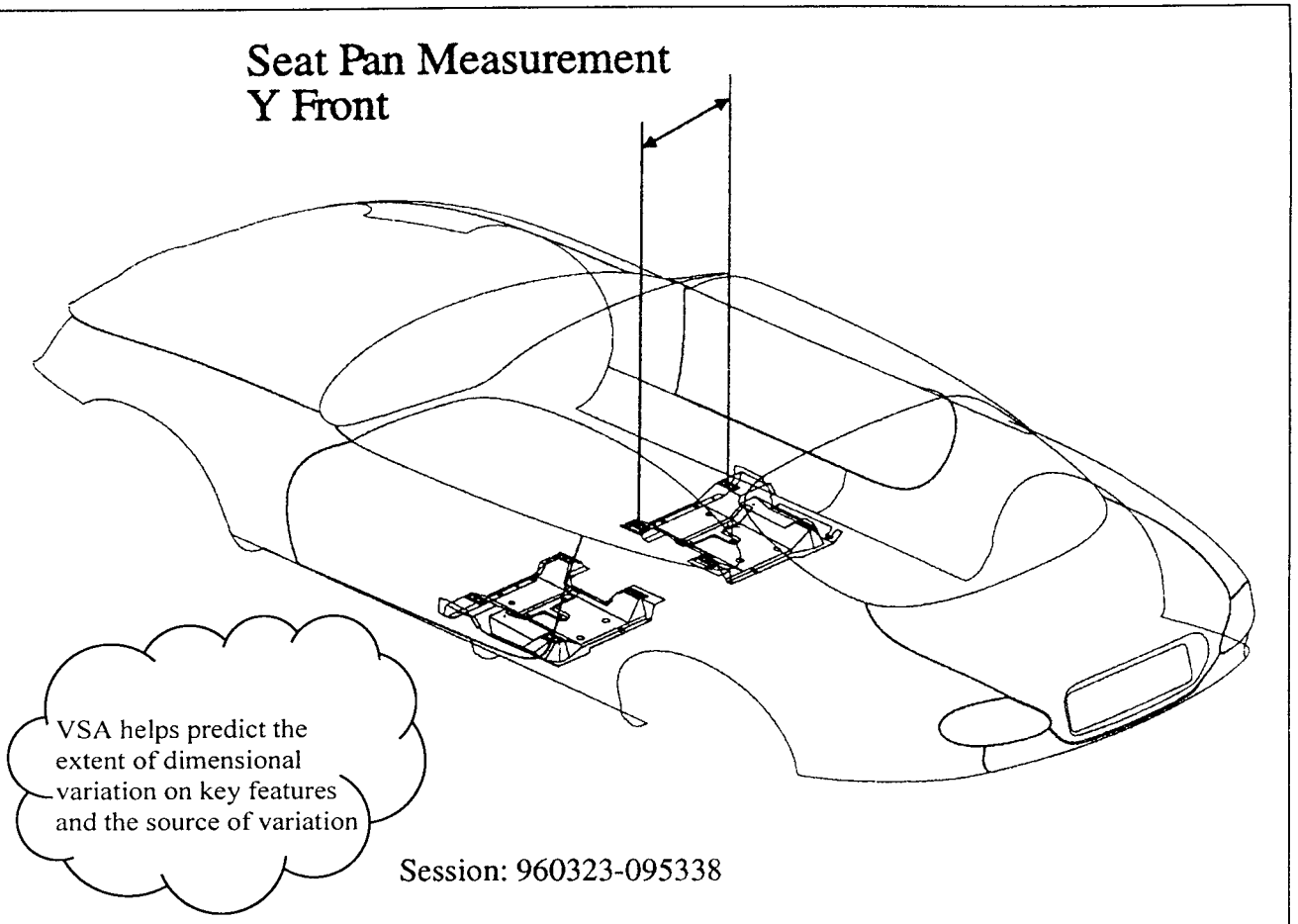
An Advanced Quality Planning Steering Group, chaired by the Programme Manager and comprising representatives from all the major disciplines, were responsible for overseeing all quality activities. This Group identified the need for a more detailed and informative timing plan outlining quality sign-off dates within the overall World Class Timing process.

Simultaneous Engineering Teams (SET's), were formed for all major sub-systems. For the completely new AJ-V8 engine, a Concept Design SET was formed, followed by seventeen individual SET's, all reporting to the Core Programme Team.
Design of Experiments (DOE) techniques were employed for many features of the engine, and complete and thorough Design and Process Failure Mode Effect Analyses (FMEAs) were carried out.

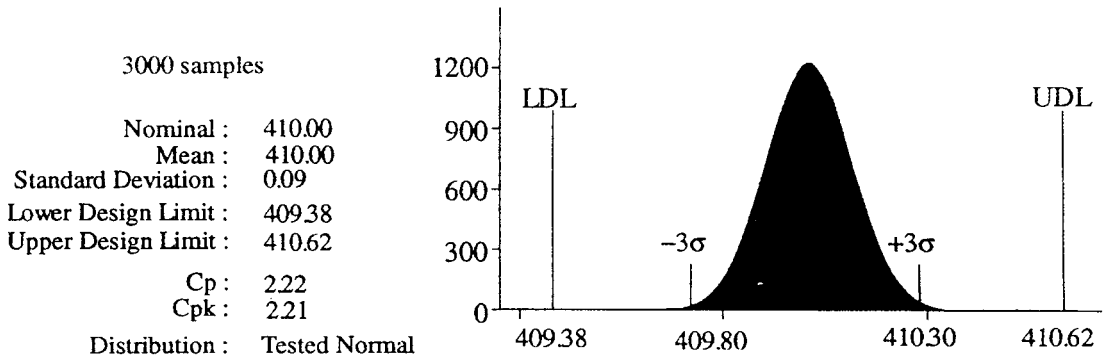
Benchmarking Competitors Vehicles using Touch Zone Analysis. This process is intended to reflect the impressions that a potential customer would experience when first looking at and sitting in the vehicle. Emphasis is placed on the immediate impressions created rather than the detailed engineering or ergonomic analysis. Full results of this exercise were displayed in the Jaguar Engineering Centre, and photograph booklets were issued to all relevant areas.

A programme of Design and Process FMEAs was drawn up for critical systems, resulting in the identification of Significant and Critical Characteristics. These were subsequently included in the Control Plans drawn up by the component suppliers and, where appropriate, by Jaguar production personnel. These characteristics were monitored during the prototype build phases of the project - resulting in higher levels of product quality from these early-build vehicles.

Training for the XK8 Project Team was heavily biased towards the new quality initiatives. Whenever possible, the majority of the Team members were trained as a group, and in particular this applied to the foundation course for the Ford EQUIP training (**E**ngineering **Q**uality **I**mprovement **P**rogramme).
This course includes modules on problem solving (TOPS-8D), process management, FMEA, Design of Experiments and Quality Engineering and Quality Function Deployment. The full team attended a residential Team Building course, and this was seen to result in improved team relationships as the project proceeded.



YFRONT True length between the seat pan front weld nuts



	Sample	Est		Sample	Est
% < Low Limit	0.00	0.00	Low	409.70	409.72
% > High Limit	0.00	0.00	High	410.31	410.28
% Out of Spec	0.00	0.00	Range	0.61	0.56

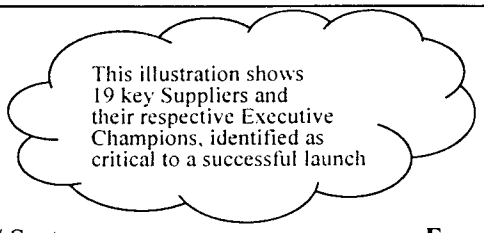
95% C.I. for % Out of Spec : 0.00 to 0.00

Example Of a Typical VSA Measurement

A total-vehicle dimensional control discipline (No-Adjust Car Build, or NACB) was introduced which recognises and manages variation during the design, manufacture and assembly of the vehicle in order to meet customer quality expectations in appearance and function, without requiring operator fit and finesse.

Variation Simulation Analysis (VSA) techniques were used to predict the product and process variation before tooling was committed. This involved the build of a three-dimensional model representing part geometry, location systems, assembly processes and component variability. The model identified areas of concern which were addressed by design changes at an early stage.

The results of these quality initiatives will be finally measured by the vehicle owners after the model is launched. However, internal audits and vehicle assessments show the consistent progress to meet Job 1 quality targets, (page 11f) for both Coupe and Convertible.



Supplier	Compt/ System	Executive Champion
ACD	Body system	**C.Tivey**
KARMAN	Hood frames	**K.Giles**
MARLEY/MAGNA	Facia	**C.Tivey**
SCHADE	Glazing seals/ retainers	**K.Lodge**
AI (LEAR)	Door casing/Trim casing	**D.Hudson**
ARVIN	Exhausts	**M.Beasley**
CAMFORD	Wishbones/links/brake disks	**K.Giles**
ITT	Frt/ Rr Bumpers	**D.Hudson**
KOSTAL	Column & Switches	**K.Lodge**
LEAR	Seating	**C.Tivey**
OGIHARA	BIW	**K.Giles**
PBM	Crossbeam/ crossmember	**M.Beasley**
SOMMER MASLAND	Carpet/Boot trim	**M.Beasley**
AUTOMOLD	runk trim	**M.Beasley**
UTA	Harnesses	**D.Hudson**
GKN DRIVESHAFTS	Propshafts	**M.Beasley**
DANA	Drive unit	**M.Beasley**
TECALMIT	Fuel pipes	**C.Tivey**
ZF	Transmission/St Racks	**R.Dover**

XK8 Suppliers: Executive Champions

4. World Class Quality Suppliers Participating As Full Partners

Quality deliverables were defined for XK8 suppliers as an integral part of the design brief or quotation request. Competitive quality criteria defining the product in terms of best competitive practice were identified and provided to potential suppliers.

Supplier participation was planned throughout the design process and manufacturing launch phases. Suppliers were fully integrated in the Simultaneous Engineering teams and worked closely with Jaguar personnel on design detail and quality planning.

The challenge was to select key suppliers very early in the programme, integrate these suppliers into the engineering activity and work together with them through launch reviews to achieve a quality product, delivered to the trackside at the right time.

Early sourcing: Initiatives were targeted at procurement of early prototype components from the development and ultimate production source. A total of 39 key systems were agreed as early sourcing priorities, based on four criteria - quality critical, long lead time, high value and technology change. Where practicable, World Class Q1 suppliers were chosen. Sourcing was completed 33 months before Job 1.

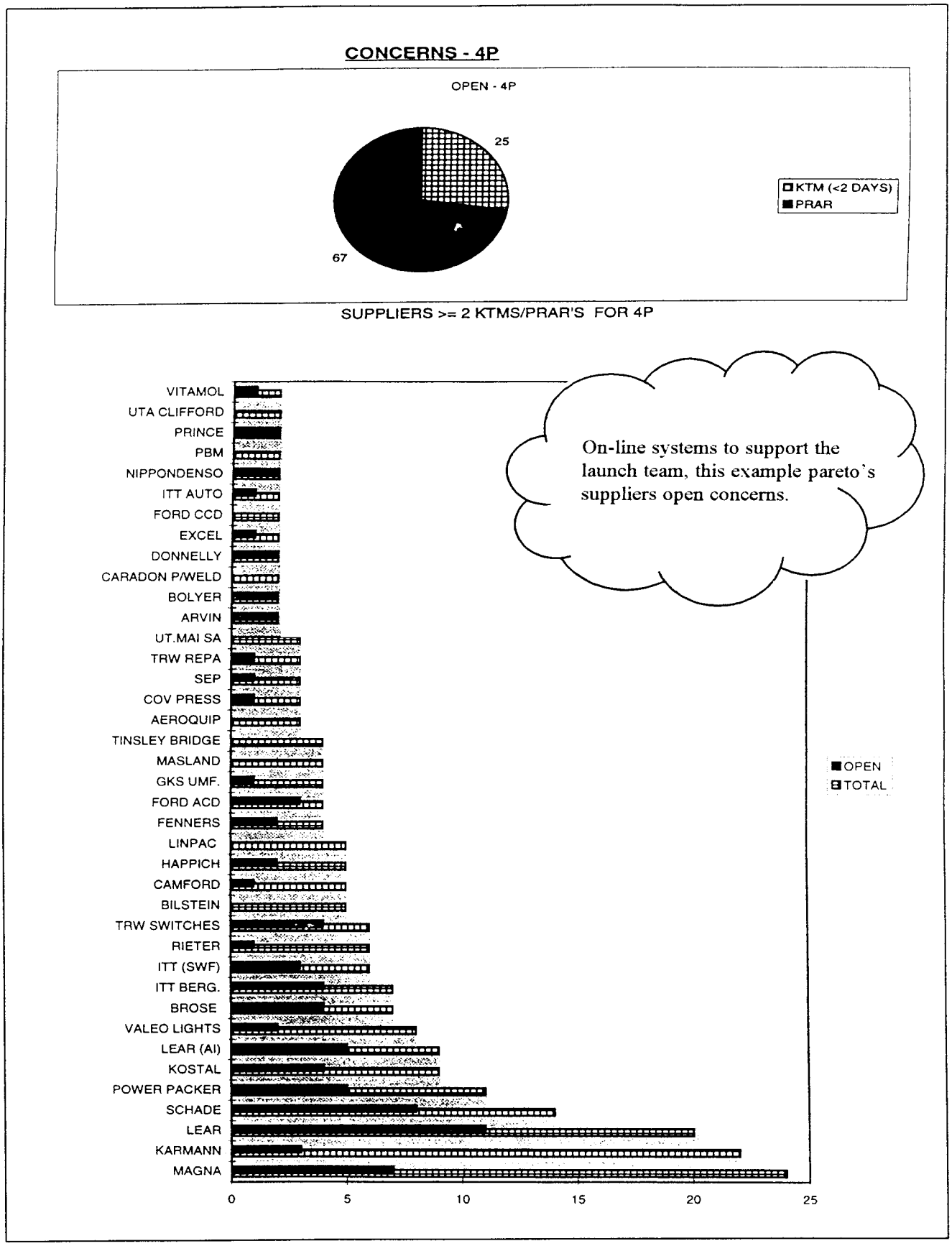
Supplier participation: Vendors of key components supplied full-time colocated support to the launch team, for all the builds at Browns Lane.

Executive champions: To enhance the launch support process, Executive Champions were appointed, 16 months before Job 1, to review progress with 19 suppliers of key components and systems identified as critical to the vehicle launch. A further 77 suppliers of medium risk components were selected for regular launch reviews with the Buyer and Supply Technical Assistance Engineers.

Launch reviews targeted areas of risk within the suppliers' own launch plans, and so required discussion on training, recruitment, facilities, tooling and sampling plans. The aim of these reviews was to focus supplier senior management effort on robust planning. The status of launch reviews were included in the Supply weekly metrics.

Advanced Quality Planning: In addition to the 39 key components and systems, a further 41 were identified for significant AQP activity. Throughout the design stages Engineering Quality worked proactively with the design areas and suppliers, to establish significant and critical characteristics and identify current car customer concerns from External Quality and Warranty data that needed to be considered during the design definition.

Supplier Technical Assistance (STA) were responsible for the downstream supplier AQP responsibilities in respect of capability studies and control plans. STA Engineers reviewed the suppliers' AQP and sample status on a regular basis. STA weekly metrics reported overall status.



On - line systems developed to monitor supply progress

Logistics: Manufacturing Engineering identified special logistical requirements for 235 parts, supplied by 40 suppliers, ranging from unique packaging to Just-In-Time trackside delivery. Inventory management benefits include reduced handling, stockholding and scheduling. Electrical data interface resources were increased to handle the increased traffic.

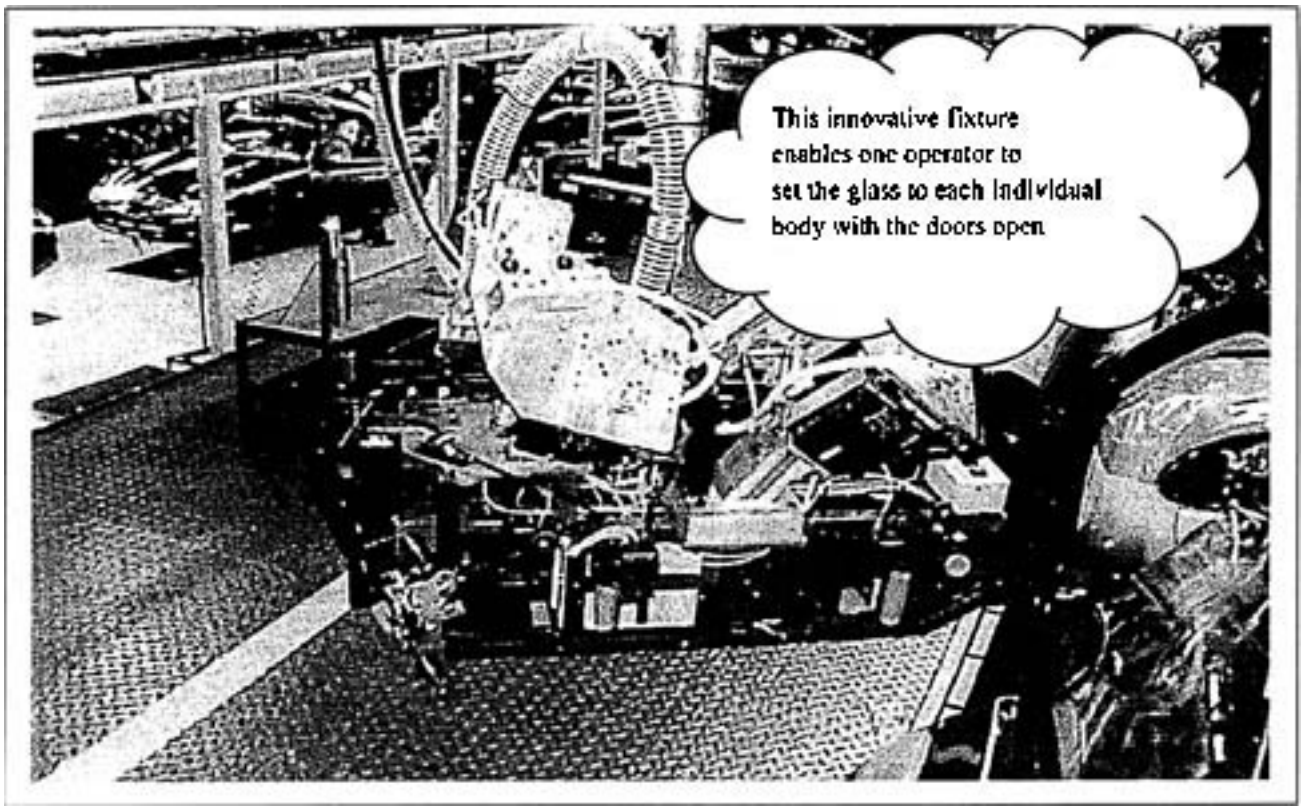
Sample monitoring/control: Production Purchasing metrics focused management attention on supplier launch, quality and sample status. Published weekly, it provided performance, trend and key issue information.

Sample data was provided by the Production Tracking Information System (PTIS). STA metrics provided key task monitor and AQP data, launch data came from the supplier reviews.

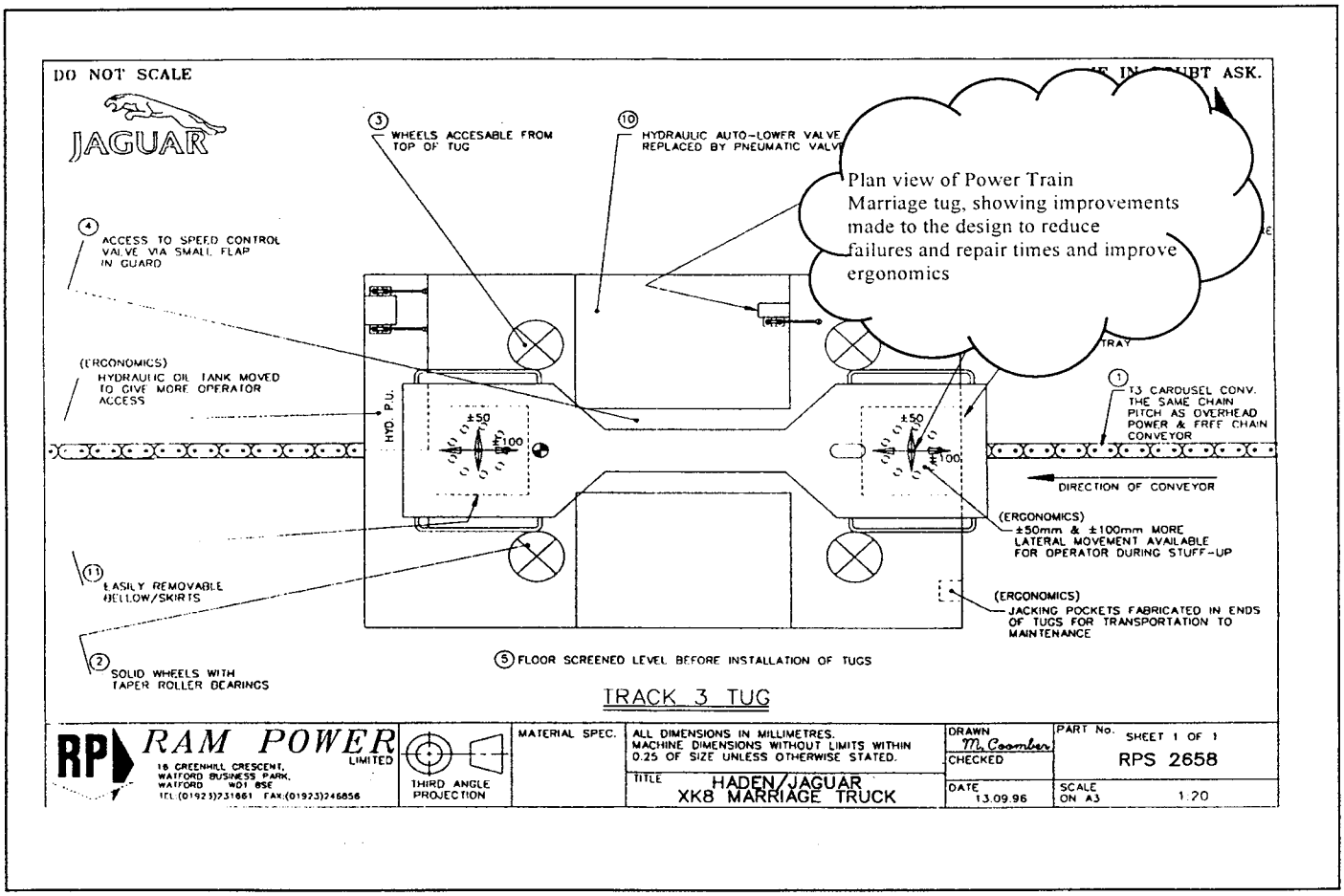
Summary

The 'team' approach of supplier/manufacturer relationships has ensured rapid response to change, reduced costs and brought the product to market on time. Suppliers have improved their own process to meet our needs and therefore placed themselves in the best position for future business in the industry.

The use of metrics as a 'health check' on the project has been carried forward into all new programmes and model year changes.



Best Practices and Innovation: XK8 Door Glass setting.



Manufacturing Involvement: Reliability & Maintainability improvements designed into the facility by Maintenance teams

5. Integrated Manufacturing, Quality & Vehicle Launch Process

This element describes the initiatives introduced within each manufacturing plant from early prototype stages through to Job 1 to develop XK8 to world class quality, timing and cost targets.

Challenge

XK8 represents the most demanding product launch in the company's history : two new body styles, suspension, power unit, interior and exterior trim and radically new electrical architecture.

Quality targets were set to exceed XJS levels at launch. An affordable cost structure based on conservative sales volumes demanded high levels of investment efficiency and cost control.

The challenge was to harness the skills and knowledge at every level, building on the processes developed for the 1995 Salon car launch.

Exploiting World-wide Best Practices. Comparative analyses within Jaguar, Ford and our competitors were carried out to identify best launch practices, manufacturing processes and facility strategies.

From analysis of strengths and weaknesses of 1995 saloon launch, the XK8 team improved key launch processes such as windnoise and water integrity management. "Chunk Teams" allocated to specific vehicle areas provided improved focus.

Benchmark visits to Ford car plants highlighted process opportunities and led to innovations such as the XK8 door glass setting fixture. Studies of competitors products led to the inclusion of auto-drop door glass, delivering major capability and quality improvements.

Manufacturing Involvement And Ownership At The Earliest Stages. Full time Production Operation support commenced three years before Job 1. For the first time, Production Plants were represented on the Project Core Team.

From the fourth quarter 1993, Production Operators, Supervisors and Engineers participated in key Simultaneous Engineering Teams, i.e. fuel system, sealing and interior trim. From EP build (Oct 94) production operators supported ALL build phases. Initially 10 Group Leaders, 11 Rectifiers and approximately 40 operators (for key operations) inputted for build feasibility and to gain early process appreciation. The number of production operators participation increased progressively through the build phases.
Maintenance tradesmen were involved in detailed facility design with equipment suppliers.

Major improvements in reduced component complexity, manufacturing feasibility and equipment reliability and maintainability were achieved.

XK8 Functional Post Build Plan for Browns Lane

FP No.	3	8	2	4	5	16	18	15	366	13	19	21	30	20	11	340	341	17	31	22	32	28	382	383	281	283	36	282	57	33
Model	Cp	Cp	Cp	Cv	Cv	Cp	Cp	Cv	Cv	Cv	Cv	Cp	Cp	Cp	Cp	Cp	Cv	Cv	Cv	Cv	Cp	Cv	Cp	Cv	Cv	Cv	Cp	Cp	Cp	Cp
Drive	LHD	LHD	RHD	LHD	LHD	RHD	RHD	LHD	RHD	LHD	RHD	LHD	RHD	RHD	LHD	LHD	LHD	LHD	LHD	RHD	LHD	LHD	RHD	LHD	RHD	LHD	LHD	RHD	RHD	RHD
Market	USA	USA	UK	USA	USA	UK/E	UK	USA	UK	USA	UK/E	USA	UK	UK	USA	USA	USA	USA	GER	UK	GER	UK	UK	GER	JAP	USA	USA	UK	UK	UK
On Track	12/2	14/2	19/2	19/2	20/2	21/2	22/2	26/2	26/2	27/2	27/2	28/2	28/2	29/2	01/3	04/3	04/3	05/3	05/3	06/3	07/3	08/3	11/3	11/3	12/3	12/3	13/3	13/3	14/3	15/3
Track Build	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Elec Prove	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Water Test	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
OTR	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
C F C	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5								0.5	0.5	0.5
Road Test	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1											1	1	1
VCATS	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1													1	1
R/Road x10			0.5	0.5		0.5			0.5	0.5		0.5			0.5														
P/Shop		2		2			2		2		2		2	2															2	
F Line/CAL	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1														1	1
Hydropulse	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5														5	0.5
Smoke Test	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5														5	0.5
NOVA - C	2				2			2							2															
Emissions			0.5	0.5		0.5				0.5		0.5																		
Elec Prove	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5														2.5	2.5
R F I checks		0.5	0.5	0.5			0.5	0.5		0.5		0.5		0.5																0.5
Days Reqd	15.5	16.0	15.0	17.0	15.5	14.5	16.0	16.0	16.0	15.0	15.5	15.0	15.5	16.0	16.0	16												15.5	15.5	14.0
Days Avail	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16										16	16	16	16
PDI	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Drive Team	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
P T S	08/3	12/3	15/3	15/3	18/3	19/3	20/3	22/3	22/3	25/3	25/3	26/3	26/3	27/3	28/3	29/3	29/3	01/4	01/4	02/4	03/4	04/4	05/4	05/4	10/4	10/4	11/4	11/4	12/4	15/4

Shows for each Prototype vehicle (columns) the number of planned days allocated for validation of each "off track " process.

Prototype Build: Exploiting every vehicle to validate key processes.

Launch Team Daily Schedule: Venue: XK8 Launch Team room, GEC Block.

0730 hrs:	Start up meeting: Agenda:	New issues	
0800 hrs:	Exceptions Meeting: Agenda:	Progress Outstanding Issues	
	0800 hrs:	B.I.W.	
	0830 hrs:	Trim	
	0900 hrs:	Chassis	
	0930 hrs:	Power Unit	
	1000 hrs:	Electrical	
	1000 hrs:	Vehicle Office	(Weekly meeting only)
	1030 hrs:	Purchase	(Weekly meeting only)
1100 hrs:	Product Change Instruction Meeting: Agenda:	Engineering Releases	
1600 hrs:	Washup Meeting (Track build meeting)		

Change Control: Rigorous daily routine

Simulated Production Builds And Teamwork. Five key principles represented major advances for XK8:

- Production teams made responsible for building prototype vehicles, exposing problems as early as possible. Familiarisation for operators commenced 18 months before Job 1. Progressive off-track, sledge build and on-track vehicle builds took place 6-12 months earlier than previous launches.

- Every prototype vehicle was exploited to validate parts of the post-build process - including Paint Repair, Road Test, Electrical Validation test and twelve other processes. This "early view" provided ample time to fix problems.

- Special builds, involving key groups to focus specific risk areas:

    * Suppliers emphasis build : viewing component assembly into vehicles.

    * "Fresh eyes " builds : Assessing detailed build process

    * Slow build : for process and serviceability verification.

- Early introduction and verification of key facilities utilising XJS build : eg. Power Train Marriage System.

- Achievement of representative track speed before Job 1. Operators were used to XJS volumes : half the track speed of XK8. By re-assigning the track and gapping every other XJS the track speed was doubled. XK8 prototypes were then built on the same track, at representative cycle times.

Total Engineering Change Control. Previous launch experience had proved the importance of managing late engineering modifications. For XK8, all changes following early prototype build were controlled by the Launch Team. This comprised 130 full time Product, Manufacturing and Production Engineers, Operators, Purchase Agents, Finance Analysts and On-site Supplier Representatives. The team effectively eliminated departmental barriers, and created the sense of urgency necessary for rapid change.

A relentless daily routine handled over 8600 launch issues, 2000 engineering releases and co-ordinated the build of 141 prototype vehicles.

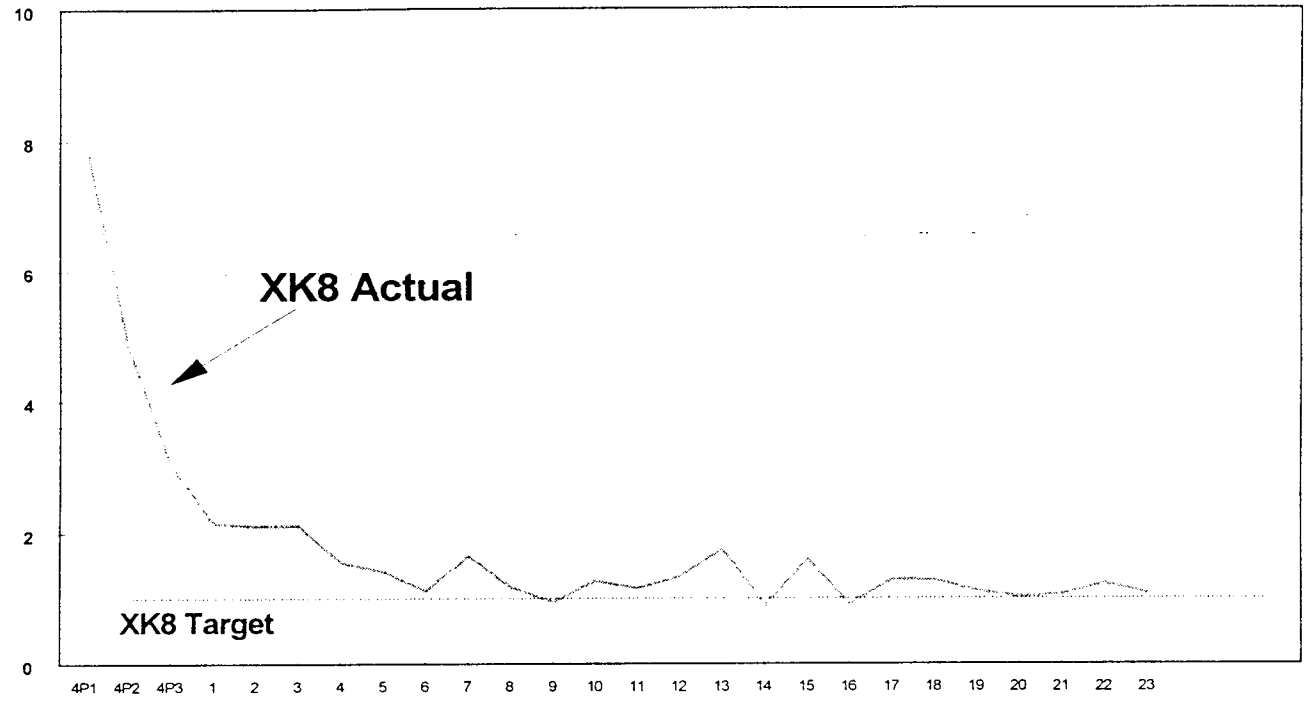
Progress was monitored against key metrics (page 11) at formal launch reviews.

Total Cost Control. The financial function within the Launch Team was to advise on cost affordability of change.

Immediately a change was identified it was logged and costed. Where cost increase were involved the launch philosophy was to protect the customer and quality levels, but to find ways to make the change affordable

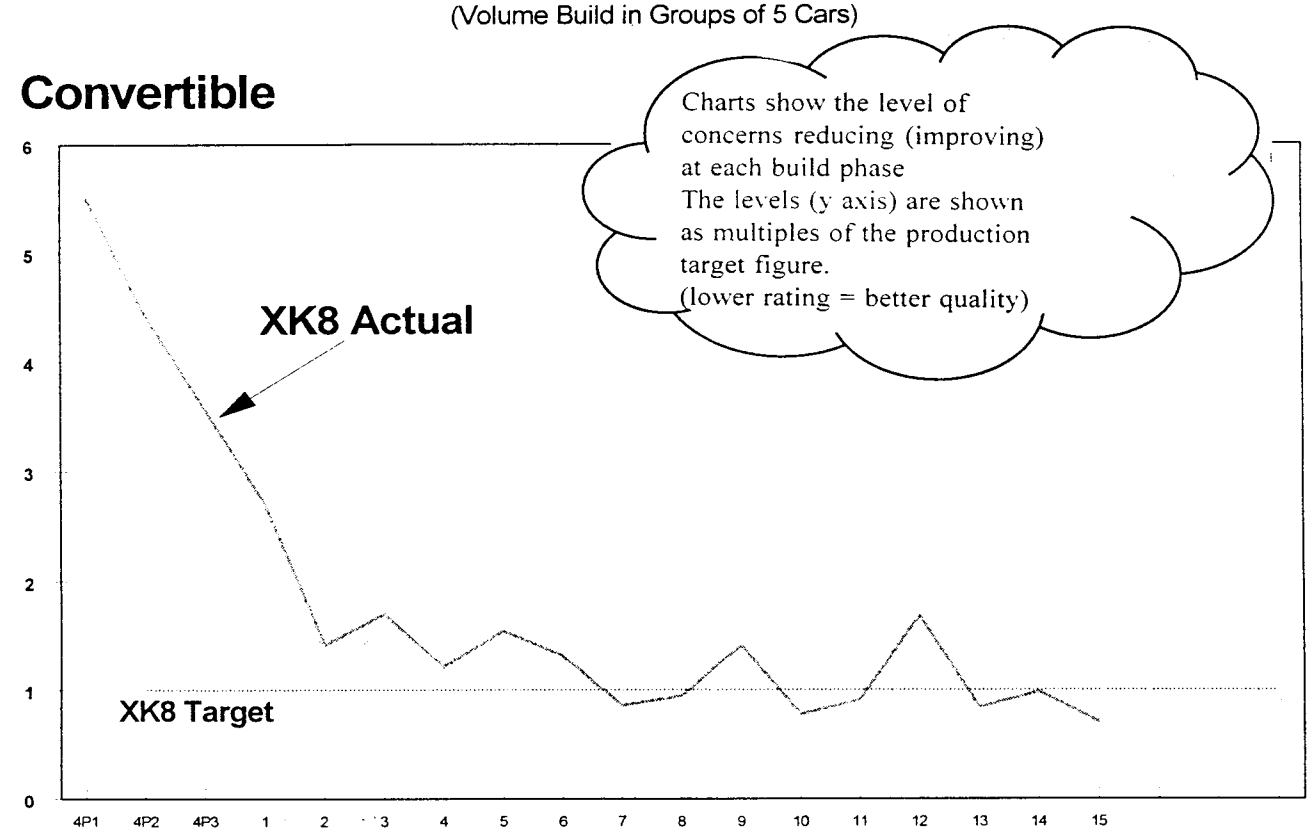
Prototype to Volume Build

Coupe



(Volume Build in Groups of 5 Cars)

Convertible



Charts show the level of concerns reducing (improving) at each build phase
The levels (y axis) are shown as multiples of the production target figure.
(lower rating = better quality)

(Volume Build in Groups of 5 Cars)

Product Control reported total vehicle cost which was fed into the profit model for confirmation of affordability. This enabled Finance to be pro-actively involved in the change process rather than reporting cost after change.

Metrics targets established by benchmarking best-in-class opposition were set for each build phase:

- Right-First-Time and Statistical Process Control characteristics measured at each build zone.

- Vehicle Assessment audits of bodies and completed vehicles.

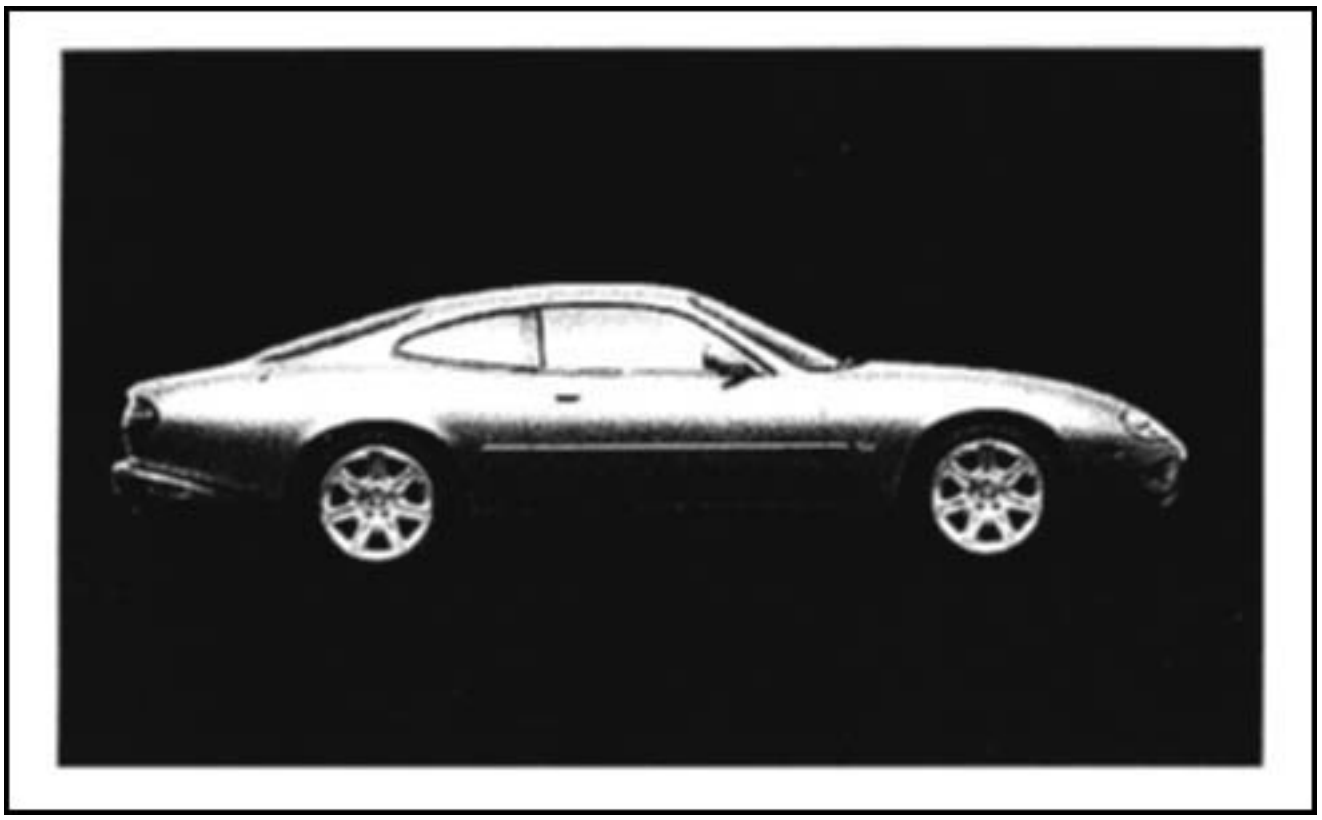
- Customer Focus Centre providing immediate feedback of assembled vehicle quality.

- Windnoise, Water Squeaks and Rattles : in-plant assessment on all vehicles.

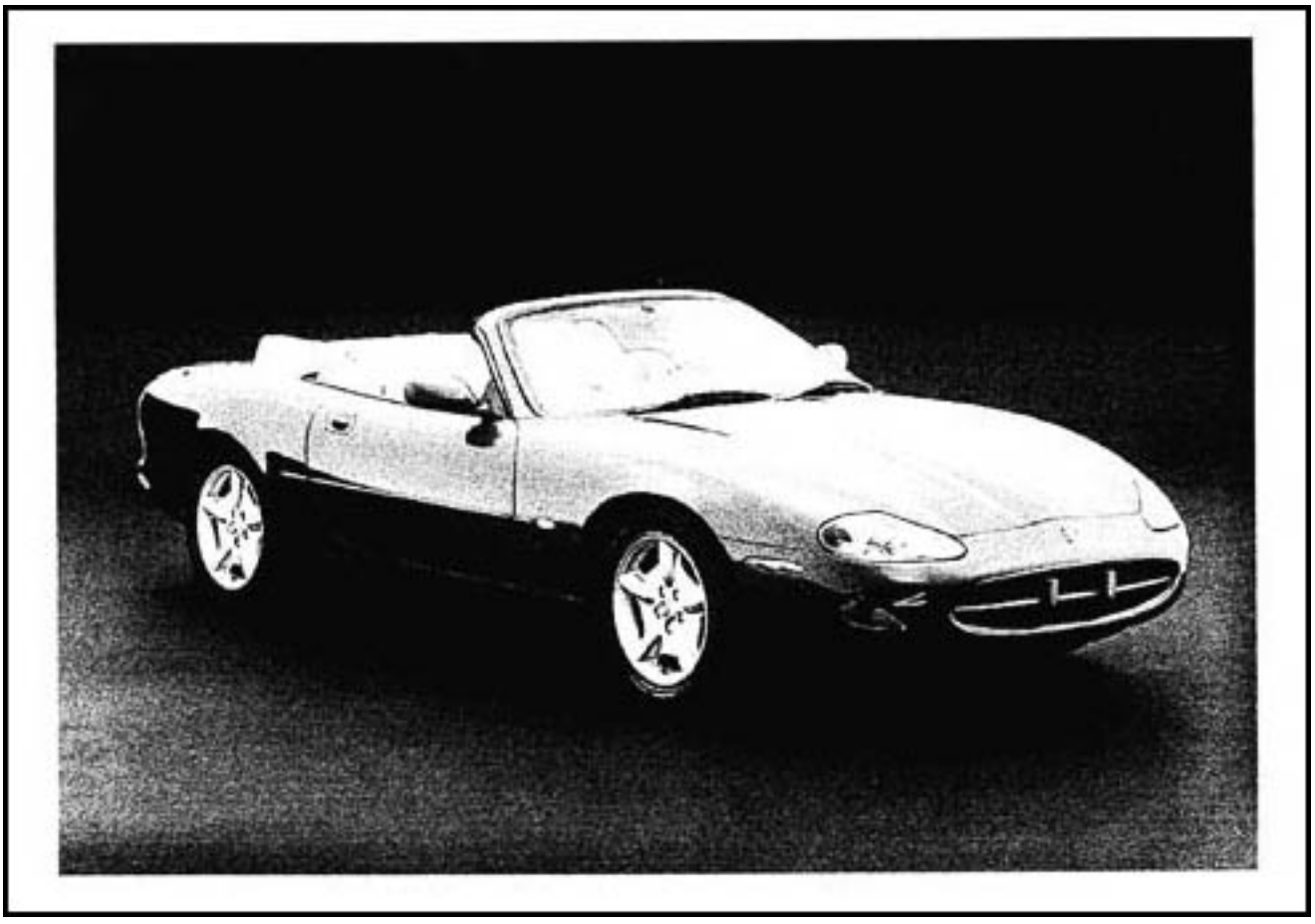
- Problem closure rate - targeted at establishing the fixes for 70% of problems, within two days.

- Functional images : status of vehicles against refinement, performance etc.

- Manufacturing readiness : facility, process and training status.



JAGUAR XK8 Coupe



JAGUAR XK8 Convertible

Conclusion

Jaguar believes that **the XK8 project fully meets the criteria for 'Manufacturing Excellence'** and represents a substantial step forward in manufacturing competitiveness for the UK, including the automotive component supplier sector.

Extensive scientific research into future market requirements has ensured a highly specified product which is set to substantially lead in customer satisfaction in the very competitive world-wide markets for luxury sports cars.

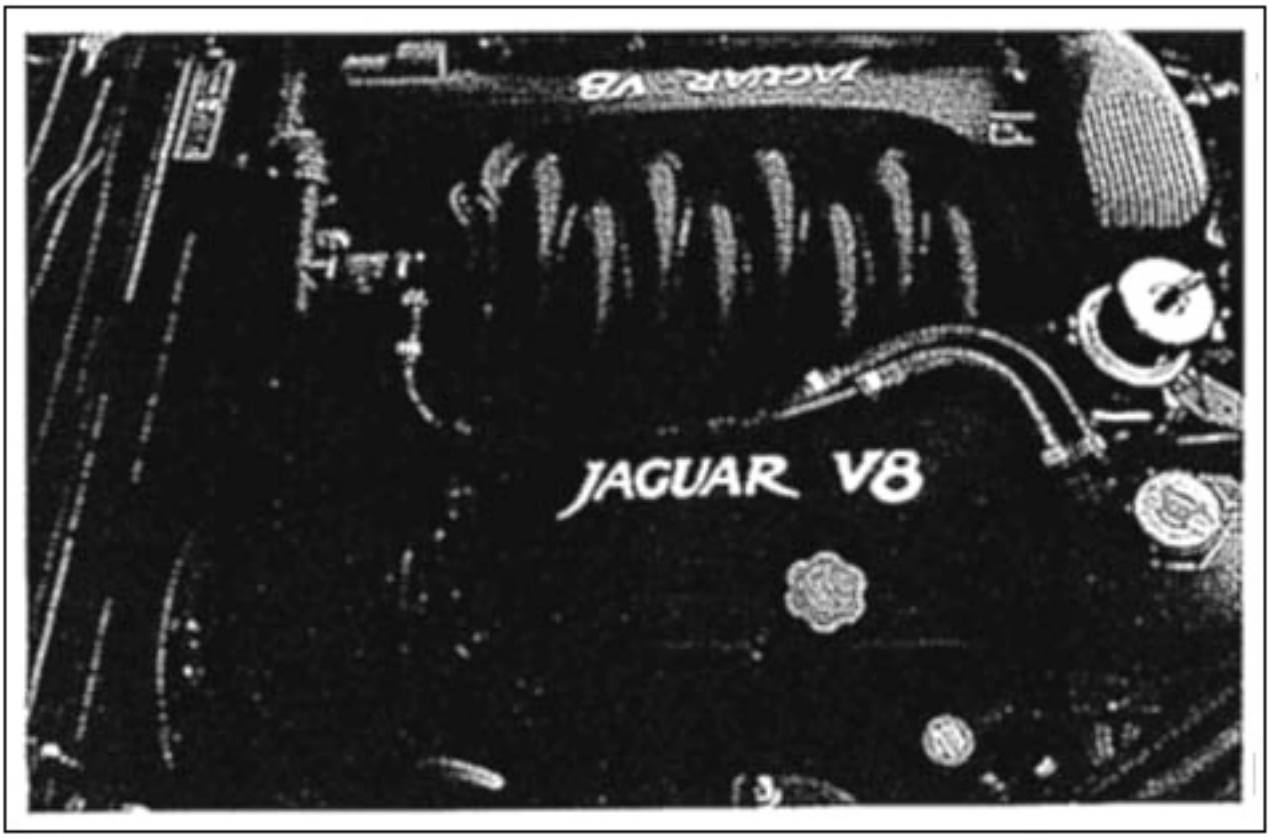
The application of advanced design and engineering has taken Jaguar's product development expertise onto a higher level of excellence. This expertise has ensured delivery of a robustly engineered and profitable new car which meets or exceeds all its targets for cost, quality and performance.

Although highly complex in specification, the XK8 is nevertheless **simple for the customer to use** and meets the highest **world-wide standards for safety, exhaust emissions levels** and **recyclability**.

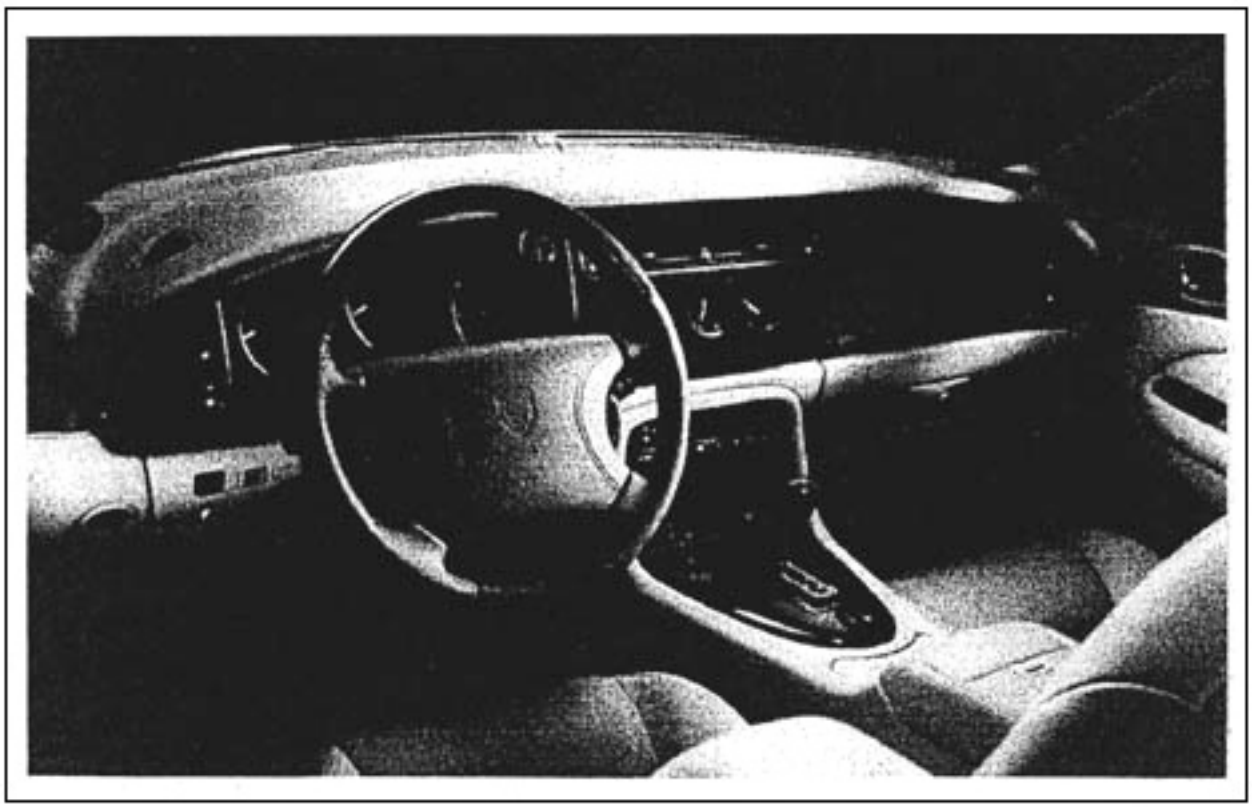
Cross-functional project teams have operated at every level from overall programme management to the detailed **simultaneous engineering** of individual components. These teams have operated to a new set of **project management disciplines** designated as the **'World Class Timing Process'** achieving much reduced project lead times compared with traditional methods. This extensive and demanding set of standards has now been institutionalised across all design and development functions at Jaguar and has formed a significant element of the Company's **certification to the ISO 9001** standard.

The careful selection of an **international supplier base with a strong emphasis on UK sourced components** has been essential to the achievement of quality and cost objectives. New advances have been made in just-in-time delivery techniques, taking advantage of the spacious new layout in the manufacturing areas enables point of fit sequenced delivery (P.O.F.D.) of components, reducing in-process stock and material handling .

At every stage in the product delivery process, **performance objectives and metrics have been established** and used to control the project. New **engineering analysis tools and statistical techniques** have been introduced with extensive operator training to ensure that the quality of the XK8 will surpass that of leading German and Japanese competitors.
The introduction of **new processes and statistical techniques into Manufacturing** (such as no-adjustment car build and variation simulation analysis) has built on the quality and efficiency improvements achieved over recent years for saloon cars. **The Mobilisation of shop floor teams and the extensive training** of all those involved in the manufacture of the XK8 has ensured total commitment to quality and consistency in delivering product to engineering specification with reduced times for customer order satisfaction.



The new JAGUAR AJ-V8 Engine



JAGUAR's XK8 Classic Interior