

**First Progress Report on QA Systems in the
European Spring Industry**

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First Progress Report on QA Systems in the European Spring Industry

1. INTRODUCTION

This is the first progress report of a SPRINT project in which SRAMA (Spring Research and Manufacturers' Association) and VDFI (Verband der Deutschen Federnindustrie) have collaborated to investigate 'Quality Management, Control and Assurance Systems that provide Effective Benefits to Spring Manufacturers'. The financial assistance of the European Communities SPRINT scheme (Contract No RA365) is gratefully acknowledged.

The report gives the results of the feasibility stage of the project, which was fully described in the original application for EC funding. As will be seen, the report is written in two parts, giving the different impressions gained by SRAMA and VDFI, whose representatives each visited springmakers and spring purchasers (the customers of the spring industry, and end users of the springs) in both Britain and Germany. SRAMA also visited springmakers in France and The Netherlands. Since SRAMA and VDFI visited different companies, although some visits were made together, there are bound to be differences in the findings, but the conclusions are very similar, and both SRAMA and VDFI confirm that a further year's funding, as envisaged in the original application, would be beneficial. SRAMA's report is written in English and VDFI's in German so as to avoid misinterpretation of terminology, which has to be precise when discussing some aspects of quality assurance.

2. SRAMA REPORT

Mr Mark Hayes, the author of this report, has managed the project, but was helped with the UK visits by SRAMA's former and current Quality Managers, Mr Geoff Graves and Mr Chris Rushton, who both have a full knowledge of ISO9002, the former as a consultant to springmakers who have wished to attain registration to ISO9002, and the latter as SRAMA's manager responsible for the achievement of ISO9002 status for SRAMA's laboratory.

2.1 SUMMARY OF ATTITUDES OF SPRING MANUFACTURERS

2.1.1 QUESTIONNAIRE

Fig 1 gives the questionnaire that was used for the survey of springmakers' attitudes. This questionnaire was translated into German and French, and was invariably provided to the springmakers prior to the interviews, so that the springmaker could prepare his answers, although no preparation was generally necessary. It was quite clear from these interviews that quality and quality assurance matters are very high in the priority list of concerns to springmakers, with many expressing the view that quality was as, if not more, important than price to the success of their business.

The answers given to the questionnaire were always carefully considered, and the task of summarising springmakers' attitudes was made difficult for the author, because most answers were qualified rather than being a simple 'Yes' or 'No'. In consequence, only a limited attempt has been made to tabulate these answers (see table 1) but the answers that shed most light upon current practices and attitudes are discussed below.

2.1.2 ISO9000

First and foremost, the QA systems of all spring makers interviewed in Britain, Germany, France and The Netherlands were based upon the ISO9000 series, with ISO 9002 being the most frequently employed, and all had a quality manual. Equally clearly, it is becoming the norm for a substantial majority of springmakers in Britain, France and The Netherlands to be accredited by an independent auditor and registered to ISO9002, whereas in Germany very few springmaking companies are considering registration. For small companies in Germany, the costs of independent accreditation to ISO9002 are typically 10 times the costs in the UK (DGQ and TUV are the only German companies qualified to register companies in Germany at present). There is also a lack of a customer-lead impetus to urge springmakers to become registered. In Germany the system audits carried out by springmakers' customers using the VDA (or similar) Fragenkatalog is accepted as sufficient testimony on their QA systems.

The Verband der Deutschen Automobilindustrie (VDA) Fragenkatalog is very similar to other questionnaires drawn up by, for instance, the electronic industries, and aerospace industries. These questionnaires are very widely accepted in Germany, and although based upon ISO9004, their requirements are rather more far-reaching than the ISO standard demands, as shown in Fig 2A, which is an English translation of the draft VDA Fragenkatalog, endorsed with SRAMA comments, which illustrate how much further the questionnaire takes QA systems beyond the ISO9000 mandatory requirements.

SRAMA have checked with the Association of British Certification Bodies and the National Accreditation Council for Certification Bodies who both confirm that, in principle, a standardised questionnaire for auditing of QA systems for a particular industrial sector would be entirely acceptable.

2.1.3 RAW MATERIAL SUPPLY

In the UK, France and The Netherlands, springmakers control the quality of the raw materials they use for spring manufacture by buying only from

- a) ISO9000 registered suppliers
- or b) Suppliers they have audited in accordance with their own ISO9000 system.

In Germany, the VDFI have set up an auditing system for the supply of wire to the spring industry, whereby one neutral expert audits all the major European suppliers to the industry. This man can obviously maintain a common level for the interpretation of quality requirements for the industry and provides a report to the wire drawers, who are then obliged to pass on this report to springmakers who request it. This obviates the need (although not always the practice) for springmakers to audit their suppliers - a task which can be very onerous and difficult for a small springmaker to undertake at large supplier companies. This system is likely to be extended by VDFI to other raw materials used by the industry.

If all raw material suppliers were to become registered to ISO9000 then the VDFI scheme would become unnecessary, but since spring wire is only a small part of many wire drawers production programmes, there are, in the author's opinion, obvious advantages to the VDFI scheme, which merit further consideration in other parts of Europe,

2.1.4 DESIGN RESPONSIBILITY

Spring manufacturing companies throughout Europe are almost always relatively small autonomous enterprises for whom springs are their most important product. They manufacture springs to their customers' requirements and seldom are they willing to accept responsibility for the design of the springs - only 20% of those interviewed by SRAMA were prepared to accept some design responsibility. Nonetheless all were willing and eager to participate in the spring design process with their customers and to offer advice.

All the springmakers, as part of their regular QA procedure, make some sort of check on the design of springs they are asked to manufacture, and all advise their customer when something is obviously wrong, but the extent to which they help their customer varies enormously. Some of the methods employed for dealing with a new spring product include

- establishing an internal project team
- fixing meetings with the spring users to discuss all aspects of the spring supply. This meeting used to be with the buyer only, but today is nearly always with a production, technical and quality representative of the customer, as well as the buyer.

- completing a product conformity questionnaire.

An example of a typical product conformity questionnaire is included as Fig 3. Some springmakers regard some questions on such questionnaires as unnecessary interference by their customers in their affairs, whereas others view it very positively as an opportunity to fully consider all aspects of supply of a new part and a means to develop an improved relationship with their customer.

2.1.5 STATISTICAL PROCESS CONTROL (SPC)

Nearly all spring manufacturers are required by some customers to provide evidence that statistical process control has been employed for all or the most important production processes. As a consequence a majority of the German springmakers interviewed now employ SPC universally whether their customers demand it or not, and an increasing proportion of springmakers in Britain are also employing SPC whenever possible.

However, SPC is demanded for some critical springs even when the production quantity is small, and it is argued that this makes no sense at all. Hence some springmakers only employ SPC for batch sizes over a given size (5000 for some, 50,000 for others, depending upon the market).

2.1.6 QUALITY AND PAY

Exactly half of the springmakers interviewed had a formal link between quality and shop floor remuneration, and those that did not, were interested in the idea. SPC indices, rejections and customer complaints were the usual quality parameters that were used for calculating quality related bonus (or deduction) payments. The increasing trend to relate quality and pay emphasises the importance of quality to the spring industry. Productivity improvements should always lead to improved profits, providing quality hasn't been prejudiced - that is the prevailing philosophy - and a very healthy one it is too.

2.1.7 SPRING DRAWINGS/SPECIFICATION

The drawings for springs can be inadequately specified, inappropriate, or even wrong. The standard of the drawings and specifications supplied to the spring industry has not improved at the same rate at which springmakers' quality has improved, in the view of springmakers. All too often SPC is specified for ridiculously small batches of springs or SQC data is required for two loads. However, for good commercial reasons the springmakers seldom see fit to tell their customers of these inadequacies (see fig 4 question 6.4). The simplest means to overcome some of these problems is the promotion of the use of standard drawings for springs, such as those given in BS1726 Pt 1 or DIN 2099 Pt 1.

It is probably worthwhile at this juncture to tell an anecdotal story related by more than one springmaker. A spring design has been supplied on a regular basis in quantities of several thousands per year without problems arising. Then the purchaser starts to insist on SPC monitoring, and/or the springmaker implements ISO9000 QA procedures. The springmaker realises that the springs that have been supplied for many years are right at the top or bottom of the specification - indeed some will have been out-of-specification. Hence an adjustment is made so that the mean values in the drawing are more accurately achieved. These more accurate springs are the subject of the first ever complaint received for the part

- the end user says that springs are now different from those that used to be supplied - and a return to the previous (out-of-specification) design is sought. The moral of the story is clear - improving quality does not always lead to the desired results because spring users are not always able to specify accurately what they want - indeed this inability certainly leads in many instances to over specification of springs, and hence higher than necessary production costs and hence waste. However this situation is rather beyond the scope of the current survey.

2.1.8 FITNESS-FOR-PURPOSE TESTING

Fitness - for - purpose is a concept that is occasionally built into the specification for supply of springs. Performance tests, such as fatigue, relaxation or corrosion resistance may be specified on a drawing as a means of ensuring that springs purchased are fit for undertaking the service application without significant risk of failure. Springmakers may respond to performance test requirements in three ways.

- a) Undertake to test a statistical proportion of each production batch of springs to verify that they are capable of the specified performance.
- b) Certify that they have made the springs according to specification and confirm that springs of this design should be capable of achieving the specified performance. The first samples may be tested to verify this statement.
- c) Tell their customer that the performance of the springs is the responsibility of the purchaser, and that the springmakers' responsibility ends with the supply of springs to the dimensional and load requirements on the drawing.

All the foregoing assumes (and this is a big assumption) that the spring purchaser is able to define clearly the performance requirements sought from the spring. If this can be done, then the attitude of the spring manufacturer will be determined from any knowledge of the service application weighed against the significant costs involved in performance testing. A further consideration will be the commercial risk involved in supplying a spring that might fail the performance test verses the willingness of the purchaser to pay a premium for the performance testing.

A springmakers' ability to give assurance to their customers that the springs they supply are fit for purpose is obviously enhanced if they have performance tested a statistically selected proportion of them. However, if the purchaser will not pay the premium for such testing then the QA risk should lie with the spring purchaser, and so the very act of offering performance tests enhances the QA status of the spring manufacturer. Naturally if the springs fail the performance test, the springmaker will be left with an unusable batch, which has to be replaced at the springmakers' expense. The other side of the coin though, is represented by the scenario in which a spring fails in service - in these circumstances it will be extremely difficult for the purchaser to press a claim upon the springmaker when agreed fit - for - purpose performance testing has been carried out.

It is the author's opinion that the QA status of spring manufacturers is always enhanced if performance testing is offered. Naturally, many purchasers will regard the risk or consequence of service failure as so

low that the costs involved of performance testing would be unwarranted, but the purchaser is likely to be given assurance by the very offer that a springmaker has the confidence, and is prepared, to offer such tests.

2.2 SUMMARY OF ATTITUDES OF SPRING PURCHASERS/USERS

2.2.1 QUESTIONNAIRE

Fig 4 gives the questionnaire that was used for the survey of spring purchasers' attitudes. Again the questionnaire was translated into German, and was supplied to the companies taking part prior to the interview.

From the answers given in the interviews, it was clear that quality and quality assurance were very high priorities to the purchasers of spring, but there was no consensus about the importance of quality requirements for springs, in relation to cost. Some purchasers clearly would be prepared to pay something extra for improved quality, whereas others insisted that high quality be maintained and at the same time prices should be reduced. Clearly the purchase of springs is a buyers' market! Equally there was very little consensus about other attitudes to the QA requirements for the purchase of springs, and this is reflected in the absence of 100% values in the survey results which are summarised in table 2. The only question receiving a 100%, or unanimous response concerned whether a single QA system for all springs (critical and non-critical) should be present within a spring manufacture. Everyone agreed that there should be only one QA system. Other answers given are further discussed, as follows.

2.2.2 ISO9000

An increasing proportion of purchasers of springs in the UK, and other parts of Europe (except Germany), are specifying that their spring suppliers should be registered to ISO9002. Those 50% of UK spring purchasers interviewed, who do not currently insist in ISO9002, often expressed a preference for ISO9002 suppliers.

Effectively, spring purchasers in Germany were also expressing a requirement that springmakers have a QA system up to and beyond ISO9004 standard, by insisting on the system being audited against the VDA Frangenkatalog.

2.2.3 QA AUDITING

UK spring purchasers that insist upon BS5750 (ISO9000) registration are effectively insisting that their springmakers' system is independently audited by a qualified person. German spring purchasers subscribing to the VDA scheme will accept a system audit carried out either by themselves or by one of the other subscribers to this scheme (listed in Fig 2 B). Clearly, such auditing is neither independent, nor is it necessarily carried out by a qualified person whose sole job is auditing QA systems.

Ideally, one system audit per annum of a spring manufacturer will suffice to ensure that systems are kept up to date and are functioning efficiently. At present most spring manufacturers receive QA system audits and further product audits from several of their major customers. This multiple auditing is time consuming and very wasteful. Once

sufficient trust has been built up in the BS5750 or VDA scheme, spring purchasers should reduce the amount of multiple auditing carried out - this would be a clear benefit to all concerned.

Some concern was expressed both in the UK and in Germany about uniformity of interpretation of the QA requirements contained in ISO9002. In the UK, there are 26 companies qualified to undertake registration of companies to ISO9002, and there are known to be slight differences in interpretation even though the standard of auditing, and auditing and auditors, is strictly monitored by the National Accreditation Council for Certification Bodies. In Germany, audits may be carried out by unqualified auditors of one company in such a way that QA aspects that are important to another company, subscribing to the VDA scheme, are not explored thoroughly enough.

2.2.4 PURCHASING POLICY

There is certainly a welcome move towards the practice of establishing supplier - customer partnerships. Such partnerships can encompass either single sourcing or multiple sourcing arrangements for spring purchases, and they make it less likely that buyers will frequently switch from one supplier to another in order to keep prices as low as possible. It is the view of the author that long-term stability in the supply of springs via partnerships is likely to bring quality and QA benefits that will more than offset any possibly adverse short-term effect upon the purchasing account of spring users.

Partnership agreements inevitably lead to continuity of supply and a better understanding of both the springmakers' and purchaser's needs. They are also likely to lead to clarification of who takes responsibility for spring design - and this is very important, in the light of this survey, in which it was revealed that some spring purchasers believe that the responsibility is the suppliers, and the suppliers all believe the responsibility lies with the purchaser, unless it has been specifically agreed otherwise.

Partnership agreements will also lead to a more sensible and coherent policy on the part of spring purchasers as to when to specify SPC and how their drawings and specifications might be improved.

2.2.5 INCOMING SPRING BATCHES

The survey revealed that almost all spring purchasers demand some sort of certificate of conformity. Sometimes this certificate covers only the final inspection values at the springmaker, but at the other extreme has to cover SPC data during springmaking, certificate of conformity from the supplier of the raw material used, and certificates from any or all of the subcontractors involved in the spring production.

Whatever the extent of the data given in the certificate of conformity, it would be reasonable to assume that if the QA system of the springmaker was working efficiently, there would be no need for the purchaser to inspect incoming goods, yet 70% of the purchasers interviewed said they still carried out some level of in-coming goods inspection. This is surely a wasteful duplication, that should be minimised.

2.2.6 QUALITY IMPROVEMENTS SOUGHT

Naturally spring users would like to purchase springs that have improved levels of reliability and consistency and yet pay lower prices for them. However, it is significant that half of the companies interviewed put reliability and/or consistency ahead of lower prices when asked what improvements they sought in future. Clearly quality and QA are very important considerations.

When questioned further about reliability of springs, purchasers gave a very wide range of responses. One purchaser regularly specifies fitness for purpose testing, and is seeking to buy springs of a lower weight that will give the same performance as at present. Other purchasers were unable to define what they meant by improved reliability, beyond saying they'd like to avoid the occasional spring failure that they experience at present. However some of the purchasers were unable to specify suitable tests to put on their specifications that would give guidance or specific targets to springmakers. Other purchasers accepted that it was their responsibility to set performance tests, and consequently tested the springs themselves, generally with the spring assembled in the intended mechanism, so that the spring would be tested as part of the mechanism.

Other purchasers simply stated that springs they purchase never gave any problems, and so it would be a waste of money to specify performance testing since they obtained entirely satisfactory performance. Such purchasers have a wholly understandable argument, but they do not yet seem to have encompassed the TQM (Total Quality Management) philosophy that is becoming very widespread in manufacturing industry in Europe today.

2.3 CONCLUSIONS

There has undoubtedly been a considerable evolution in attitude to quality management in the springmaking industry in the past few years, and the evolution is continuing. The impetus for change has come from the customers of the industry, and this project has given a welcome chance to report on these changes. It is difficult to make generalisations about a large and diverse industry, whose attitudes are changing gradually and so this report is aimed at a moving target, but the changes in quality practices and the investment in equipment to manufacture better quality springs has not always been accompanied by either adequate recompense for these improvements or a greater understanding of the spring industry by its customers.

'Quality management, control and assurance systems that provide effective benefits to springs manufacturers' is the title of this project. After the first year's survey, looking back on all the information received, it is apparent that many of the recommendations that have been put forward for improving systems in the spring industry surround standardisation of

- a) The questionnaire used for QA audits
- b) The drawings used for spring specification
- c) Accreditation costs for ISO9000
- d) One QA systems audit/annum being sufficient
- e) Inspection of springs once only.

It would be wrong to interpret the extent of the standardisation recommended herein as an attempt to reduce the competition in the spring supply industry. That is certainly not SRAMA's nor VDFI's objective, but quality management methods based upon ISO9000 are evolving throughout the industry and this is generally leading to the supply of higher quality springs, and this is SRAMA's and VDFI's objective.

Beyond the above standardisation there are a number of other general conclusions to emerge from the project so far, which can be listed as follows

- i) Spring manufacturers should adopt a single QA system, based upon ISO9002 requirements, for all their springs, whether they will be used in safety critical, or for low integrity applications.
- ii) There is scope for improvements in the QA systems for the raw materials used by the spring industry.
- iii) There is an urgent need to clarify whether spring maker or purchaser has design responsibility in some instances.
- iv) SPC is a valuable tool for improving spring quality, but it should only be specified for batches of springs where the batches sizes are large enough. For smaller batches, SQC is more appropriate, but this must be specified intelligently.
- v) Springmakers - customer partnership agreements are likely to be beneficial to the long-term quality interests of both parties.
- vi) More complete information about the function and application of the springs they purchase would generally lead to an improved quality and QA service from spring manufacturers.
- vii) Fitness - for - purpose testing should be offered more often than it is today - there is a need to explain to both springmakers and purchaser the benefits that may accrue from such testing. The argument for fitness - for - purpose testing has been given fully in section 2.1.8 of this report.

Much has been learnt about quality attitudes in the spring making and using industries, and significant benefits would accrue from continuation of this project for a further one or two years to pursue the conclusions listed above. The application for the continuation of EC funding of this work is included in section 4 of this report.

TABLE 1 SURVEY OF SPRING MANUFACTURERS

	Answer
1. QA System	
- have you a quality manual?	100%
- based upon	100%
ISO9002	30%
Q101	40%
AQAP4	100% in Germany only
VDA	60% excl. Germany
- are you registered to ISO9002?	100% excl. Germany
- if not, will you become registered?	
2. Effect of QA system upon production	
- does the M.D. take ultimate responsibility for QA?	100%
- are you prepared to take spring design responsibility?	20%
- is SPC or SQC employed when required	90%
- for all products	Majority in Germany Minority elsewhere
3. Audits	
- do you audit your suppliers?	100%
- by visit (excl. VDFI scheme/ Herr Kaiser)	30%
- do you undertake internal audits	100%
- do some of your customers audit you	100%
- are you audited by an external independent auditor	60% excl. Germany
4. What should happen in the future?	
- fitness for purpose testing	30%
- standardisation and hence improvement of spring drawings	60%
- improved information from the customer about spring application	70%

TABLE 2 SURVEY OF SPRING PURCHASERS

1. QA System			
required at springmaker	ISO9002		50 in UK
			0% in Germany
	VDA, or similar		0% in UK
			100% in Germany
Should a springmaker have one QA system for all springs			100%
2. Purchasing Policy			
Springs always single sourced			30%
Springs always multiple sourced			30%
Spring design and tolerance advice expected			80%
Design responsibility is purchasers			70%
Design responsibility is springmakers			30%
SPC demanded for large batches			40%
Performance testing (fit for purpose) demanded			10%
3. Incoming Goods			
Demand certificate of conformity for springs			90%
Inspect incoming springs			70%
4. Quality Improvements Sought			
Reliability and consistency			50%
Lower process at same quality			50%
Purchasers drawing could be improved			20%
Fitness for purpose testing			
- good idea, but too expensive			70%
- will be demanded for critical springs			20%
- impractical to specify			40%

Fig 1 Questions that may be asked during the survey of attitudes to QA in the spring manufacturing and spring using industries.

1. Have you a QA system?
 - 1.1 Have you a quality manual?
 - 1.2 Upon what system are your QA procedures based?
eg ISO 9002, VDA, AQAP4, Q101, etc.
 - 1.3 Are there other QA requirements that you must adhere to?
2. Please describe your QA system as it affects
 - 2.1 Management structure
 - 2.2 Economic considerations
 - 2.3 Sales and advanced quality planning
 - which items below are considered
 - who takes responsibility for design (usually)
 - 2.4 Purchasing and sub-contracting
 - 2.5 Production processes, process control (coiling, heat treatment, grinding)
 - 2.6 Product testing
 - 2.7 Documentation and records (is traceability important?)
 - 2.8 Corrective actions
 - 2.9 Statistical methods eg SPC, FMEA, etc
 - 2.10 Product safety and liability
3. Which audits are carried out to improve your QA system?
 - 3.1 Internal (have your personnel been trained for this task?)
 - 3.2 External (of your suppliers, by questionnaire or visit?)
 - 3.3 By your customers?
 - 3.4 By an independent auditor (eg Lloyds or BSI?)
4. What methods do you employ to improve the quality of your products?
 - 4.1 Training
 - 4.2 Project teams
 - 4.3 Other control methods

- what is your attitude to the costs associated with improving quality?
5. Management aspects
 - 5.1 How is your quality management communicated from management to shop floor and vice-versa?
 - 5.2 Is there a link between pay and quality?
6. Certification - does this bring advantages?
 - through which organisation (BS 5750 , Ford QI etc)
 - through vendor ratings
 - does this help your company gain a larger market share
7. What should happen in the future?
 - in your opinion
 - is 'fitness for purpose' certification practicable - would your customers pay for this critical application
 - how can spring drawings from your customers be improved
 - would improved documentation of products help

Fig 2A VDA draft fragenkatalog

No	Questions	
		M Management
01	<u>Management responsibility</u> (EN 29004 Section 4)	
01.01	Has the management established a quality policy in writing and distributed it on all levels?	
01.02	Have corporate quality objectives been agreed upon and are they maintained?	
01.03	Are quality orientated expenses regularly presented to and monitored by the management?	not covered in 5750:Pt 1
01.04	Does the management systematically verify the effectiveness of the QA-system?	
02	<u>Quality system principles</u> (QA-system) (EN 29004 section 5)	
02.01	Does the QA-system apply to all areas, levels and to all personnel in the company?	
02.02	Have all responsibilities and authorities for Q-elements been established?	
02.03	Is the full independence of the quality assurance guaranteed?	(recommended by not mandatory).
02.04	Has the QA-system been documented in a quality assurance manual (QA-manual) or similar document of equal importance?	
02.05	Has an audit plan been established and introduced by which the	

SRAMA comment regarding BS5750 (ISO9000) requirements

- QA-system's inherent elements are evaluated internally on a regular basis?
- 02.06 Is the personnel qualified for quality audits and independent of the areas inspected? (not defined in 5750:Pt 1).
- 03 Economics - Quality-related cost considerations
(EN 29004 section 6) (This section not in 5750:Pt 1).
- 03.01 Is there a system for recording and tracing quality related cost?
- 03.02 Is there any documentation of expenditures for activities intended for the improvement of quality?
- 03.03 Is there any documentation of expenditures for quality inspections and records?
- 03.04 Is there any documentation of cost incurred by insufficient quality before delivery?
- 03.05 Is there any documentation of cost incurred by insufficient quality after delivery? (This section not in 5750:Pt 1).
- 04 Product safety and product liability (EN 29004 section 19)
- 04.01 Are the principles of product liability known internally?
- 04.02 Is there a system for the determination and identification of control items and the relevant features?
- 04.03 Is there a procedure to recognise product risks?
- 04.04 Is there - if required - a procedure to limit nonconforming lots?

05 Personnel (EN 29004 section 18)

This section is much more searching than the requirements in 5750:Pt 1

- 05.01 Does the company provide for specific training program and are the respective responsibilities specified?
- 05.02 Does the program include activities for further QA training?
- 05.03 Are all executives and the management included in the further QA-training program? Not necessarily, only personnel undertaking tasks affecting quality.
- 05.04 Are there introduction and training programs for new/relocation employees and for the introduction of new or modified processes, procedures etc.?
- 05.05 Is the personnel - if required - formerly qualified to perform QA-functions?
- 05.06 Are there activities to motivate and foster the awareness for quality? Not in 5750
- 05.07 Have all departments affected the possibility to compare the quality targets with the quality achieved by means of clearly understandable presentations?
- 06 P Product and Process
- 06.01 Is there a system for reviewing contracts and are the responsibilities clearly specified?
- 06.02 Are the customer's quality requirements concerning product and quality assurance sufficient?
- 06.03 Does the system make sure that all requirements from the specifications are clearly and accurately communicated within the company?

06.04	Are there procedures for monitoring the product in use?	Not applicable for most springmakers
06.05	Are there procedures to analyse product failures in the field as well as for the initiation and control of corrective actions?	Under customer complaints para 4.14(b)
07	<u>Quality in specification and design</u> (EN 29004 section 8)	
07.01	Is there an autonomous R&D with the specific know-how and installations?	Unlikely in the spring industry.
07.02	Is there an information system in order to make the design experience available to subsequent areas?	
07.03	Are product tests carried out in the development phase in order to prove that the quality requirements have been met?	
07.04	Has been made sure that all quality requirements and their feasibility has been considered?	
07.05	Are procedures and methods available to conduct a quality evaluation of designs and prototypes at the individual design stages?	
07.06	Do all affected levels of the company participate in the release for the implementation of the design?	
07.07	Is the result of design and development documented in specifications and drawings?	
08	<u>Quality in procurement</u> (EN 29004 section 9) Concerns requirements for materials, semi-finished products, components, assemblies and services completely and clearly documented in the quotation documents?	

- 08.02 Is the evaluation and selection of sub suppliers specified?
- 08.03 Are initial sample tests specified? Not mandatory in 5750
- 08.04 Does the supplier apply a system for the periodic assessment of his sub-suppliers?
- 08.05 Are there agreements with sub-suppliers regarding the method of the quality evaluation?
- 08.06 Is there a schedule for the inspection of purchased parts and materials?
- 08.07 Is the quality of incoming goods ensured?
- 08.08 Has a process been established - if required - for tracing back the batches supplied by the sub-supplier?
- 09 Quality in production (EN 29004 section 10)
- This section comprises of all activities required for start-up and restart of production, e.g. production preparation and organisation, material and production flow, production layout.
- 09.01 Are production plans and documented work instructions available?
- 09.02 Are capability studies conducted for new machines, production equipment and installations? Not a requirement of BS5750:Pt 1
- 09.03 Are the conditions for the release for production for new parts and changes specified?
- 09.04 Is there a customer approval system - if required - for initial samples and changes? Not in 5750:Pt 1 but springmakers are almost certain to have a procedure for initial samples.

- 09.05 If required, is the process to establish inspection sequence plans specified?
- 09.06 Are inspection plans and documented inspection instructions available?
- 09.07 Has been determined how the quality requirements can be met in case the process capability could not be proven? Not in 5750
- 09.08 Is the working environment clean and appropriately equipped? A clean working environment is not required in 5750, nor likely to be achieved by hot coilers!
- 10 Control of production (EN 29004 section 11)
- 10.01 Is there a system for the release for production?
- 10.02 Is there a system for the identification of materials and parts?
- 10.03 Has been ensured that the adherence to quality requirements is safeguarded by QA-measures in production?
- 10.04 Can the characteristic data of materials and parts - if required - be traced back from dispatch to receiving?
- 10.05 Is the production equipment appropriately stored and protected while not in use?
- 10.06 Is the maintenance of all production equipment effected by means of a maintenance schedule? Not essential to BS5750
- 10.07 Are production processes and the respective parameters documented and deviations, incl. countermeasures recorded? Not essential to BS5750
- 11 Product verification (EN 29004 section 12)

Verification can take place via internal records in order to give direct or indirect proof of product quality but also by certificates made out to the customer to this extent.

- 11.01 Are the specified quality records maintained at the incoming goods level?
- 11.02 Are the specified quality records maintained during the individual process/operations?
- 11.03 Are the specified quality records maintained for the final product?
- 11.04 Are records maintained on periodical inspections or, if required, reinspection?
- 12 Control of measuring and test equipment (EN 29004 section 13)
Control and measuring equipment include all instruments used for the evaluation/assessment of product and process quality.
- 12.01 Is there a documented system for the acceptance inspection, calibration, identification and monitoring of measuring and test equipment?
- 12.02 Is only test and measuring equipment of sufficient accuracy used?
- 12.03 Is there a system to ensure the capability of test and measuring equipment specified?
- 12.04 Are corrective actions in case of defects and damages to test and measuring equipment specified?
- 13 Nonconformity (EN 29004 section 14)
- 13.01 Is there a specified procedure for handling nonconforming

units/batches?

- 13.02 Is the customer's approval requested before the delivery of nonconforming units/batches?
- 13.03 Are there procedures to prove that specified actions have been taken?
- 13.04 Is there a system to recognise recurrences?
- 14 Corrective actions (EN 29004 section 15)
Applies to corrective actions to eliminate causes for problems and to improve quality.
- 20 14.01 Are the responsibilities for the institution and monitoring of corrective actions clearly defined?
- 14.02 Are there procedures to evaluate the risk of potential failures and to initiate the respective preventative actions? **Not mandatory in 5750**
- 14.03 Are there procedures to analyse and remedy causes for nonconformities?
- 14.04 Is there a system to avoid recurrences?
- 15 Handling and post production functions (EN 29004) section 16)
Includes all transportation and storage procedures from receiving to shipping or reception at customer's end.
- 15.01 Are there instructions for the handling of products?
- 15.02 Has been ensured that damages or loss of quality is avoided in transit?

15.03	Are there procedures laid down in writing to eliminate and record packaging errors and transport damages as well as for corrective actions?	
15.04	Is the identification of the goods ensured during transportation and storage?	
15.05	Is there an after-sales service and is it integrated into the information flow?	Not essential in BS5750
15.06	Have user's and installation instructions - if required - been laid down in a clearly and generally understandable way?	Not applicable
15.07	Is there an early warning system in case of product failures in the field?	Not applicable
16	<u>Quality documentation and quality records</u> (EN 29004 section 17)	
16.01	Have the procedures and responsibilities been laid down for the identification, maintenance, inspection and approval of quality relevant documents and records?	
16.02	Is there an approval and distribution system including an updating service for technical documents?	
16.03	Are procedures and responsibilities laid down for the evaluation and distribution of quality related records?	
16.04	Has been determined where, how and how long quality related documents and records are to be kept?	
17	<u>Use of statistical methods</u> (EN 29004 section 20)	
	Possible procedures are:	
	- defect listing, ABC - analysis	
	- random sampling plans	

Not mandatory in 5750:Pt 1 but recommended.

- quality control charts
 - statistical test planning/factorial analysis
 - variance/regression analysis, significance tests
- 17.01 Are statistical procedures used in the planning and evaluation of test during product development?
- 17.02 Are statistical methods applied to evaluate quality inspections of purchased parts?
- 17.03 Are statistical methods used in process control?
- 17.04 Are statistical methods applied to plan and evaluate quality in final inspection?
- 17.05 Are statistical methods applied to evaluate product failures in the field?
- 18 QA-systems elements - Purchaser supplied product (EN 29004 section 4.7)
- These are products for which the purchaser bears the full responsibility as regards quality.
- 18.01 Are the agreements between purchaser and supplier regarding quality assurance measures for supplied products adhered to?
- 18.02 Will supplied products be inspected after receiving?
- 18.03 Is there a procedure for reporting defects on supplied products to the purchaser?

Not applicable

Fig 2B Companies taking part in this VDA scheme are

BMW
Boge
Robert Bosch
DQS
Ford
General Motors, Europe
Glyco
Gebr. Happich
Kella.KG, Hueck & Co
Keiper Recaro
Lemforderer Metallwaren, J. Ulderupp
Mahle
Mercedes Benz
Pierburg
Porsche
Ed. Schwarwachter
SKF
Teroson
TRW Ehenreich
VDO Adolf Schindling
Volkswagen
YMOS

Organisations accepting most parts of this questionnaire

Deutsche Gesellschaft Für Materialkunde
Deutsche Schrauberverband
Verband der Chemischen Industrie
Verband der Deutschen Federnindustrie
Verein deutscher Eisenhüttenleute
Industrieverband Deutscher Schmieden
Wirtschaftsvereinigung Ziehereien und Kaltwalzwerke

Fig 3. Commitment to Product Conformity Questionnaire

This form relates to Drawing no ABC Issue 1

1. Have you, the springmaker, provided input to the design of this spring?
2. Are the drawings and associated specification complete, unambiguous and fully understood?
3. Can the drawing requirements be continuously conformed to?
4. Do you require assistance from the purchasing company, in order to determine your ability to provide total conformance?
5. Are there drawing modifications that might be mutually beneficial either in terms of conformance or cost?
6. Are similar springs made by you for our company or others?
7. Can you confirm that springs to drawing ABC Issue 1 will not at any time be confused with any similar springs?
8. Are you aware of the specific packaging/labelling requirements for this spring?
9. Please state the date by which the following will be made available to the purchasing company -
 - a. Failure Modes and Effects Analysis
 - b. Supply of 50 samples
 - c. Evidence of process capability
 - d. Process Conformance control procedures

Fig 4 Questions for Spring Users

For the springs that you purchase.....

1. What QA systems do you demand from your spring suppliers? e.g. ISO 9002, Q101, VDA, your own etc...
 - 1.1 Do you request other QA requirements? Will these become mandatory?
 - 1.2 Would registration to ISO 9002 (BS5750) suffice?
 - 1.3 In what way do QA requirements influence your purchasing policy (e.g. single sourcing, multiple sourcing, JIT etc..)?
2. What service do you expect from your spring supplier in terms of
 - 2.1 Advanced Quality Planning (e.g. does springmaker check design? Are tolerances advised?)
 - 2.2 Who takes responsibility for spring design, and any changes?
 - 2.3 Do you stipulate any quality requirements on raw materials used for spring manufacture?
 - 2.4 Do you require SPC data or other information on any manufacturing process?
 - 2.5 Is traceability of documentation and production records important?
 - 2.6 Do you require other statistical methods (e.g. FMEA) to be used?
 - 2.7 What product testing/documentation do you require?
 - a. With delivery of first batch of springs
 - b. With regular supply batches
 - 2.8 Do product safety and liability considerations affect your spring purchasing strategy?
3. Do you inspect incoming springs? If so, how many?
4. Which audits are carried out in your spring suppliers
 - 4.1 Do you audit them by questionnaire or visit? How often?
 - 4.2 Do you expect them to have an independent audit?

5. Do you expect your spring suppliers to have a programme of quality improvements? If so, do you expect this to be self-financing for the spring manufacturer?
 - 5.1 Do you help this process (e.g. by providing training)?
 - 5.2 What improvements do you seek?
6. What should happen in the future?
 - 6.1 In your opinion
 - 6.2 Do all springs require the same QA system, whether designed for simple function or a safety critical application?
 - 6.3 Do you regard "Fitness for purpose" testing as a practicable idea for improving the QA service you receive. What is your attitude towards the costs associated with the testing that would enable "Fit for purpose" certificates to be issued. Would you be prepared to define precisely the testing required?
 - 6.4 Springmakers are often critical of the drawings they receive, although they rarely tell their customers directly. Are your spring drawings comprehensive or even over-specified? Could they be improved?
 - 6.5 Would improved documentation/labelling help?

FIRST REPORT

**QUALITY ASSURANCE SYSTEMS OPERATED
IN THE EUROPEAN SPRING INDUSTRY**

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FIRST REPORT
QUALITY ASSURANCE SYSTEMS OPERATED IN
THE EUROPEAN SPRING INDUSTRY

1. Background and Approach to the Subject

Under the auspices of the Sprint Project and in collaboration with SRAMA (The Spring Research and Manufacturers' Association), The VDFI (Verband der Deutschen Federnindustrie) has undertaken to further European Co-operation. Increased competition and steadily growing demands are forcing European companies - Manufacturers and component suppliers alike - to considerably improve the standards of quality assurance they operate. The highest quality levels achieved must not only to be maintained, but should also be further improved upon, wherever possible, in order to make economic sense.

Measures employed for quality assurance are carried out not only by suppliers but also by customers, demanding the intensive collaboration of both partners. This covers a rigorous search for the right suppliers on the basis of an objective assessment of their quality levels, ranging from the taking of samples to the assessment of delivery reliability.

The problem which arises with the current system of quality assurance procedures is that, for now, there are still differences which exist between the quality assurance systems of the different European nations. The aim of the collaborative work undertaken by SRAMA and the VDFI is to redress this situation. Both national spring associations are members of the European Spring Federation (ESF). Under the contract number RA 365 this project has been instigated with grateful thanks to the European Commission, from which it has achieved support.

The E.S.F. has identified three areas of work under the theme of Quality. It is recognised that quality assurance carried out in the Single European Market

will play a considerable role in terms of competitiveness. This means that, for springmakers as well as spring users, products must be produced according to their particular quality requirements which relate to the market opportunities for the product.

The outcome of this project should be the formation of common European practices which are already being established and proven between spring manufacturers, their suppliers and their customers. The requirements formulated under the project are intended to take into account the whole of the supply chain, including suppliers to the spring industry.

Quality is a subject which is especially important to the work of the VDFI. This has been realised by the instigation of specific working groups, in both the road spring and cold-formed spring sections of the Association, which are taking a good look at the whole philosophy of quality assurance. Both working groups have given support to Herrn Manfred Plizko, the technical representative of the VDFI, in the preparation of this project. In total, 32 experts from medium sized companies have participated in this project, to which we extend our grateful thanks.

2. Aim

The aim of the survey under the Sprint Programme was defined in collaboration with SRAMA. The object is the necessary investigation into whether differences exist between the quality systems present in Britain and Germany. This has been achieved by means of a two-step process, namely:

- a) Survey of Spring Manufacturers
- b) Survey of Spring End Users

The standard DIN/ISO 9000, which is identical to EN29000, has been used when producing the questionnaires, for the above surveys.

3. Methodology:

First of all the survey questionnaires were devised. The questionnaire for the spring users was given particular attention to ensure that enough consideration was given to both the internal and the external influences placed on the companies. It was also necessary to take into consideration that the manufacturing process of a spring is quite different from that of a part made from flat material.

Because of the many different types of springs, various production methods exist and the quality assurance system must fit in with the production programme of the whole company.

4. Results

4.1 Survey of German and British Spring Manufacturers

The survey results are presented in tabular form on page 42B, and are commented on below from the point of view of the German interest in this project.

4.1.1 The Survey Questionnaire for Spring Manufacturers

The survey of German and British spring manufacturers has shown that the questionnaire was appropriate. Because the questionnaire was sent to the springmakers before the visit took place, the answers received were not just "yes" or "no" responses, more detailed information was given in response to the questions. The separate responses are discussed in the report sections to follow.

4.1.2 VDA - Fragenkatalog No 6: "Audit of Quality Assurance Systems"

The VDA (Verband der Automobilindustrie - Automotive Industry Association) Fragenkatalog number 6 is a questionnaire, which is an established means of

assistance, that enables the spring supplier to review his quality system in order to meet customer requirements. The Fragenkatalog is the product of work jointly undertaken by leading German and automotive companies, automotive component suppliers and the German Society for the Certification of Quality Assurance Systems. At the beginning of the Sprint Project the first edition of the Fragenkatalog was current, and already proven as a very useful basis for the evaluation of the quality assurance systems in use within the spring and subcontract industry. Since its publication, the Fragenkatalog had found great acclaim across industry and is now used internationally. It was therefore decided to publish a second edition, and this has also achieved validity. German industrial associations have stated in the Appendix of the 2nd edition how the first Fragenkatalog has been used, but have ignored the usual industry questions, which cannot be used for comparative purposes when carrying out the auditing and evaluation process.

The VDFI has also worked intensively on the content of the Fragenkatalog and its formulation and has drawn up a list of the questions irrelevant to the Association (see Appendix 2, page 42A).

4.1.3 VDFI Model for Material Supplier Audits

It is written under Section 8 of the VDA Fragenkatalog - Quality Procedures for Procurement Practices - that it is necessary to undertake quality audits on material suppliers. The VDFI has thus developed, for the use of its members, a model for supplier audits. This is shown on page 42C. Through the use of this model it has been possible to control the audit process as all the members of the Association have chosen to adopt this model, particularly as it offers them the opportunity of a neutral Auditing Body. This "neutral" Auditor has been found, and he now carries out audits of supplier firms on behalf of the VDFI in accordance with the VDA Fragenkatalog. The Auditor has been on specific courses concerning the administration of the VDA

Fragenkatalog, and is recognised by the VDA as an official Auditing Body. It has been proven that, in order to be able to compare the quality assurance systems of suppliers, an experienced auditor, as well as a standardised Fragenkatalog, is required. The Auditor, as a result of his training, is able to develop standardised evaluation criteria, so, in effect, a firm is audited according to the evaluation of certain performance criteria and is then graded in a directly comparable way to another company. This has the advantage that the spring manufacturer can choose the supplier which, with regard to the product in question, achieves the best evaluation results.

4.1.4 Spring Drawings

In order to prevent mis-understandings about enquiries and orders for springs, drawings of coil and extension springs have been developed by the committee for springs at the German Standards Institute (DIN), and are being introduced into the industry. It has been proven that these standardised drawings are of significant help to spring manufacturers and spring users as they contain all the important data necessary for the design of a spring. It has also been acknowledged that the drawings developed in 1973 must now be reworked, because they lack the details which allow the manufacturer to mark down SPC features. This procedure is, of course, a necessary one, considering the most efficient spring production methods.

4.1.5 Spring Testing

The survey carried out under the Sprint Programme has shown that the testing of springs is carried out not only by the manufacturer but also by the spring user. It would therefore be sensible to reach a situation whereby the two test methods are standardised. In this case it would be necessary to determine the type of testing, the test methods and test criteria. Furthermore, both partners must work closely together in order to determine

the budget for the testing. The collaborative work undertaken in this area could also lead to cost savings, since the test equipment need only be made available in one factory. The most important outcome of this standardisation of test methods is the determination of exact test criteria. The resulting test procedures should then be binding for all participants, and the results should be made available to both the springmaker and the spring user to assist them in the development of their products.

4.1.6 Responsibility for Spring Design

Most German spring manufacturers on receipt of an order for a new spring expect to get the relevant drawings and explanatory notes. The manufacturer is seldom informed of the exact use of the spring, and it is rare for information on how the spring is to be placed in its application to be divulged. For this reason, the spring manufacturer is not able to take responsibility for spring design. This is an area requiring a re-thinking process by both partners as follows:-

1. THE SPRING MANUFACTURER:

Spring manufacturers are willing to offer technical support when asked, especially if they are involved from an early stage in the planning of their customers products. Through this type of co-operative work, situations can be avoided whereby costly spring designs, which may prevent the use of automatic production methods, are presented for production.

2. THE SPRING USER:

Spring users must be prepared to be open about their designs. It would be most desirable if, when giving a supplier a design specification, the client supplies all other necessary details of relevance to the spring manufacturing process.

The springmakers interviewed in this project confirmed that they were prepared to undertake such close collaboration with their customers. This would mean a change for some springmakers which are still dealing with agents and do not deal directly with the end-user. For these companies a fundamental change in how they do business should also have a positive effect on the production of springs.

The responsibility for spring design is undertaken by companies already supplying components for which design development is carried out by the joint efforts of both supplier and customer.

4.1.7 SPC Monitoring

Statistical Process Control is recognised and used by all of the springmakers surveyed. They admit that the use of SPC is only meaningful when batch sizes are large enough to produce a stable monitoring process. It is important that the SPC features are worked out by the spring supplier and user together to ensure that the control process is a useful one. Variations from the mean tolerance during spring production alone cannot be prevented for various technical reasons. With SPC, these variations from the mean can only be identified by means of a variance analysis. From this analysis the intercept limits can be determined. This procedure must then be used if the loads of the spring in an untempered state are fixed as SPC features.

4.1.8 Quality & Costs

This is one area in which differences of opinion between thinking in Germany and in the UK were revealed by the survey. The main reason for this is that the companies interviewed in the two countries operate different methods of recording costs. 80% of the companies surveyed included their quality costs in their general budget figures.

Only 20% of the companies surveyed carry out cost analysis. This is an area which requires further analysis so that quality does not incur extra costs. This means that springmakers are required to use cost centres for their work. 15% of the German respondents have a premium system for good quality service.

In Germany "TQM" has become a well known buzz word. Some companies have adopted the basic principles of TQM in agreement with their customers, suppliers and employees. The objective is to reduce costs by constant improvements in quality. The questionnaire has shown that some companies are prepared to work long and hard on the development of TQM methods, because they view this as an important competitive feature of their company.

4.2 Survey of German and European Spring End Users

The results of this questionnaire are summarised in table form (Page 42D) and, as before, individual points are expanded on below from the German point of view.

4.2.1 Questionnaire For End Users

The questionnaire used was sent to the individual companies prior to the interview, as with the springmakers' survey. The reason behind this was the desire to illicit detailed information from the participants, rather than just "yes" or "no" answers.

The survey has shown that quality is an essential feature of the purchase of springs and is taken for granted by spring users. That is to say price is the most important factor taken into account in the buying decision. Spring buyers' expect increasingly higher levels of quality at lower prices.

4.2.2 Auditing

Large spring buyers in Germany have, in the past, used their own questionnaires for system audits. It has been shown that the use of different quality questionnaires prevents the quantification of quality assurance systems, because they are carried out under conditions which are not directly comparable. A considerable improvement on this is the published series "Quality controls in the Automotive Industry", Number 6 - Quality Assurance Systems Audit Fragenkatalog, Results Evaluation. The aim of this series is to harmonise the necessary audits and to rationalise the abundant assurance procedures for the Auditor, as well as the company under scrutiny.

The German spring industry, as a major supplier to the automotive industry, welcomes this move. There is agreement amongst Quality Managers of automotive companies and their suppliers that audits carried out by this unified Fragenkatalog and evaluation system should be accepted and recognised by both sides. The recognition of system related audits therefore enables the large spring buyers to concentrate on specific product-and production-related audits.

4.2.3 Purchasing Policies

The spring market is a hard-fought buyers' market, through which prices are determined. Some of the companies questioned view their spring suppliers as problem solvers. The necessary collaboration between manufacturer and supplier cannot only be sustained by work on quality improvement. It must also cover other areas, particularly product development. Partnerships between manufacturers and supplier would support the growing trend to hand over responsibility for product development to qualified component suppliers. Increased product development costs would then be reflected later on in the unit cost of the end product. In this way, the gap which still exists between

spring suppliers and spring users would, be bridged. Collaborative partnerships, would mean an end to relationship worries which are still caused, in many cases, by the extreme buying power enjoyed by the customer.

4.2.4 Delivery Controls

The large spring users today do without delivery controls. They rely on documents supplied with the spring delivery. 70% of those interviewed do this, the rest of the spring buyers limit themselves to sample inspections. The precursor to the relaxing of delivery controls is the adoption of the customers' quality assurance procedures by the springmaker. Dual testing must be avoided, and the customer should be able to trust the details sent with a delivery by the supplier.

4.2.5 Improvements in Quality

In the interviews with the various spring buyers/users it was revealed that some products are delivered to meet the requirements of the system "Fit for Purpose". The springmaker is known to be a high quality supplier. For the springmaker, this means considerable efforts to create the correct working conditions for quality manufacture. Thus, it corresponds that the people responsible for quality must be particularly important and have a high profile in the company. Only regular contact between employees of spring companies and their customers will achieve quality improvements. One must also ensure, however, that at all levels in both of the partner companies employees understand and support the drive for continuous improvement.

5. PRACTICAL USES - ECONOMICS

5.1 Survey Results

The survey has revealed that, as far as the philosophy of quality assurance is concerned, there are no differences between Germany and the UK. Differences

only exist in the interpretation of quality control systems. In the UK, it is the general opinion that certification is the sign of a high quality product. It has been revealed, however, that despite a supplier previously having attained quality approvals, the customer does not refrain from carrying out its own audit, whether they be product - or process-related. Furthermore, one is of the opinion that certification costs in the UK are a fraction of the cost of those in Germany.

For these reasons, the German system of auditing by means of the VDA audit Fragenkatalog has essentially been developed because it has, in our opinion, the following advantages:

- 1 a standardised questionnaire
- 2 an experienced auditor
- 3 an interpretation of the audit results and classification of suppliers

Companies receiving these results can be sure that the quality assurance systems of the supplier are approved to DIN/EN 9000. It cannot, however, be guaranteed in both systems that existing certification and audit results will automatically lead to improvements in product quality.

BS5750 certification is tied to a certain formula. The certificate attained does not make clear just how far, (ie, average, well or very well), a company meets the requirements of the ISO Standard. It is a "black and white" assessment, without recognition of grades of achievement. In contrast, one knows exactly with the VDA - Audit what grade has been achieved, not only for specific products or processes, but also for the company as a whole.

5.2 Concluding Remarks

It can be concluded that, for the export market, the need for German companies to become certified is becoming more and more important. A way must be found for German companies to attain certification at the same cost as British

companies, otherwise this will prove to be a hindrance to our competitiveness, which will burden the German SME sector and lead to impeded growth. The costs of quality certification are reflected in the price of the spring. Different certification costs will lead to higher unit costs.

6. APPLICATION OF THE RESULTS

In the same way as the automotive suppliers have agreed on the collective VDA - Audit Fragenkatalog Number 6, it should also be possible for the certification bodies to agree on a common questionnaire. This would have the advantage that the certificates, which would all require the same criteria, would compare equally with one another. With regard to the trust-building measures between spring users and suppliers, the certification body has a special duty because, if a standardised questionnaire is used, this is a source of great experience in the practice of certification. At the same time extensive industry specific knowledge can be provided by a certification body, which is mainly involved with a specific industry sector. To this end, the VDFI intends to enter into a co-operation plan, in collaboration with the Association for Quality Assurance (AGQS), which shall contain an explanation of the fundamental elements of how to successfully carry out the VDFI Audit Model.

In order to expedite and strengthen the "Trust Process" it would be conceivable in the interim period, for an audit team, made up of employees of the certifiers and the spring user companies, to audit the quality system of the springmaker together, using the VDA - Fragenkatalog as a base, and award the certificate on compliance with the audit requirements. A study has revealed that the three certifiers have shown an agreement rate of 80% when using the VDA Fragenkatalog. Perhaps it would be possible for the other certification bodies accredited in Germany (6 in total) to endorse this questionnaire. One should not forget that for the spring user the fulfilment

of the requirements of the DIN/ISO standards series may not be the only worthwhile objective of their suppliers, but may offer a platform from which increased levels of competitiveness can be achieved.

7. **CONTINUATION OF THE SPRINT CONTRACT NO RA365**

Mr Hayes has justified in detail why this contract should continue. The VDFI would like to further underline this need, and would heartily welcome the agreement and support of the Commission.

Hagen 21.06.93

10. **APPENDIX**

10.1 **Introduction**

Since the publication on 1st January 1991 of the first edition, the report on the Audit of Quality Assurance Systems in accordance with DIN/ISO 9004/EN29004, has awakened a great deal of awareness in the automotive industry. This was also the reason why quality assurance working groups, representatives made up of several expert bodies and industrial associations, have undertaken to critically review the content and composition of the report. In this way, it has been established that the questionnaire is accepted up to and apart from a few general industry questions. These questions should not be taken into account during the audit and evaluation process. The final determination of the questions, whether taken into account or not during the audit, is subject to agreement between the supplier to be audited and the customer, under consideration of risk aspects. The expert bodies and industry associations list, from their point of view, the general industry questions as follows:

10.2.4 **VDFI: Re Its Membership**

- VDFI Road Springs -

Questions 06.04	15.06
	15.07

VDFI cold formed springs

Questions 06.04	15.05	17.01
06.05 to	15.07	17.05

For members of the "cold formed" spring association, questions 07.01 to 07.07 do not apply when product development does not occur.