VDA | QMC
德国汽车工业协会
质量管理中心中国分公司
China

Pocket Guide / 袖珍指南

VDA Volume 5 Measurement and inspection processes
VDA 5 测量和检验过程

Innovations and improvements in the new, 3rd edition, 2021
2021 年第 3 版的创新与改进

The new VDA Volume 5

More precise, transparent, and more easily applicable

For this new edition, our focus has been on clear definitions, cost optimization and a sensible, target-oriented use of the methods.

This has for example been achieved thanks to a risk-based approach and by giving greater consideration to minimum requirements and the description of roles.

The new VDA 5 methodology is now much more comprehensible!

You will see: there is no contradiction between inspection process capability and profitability.

Further features and improvements as well as the new training concept are briefly described on the following pages.

You can order VDA Volume 5 via our web shop:
https://vdachina.com.cn/bookshop/cn

新版 VDA 5

更精确、透明，且更易于应用

这个新版本重点在于明确的定义、成本优化和合理的、目标导向的方法使用。

例如，这要归功于采用了基于风险的方法以及更多地考虑了最低要求和角色描述。

现在，新版 VDA 5 所述的方法更易于理解！

您将发现检验过程能力与盈利能力之间不存在任何矛盾。

接下来的页面简述了更多功能和改进情况以及新的培训理念。

您可通过我们的网上书店订购 VDA 5：
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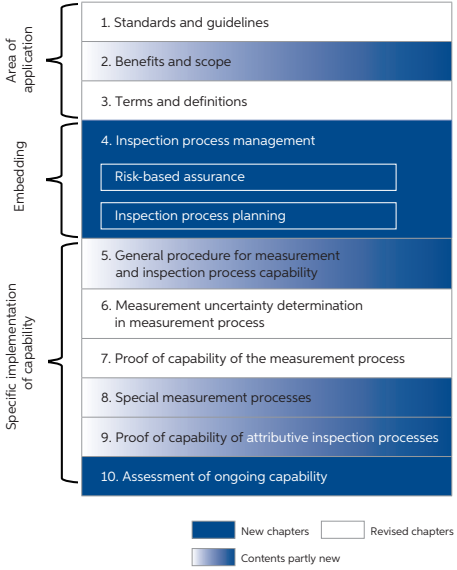
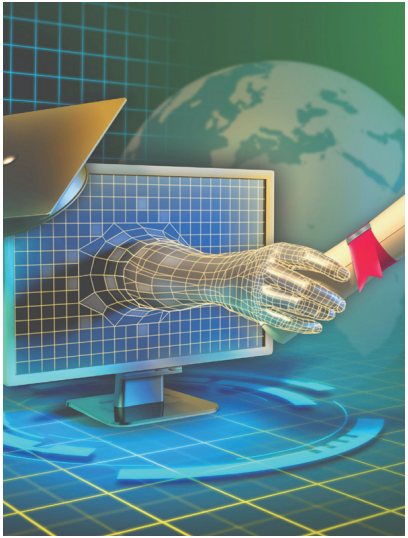
Better applicability

New chapter structure
in VDA Volume 5 (Red Volume)



With supplementary practical handbook
with examples for implementation

New training concept for users
and auditors



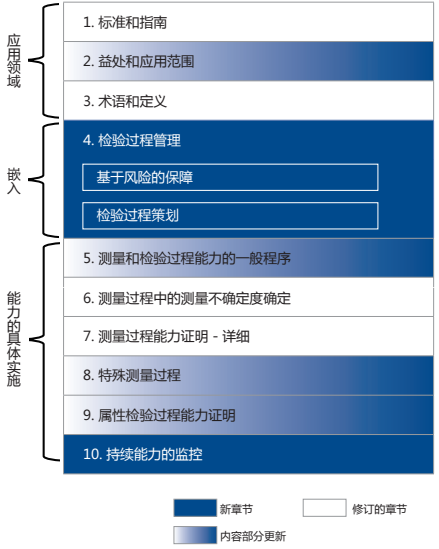
Comparison of chapters in 2nd and 3rd editions of VDA Volume 5

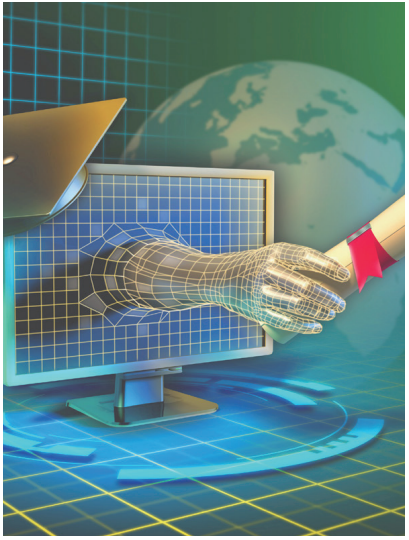
更好的适用性

VDA 5（红皮书）中新的章节结构

附有补充实用性手册及及实施示例

针对用户和审核员的新培训理念





VDA 5 第 2 版和第 3 版的章节比较

Synchronization with norms and standards

Consideration of **GUM – ISO/IEC Guide 98-3** (Guide to the expression of Uncertainty in Measurement)	Consideration of the pending revision **DIN ISO 22514-7** Statistical methods in process management Part 7: Capability of measurement processes	Consideration of **DIN EN ISO 14253-1** Decision rules for verifying conformity or nonconformity with specifications	Comparison and reconciliation with **VDI/VDE 2600, 1-3** Inspection process management - Identification, classification and proof of suitability for inspection processes
Replacement of the "Measurement system capability" **reference manual of the automotive industry**	Consideration of **DIN EN ISO 15530-3** Geometrical product specifications (GPS) - Part 3: Use of calibrated workpieces or measurement standards	Intensive exchange with the Federal Institute of Physics and Metrology ("Physikalischen-Technischen Bundesanstalt", (**PTB**))	Consideration of **DIN ISO 31000** by inclusion of risk-based assurance
Strategies for harmonization with **AIAG** regarding Core Tool MSA (4th edition)	Proposed amendment to the current version of **IATF 16949**, chapter 7.1.5.3.2 External laboratories	Comparison and reconciliation with **DIN EN ISO/IEC 17025** General requirements for the competence of testing and calibration laboratories	Synchronization with **ISO 7870- 8** Control charts - Part 8: Charting techniques for short runs and small mixed batches

与规范和标准同步

考虑事项 **GUM – ISO/IEC Guide 98-3** （测量不确定度表示指南）	待修订内容的考虑 **DIN ISO 22514-7** 过程管理中的统计方法第 7 部分： 测量过程能力	考虑事项 **DIN EN ISO 14253-1** 验证符合或不符合规范的 决策规则	比较与协调 **VDI/VDE 2600, 1-3** 检验过程管理 - 检验过程适用性的 识别、分类和证明
代替**汽车行业参考手册** 《测量系统能力》	考虑 **DIN EN ISO 15530-3** 几何产品规范 (GPS) - 第 3 部分： 经校准的工件或测量标准的使用	与德国联邦物理技术研究所 ("Physikalischen-Technischen Bundesanstalt" (**PTB**)) 进行深入交流	考虑事项 **DIN ISO 31000** 包含基于风险的保证
与 **AIAG** 的协调策略，涉及： 核心工具 MSA（第 4 版）	修改方案 依据现行版本 **IATF 16949**, 第 7.1.5.3.2 章，外部实验室	比较与协调 **DIN EN ISO/IEC 17025** 《检测和校准实验室能力的一般要 求》	与以下项目保持同步 **ISO 7870- 8** 控制图 - 第 8 部分： 短期和小规模混合批次的制图技术

Clear definition of measuring and inspecting

Measuring system

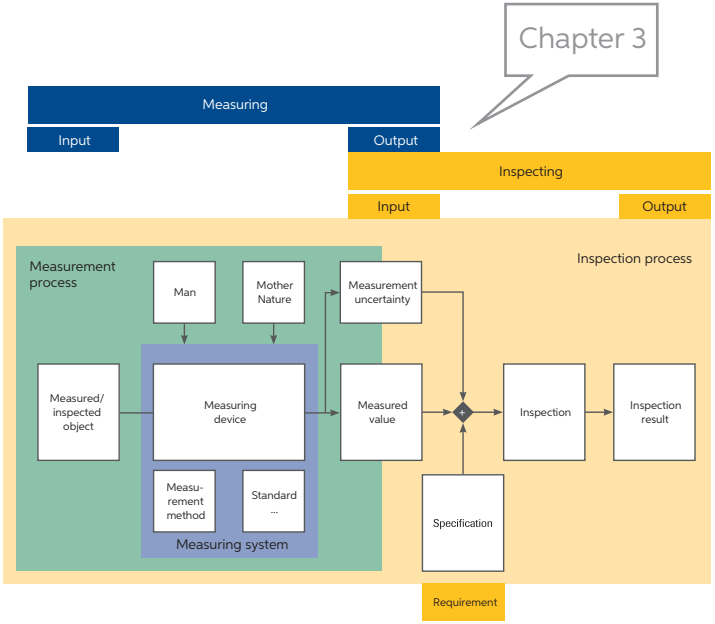
A combination of measuring devices and often other equipment and, where necessary, reagents and utilities arranged and adapted to provide information to obtain measured values within specified intervals for quantities of specified kinds.

Measurement process

Set of actions for determining a quantity value.

Inspection process

Performing an inspection and determining an inspection decision by comparing the result of a measurement process with a given specification with due consideration of the assessed measurement uncertainty.



Relationship between measuring system, measurement process and inspection process based on VIM and ISO 3534

测量和检验的明确定义

测量系统

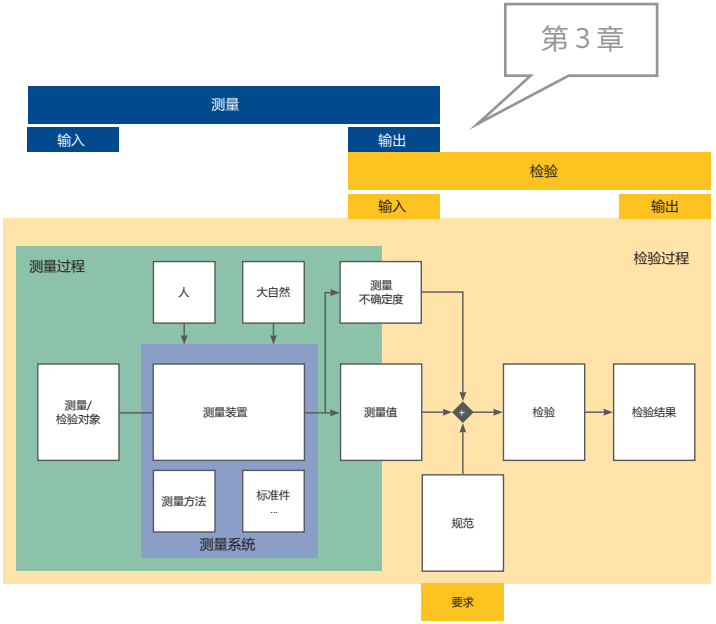
一种测量仪器的组合且通常包括其他设备，必要时还包括安排的试剂和设施，用以提供信息以在规定的区间内获得特定类型量的测量值。

测量过程

确定量值的一系列措施。

检验流程

通过将测量过程的结果与给定的规范进行比较来执行检验并确定检验评定，适当考虑评估测量不确定度。

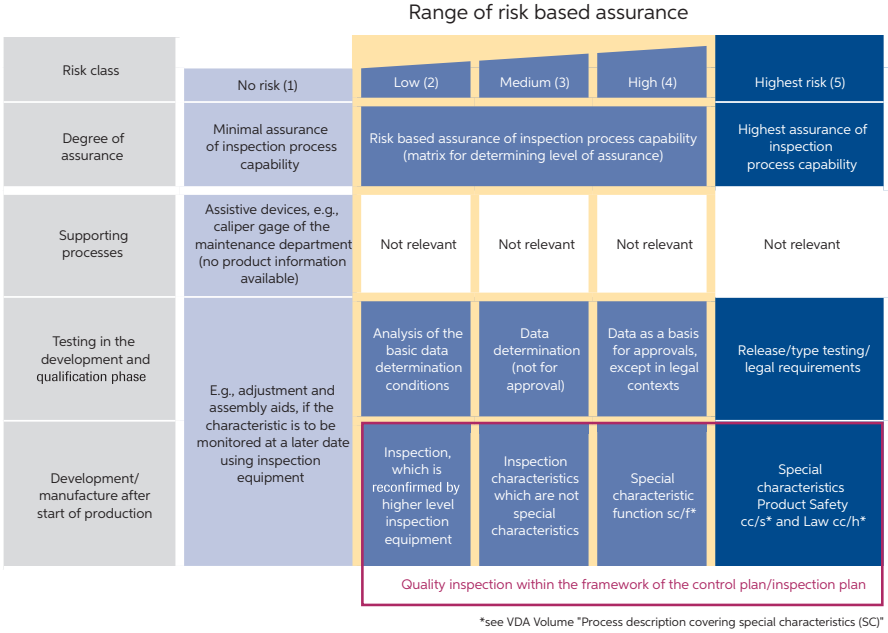


基于 VIM 和 ISO 3534 的测量系统、测量过程与检验过程的关系

Risk based approach

Risk based assurance allows for a differentiated approach to inspection decisions by means of specifying risk classes. That way, economic requirements (among other things) are taken into consideration.

Chapter 4.3

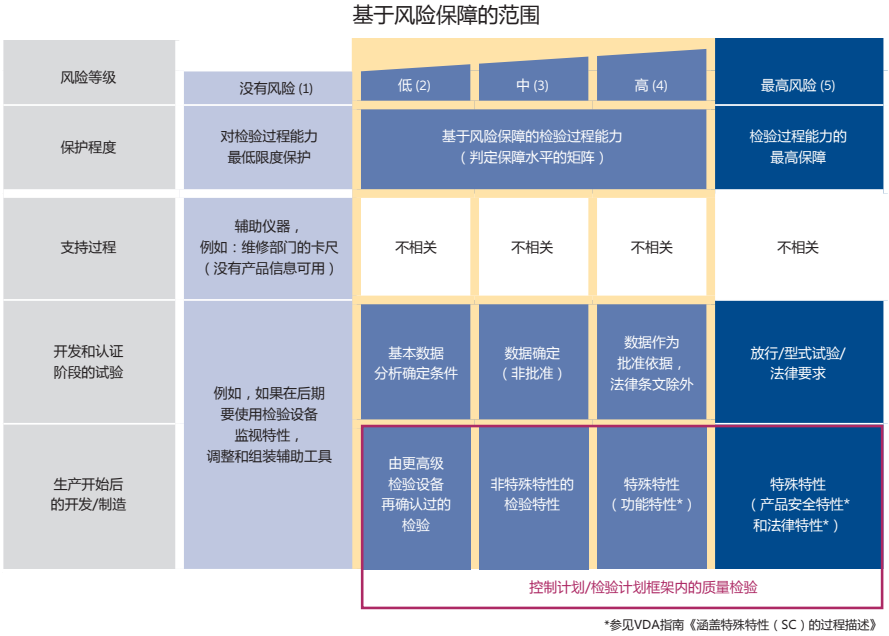


Preselection of inspection processes for risk-based assurance

基于风险的方法

基于风险的保障允许采用差异性方法通过指定风险等级做出检验决定。则需将经济性要求（除了其他方面）考虑在内。

第 4.3 章



预先选择基于风险的保障的检验过程

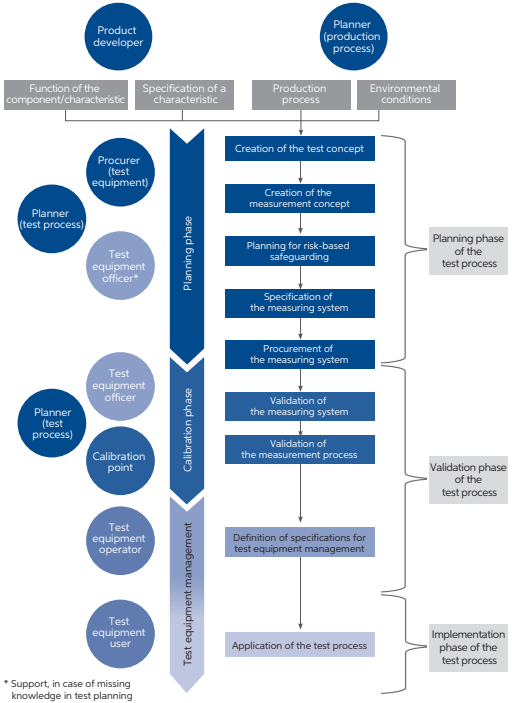
Inspection process planning with defined roles

Inspection process planning is an important part of the product creation process and leads from the specification of a characteristic and proof of capability to a statement of conformity. In that regard, interdisciplinary collaboration between the relevant departments is required: For that purpose, the corresponding roles are defined and described.

Chapter 4.2

Roles in inspection process management

Chapter 4.4



Schematic sequence of inspection process planning

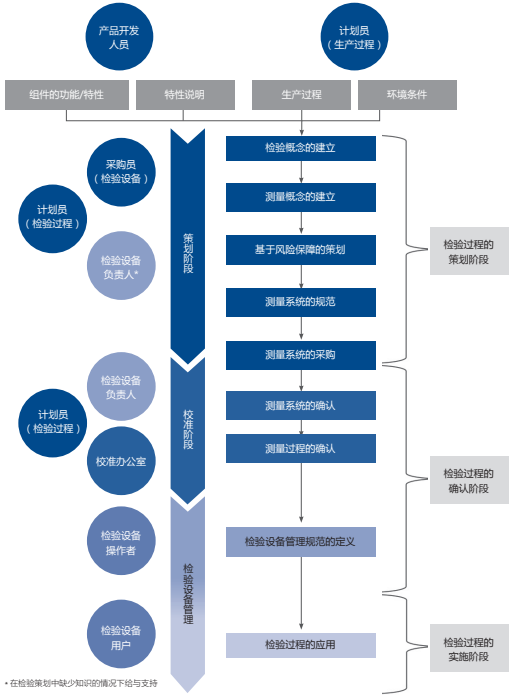
具有定义角色的检验过程策划

检验过程计策划是产品创建过程的重要组成部分，并从特性的规范化和能力证明延伸到符合性声明。在这一点上，要求相关部门之间的跨学科合作：为此，对相应的角色进行定义和描述。

第 4.2 章

检验过程管理所涉及的角色

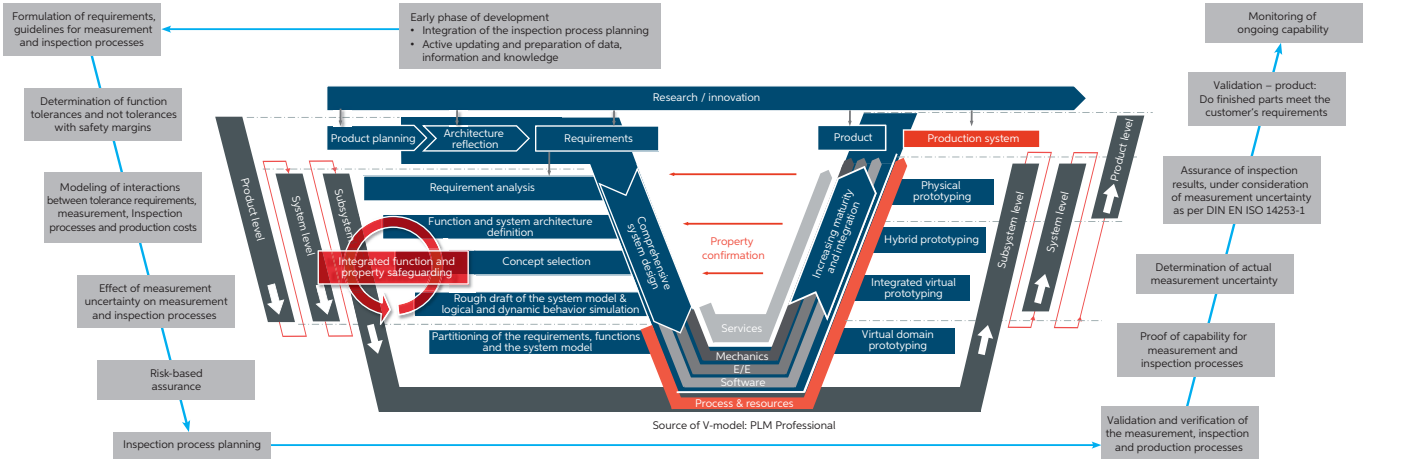
第 4.4 章



检验过程策划顺序示意图

Contribution to the systems engineering process

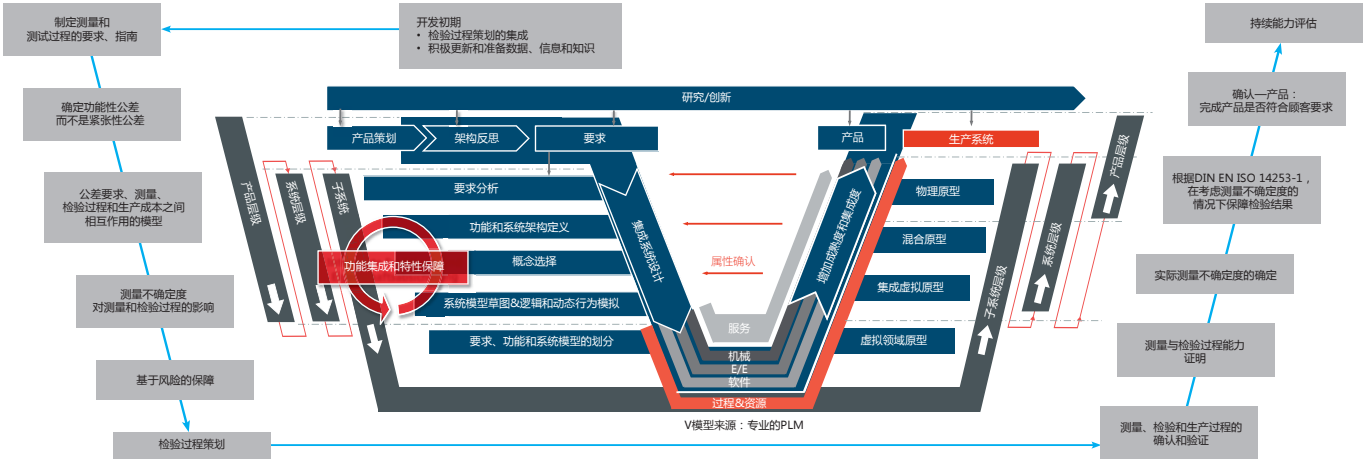
System engineering is a holistic approach for the development of complex and interconnected processes. By means of systematic structuring of the processes and early coordination between product development, production process planning and inspection process planning, capable measurement and inspection processes can be generated.



Implementation of the systems engineering approach to capability, planning and management of measurement and inspection processes

对系统工程过程的贡献

系统工程是开发复杂、相互联系的过程的整体方法。通过系统的过程结构和产品开发、生产过程策划和检验过程策划之间的早期协调，可形成有效的测量和检验过程。

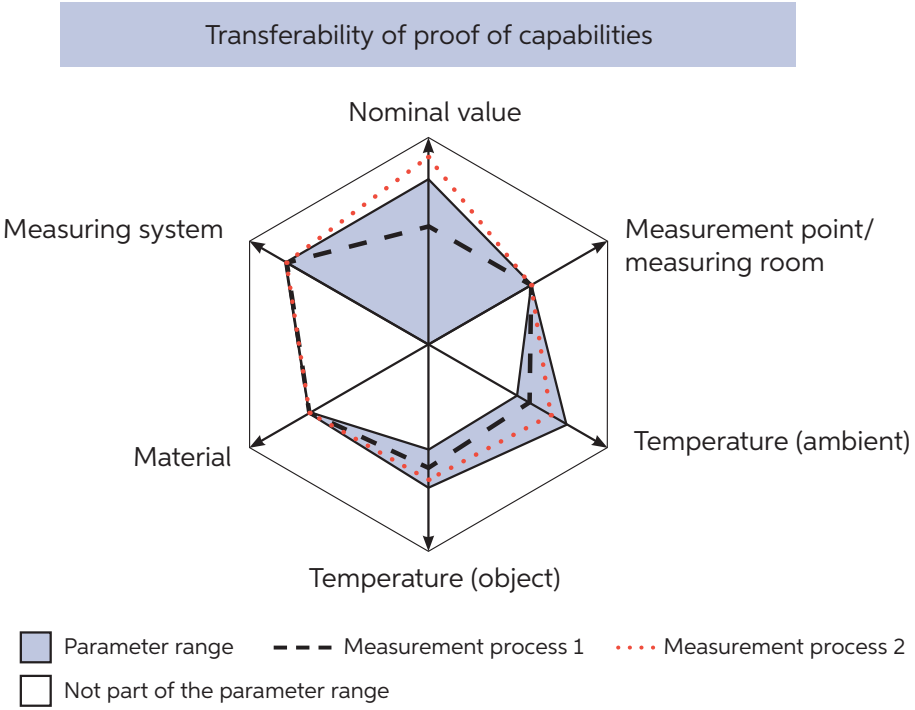


第 4.4.2 章

对测量和检验过程的能力、规划和管理设施系统工程设计方法

Transferability of proofs of capabilites

Under the assumption that there are no significant differences between the individual inspection processes regarding the uncertainty contributions, capability can be transferred if the boundary conditions are the same.



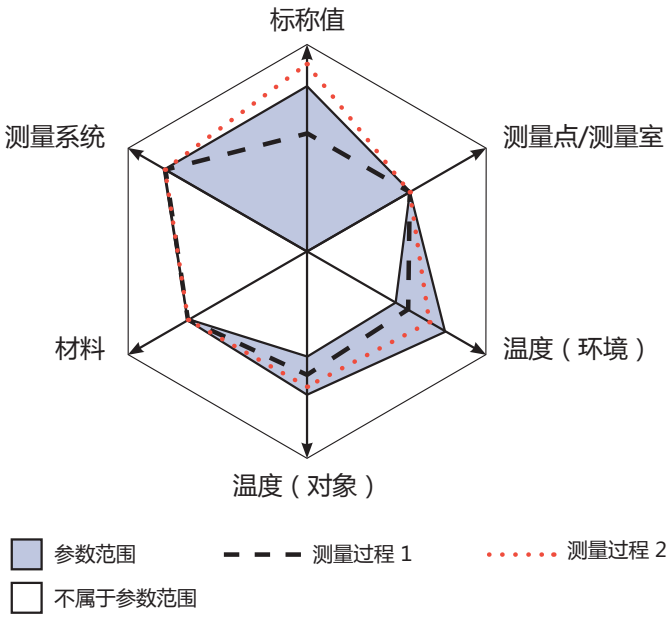
Spider's web diagram for variation of the input parameters

Chapter 4.7.4

能力证明的可转移性

在各个检验过程之间不存在显著差异的假设下，参见不确定度所起到的影响，如果边界条件相同，则能力可能发生转移。

能力证明的可转移性



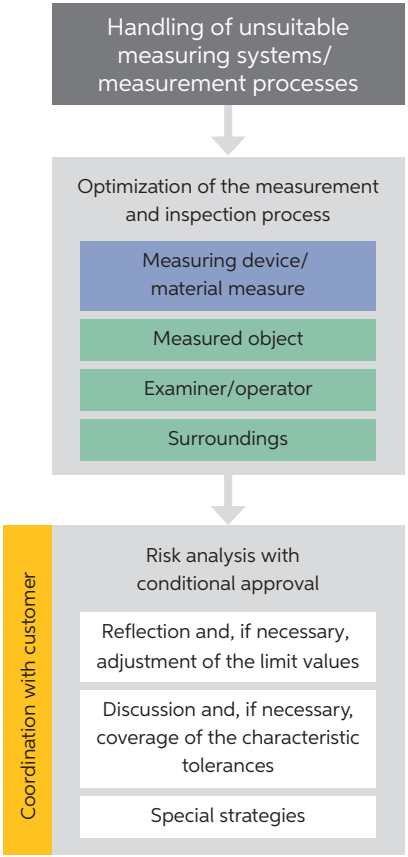
输入参数变化的蛛网图

第 4.7.4 章

Handling of unsuitable measuring systems/ measurement processes

Various ways of dealing with unsuitable measuring systems or measurement processes are described in detail in individual chapters.

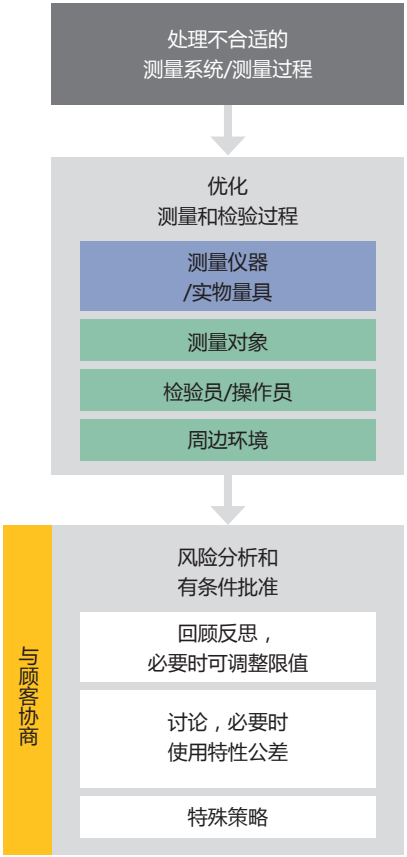
Chapter 7.4



不适合的测量系统 / 测量过程处理

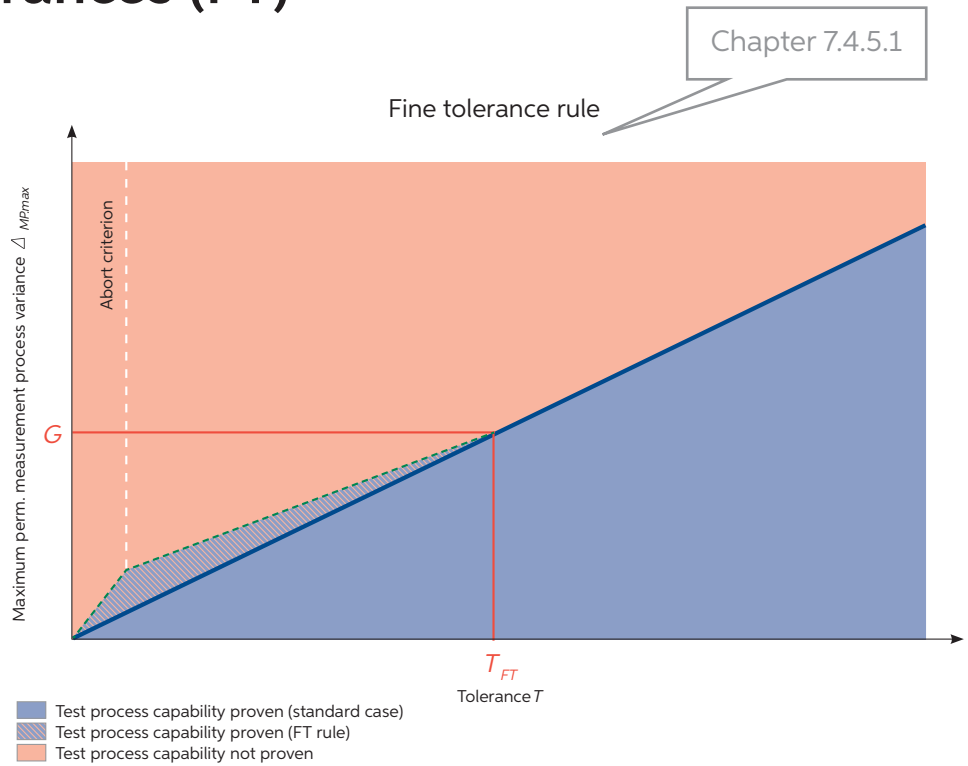
有关处理不适合测量系统或测量过程
的各种方法，详见各章节内容。

第 7.4 章



Handling fine tolerances (FT)

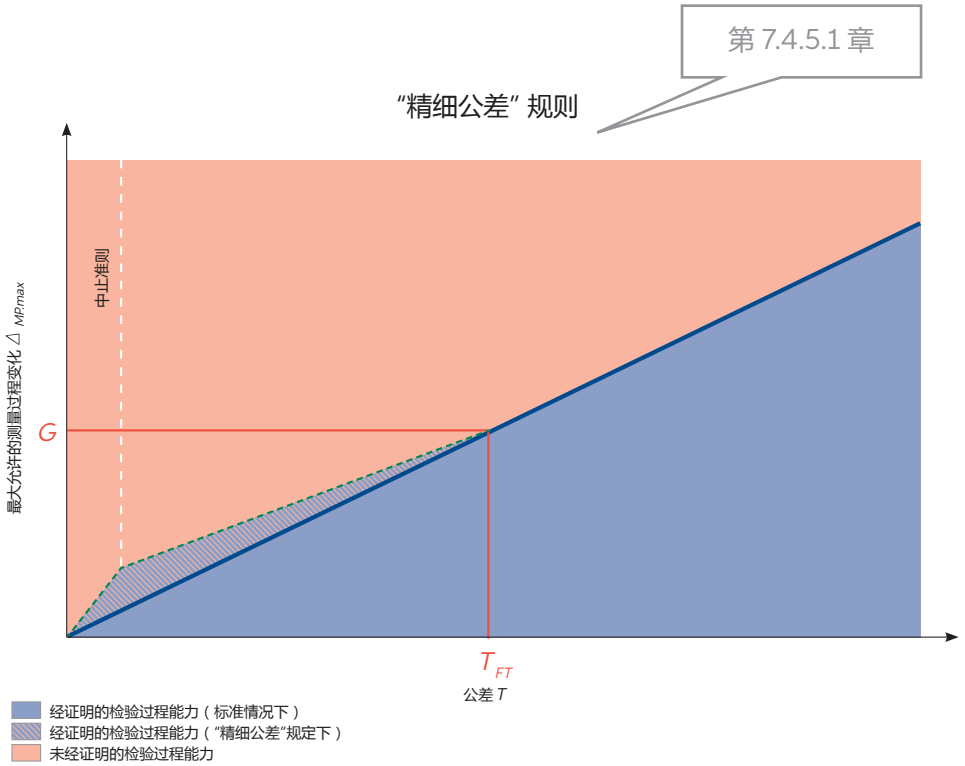
Fine tolerances are at the limit of what is technically measurable. With the FT rule ("fine tolerances") in VDA Volume 5, capability can also be proven in case of very fine tolerances. It is equally applied if no capability values or capability ratios can be obtained with the standard VDA 5 evaluation.



Schematic representation of the FT rule

处理精细公差（FT）

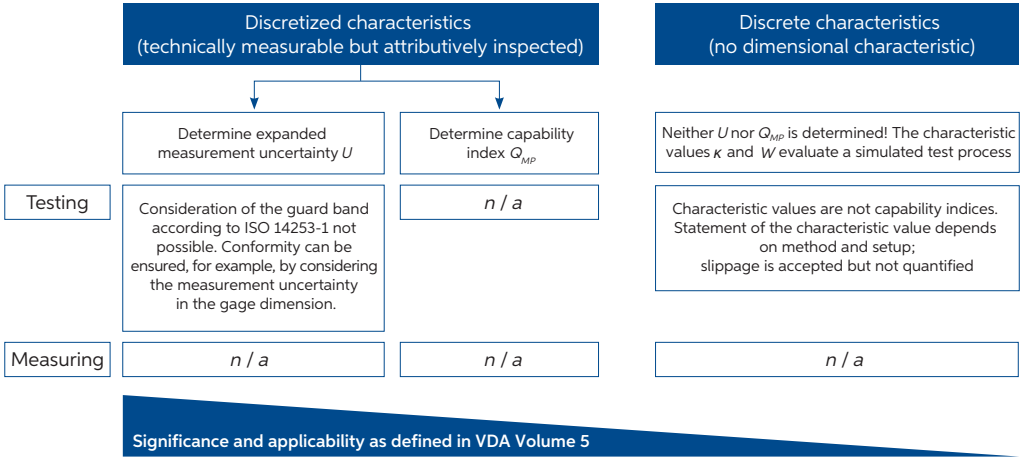
精细公差处于技术上可测量的极限。通过 VDA 5 中的 FT（" 精细公差 "）规则，在公差非常精细的情况下也可以证明能力。如果标准 VDA 5 评估无法获得能力值或能力比，则同样适用该方法。



“精细公差” 规则示意图

Current knowledge regarding attributive inspection

The new VDA Volume 5 offers a thorough overview of the methods for evaluating attributive inspection processes. These are clearly structured and subdivided into scope of application, advantages and disadvantages.



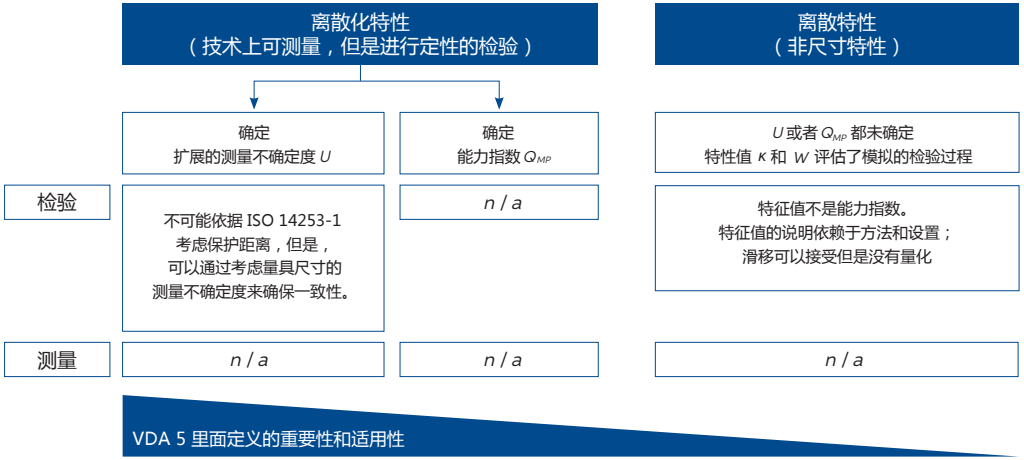
Characteristics that have been made discreet:
Signal detection, extended signal detection, analytical method

Characteristics that are discreet:
Short Method, effectiveness, Bowker test, Kappa method according to Cohen and Fleiss and concordance coefficient W according to Kendall

Chapter 9

有关属性检查的现有知识

新版 VDA 5 全面概述了用于评估属性检查过程的方法。这些方法均具有明确的结构和细分的适用范围、优点和缺点。



离散化特性：
信号探测法和分析法

离散特性：
小样法、有效性、鲍克检验、根据 Cohen 和 Fleiss 的卡帕法和 Kendall 的一致性系数 W

第 9 章

New training concept

Companies do not always have their own experts for inspection process capability and inspection equipment management. However, changes with regard to standards have meant that these issues are increasingly focused on: the results could be major and minor nonconformities in audits.

The new training course offered by VDA QMC covers all aspects regarding measuring systems, measurement processes and inspection processes.

The training course includes clear and succinct specialist presentations, intensive group work and feedback provided by an experienced trainer. There will be a special emphasis on trying out and practicing the concrete activities in inspection process management based on practical examples.

That way, you will be able to build up know-how regarding measurement and inspection within your company!

Training information as well as training dates can be found on our webpage for
International Training Management Tool (ITMT) https://itmt.vda.cn

新培训理念

公司并不是总能拥有自己的检验过程能力和检验设备管理专家。但是，标准方面的变化就会意味着这些问题越来越受到关注：结果可能是审核中存在重大和次要不符合项。

VDA QMC 所提供的新版培训课程涵盖测量系统、测量过程和检验过程的所有方面。

该培训课程包括清晰简洁的专业陈述、密集的小组工作或任务以及由经验丰富的培训师提供的反馈等。此课程将特别强调在实际案例的基础上尝试和实践检验过程管理中的具体活动。

这样一来，您就可以在积累起企业内部有关测量和检验的专门知识！

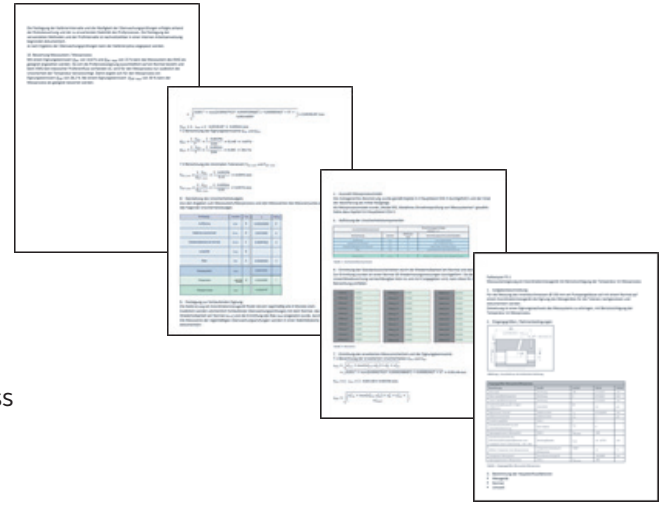
更多课程信息及培训日期扫描右侧二维码或点击以下链接了解
全球培训管理工具（ITMT）：https://itmt.vda.cn

VDA 5 Practical handbook

As a supplement to the new VDA Volume 5, a practical handbook with examples from day-to-day work related to measurement and inspection processes is currently being developed.

All practical examples are structured in the same way, and concrete descriptions of the procedures for application are provided.

1. Task description
2. Input variables / general conditions
3. Determination of the main influencing factors
4. Measurement process model selection
5. Listing of uncertainty components
6. Determination of standard uncertainties
7. Determination of the extended measurement uncertainty and the capability ratios
8. Presentation of the uncertainty budget
9. Specification for ongoing capability
10. Evaluation of measuring system / measurement process

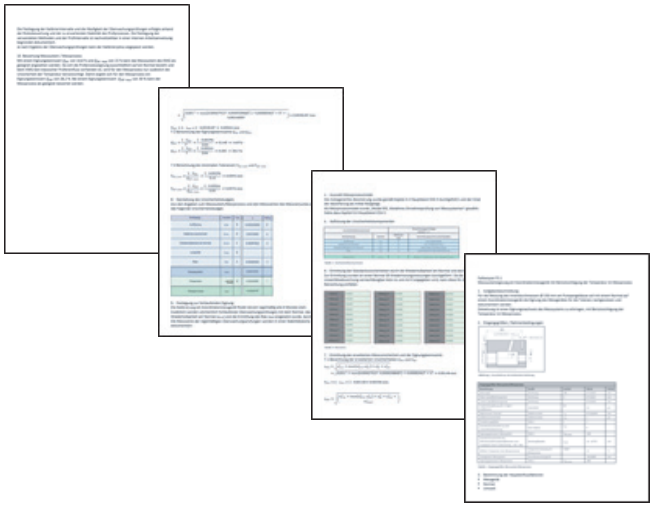


VDA 5 实用手册

作为新版 VDA 5 的补充，我们目前正在编制一本实用手册，其中附有大量有关测量和检验过程的日常工作示例。

测量所有实例的结构均大致相同，并且同时还提供了有关应用程序的具体描述。

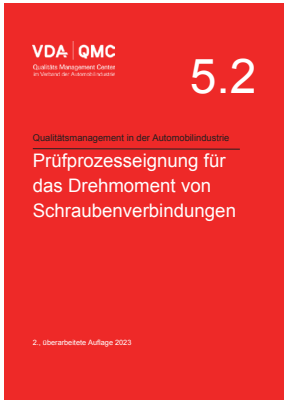
1. 任务描述
2. 输入变量 / 一般条件
3. 主要影响因素确定
4. 测量过程模型选取
5. 不确定度分量列表
6. 标准不确定度确定
7. 扩展测量不确定性和能力比的确定
8. 不确定度报告展示
9. 持续能力规范
10. 测量系统 / 测量过程评估



Outlook: “VDA 5.x”

Besides the practical handbook as a supplement to VDA Volume 5, with examples and case studies for the individual topics, further VDA volumes relating to measurement and inspection will be revised and compiled:

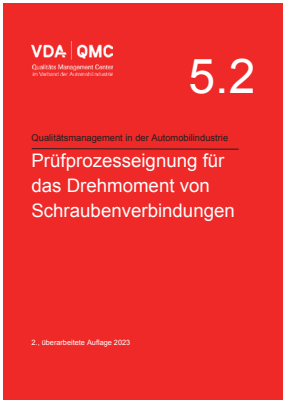
- Revision of VDA 5.1 “Traceable Inline Metrology in Car Body Manufacture”
- Revision of VDA 5.2 “Capability of Measurement Processes for the Torque Inspection on Bolted Joints”
- Creation of new volume VDA 5.3 on optical sensors and image processing



展望： “VDA 5.x”

除了作为 VDA 5 补充的有关实用手册，以及针对各个主题内容的示例和案例研究以外，还将修订或汇编与测量和检验相关的更多 VDA 标准：

- VDA 5.1“车身制造中可追溯在线计量”的修订
- VDA 5.2“螺栓接头扭矩检验测量过程能力”的修订
- 创建有关光学传感器和图像处理的 VDA 5.3 新标准



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