Stork提供世界级无损检测技术及服务：

8.1 Austenitic Materials / White Metals 奥氏体材料, 白色金属

In accordance with British Standards, each application shall require a specific procedure relevant to the grade of material, thickness range and configuration that is under test, in addition to this, a specific reference block will need to be manufactured from the same grade of material, curvature and configuration as that under test, this will have artificial defects that will be used as a reference, Storks Technical Authorities shall be able to draft and approve specific procedures as and when required during the project.

按照英国标准，每个应用都需要一个与之材料等级相关的特定步骤，即要符合测试的厚度范围和配置。除此之外, 要制造出一个按照同级别的材料、曲率和通过测试的配置而特定的参考板，这些人造的有瑕疵的材料将被用来做参照。Stork技术主管部门能够在项目期间根据需要起草和批准具体的程序。

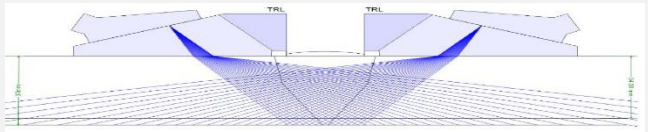
8.2 Specialist Inspection – Automated UT 特殊检查-自动超声波测试

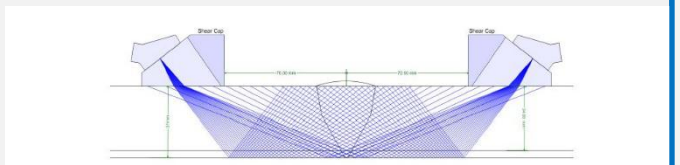
Some of our clients request that we use Automated Ultrasonic Testing to inspect Stainless Steel and Inconel Welds without removing the weld caps.

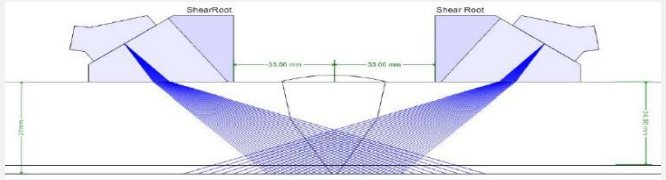
我们的一些客户要求我们使用自动超声波检测来检测不锈钢和铬镍铁合金焊缝，而不需要移除焊接帽。

To support our clients, Stork has developed a new technique that uses transmit-receive longitudinal (TRL) Phased Array wedges to inspect the weld volume and bevel, Shear Wave Phased Array probes to inspect the weld bevel for lack of fusion and Creep Wave probes to detect surface and near surface defects. Due to the creep wave probes producing multiple types of ultrasonic waves, the probes are usually gated to only use the creep wave. After some experimenting, Stork decided to create an additional group to use the longitudinal wave from the creep wave probe (transmit and receive from the same side) and display it in a Time of Flight Diffraction (ToFD) format for easier interpretation and data correlation.

为支持我们的客户**, Stork已经开发出一种新技术，利用收发两用纵向 (TRL) 相控阵楔形检查焊缝体积和斜角，**横波相控阵探头检查焊缝坡口未熔合，爬波探头检测表面和近表面缺陷。由于爬坡探头产生多种类型的超声波，因此探头通常只使用爬行波。经过一些实验后，Stork决定创建额外组来使用来自爬坡探头的纵波 (从同侧发射和接收)，并将其显示为飞行衍射时间 (ToFD) 格式，以便于解释和数据关联。







8.3 Phased Array Ultra-Sonic Thickness (PAUT) Nozzle Scanner
相控阵超声厚度(PAUT)喷嘴扫描仪

Fast, accurate and highly efficient, the PAUT Nozzle Scanner was developed mainly to cater for Phased Array UT inspection of Pressure Vessels during the fabrication stage and in service Inspections which required Code Compliant inspections of their Nozzle welds.

一种快速、准确、高效的压力容器相控阵超声厚度 (PAUT) 扫描仪，主要用于压力容器制造阶段和使用阶段的相控阵超声厚度 (PAUT) 检测，要求对其喷嘴焊缝进行符合规范的检测。

Scanners are widely available for the inspection of pressure retaining seams where there is access to both sides of the weld, what is not typically available is a scanner that is able to circumferentially scan a nozzle in a mechanised system keeping a fixed distance between the nozzle weld and PAUT probe. When performing Ultrasonic Weld inspections there is a code requirement to perform the inspections using a fixed mechanized system (no probe rotation allowed) ensuring that the ultrasound passes through the weld perpendicular to the weld centreline greatly increasing Probability of Detection (POD). Magnetic rollers attach to the nozzle itself while the encoder is fixed to the magnetic wheel housing using the nozzle wall to encode the scan distance accurately around the nozzle circumference. This allows for accurate defect measurement when marking up the location of non-compliant welding flaws.

扫描仪广泛用于检验焊缝两边保留压力的接缝。通常扫描仪不能够压痕扫描机械化系统的喷嘴，难以保持一个固定的喷嘴焊接和PAUT探针之间的距离。在进行超声波焊缝检测时，按照规范要求要使用固定的机械系统 (不允许探头旋转) 进行检测，以确保超声波通过垂直于焊缝中心线的焊缝，大大增加了检测的概率 (POD)。磁性滚轮附着在喷嘴上，编码器固定在磁性轮壳上，利用喷嘴壁围绕喷嘴周围精确地编码扫描距离。这允许当标记的位置不符合焊接点时，依然能够准确测量缺陷。

Client benefits include 客户得益于:

- A greater inspection accuracy reducing shop floor hours repairing indications otherwise complying to the code 更大的检查精度，减少车间工作时间，维修符合规范的指示
- Code compliant inspection 符合规范的标识
- Faster inspection time due to ease of setup 缩短检查时间，方便安装
- No need for scan offset rings to be fabricated by client 不需要扫描由客户制造的偏离套环
- increased POD 增加检测的概率

STORK
A Fluor Company

8.4 Digital Radiography 数字射线

Stork has worked closely with GE to develop its capabilities in Digital Radiography and we are currently using GE Digital Panel Plates on our inspection contracts. By using this technique with close proximity radiography, we are able to reduce the exclusion zone and shot times are reduced to less than a minute, resulting in reduced impact to asset operations. The benefits of this method include:

Stork与GE密切合作以发展其在数字射线照相方面的能力，我们目前在检查合同中使用GE数字面板。通过使用近距离放射成像技术，我们减少禁区，拍摄时间减少到不到一分钟，从而减少对资产运营的影响。这种方法的好处包括:

- Shorter exposure times (Less than one minute) 更短的曝光时间 (少于一分钟)
- Real Time Applications 实时应用
- Use of analysis tool and defect recognition software 使用分析工具和缺陷识别软件
- Improved detail detectability 改进的细节可检测性
- Enhanced SNR and linearity 更强的SNR和线性度
- Reduced inspection time as no chemical processing of film is required 更短的检测时间，因为不需要对胶片进行化学处理
- Eliminates processing chemicals hence safe for environment 消除加工化学品，因此对环境安全
- Digital image enhancement and data storage 数字图像增强和数据存储
- Higher productivity 更高的生产力
- Portability 便携性
- Increased dynamic range enables multiple thickness to be inspected in one shot
  增加的动态范围，使多个厚度可以检查在一个镜头
- Immediate feedback straight to laptop in real time 即时反馈，直接到笔记本电脑
- Reduced barricade time on units to inspect for optimised process 减少了路障的单位时间，以检查优化的过程

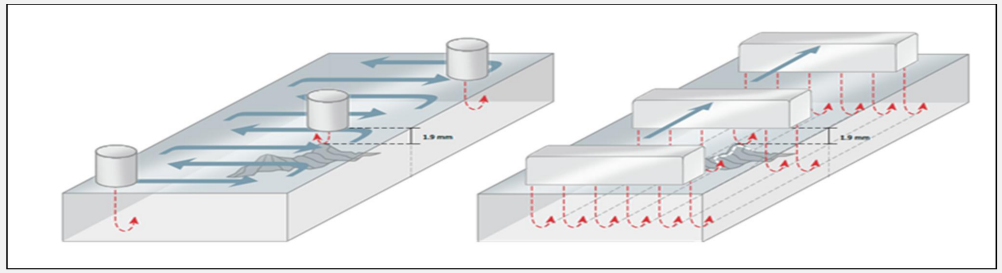
8.5 Phasor DM矢量 DM

Stork has developed an internal course in accordance with our SNT-TC-1A written practice where each inspector will receive a Phased Array Level 2A certificate.

Stork根据SNT-TC-1A书面实践制定了内部课程，每个检查员将获得相控阵2A级证书。

Phasor CV/DM combines a phased array imaging device and a conventional flaw detector within one instrument, with a phased array probe which allows significantly increased confidence in corrosion inspection data. Compared with traditional thickness gauge and flaw detector inspection, it offers much better probability of detection of corrosion pits and faster, more reliable scanning.

矢量CV/DM将相控阵成像设备和常规探伤仪结合在一起，并配备了相控阵探头，大大提高了腐蚀检测数据的可靠性。与传统的测厚仪和探伤仪检测相比，该方法具有检测腐蚀坑的概率更高、扫描速度更快、更可靠等优点。



8.6 M SKIP™

Stork is curently qualifying ESR Technologies' M-Skip™ ultrasonic technology to inspect for defects obscured by the following features:

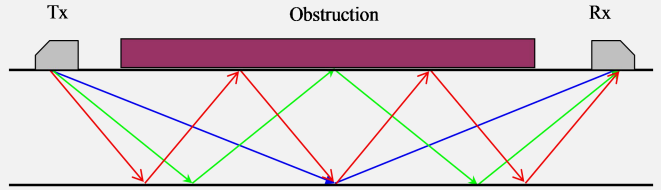
Stork对ESR技术的M-Skip™超声波技术进行了常规检测，来检查易被遗漏的以下隐藏特征:

- Pipe supports 管道支架；
- Pipeclamps 管道支架
- Pipework and pressure vessel saddles and compensation pads 压力容器鞍座、补偿垫
- Piping trunnions 管道耳轴

M SKIP™ is a medium range pitch-catch (transmission) ultrasonic technique with the key features:

M SKIP™是一种中程pitch-catch (传输) 超声波技术，主要特点有:

- Up to at least 1m probe separation 探头间距不小于1m
- 100% wall coverage between the probes 探头之间100%的壁厚覆盖
- Detection and sizing of wall loss defects. 壁损缺陷的检测和分级
- Suitable for inaccessible geometries and fast screening 适用于不可达的几何形状和快速筛选
- Quantitative information on extent of wall loss 壁损范围的定量信息
- Uniform wall thickness measurements 均匀壁厚测量
- Upper bounds on wall loss of localised areas 局部区域的壁损上限



8.7 Pulsed Eddy Current Testing (PECT) 脉冲涡流检测 (PECT)

Pulsed Eddy current is a proven technique that provides the ability to measure steel wall thickness without contact between the instrument and steel, the main advantage of this being that coated or insulated parts can be inspected without having to remove lagging, paint or protective coatings etc. PECT is an effective solution for Corrosion Assessment and Wall Thickness measurements.

脉冲涡流是一个经过验证的技术，能够在没有仪器和钢铁间碰触的情况下测量钢壁厚，其主要优势在于对涂层或绝缘部分检查可以无需去除隔热材料，油漆或防护涂料等。脉冲涡流检测是一种有效的解决腐蚀的评估方案和壁厚测量手段。

Key advantages 主要的优势:

- No requirement to remove lagging, coatings or protective materials such as weather sheeting
  不要求去除隔热材料、涂层或防护材料，如耐候性材料、薄膜材料
- Surface preparation is not required. 不需要表面处理材料
- Steel thickness measurement range from 4mm to 50mm 钢水厚度测量范围从4mm到50mm
- Temperature range from -100C to +500C 温度范围从- 100c到+500C
- Very good reproducibility of repeat measurement +/- 0.05mm 对于重复测量+/- 0.05mm重现性非常好

8.8 PACE – ACFM 检测技术

The ACFM technique is a non-contacting electromagnetic technique for the detection of surface breaking defects in conducting materials. The ACFM probe induces a uniform electric current into the material being inspected which then produces a magnetic field which will disturb and flow around the edges of a defect if present.

ACFM技术是一种用于检测导电材料表面断裂缺陷的非接触电磁技术。ACFM探头将均匀的电流引入被检测的材料中，然后产生一个磁场，如果存在缺陷，会干扰磁场并在缺陷边缘流动。

PACE Applications PACE应用：

- One-person operation 一人作业
- Rope access inspections 绳索进场检查
- Topside offshore / onshore structures 海洋上层/陆上结构
- Refinery piping and vessels 炼油管道及容器
- Cranes and towers 起重机及塔架
- Pipeline welds 管道焊接
- Painted / coated structures 涂漆结构
- High production rates 高产率

PACE – PDF Field Reports from inspections are instant, showing defect size, length and depth along with the ability to take a photograph to insert into the inspection report.
PACE--PDF字段报告是即时的，显示缺陷的大小、长度和深度，并且可以取照并将照片插入检查报告。

APCE – ACFM is 75% faster than conventional surface methods with no requirement to remove the coating. The accuracy of depth measurements of surface breaking defect is also improved. The portability of the solution and the immediate generation of the inspection report improves efficiency by reducing work times.
APCE - ACFM比传统的表面处理方法快75%，不需要去除涂层。提高了表面断裂缺陷深度测量的精度。解决方案的便携性和即刻生成的检查报告，减少工作时间而提高效率。

8.9 Remote Visual Inspection远程视觉检查

Increasingly, operators are employing Remote Visual Inspection (RVI) techniques to give information on the external condition of piping, vessels, tanks and structures so that this can be used to make engineering assessments of the integrity status of the parts inspected. High quality images can be captured in a variety of ways (2D still/video, 360 degree still/video, IR cameras, CCTV, drones, crawlers, telephoto lenses from static positions, periscope camera to name a few). Stork deploys a number of these technologies, many controlled wirelessly, to establish the condition of plant that is under scrutiny.
操作人员越来越多地采用远程目视检查 (RVI) 技术来提供管道、船舶、水槽和建筑物的外部状况信息，以便对被检查部件的完好性状态进行工程评估。高质量的图像可以通过多种方式获取 (2D静止/视频、360度静止/视频、红外摄像机、监控摄像机、无人机、网络爬虫、静止位置的远摄镜头、潜望镜等)。Stork部署了很多这样的技术，其中许多是通过无线控制的，来建立被监视的工厂的状态。

Typically an RVI is looking for a variety of defects such as **典型的远程目视检查可找出各种缺陷，如:**

- Mechanical damage (impact, movement, buckling, bending, loose, worn, broken, missing parts, cracks and tearing)
  机械损伤（撞击，移动，膨胀，弯曲，松散，磨损，故障，部分丢失，裂缝和裂纹撕裂）
- Loss of containment (weeps, seeps, leaks, fugitive emissions from flanges and PSV's)
  抑制损失 (渗出，渗漏，泄漏，法兰辐射排放和PSV)
- Environmental damage (corrosion extent, type, severity, coating, cladding dis-bondment, scaling, staining, debris, heat damage, wind damage, water ingress and ground movement)
  环境造成的破坏 (腐蚀程度，腐蚀类型，严重程度，涂料，电镀损坏，剥落，染色，碎片，热损伤，风损，进水和地面移动)
- Damage to the environment (extent of spills and contamination) 对环境的破坏 (泄漏和污染程度)
- Third Party interference (unintentional effects from other activities, deliberate acts of theft, vandalism and terrorism) 第三方干涉 (无意影响其他活动，故意的盗窃行为，破坏和恐怖主义)
- Any other pre cursor signs of likely future issues 任何显示的可能的未来的问题指标。

8.10 Drone Inspection无人机检查

At Stork we use drones across all of our global inspection regions for a large variety of workscopes. We have introduced this method of inspection for scopes which cover flare tips and vent stacks, undersides of platforms and bridges and internal inspection of boilers. In the UK Stork was recently contracted to conduct a structural and coating inspection of an offshore drilling derrick. After assessing the remaining Fabric Maintenance scope on the asset Stork commissioned a third party to deploy its ROAV to allow for a full assessment of the structure and coating condition of the drilling derrick. The inspection involved accessing areas that would have been particularly challenging and time consuming for traditional rope access and scaffold inspections. By managing this workscope and using this technology, Stork delivered a quality service with improvements in time, costs and safety.
在Stork，我们在全球所有的检查区域都使用无人机，用于各种各样的工作范围。**我们推广在包括火炬、烟囱、平台和桥梁底面以及锅炉内部检验范围在内的无人机检验方法。在英国，Stork最近承包了对海上钻井井架进行结构和涂层检查。**检查涉及到的区域对于传统的绳索通道和脚手架检查来说是特别具有挑战性和耗时的。通过管理该工作范围和使用该技术，Stork在时间、成本和安全方面提供了高质量的服务。

8.11 Technical Authority Support 技术权威支持

Stork employs a number of NDT Level 3s to assist with technical support and with a range of combined NDT experience. Stork's TA covers all of the below and more:
Stork雇佣了大量三级无损检查人员来协助技术支持并进行一系列无损检测综合实验。Stork的技术当局涵了以下服务:

PCN Level 3 PCN 等级3:

- UT welds, Castings and Forgings 自动超声波测试焊接、铸件和锻件
- UT of austenitic stainless steel welds 自动超声波测试的奥氏体不锈钢焊缝
- UT of white metal 自动超声波测试的白色金属
- ET welds, Casting and Forgings ET焊接，铸件和锻造
- Radiography, Digital and Conventional 放射线，数字和常规
- Magnetic Particle Inspection 磁粉检验
- Liquid Penetrant Inspection 液体渗透检测
- Condenser Tubes 冷凝器管
- Phased Array 相控阵飞行
- Time of Flight Diffraction 时间衍射

ASNT Level 3 ASNT 等级3:

- Electromagnetic Testing 电磁测试
- Liquid Penetrant Testing 液体渗透测试
- Magnetic Flux Leakage 漏磁监测
- Magnetic Particle Inspection 磁粉探测
- Radiographic Inspection 射线照相检验
- Ultrasonic Testing 超声波测试

Stork has developed a robust written procedure with regards to certification and qualifications of personnel written to BS EN ISO 9712 and SNT-TC-1A. Experience dictates that often one method of inspection in isolation is not always sufficient and will need to be supplemented by another complimentary inspection technique. Stork has the ability and knowledge to provide various methods in order to overcome many challenges.
对于BS EN ISO 9712和SNT-TC-1A相关人员的认证和资格，Stork制定了一套完善的书面程序。经验表明，通常单一的检查方法并不总是充分的，需要用另一种互补的检查技术加以补充。Stork有能力和知识提供各种方法，以克服许多挑战

8.12Accreditations & Memberships认证&会员

One of Stork's core values is to excel at the quality of service we provide which will save our clients time and financial resources through our efficiencies. In order to substantiate these values, Stork are fully accredited to:
Stork的核心价值之一是擅长于我们提供的服务质量, 通过我们的效率节省客户的时间和经济资源。为了提升价值，**Stork得到以下认可**:

- UKAS Accreditation for ISO 17020 for Integrity and Inspection (Type C Inspection Body)
- UKAS认可ISO 17020的完整性和检验(C类检验机构)
- ISO 9001:2015
- ISO 14001:2015

Stork are active members of the Joint Industry Project (JIP) HOIS which has been running for more than 30 years. We actively participate in a number of trials and tests in relation to NDT Inspection technologies along with other industry bodies such as;
Stork是联合工业项目 (JIP) HOIS的活跃成员，该项目已经运行了30多年。我们使用无损检测（NDT）技术积极参与多项实验和测试，**并与以下组织合作:**

- Oil & Gas Operators and Energy Producers 石油天然气运营商和能源生产商
- Non-Destructive Testing (NDT) service companies 无损检测 (NDT) 服务公司
- NDT equipment vendors 无损检测设备供应商
- A regulatory authority (UK HSE) 管理机构 (英国HSE)

The HOIS vision is to improve the effectiveness of in-service inspection by:
HOIS的目标是透过以下方法提高不脱产巡检的成效:
- More reliable in-service inspection – better detection of in-service degradation
  更可靠的不脱产检验——更好的不脱产检测
- More accurate measurements of remaining wall thickness 更准确的测量剩余壁厚
- Providing asset owners with improved information on asset condition
  为资产所有者提供改良的信息资产条件
- Reducing leaks and near misses 减少已经泄漏并预防可能泄露

The accreditation cited earlier and the membership to HOIS reinforces Stork's commitment to providing our clients with an approved quality service utilising the most advanced techniques in the market.
先前提到的认证和HOIS的会员资格更加肯定了Stork的承诺，即利用市场上最先进的技术，为我们的客户提供经过认可的优质服务