ILI Technology share & exchange meeting
管道内检测技术分享交流会

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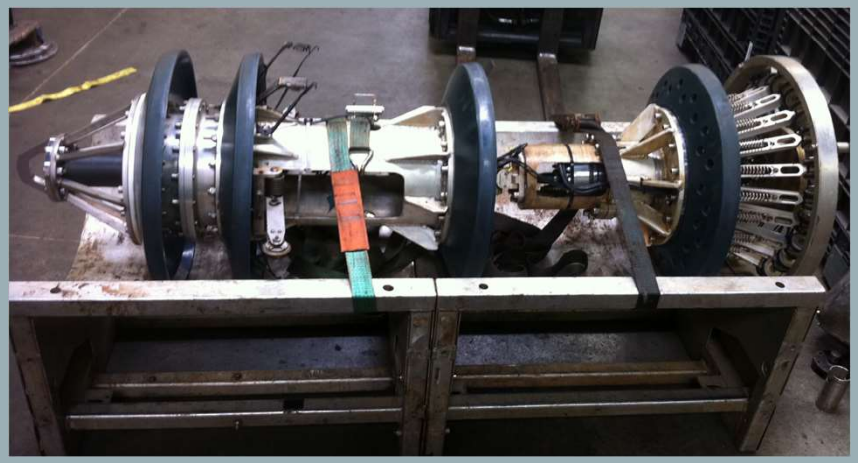
Technical Training技术培训



Technical Training

Training

- HSE is a big part of our culture and is reinforced in all of our training programs. We want to ensure our employees and channel partners are safe and environmentally conscious.
- HSE是我们企业文化的重要组成部分并且是在所有培训课程里不断强化的。我们要确保我们的员工和合作伙伴都保持安全和环保意识。
- All new employees and channel partners must attend classroom trainings, where ILI theory and concepts are explained in great detail. We would like our technicians to have an open mind and approach their work as a mission, not a task.
- 所有新员工/合作伙伴必须参加把内检测理论和概念都详细解析课堂培训。我们期望我们所有技术人员都有开放性思维并且做到把工作当成使命而不只是任务。
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Technical Training技术培训

Training

- All new employees and channel partners perform hands-on training in our workshop and in the field. This gives them the real life experience they need before managing their own projects.
- 所有新员工及合作伙伴都会在工作间和现场履行实习培训，这给予了他们在实际执行项目前所需的亲身体会和实践经验。
- All of our technicians and channel partners are ILI PQ 2017 certified. We want to make sure that our technicians and channel partners adhere to the highest industry standards of China and the rest of the world.
- 我们所有的技术员和合作伙伴都是经过ILI PQ 2017认证的。我们期望确保我们的技术团队坚持最高的国内及国际行业标准。
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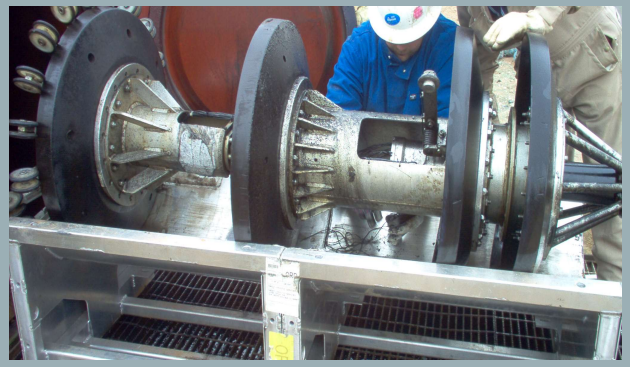
ILI Technology管道内检测技术
Pipeline defects type 管道缺陷类型

PPS ILI Technology 管道内检测技术

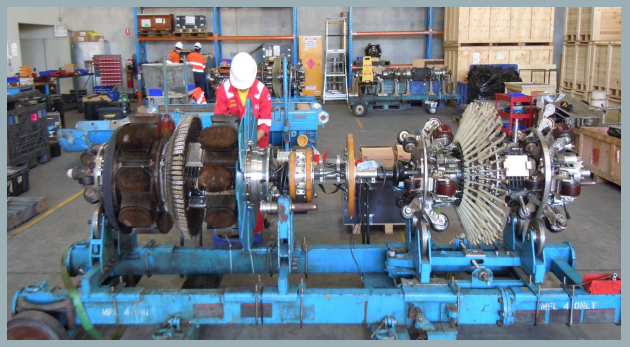
Caliper几何检测器

- EP Caliper EP 几何检测器
- HR Caliper 高清几何检测器



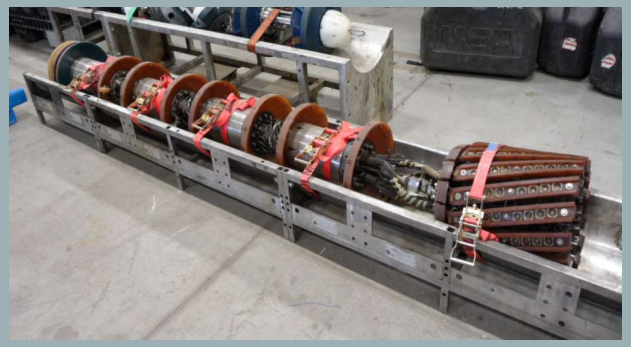
Magnetics漏磁检测器

- MF3 三代漏磁检测器
- MF4 四代漏磁检测器
- TFI 环向漏磁检测器



Ultrasonics 超声波检测器

- Wall measurement壁厚测量
- Crack Detection裂纹探测
- EMAT 电磁超声波检测器
- DUO （暂无中文名称）



ILI Technology管道内检测技术

Caliper几何检测器

- EP Caliper EP 几何检测器

  Available in all sizes. Great for bend measurements and picking up dents.

  涵盖所有尺寸。非常适用弯头测量和凹陷识别。

- HR Caliper高清几何检测器

  Available in some sizes, higher resolution than the EP Caliper.

  部分尺寸适用，分辨率比EP几何检测器高。

ILI Technology管道内检测技术

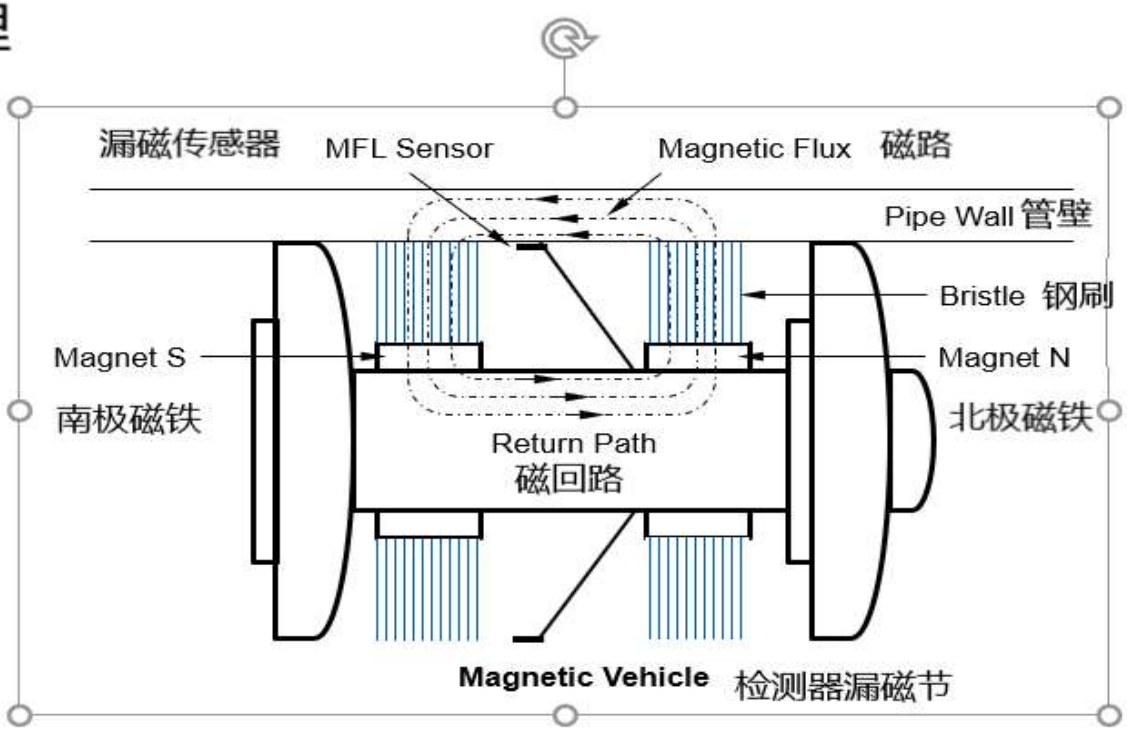
MFL Principles

漏磁检测器工作原理

MFL Theory

When the tool is inside the pipe, the pipe wall closes the magnetic circuit. The body of the MV provides a return path for the magnetic flux.

当检测器在管道中运行时，管壁使磁路闭合，漏磁节的主体为磁场提供了回路。



ILI Technology 管道内检测技术

MFL Principles

漏磁检测器工作原理

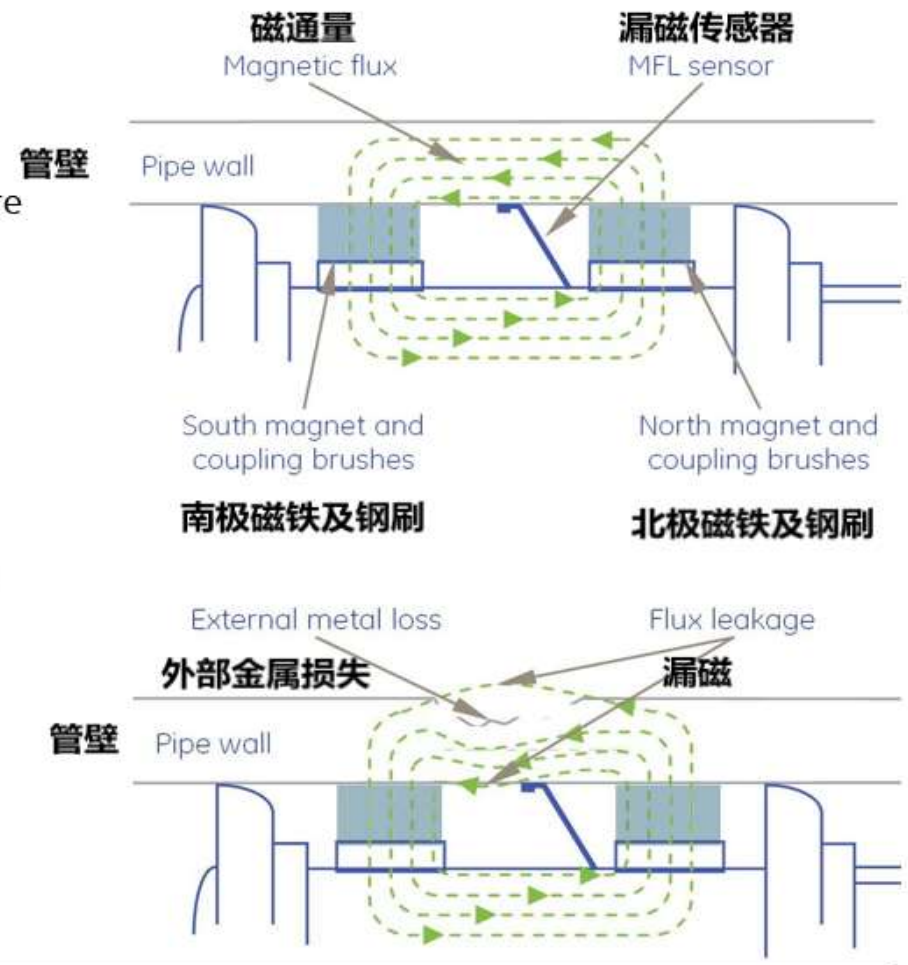
MFL Theory 漏磁理论

When there are no defects in the pipe wall, there is an undisturbed and uniform distribution of magnetic field, which is detected by the MFL sensor as a constant signal.

当管壁上没有缺陷时，未被干扰的、分布均衡的磁场会被漏磁传感器探测到并记录为连续的信号。

Any metal loss defects, either in the external or internal pipe wall, interrupt the magnetic flux and cause small amounts of flux to leak from both the internal and external surfaces of the pipe wall. The MFL sensor gives a output signal corresponding to the leakage field.

任何金属损失缺陷，无论内外管壁，会干扰磁路并引发内外管壁表面少量漏磁。漏磁传感器会根据漏磁场给出信号。



ILI Technology管道内检测技术

Magnetics - **MF3 漏磁检测器-三代漏磁检测器**

- Measure leakage field in axial direction only
- **只能测量轴向漏磁场**
- Legacy system **经典实用系统**
- Proven technology**久经考验的技术**
- Has been in service longer compared to MF4
- **服役时间长于四代漏磁**
- Can run in gas and liquid pipelines
- **可在气体及液体介质管线运行**

ILI Technology管道内检测技术

Magnetics - MF4 漏磁检测器-四代漏磁检测器

- Measure leakage field in 3 directions
- 能从轴向、径向及环向测量漏磁场
- More channels compared to MF3
- 比三代漏磁有更多信道
- Caliper as standard
- 高清几何为标准配置
- Mapping ready
- 集成测绘可选
- Super High Res reporting specifications
- 超高清报告
- 1.5D standard on most builds
- 绝大部分为1.5D标准组装

ILI Technology 管道内检测技术

Magenetic Field Components 磁场要素

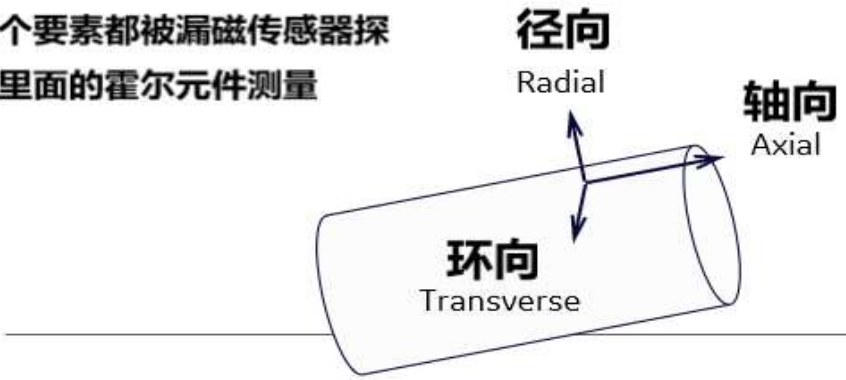
Magenetic Field Components

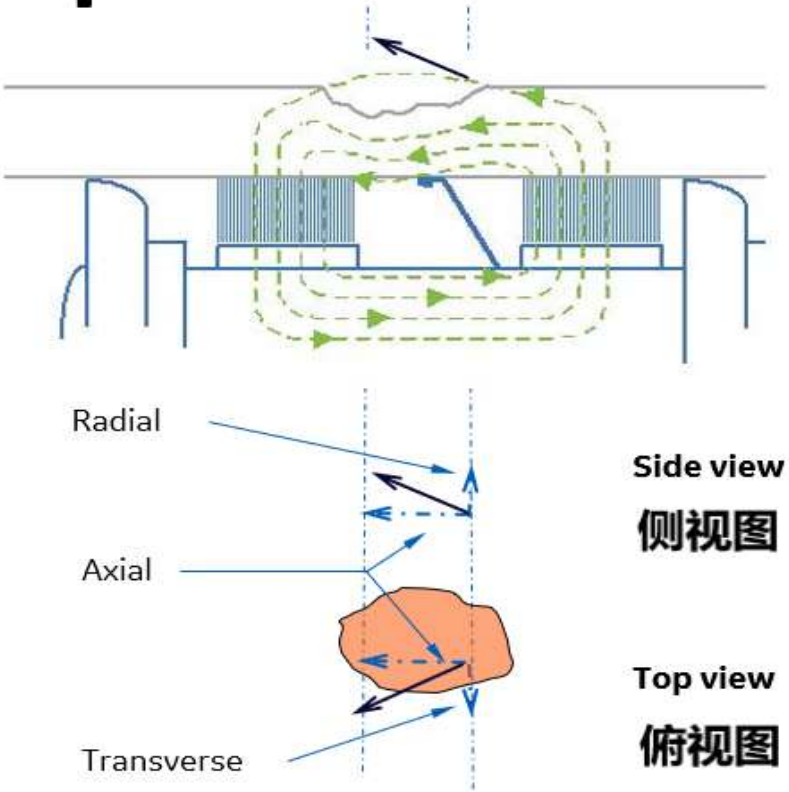
Any point in the magnetic field can be resolved into 3 components.
磁场中的任意一点都可以分解为三要素
Axial - in the same direction of the flow
轴向：与管道内流体同向
Radial - perpendicular to the pipe wall
径向：与管壁垂直
Transverse - circumferential direction

环向：圆周方向

Each component is measured by Hall-effect sensor within the MV sensor finger.

每个要素都被漏磁传感器探头里面的霍尔元件测量





ILI Technology管道内检测技术

Magnetics - TFI漏磁检测器-环向漏磁检测器

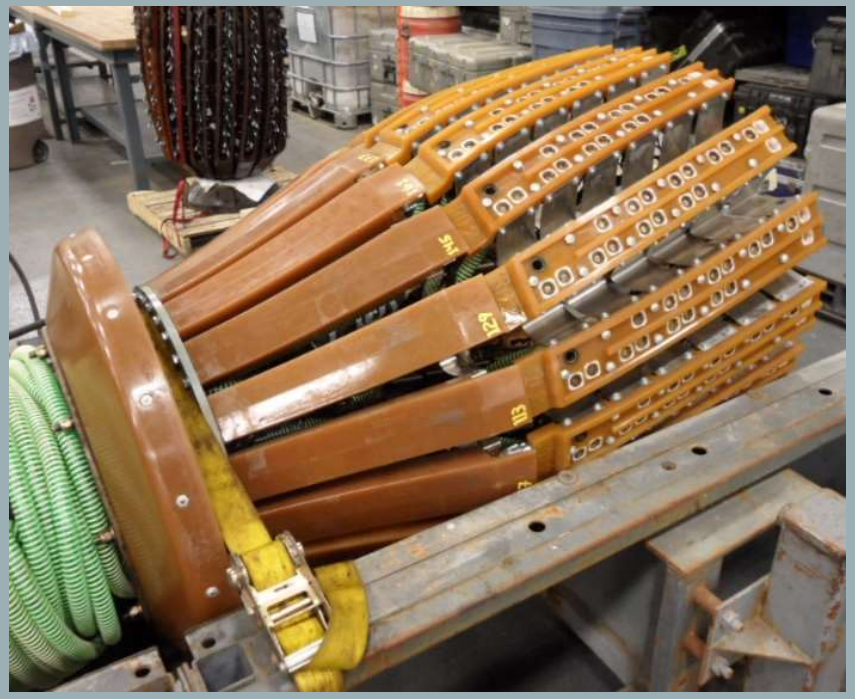
- Transverse Field Inspection
- 横向场检测
- Great for longitudinal defects such as channeling and defects along seam welds.
- 非常适用于纵向裂纹探测如沟槽、沿焊缝分布的缺陷

ILI Technology管道内检测技术

Ultrasonics - Wall measurement

超声波检测器-壁厚测量检测器

- Use perpendicular compressed wave to measure metal-loss
- 用垂直压缩波测量金属损失
- Measurements of metal-loss based on sound speed and timing of echoes
- 金属损失的测量基于音速和反射波时长
- Internal and external discrimination
- 内外部（缺陷）辨别
- Accurate defect profile for MAOP calculation
- 为计算管道的最大运行压力计算提供精确数据
- Can only run in liquid pipelines
- 只能在液体介质管线中运行



ILI Technology管道内检测技术

Ultrasonics - Crack detection

超声波检测器-裂纹检测器

- Use 45° sheer wave in the pipe wall to detect cracks
- 利用管壁中的45度横波来探测裂纹
- Detect and measure longitudinal cracks down to 1mm deep
- 最低可以探测并测量一毫米深的纵向裂纹
- Only works in liquid lines
- 只能在液体介质管线里运行

ILI Technology管道内检测技术

Ultrasonics – EMAT

超声波检测器-电磁超声波检测器

- EMAT stands for Electromagnetic Acoustic Transducer
- EMAT 代表电磁声学传感器
- Use 6 sensor carriers to increase
- Probability of Detection
- 使用六个传感器载体增强探测概率
- Detect and measure longitudinal cracks down to 1mm deep
- 最低可以探测并测量一毫米深的纵向裂纹
- Run in gas pipelines
- 可在气体管线中运行

ILI Technology管道内检测技术

Ultrasonics – DUO

超声波检测器-DUO

- Use phased array sensors
- Can do crack detection and wall measurement in one run
- 采用相控阵传感器可以在一次运行中完成壁厚测量和裂纹检测
- Only one in the world
- 全世界仅有一台
- Run in liquid pipelines
- 只能在液体管线中运行

Local Entity 本土实体

Local Entity本土实体

Local technicians 本土技术员

All of our local field technicians have been through our rigorous training programs, in-field assessment and are Level 2 certified, some in more than one technology. They have many years of experience and are competent in executing commercial projects.

所有的本土技术员都经历了我们严格的培训程序，现场考核评估以及二级认证，部分人员掌握多种技术。他们都拥有多年工作经验能胜任商务项目的执行。

Local Entity本土实体

Local tools 本地检测器

We have our own dedicated tool fleet in China for flexibility and quick response time. In case of peak demand, we can acquire tools from other regions.

我们在中国拥有自己的专用的团队以便于提供更灵活和快速的回应。同时我们也可以从其他区域获取检测器以应对需求高峰。

Local Entity本土实体

Local sourcing本地采购

Fasteners, some machined parts and PU parts are sourced locally. This allows us to reduce cost and turn-around time, and be responsive to customers' needs.

紧固件、部分机加工零部件及聚氨酯零部件采用本地采购。这就为我们降低成本和周转时间、能够更加灵活和快速的应对客户的需求提供了便利。

Global Support全球支援

If we require any support for complex projects, we have a dedicated applications team around the world. They can support us in terms of project evaluation, engineering design, special parts, unconventional tool configurations and man power.

如果有复杂的项目需要任何支持，我们有一只专业的应用工程师分布在世界各地。他们可以从项目评估、工艺设计、特殊零部件、非常规设备配置及人力方面提供大力支持。

Global Support全球支援

Canada	
Facilities	Headcount
1	280

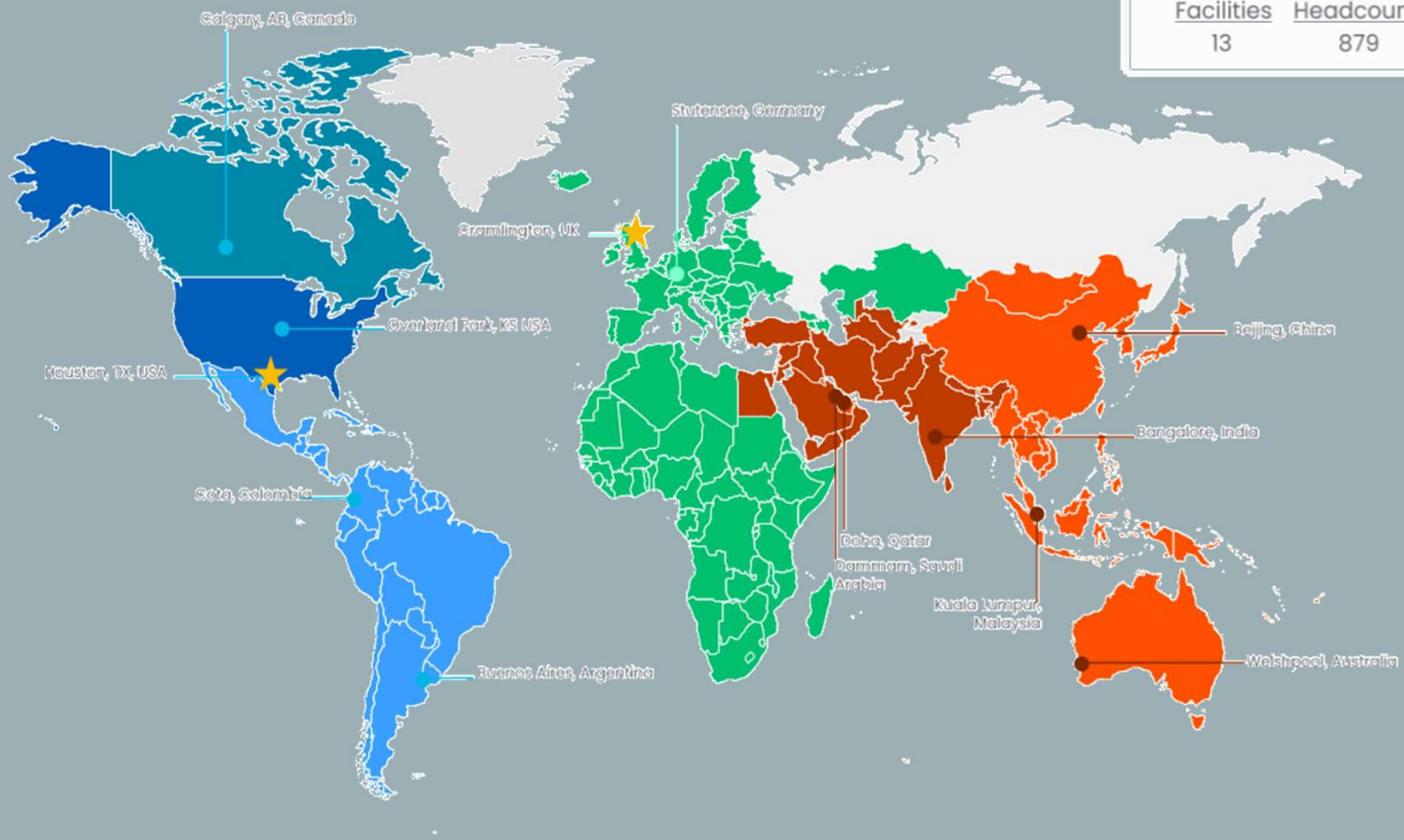
United States	
Facilities	Headcount
2	184

Latin America	
Facilities	Headcount
2	46

Europe, Africa & Caspian	
Facilities	Headcount
2	279

Middle East	
Facilities	Headcount
3	33

Asia Pacific	
Facilities	Headcount
3	57



Global	
Facilities	Headcount
13	879

Questions and answers 问答时间

Thank you for your time!!!!!!

非常感谢大家的参与!