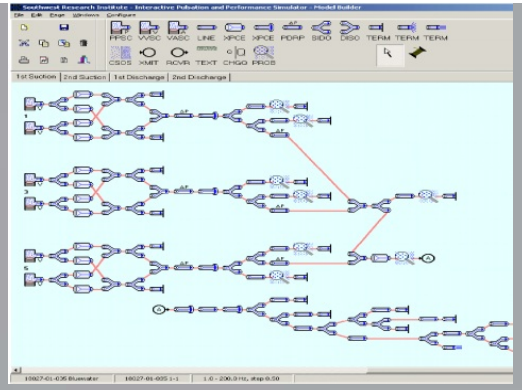
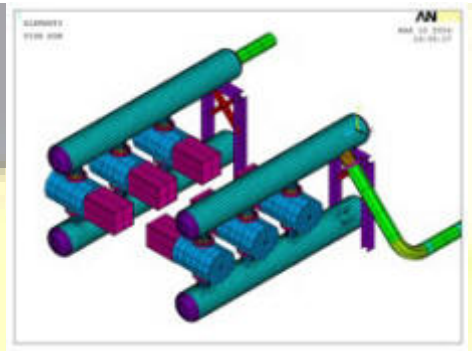


IPPS input interface window, which is used to input the compressor information and the acoustic layout of the attached piping.

IPPS 输出窗口界面，用于压缩机信息的输出和连接管道的声能分布。



ANSYS mechanical build-up for a 6-cylinder reciprocating compressor manifold system

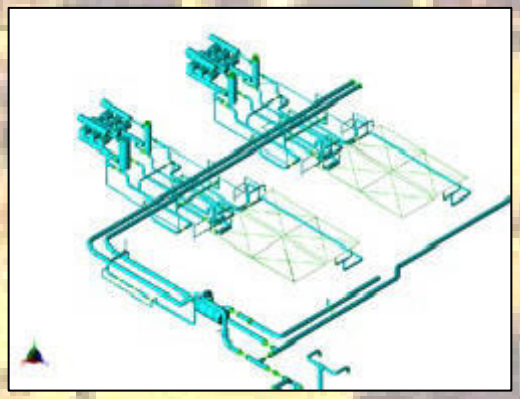
用于 6 缸往复式压缩机系统的有限元 ANSYS 软件的机械构造。

Fluid Systems Engineering

流体系统工程

Compressor System and Pump System Analyses

压缩机和泵系统分析

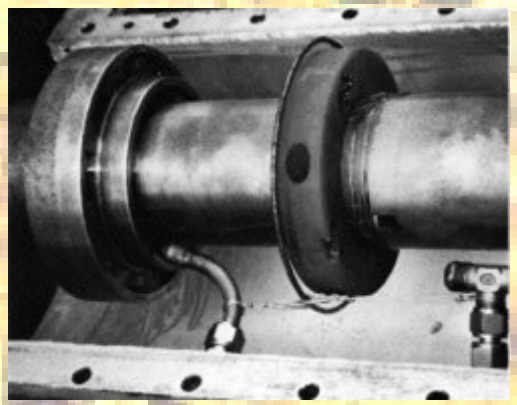


Caesar II piping build-up for a thermal analysis of two, parallel 6-cylinder reciprocating compressor units

用于热力分析的 Caesar II 管道，由两套并行的 6 缸往复式压缩机建成

A typical reciprocating compressor installation, including the top of the concrete block and the chock mounts

典型往复式压缩机的安装，包括水泥基础和楔形衬件。



SwRI engineers installed a strain gage transmitter at the coupling to identify damaging critical speed in a rotor train.

美国西南研究院工程师在列车转动连接处安装扭力规传感器，用于确定临界速度的伤害。

Fluid Systems Engineering

流体系统工程

Compressor System and Pump System Analyses
压缩机和泵系统分析

The Gas Machinery Research Council (GMRC) Design Facility (also known as the Fluid Systems Engineering section at Southwest Research Institute (SwRI)) provides engineering design solutions to compressor and pump problems. The Design Facility provides the following design services:

- Acoustical (pulsation) analyses
- Mechanical vibration analysis
- Thermal stress analysis
- Foundation analysis
- Torsional analysis

天然气机器研究委员会（GMRC）设计设施（在美国西南研究院内部也称作流体系统工程部）为压缩机和泵的技术问题提供工程设计结论，美国西南研究院能够提供以下领域的设计服务：

- 声音及脉冲分析
- 机械振动分析
- 热应力分析
- 基础分析
- 扭转分析

Our design services include validating designs before construction and correcting problems of existing field installations. These design services are applicable to systems associated with the following machine types:

- Reciprocating compressors
- Centrifugal compressors
- Pumps

我们的设计服务包括设计校核（在施工和现场安装之前的设计修正）。这些设计服务主要应用于以下机器类型：

- 往复式压缩机
- 离心式压缩机
- 泵

Field troubleshooting services can also be provided by the SwRI Plant Engineering section.

More than 10,000 compressors have been studied by SwRI for companies in more than 60 different countries
美国西南研究院为其它公司研究的压缩机数量已经超过1万余台，遍布十七多个国家

我们也能为客户提供现场故障诊断及问题解决的服务。

Acoustical (Pulsation) Analyses

Simulation analyses of the effects of pressure pulsations from a compressor or pump can assess the likelihood of system component or piping vibration. Predicted system responses can be used to identify and eliminate operationally undesirable or structurally damaging pulsations.

The pressure pulsation (acoustic) design analysis tool used and developed at SwRI is known as the Interactive Pulsation-Performance Simulation (IPPS) tool.

声音及脉冲分析

压缩机和泵的压力脉冲效果的仿真分析能够评价系统部件及管道振动的可能性，系统响应的预测

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能用于确认和消除运行中所不期望的对结构造成损伤的脉冲现象。

在美国西南研究院应用和开发的压力脉冲（声音脉冲）设计分析工具，被称作 IPPS 交互式脉冲性能模拟工具。

Mechanical Vibration Analysis

Mechanical modeling techniques are used to eliminate excessive vibration and dynamic stress caused by mechanical and pulsation-induced shaking forces generated by compressors and pumps. Mechanical analyses are performed to assess the likelihood of a coincidence of system component structural resonance and pulsation (acoustic) energy within the piping system.

机械振动分析

机械建模技术常用于消除在压缩机和泵运转过程中由机械和脉冲冲击力造成的过度的振动和动应力。在管道系统内，采取机械分析的方法评价系统中部件的结构共振及脉冲能量的现象。

Thermal Stress Analysis

To determine static stress caused by thermal expansion, pressure, and weight, engineers at SwRI model piping systems and major system components, such as support structures, pulsation control systems/filter bottles, coolers, and pressure vessels.

Piping configurations, diameters, restraints, and branch connections can be modified to reduce stress to within allowable tolerances. Recommended system modifications are assessed to ensure they do not adversely affect system flow performance and efficiency.

热应力分析

确定由热膨胀、压力及重量引起的静态应力，美国西南研究院工程师模拟管道系统和主要的系统部件，如支撑结构、脉冲控制系统/过滤器、冷却器及压力容器等。

管道形状、直径、管道约束、支线连接都能够改造，使应力降低在允许的容许量之内，同时进行推荐系统改造的评价，确保它们不足以影响流动的性能和效率。

Reciprocating Compressor Foundation Integrity

SwRI engineers help increase foundation block integrity and foundation block life and reduce block maintenance costs by predicting both compressor foundation loads and the stresses they cause and the potential for concrete cracking. Engineers then analyze alternative approaches to control excessive stresses and cracking.

往复式压缩机基础的完整性

美国西南研究院工程师通过预测压缩机基础的负荷及应力，这可能引起混凝土裂纹，从而帮助增加基础结构的完整性和基础的使用寿命、且减少其维修费用。随后，为控制过多的应力及裂纹，工程师们进行替代的方案分析。

Machinery Torsional Dynamics

Natural frequencies created by the distribution of train component flexibilities and inertias cause damage when torsional critical speeds of the compressor or pump coincide with strong excitation frequencies. Process trains driven by synchronous motors or with some types of variable-speed

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couplings can be especially susceptible to damage at resonance because of excessive excitation.

机械扭转动力学

列车部件挠性力和惯性力分布产生的列车固有频率，当压缩机和泵的扭转临界速度具有强烈的激励频率时，会引起结构的伤害。同步电机驱动或变速箱驱动的列车，由于过度激励导致的共振，特别易于受到伤害。

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