PSRE
NTP Truboprovod
Piping Systems Research & Engineering Co.

START Prof – THE WORLD'S FIRST PIPE STRESS ANALYSIS SOFTWARE

First introduced in 1969

De facto standard in Russia and CIS countries

Summary

START Prof evaluates the structural responses and stresses of the different-purpose piping systems at static and cyclic loadings and seismic analysis. The first edition of the START Prof Software has been introduced in 1969.

Today START Prof is the most widely used pipe stress analysis software in Russia and CIS countries. It has become a pipe flexibility and stress analysis *de facto* standard for process and power piping, gas and oil transmission, and district heating piping systems in these countries.

START Prof is used by more than 1500 companies in Russia, Ukraine, Belarus, Kazakhstan, Turkmenistan, Uzbekistan, China, Japan, Lithuania, Czech Republic, Serbia, Finland, Germany, Italy, United Kingdom, and South Korea. The total number of the licenses exceeds 8000. START Prof is widely used by major plants and design companies in chemical, oil & gas, power, metallurgy and other industries.

START has a Russian, English and Chinese user interface, user guide, and help system.

Due to ongoing feedback from a lot of users, cross-testing with other software, quality assurance system, it is well verified. Every new version passes quality assurance testing with more than 200 special verification models.

The START Prof Software is fully certified according to Russian standards.

System requirements: Windows 7/8/10, IA-32 or AMD64/EM64T processor, Memory 1Gb and more, Graphics card with OpenGL 2.0 or higher, support NVIDIA or AMD/ATI, recommended NVIDIA GeForce 7000 or higher or Radeon X300 or higher with 1Gb or more memory.

Codes

START Prof performs stress computations according to various Russian, Chinese and American piping codes:

- Power piping: ASME B31.1, DL/T 5366-2014, RD 10-249-98
- District heating: CJJ/T 81-2013, GOST R 55596-2013
- Process piping: GOST 32388-2013
- Gas & oil transmission pipelines: SNiP 2.05.06-85, SP 36.13330.2012
- FRP/GRP/GRE piping: ISO 14692-3:2002

Types of Pipelines

The following types of pipelines are covered:

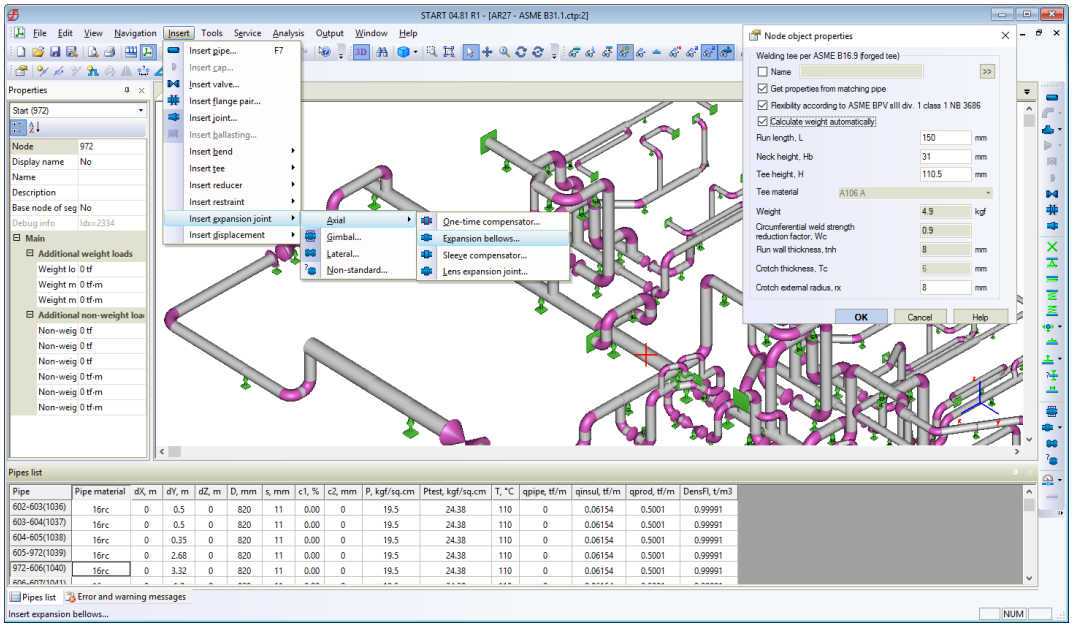
- Above-ground, underground and buried pipelines
- Branched and closed contour pipelines
- With different types of expansion joints
- With various types of restraints and boundary conditions
- With different external loads (thermal expansion, dead weight, pressure, concentrated and distributed forces, supports displacement, hanger, settlement, pre-stretch, etc.)
- Operating at low and high temperatures. For high temperature pipelines the creep and stress relaxation effects are analyzed.
- With internal and external pressure (vacuum). For vacuum pipelines a local stability analysis of walls is performed
- Simultaneous analysis of several not connected pipeline segments
- Seismic analysis
- Plastic piping analysis

Databases

The software includes five databases:

- "Materials": includes physical properties of pipeline elements and materials
- "Springs": includes properties of spring hanger tables per OST 108.764.01-80, MVN 049-63, OST 24.125.109-01, MN 3958-62, LISEGA, WITZENMANN, NBT 47039-2013, China Power
- "Constant load hangers": includes properties of constant load hangers WITZENMANN, NB/T 47038-2013
- "Soils": includes mechanical and physical properties of soils for buried pipelines modelling
- "Flexible joints": includes properties of axial, gimbal, lateral flexible joints
- "Insulation": includes insulation weight values depending on the insulation structure, temperature and pipe diameter

START Prof User interface



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START-Elements — Pipeline Designer's Tool

Besides analysis of arbitrary configuration pipelines, we have implemented a working tool for a pipeline designer — a START-Elements option. Start software is designed for rapid flexibility estimation of separate pipeline fittings, their strength and stability analysis. Using START-Elements, one can do the following:

- Analyze stress of L, Z and U-shaped piping loops (buried and above-ground)
- Calculate wall thickness or maximum pressure for pipes, bends, reducers, tees, caps, according to the code selected
- Calculate maximum allowable distances between supports via strength and stiffness analysis
- Check general and local stability of straight and curved pipe elements under the thermal expansion, external pressure (vacuum) and soil pressure loads
- Calculate minimum pipeline laying depth for buried pipelines using stability analysis
- Calculate maximum pipeline laying depth for buried pipelines by polyurethane insulation stress analysis
- Calculate allowable load on saddle support for large-diameter pipes
- Calculate allowable distances between single action (one time) compensators and their closing temperature
- Calculate bellows stiffness if the manufacturer's data are absent
- Check leak tightness of flange joints
- Centrifugal pump load check per API 610 (ISO 13709), GOST 32601-2013 and Kellogg (L.C. Peng)

START Prof Offers

- User friendly interface
- Object-oriented data input
- Input data error checking and reports. The error checker analyzes the user input and checks for consistency from both engineering and geometrical point of view
- Context-sensitive help system and detailed user manual
- Automatic on-the-fly checking of all pipes and fittings allowable pressure
- Check and selection of typical piping assembly parameters (different types of expansion joints, stub-ins, tees, flange joints)
- Analysis of multipurpose pipelines with various location (including vacuum lines) in accordance with different codes and standards
- Vessel nozzles flexibility calculation
- Integration with Hydrosystem software
- Training by our certified specialists that can be provided at your location or in one of our training centers for additional fee
- Wide reliable network of distributors throughout Russia, Europe and Central Asia
- Technical support from START Prof developers
- Export of pipeline model to dxf file for further processing by AutoCAD, MicroStation etc.
- Exports input data and analysis results to Microsoft Word
- Import from PDMS, Plant4D, PCF format files (provided by CEA Plant4D, Bentley AutoPlant, PlantSpace, Autodesk Plant3D, Coade CADWorx, Intergraph SmartPlant and other systems), START Neutral file

Analysis and Design Features

- Nonlinear effects by friction in sliding, guide and spring supports, large-rotational rods and hangers, one-directional restraints
- Interaction between pipeline and soil in buried pipelines, taking into account nonlinear soil flexibility, PUR insulation layer and expansion cushions
- PUR insulation stress analysis
- Automatic spring hanger and constant load hanger selection
- Bourdon effect in pipeline and bends having initial ovality
- Equipment and vessel nozzle flexibility effect (only with START-Nozzle option)
- Prestressed long radius curved pipes analysis
- Vacuum line walls stability analysis considering stiffening rings reinforcement.
- Analysis results include code stress tables, support & nozzle loads, displacements, forces, deformations of expansion joints and vacuum line walls stability factors
- Pipeline deformed shape view
- Colour illustration of code criteria in piping output
- Plastic piping analysis polyethylene (PE), polypropylene (PP), polybutene (PB), Polyvinylidene fluoride (PVDF), polyvinylchloride (PVC) e.t.c. according to GOST 32388-2013

Pricing Options

Option	Description
START-Power	Include codes: Power piping (ASME B31.1, DL/T 5366-2014, RD 10-249-98) and District heating (CJJ/T 81-2013, GOST R 55596-2013), FRP/GRP/GRE piping (ISO 14692-3:2002)
START-Process	Include codes: Process piping (GOST 32388-2013) and Gas & oil transmission pipelines (SNiP 2.05.06-85, SP 36.13330.2012), FRP/GRP/GRE piping (ISO 14692-3:2002)
START-Professional	Include all codes

Some reference Users of START Prof Software

Power and Heating Supply Industries: Beijing deyu technical service, Jinan Municipal Engineering Design & Research Institute, Qingdao Kaiyuan Heating Engineering Design and Research Institute, Jilin Gas And Heating Engineering Design Institute, Institute of Architecture Design & Research, China Academy of Sciences, Beijing Thermal Engineering Design, Shenyang Thermal Engineering Design and Research Institute, Heilongjiang Academy of Forestry Research and Design Institute, Heilongjiang Haote Thermal Design, China Northeast Municipal, Yinchuan planning & design institute (China), DAELIM Industrial (South Korea), OÜ Aither (Estonia), UAB Bioprojektas (Lithuania), Gandras Ebergoefektas (Lithuania), Regional engineering centers and energy generation companies: Institute TeploElektroProekt (Russia), Ural Power Engineering Centre (PEC), Volga region PEC, VNIPIenergoprom (Russia), BelNIPIenergoprom (Belarus), KazNIPIenergoprom (Kazakhstan); All-Russian Thermal Engineering Institute – VTI, Project-Engineering Center New Generation (Russia); Atomenergoprom design institutes: Atomenergoproekt, VNIPIET, KGPII VNIPIET, UPII VNIPIET etc.

Oil and gas industry, oil and gas refining, petrochemistry: Mitsubishi Heavy Industries Ltd. (Japan), JOHN Brown Engineering (UK); Key Industry Engineering Group s.r.o. (Czech Republic); TECHNIP (Moscow); VNIPIneft (Moscow); Giprokauchuk (Moscow); Surgutneftegaz design institutes: SurgutNIPIneft, Lengiproneftekhim (St. Petersburg); Rosneft design institutes: Samaraneftehimproekt, SakhalinNIPImorneft, Rosneft-NTC; LUKOIL-Rostovneftekhimproject; Angarskneftekhimproekt; GAZPROM design institutes: Giprogazcenter (Nizhny Novgorod), VNIPIgazdobycha (Saratov), Gazproektengineering (Voronezh), TyumenNIIgiprogas; Giprotyumenneftegaz, Tyumenneftegazproject, Giprogazoochistka (Moscow), Omskneftekhimproject, Bashgiproneftekhim (Ufa), Ukrneftekhimproject (Ukraine), Belorusneft-NeftekhimProject (Belorus, Minsk), NIICHIMMASH (Moscow), IrkutskNIIhimmash, Tyumengiprotruboprovod, VNIIST-Neftegasproject (Moscow), Giprovostokneft (Samara), VNIPITRANSGAZ (Ukraine, Kiev), LUKOIL-Permnefteorgsintez, Neftgaz Sanoat Lohiya (Uzbekistan) etc.

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Chemistry: Poyry Industry Oy (Finland), ACRON (Veliky Novgorod), Sayanskkhimplast, SIBUR Kemerovo Azot, TogliattiAzot, GIAP (Moscow), GIAP (Grodno, Belarus), Design Institute of Russian Scientific Center Applied Chemistry (St. Petersburg), Giprosintez (Volgograd), NIIK (Dzerzhinsk), EuroChem Tulagiprohim, Giprokislorod (Moscow), Sterlitamak Petrochemical Plant, EuroChem Azot (Novomoskovsk), Plastpolymer (St. Petersburg), Grodno Khimvolokno (Belarus) etc.

Metallurgy: Uralgipromez (Ekaterinburg), Chelyabgipromez (Chelyabinsk), Gipromez (Magnitogorsk), RUSAL VAMI (St. Petersburg), Evraz – Zapsib Steel Mill (Novokuznetsk), MECHEL Chelyabinsk Metallurgical Plant, MECHEL Izhstal (Izhevsk), Ashinskiy Metallurgical Works (Asha), Ukrgipromez (Ukraine, Dnepropetrovsk), UralEnergochermet (Ekaterinburg), Vyksa Steel Works etc.

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