# Dynamic Simulation

**MAN Energy Solutions**
Future in the making

**Digital solutions for process system analysis**

# Dynamic Simulation

**Dynamic Simulation sets the course towards a digital future of process design and system analysis. As an advanced engineering tool, it provides an in-depth understanding of transient processes of turbomachinery trains in numerous scenarios.**

Besides steady-state analyses, which are based on simplified mathematical models and are limited to a certain process condition, dynamic simulations provide a broader overview of the continuous operation of a system and translate it into transient behavior using rigorous thermodynamic and fluid flow calculations.

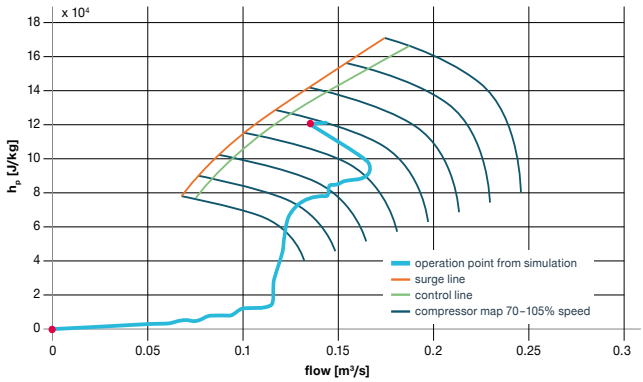
Simulations are carried out using MATLAB Simulink or Aspen HYSYS depending on the specific requirements and the intent of the study.
Typical scenarios that are examined during a simulation study include start-up procedure, load changes, normal or emergency shutdown, feed reduction and antisurge valve failure.

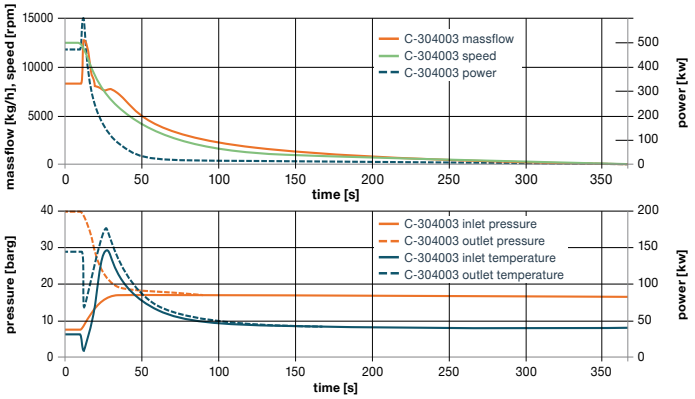
The simulation model integrates the compression system including suction system, compressor stage, recycle valve, anti-surge controller, discharge system, heat exchangers, interconnecting pipings and steam turbine or electric motor driver.

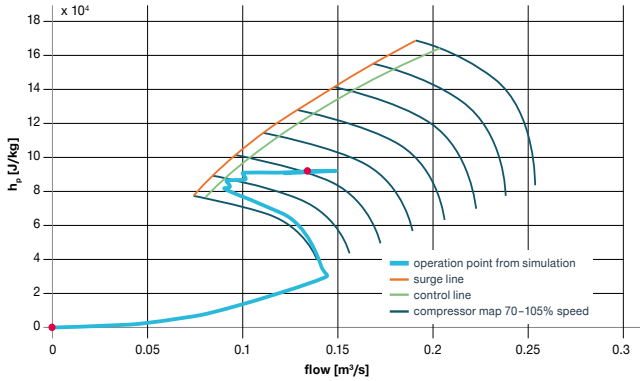
# Simulation report

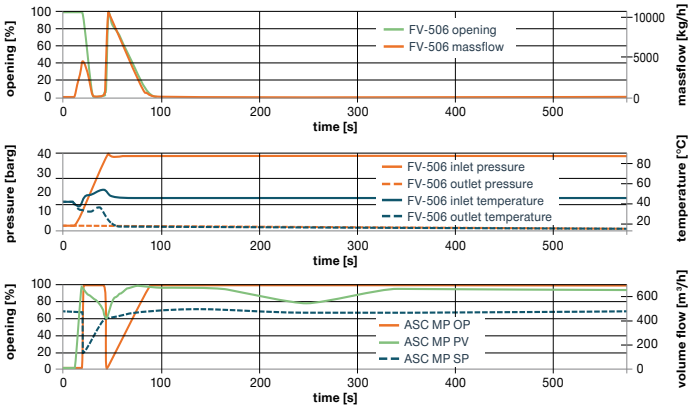
Visualize your specified operating cases in a dynamic model to analyze the transient behavior of various parameters of the compressor against time. Whether it is the start-up procedure, a static operation or a delayed or undelayed trip scenario, the options are countless.

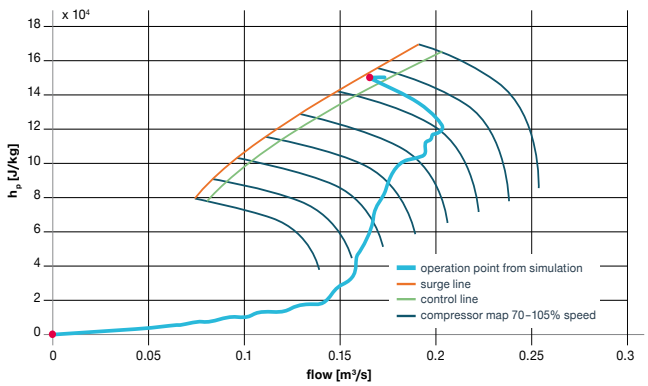
A detailed simulation report covers the results of a dynamic simulation study according to the contractually agreed scope.

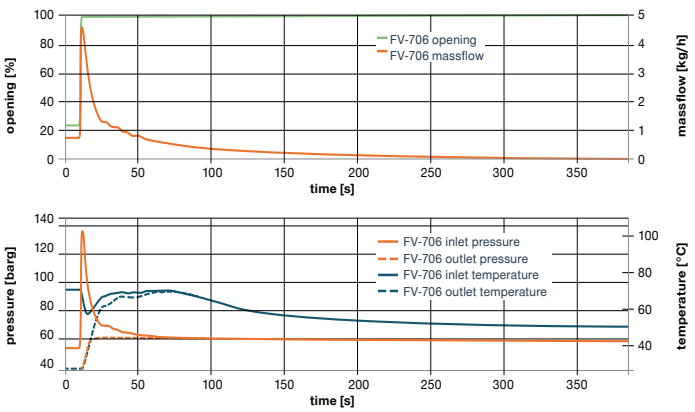


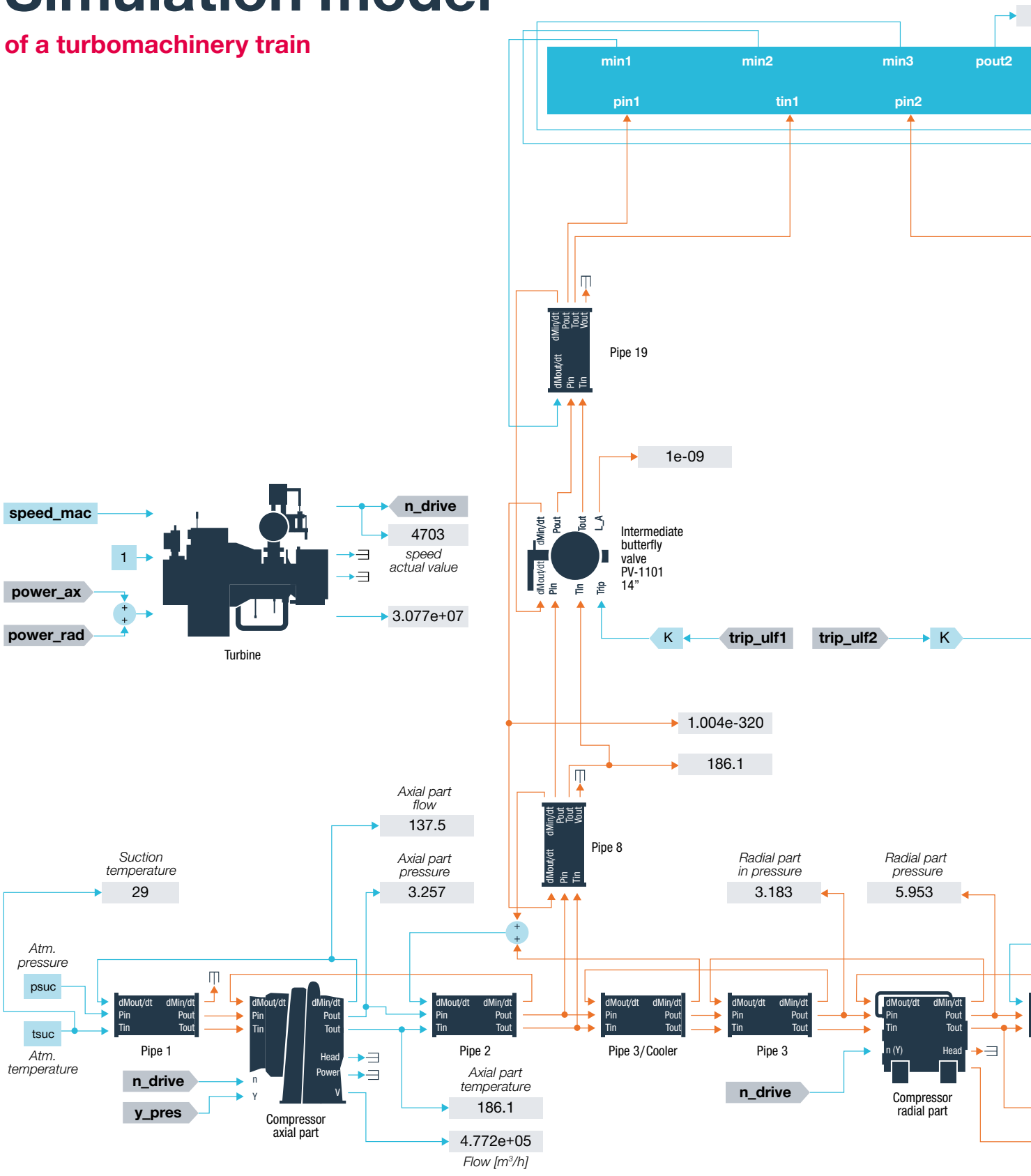



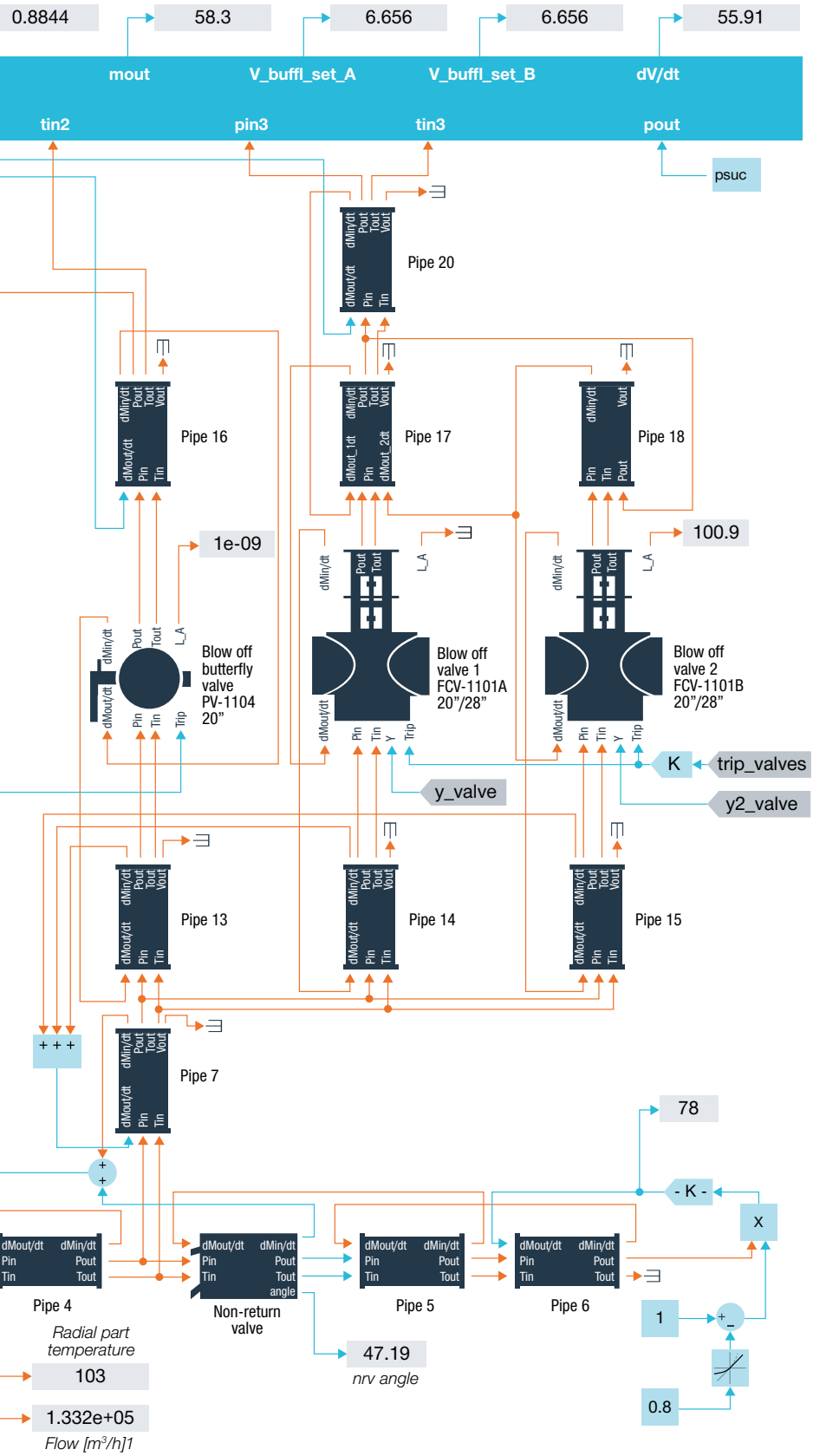



# Simulation model

## of a turbomachinery train






## Long-term experience

MAN Energy Solutions SE prides itself with over 10 years of profound experience in performing dynamic simulation studies. Over the course of time many system components have been modelled and optimized to meet any specific needs. Comparisons of simulation results with actual measured compressor performances have proven the excellent quality of MAN Energy Solutions’ simulation approach.

## Flexibility

A simulation study can be performed for new-built machine trains as well as for existing trains in order to verify a proposed system or recommend changes to increase the efficiency and overall performance of a train.

## Verification of operability and controllability

- Verify operability and controllability of the train under steady state and transient conditions
- Verification of response of the entire compression system during normal and abnormal operating scenarios
- Verify that control systems are capable of ensuring safe operation and equipment protection
- Verify the response of the anti-surge control systems and associated recycle piping
- Verify the SOP (Settle-Out Pressure) in different shutdown scenarios
- Capability to start-up from settle-out conditions
- Evaluate the requirement of hot gas bypass valve across anti surge valve
- Verification of design pressure and temperature

## Setpoints adjustment

- Adjust anti-surge valve opening time and control system response
- Optimization of control system

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