



SOUTHWEST RESEARCH INSTITUTE



Separation Technology Research (STAR) Program: Phase 2

Active Projects

Within the first few months of the STAR Program, various brainstorming and project identification efforts were completed. The result was an initial identification of six potential projects, including a mix of gas/liquid and liquid/liquid separation topics. During the initial 30 months of the STAR Program, three projects have been initiated which address four of the six topics. These projects are discussed below.



A Consortium of SwRI

Scrubber Internals Performance Testing

In specifying and selecting gas-liquid separation equipment, it is necessary to understand the performance of devices over the entire operating envelope of pressures, temperatures, and flow composition. The performance of the equipment is affected by many interdependent factors, such as the overall fluid dynamics and gas/liquid ratio of the inlet flow, flow distribution, and the fluid properties of the gas and liquid phases, all of which vary with pressure and temperature. The objective of this project is to develop performance data on scrubber internals (vane inlet device, mesh pad, and demisting cyclone pack) offered by seven equipment manufacturers with model oil and methane gas at field conditions. The testing was conducted in the SwRI Multiphase Flow Facility (MFF). This project has been completed.

Liquid-Liquid Coalescing Media Characterization

Correlating the coalescence efficiency of plate packs under various conditions can be used for the prediction of separation performance, and thus the selection of equipment. The objective of this project is to obtain performance data on a standard plate pack device in liquid/liquid service. The idea is not to simulate field-like conditions but to characterize the performance of the systems under controlled conditions. The testing will involve two standard plate packs under various atmospheric conditions, water cuts, fluid viscosities, inlet shearing conditions (droplet size), and over a range of flow rates. This project, which was actually a result of combining two project topics, was conducted at a third-party facility and SwRI monitored and directed this work. The project has been completed.

Compact Gas/Liquid Separators

Compact separation is a great weight and space saver for topside applications such as debottlenecking, but it is the holy grail of subsea. However, performance data of commercially available compact separators under a variety of field-like conditions, which would provide the confidence to use compact separation in subsea application, isn't currently available. The objective of this project is to collect small-scale performance data (taking advantage of available testing facilities) for a wide range of realistic operating conditions on currently available cyclonic/compact separators. The project is currently underway at SwRI's MFF and will be completed in May 2017.



D021824

Future Plans

In addition to developing detailed project plans for the projects underway, two additional project plans are nearly complete. The expectation is that these two projects would be initiated early in Phase 2.

Impact of Glycol (MEG) on Scrubber Performance

The presence of MEG is known to affect the performance of a gas/liquid scrubber. There is a question of whether and how much derating is necessary to account for the presence of MEG in comparison to the performance of identical equipment in an oil/gas only system. This project will provide a set of indicative tests to provide guidance for the definition of further testing to determine the details of glycol effects. The target application is intended to address the flow at the end of a tieback from an offshore platform in which MEG has been injected for hydrate inhibition but the scrubber was not originally sized for the presence of MEG. The expected outcome of this project is to measure the difference in performance of a scrubber package when MEG is present in the hydrocarbon/oil multiphase flow. This project will leverage the data and facility setup used for the Scrubber Internals Performance Testing project. The project plan is essentially finalized.

Vane Pack (Demister) Performance in Gas/Liquid Separation

The performance of vane packs for gas scrubber applications is not known with high confidence. Mapping the performance range of three "generic" vane packs – no pocket, single pocket, double pocket – over a wide range of conditions will help to determine the conditions at which the performance changes in order to obtain the basic flow performance of vane packs under realistic pressure conditions. This project will target applications such as compressor scrubbers (where efficiency is very important) and production scrubbers (where performance must be well-known or predictable). The project plan is under active development and a completed plan is expected prior to the start of STAR Program: Phase 2.

Project plan development for these additional projects is underway and these are expected to help provide a quick start to the STAR Program: Phase 2 project:

- Gas/Liquid Separation with Cyclonic Inlet Devices – The objective of this project is to collect data that will enable prediction of inlet cyclone efficiency under real conditions.
- Gas/Liquid Scrubber Tests without Mesh – The objective of this project is to evaluate the performance of gas/liquid scrubbers configured with a vane inlet and demisting cyclones (no mesh or vane agglomerators) over a wide range of gas velocities, liquid loads, and pressures.
- Gas/Liquid Scrubber Tests with Different Fluids – The objective of this project is to test the influence of different fluids on the separation performance of a gas/liquid scrubber.
- Liquid/Liquid Separation with Different Inlet Devices – The objective of this project is to quantify the effect of various types of inlet devices on liquid/liquid separation.
- Liquid/Liquid Separation with Cyclonic Inlet Devices – The objective of this project is to investigate the influence of cyclonic inlet devices on liquid/liquid separation.
- The Effect of Flow Conditioning on Gas/Liquid/Liquid Separation – The objective of this project is to quantify the impact that upstream piping configurations have on separator performance.
- Add Gas to Determine Impact on Liquid/Liquid Separation – The objective of this project is to collect data to allow the prediction of the separation efficiency as a function of type and amount of gas, bubble size, density difference, viscosity, and surface tension.

To join, please contact:

Steven Green

210.522.3519

sgreen@swri.org

starprogram.swri.org

SOUTHWEST RESEARCH INSTITUTE

Southwest Research Institute is a premier independent, nonprofit research and development organization using multidisciplinary services to provide solutions to some of the world's most challenging scientific and engineering problems. Headquartered in San Antonio, Texas, our client-focused, client-funded organization occupies 1,200 acres, providing more than 2 million square feet of laboratories, test facilities, workshops, and offices for nearly 2,600 employees who perform contract work for government and industry clients.

An Equal Employment Opportunity/Affirmative Action Employer
Race/Color/Religion/Sex/Sexual Orientation/Gender Identity/National Origin/Disabled/Veteran
Committed to Diversity in the Workplace

swri.org

SwRI Business Development
PO Drawer 28510
San Antonio, Texas 78228-0510 USA

bd@swri.org • 210.522.2122



©2018 Southwest Research Institute.
All rights reserved.

Designed & printed by SwRI MPS 18 0118 254148 tp

Benefiting
government,
industry and the
public through
innovative science
and technology