

# **SUCKER ROD PUMPING – RELIABILITY INFORMATION AND FAILURE TRACKING SYSTEM (SRP-RIFTS)**

Cleon Dunham, Oilfield Automation Consulting  
Francisco Alhanati, C-FER  
Bill Lane, Weatherford  
Guillermo Leal, BP  
James Martin, Consultant

## **ABSTRACT**

For more than ten years the Petroleum Industry has used and benefited from a Reliability Information and Failure Tracking System for electrical submersible pumping (ESP-RIFTS). More recently another RIFTS system for progressing cavity pumping (PCP-RIFTS) has proven to be beneficial to participating members. At the 2010 Sucker Rod Pumping Workshop, discussion started about developing a RIFTS project for sucker rod pumping. This is now about to become a reality.

The RIFTS systems collect and store information on pumping systems and system failures. This information is tracked to discover different types of failures and failure mechanisms. Companies that are members of the RIFTS Joint Industry Project (JIP) can search this information to determine which system components work best in differing conditions. They can determine which metallurgies or system suppliers are more effective in specific situations. They can benchmark their equipment and processes vs. others.

Participation in the JIP's created for the development of ESP-RIFTS and PCP-RIFTS has been limited to Operating Companies. However, for the Sucker Rod Pumping – Reliability Information and Failure Tracking System (SRP-RIFTS), it may be possible to include other industry players (e.g. manufacturers, service providers, consultants, and universities), which would contribute some of the data or system tools and have access to some of the information in the system.

## **INTRODUCTION AND BACKGROUND**

Discussion of the need for improved methods to learn about sucker rod pumping failures and reliability started at the 2010 Sucker Rod Pumping Workshop. There was a presentation by Mike Poythress of John Crane entitled, "Drill Baby, Drill," in which he stressed the importance of collecting and analyzing sucker rod failure data. This was followed by a discussion among the Workshop attendees of the potential value of having an industry-wide system for this process. It was pointed out that there is precedent for this. There are existing systems for collecting and evaluating failure data for electrical submersible pumping systems and progressing cavity pumping systems. These are:

- ESP-RIFTS with 14 member companies.
- PCP-RIFTS with 6 member companies.

## **INITIAL PROCESS**

The Artificial Lift Research and Development Council (ALRDC) agreed to take the initiative on this. It agreed to form a team to explore development of a RIFTS system for sucker rod pumping. The following steps have been taken:

- Several Operating Companies, Service/Supply Companies, and others (Consultants, Universities, etc.) have been invited to a series of meetings to discuss this initiative. There have been four meetings so far.
- A questionnaire was prepared to understand each company's specific interests in this effort. Results of this are discussed in the next section of this paper.

- The Canadian Research Organization C-FER-Technologies was chosen to lead the SRP-RIFTS project. They lead the ESP-RIFTS and PCP-RIFTS projects so already have the knowledge and experience to successfully lead the SRP-RIFTS project.

### QUESTIONNAIRE OF POTENTIAL MEMBER COMPANIES

A questionnaire was sent to the companies that have shown interest in this project. Here are some of the primary results from the questionnaire:

- Eleven companies completed the questionnaire; four Operating Companies; three Service/Supply Companies, three Consulting Companies, and one University.
- Each of the Operating Companies that responded operates more than 1000 sucker rod pumping units.
- Most of them provide training in sucker rod pumping design and use, and some of them conduct research and development of ways to improve sucker rod pumping usage.
- All companies would like to include the following information in an SRP-RIFTS system.
  - All primary sucker rod system components, including surface equipment, tubulars, rods, downhole pumps, and related equipment.
  - Various types of pumping units, including conventional units, Mark II units, hydraulically operated units, etc.
  - Various well configurations, including vertical, deviated, and horizontal completions.
  - Various types of wells, including oil, gas, and water source wells.
  - Various production characteristics, including “normal,” viscous, gassy, sandy, etc.
  - All normal oil, water, and gas properties, including, gravity, salinity, etc..
  - Various temperature ranges, including “normal,” hot, and cold.
  - Various production rates for oil, water, and gas.
  - Well test rate histories and cumulative production of oil, water, and gas.
  - All types of failures from erosion, corrosion, overloading, defects, handling and make-up, etc.
  - All types of failure descriptions, including infant mortality, depth where failure occurred, deviation where it occurred, etc.
  - The reason for pulling the rods/tubing , including planned shut-down, poor performance, known failure.
- Most companies would prefer and support some form of automatic data collection. Since there is a concern about the effort involved in collecting/validating information on a large number of wells, it will be very desirable to fully or at least partially automate this process.
- Most Operating Companies are willing to share sucker rod pumping failure data with other companies. This leads to inviting Operating Companies to be “Full” members of the SRP-RIFTS JIP.
- Most Service/Supply Companies are not willing to share information on their pumping equipment with other Service/Supply Companies. As a result Service/Supply Companies may become “Limited” members whereby they can see information on their equipment in detail, but access to information related to other Service/Supply Companies will be limited. .
- Most companies are interested in using various failure analysis tools including methods to:
  - Evaluate system and component performance and explore ways to improve it.
  - Benchmarking their operations and/or equipment vs. others.
  - Helping to choose equipment for new fields.

### INFORMATION COLLECTED TO DATE

- List of companies that already collect sucker rod pumping data. Quite a number of companies already collect sucker rod failure information and have it in a form where it can be relatively easily transmitted into an industry RIFTS database. Currently there are nine companies on this list.

- List of Operating Companies that have expressed at least some interest in joining an SRP-RIFTS Joint Industry Project (JIP). There are twenty six companies on this list. Of these, four have expressed definite interest in joining a SRP-RIFTS Joint Industry Project.
- List of Service/Supply Companies that are interested in being part of this effort, but probably on a different basis from Operating Companies, since they are unwilling to share information on their equipment and proprietary information from their client Operating Companies. There are ten companies on this list and all but one have expressed definite interest in being part of the project.
- Lists of Consultants, Universities, etc. who are interested in helping with this effort. Potentially they will offer “in kind” services in lieu of paying a JIP membership fee. There are eight companies and/or universities on this list and all have expressed definite interest in being part of the project.
- A number of documents. Copies of these documents can be provided to anyone who is interested by contacting the author at [cleon@oilfieldautomation.com](mailto:cleon@oilfieldautomation.com).
  - A comprehensive outline of this project.
  - A high-level project description.
  - A justification that may be used by any company that wishes to consider joining the SRP-RIFTS Joint Industry Project.
  - A statement of the costs and conditions for membership in the SRP-RIFTS Joint Industry Project.
  - An explanation of how the project will be managed.
  - A draft contract that companies will be asked to sign.
  - A detailed list of the specific items that people want to have covered by this system.

### POTENTIAL THREE-PHASE DEVELOPMENT PROCESS

The team has defined a three-phase process to implement the SRP-RIFTS project.

- **Phase I** – Phase 1 is being conducted by ALRDC. Companies are not required to join a JIP at this stage so there are no direct out-of-pocket costs.
  - Collect a sample of sucker rod pumping information from a short list of companies.
  - Illustrate that the process for collection data can be at least partially automated so the burden for collecting/validating data on large numbers of sucker rod pumping wells will not be excessive.
  - Demonstrate how this information can be used to improve sucker rod pumping system performance.
  - Develop a standard approach and methodology for collecting sucker rod data.
  - Prepare a comprehensive project justification that companies can use to convince their management of the value of joining the SRP-RIFTS Joint Industry Project.
- **Phase 2** – The project team will develop a comprehensive plan to initiate the project. As part of this phase, companies will be enlisted to join the SRP-RIFTS Joint Industry Project.
  - **Legal Agreements.** Legal agreements will be created that companies can use to officially join the SRP-RIFTS Joint Industry Project.
  - **Costs.** The costs of membership in the SRP-RIFTS Joint Industry Project will be defined.
  - **Anticipated Benefits.** The anticipated benefits of SRP-RIFTS will be documented. These will include but will not be limited to the ability to:
    - Estimate system run-life in different applications.
    - Verify which companies have experience in specific applications (e.g. thermal recovery, CBM, or shale operations),
    - Benchmark run-life in one operation vs. those in similar operations across the industry.
    - Compare performance across operations using a standard “score card” of well defined and consistent reliability metrics.
    - Improve the quality (completeness and consistency) of the data collected.

- **Time Line.** The timeline for official formation of the SRP-RIFTS Joint Industry Project will be defined.
- **Phase 3** – In Phase 3, the SRP-RIFTS system will be implemented. During this phase, training may be offered in data capture/validation and in failure root cause analysis/mitigation, if this is requested by the Member companies.

#### CURRENT STATUS

- A justification has been prepared for Phase I.
- A confidential disclosure document drafted to protect confidentiality of information provided for Phase I. This has been sent to all potential participants in Phase 1.
- Efforts are currently underway to begin collecting sucker rod pumping operating and failure data to perform the study component of Phase 1. This is being addressed by James Martin working under the auspices of ALRDC. He will integrate the data into a trial SRP-RIFTS database for initial analysis.