Memorandum

To: Louis Walckiers AT-MTM

CC:

From: V. Chohan and SM18 Operation Team

Date: 10/21/2005

Re: **Single Stretched Wire Measurement Systems - Problems and Solutions**

The Operation team at SM18 has carried out Single Stretched Wire measurements on SSS (ARC and IR) and Dipole magnets several times during the past one year. During these measurements, the operation team has encountered numerous problems due to a variety of reasons. **These problems have led the operation team to approach SSW measurements with apprehension and they often feel stressed while carrying out the measurements.** A list of the various problems encountered, the underlying reasons and possible solutions are detailed below.

I) Equipment related problems

1. The SSW system consists of a trolley with specialized electronics rack and workstation, 2 Stages for wire installation and Leica equipment for survey purposes. This equipment is not only bulky but also delicate and fragile and it requires specialized, careful and patient handling. Hence it is not particularly suited for production testing of magnets where one has to complete one test after another in minimum time in order to match with the required magnet testing rate.

2. Assembling the equipment in its proper place requires a lot of material handling (using cranes) and requires specialized staff and tools (not available at night or weekends). Interconnection between the stages, trolleys and electronics of the system requires connection of a large number of cables which are poorly marked or documented and the connection differs from one SSW system to the other.
3. Currently, 3 SSW systems are available for use, but all three systems have slightly different configuration, connection schemes and wire installation techniques leading to some confusion among the users.
4. The software for the SSW system is based on UNIX-like (SUN-OS), which is not very user-friendly (not 'convivial') especially for people who have never worked on UNIX systems.

II) Installation related problems

1. The installation of wire on SSW stages is a delicate operation, requiring lot of care and patience and needs the services of at least two persons from the Op team. It is de-motivating for the Op team to learn that after all their efforts, there are wire breakages due to faulty sensors in the equipment.

2. After going through the process of connecting the large number of cables and installing the wire, there is no way of confirming whether all the inter-connections/sensors/gauges are working properly or not. Only after performing the test and analyzing the results do we come to know about some problem leading to repetition of the test and loss of time.

3. There is no proper fixed lighting arrangement near the SSW stages making the wire installation work doubly difficult. The Op team had recently procured a few portable lamps to solve this problem but they have been taken away (stolen) by other teams working at SM18 for their own uses.

4. The wire fixing technique on the stages of the SSW system differs slightly from system to system. Since the wire installation is a delicate operation, it takes time to master the technique and when the technique differs from one system to the other it leads to delay in wire installation.

III) Information/Support related problems

1. SSW measurements on different types of magnets (like IR-SSS, ARC-SSS or dipoles) require a different set of configuration files. In many cases it is found that these files are either not defined or the file location not informed to the testing teams. So time is lost in searching for the correct configuration files.

2. In some cases the configuration files are not properly updated as per the magnet type leading to incorrect results and repetition of measurements. Also configuration files are different on different SSW systems adding to the delay in test execution.

3. Some SSW systems need initialization script that is neither automated nor clearly documented.

4. For some of the IR-SSS magnets there is absence of any SSW reference data such as tolerance values, alarm limits, etc. Hence the results of SSW on IR-SSS could not be analyzed by the team performing the tests.

Some possible Solutions

- **It should be ensured that all measurement systems for SSW are working and in proper condition**. This would avoid the possibility of faulty sensor/equipment in the system causing delays in the test execution (eg. faulty tension sensor leading to wire breakages in SSW).
- It is emphasized that all reference data as well as required configuration files should be made available to the test operating teams and **experts on SSW should be identified** whom the test team can refer to in case of doubt.
- The Op team (Kevin) has prepared scripts which run on the SSW workstation to aid the Op team in running the SSW measurement programs. The scripts help in identifying the configuration files for each type of magnet and also in launching the required test. A list detailing the file naming convention followed by the script has been prepared and released by Kevin. **It should be ensured that ALL CONFIGURATION FILES should follow the same naming convention (case sensitive) as defined in this list.**
- A lot of time is lost in launching the SSW measurement programs from the local SSW workstation, because of the 'un-friendly' nature of the user interface. A **proposal to upgrade this interface to a more user-friendly Graphical User Interface (GUI) had been forwarded** almost a year back but no decision has been taken on this so far. Members of the Op team (Kevin, Eric) are willing to help out in this activity, which will be of great help to the Op team members and aid in the speedy completion of SSW measurements.
- It is proposed that a **special team to work on SSW** be set up and an on-call Mr X 'expert service' be made available for SSW on a 24-hour basis.