

MALDI EasyCare

MALDI EasyCare: Maintain instrument performance for demanding MALDI-TOF applications

Matthew Openshaw
Kratos Analytical, Manchester, UK

User Benefits

- ◆ Helps maintain optimal instrument performance, particularly for high-throughput or challenging applications.
- ◆ Empowering users with the ability to perform basic maintenance (optics clean) and automated tuning.
- ◆ Reduced service callouts / reduced service costs for instrument tuning visits.

■ Introduction

All MALDI-TOF instruments are prone to fouling of the ion optics by neutrals from the matrix and sample which are ablated from the sample spot following irradiation by the laser during the MALDI process (see Fig. 1). The extraction lens - one of the lenses which form the ion optics assembly (see Fig. 2) in the MALDI-8000 series instruments – is positioned closest to the sample spot during analysis and, as a result, receives most of this contamination. This can lead to reduced instrument performance e.g., reduced sensitivity and resolution.

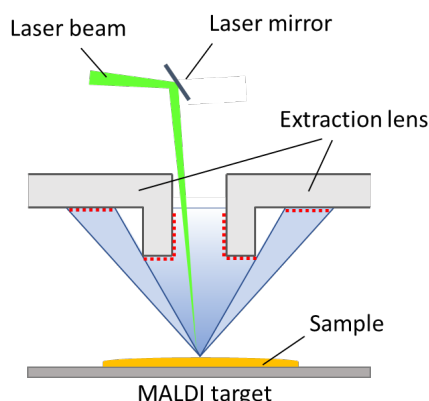


Fig. 1 MALDI ion source showing extraction lens and areas prone to contamination/fouling (red dashed lines). During ionisation, the ions & neutrals generated by the incident laser beam expand towards the extraction lens, contaminating the exposed areas which eventually leads to reduced instrument performance.

Another cause of reduced instrument performance is reduced detector gain over time. The detector is a consumable item on any mass spectrometer. Due to the large number of ions striking the detector surface over time, the resulting signal from the detector can gradually reduce. This can be corrected by increasing the voltage applied to the detector but this is typically done by a service engineer to avoid damaging or prematurely aging this vital component.

With the MALDI EasyCare systems, end users can easily access and clean the contaminated parts of the ion optics (i.e., extraction lens), thereby recovering instrument performance without the need for an expensive service engineer visit. A software wizard guides the user through the entire process including automated instrument conditioning and tuning.



Fig. 2 Contaminated extraction lens. In its normal configuration, the top lens is pointing down towards the sample (see Figure 1). The 'clean' area immediately surrounding the raised boss of the contaminated lens is a result of a shadow effect caused by the boss itself which protects this area from contamination (the white triangles either side of the extended boss in Figure 1).

■ Software-guided user maintenance

The MALDI EasyCare process is initiated by the user from within the *Data Acquisition* application. [Note: access to this function can be restricted by the system administrator.] On starting the software wizard, the user is presented with two options (see Fig. 3).



Fig. 3 On starting the MALDI EasyCare workflow, the user is prompted to select one of two options: (i) Detector tuning only or, (ii) Manual source cleaning i.e. optics removal/cleaning and tuning.

- (i) *Detector Tuning Only* – this is a short (approx. 20 min) fully automated tuning process which (re)optimizes the detector voltage-only.
- (ii) *Manual Source Cleaning* – the software will guide the user through the full process starting with safely venting and powering off the instrument. Once in a safe state, the software continues to guide the user through the steps to remove, clean and refit the ion optics assembly (see Figs. 4 and 5). Finally, after reconnecting the power, the software will automatically recover the instrument vacuum, condition the high voltages (necessary if the instrument has been vented) and perform automated tuning of the deflector and detector voltages. The whole process takes approximately 2.5 hours.

The samples required for detector and deflectors tuning are contained within the TOFMix MALDI standards kit (P/N TO-724R00) and the workflow has been fully validated using samples prepared from this kit.

By enabling these workflows, users now have more control over maintaining the performance of their MALDI-TOF instruments. Whether running high shot number applications like MALDI imaging or more challenging applications using samples which are known to rapidly deteriorate instrument performance, the MALDI EasyCare instruments are designed to deliver more consistently for more of the time, resulting in increased uptime.



Fig. 4 Designed with the user in mind, the ion optics are easily accessed via a hinged panel following removal of the side cover. Additional safety features built into the instrument design ensure there is no risk of injury from other components during the MALDI EasyCare workflow.

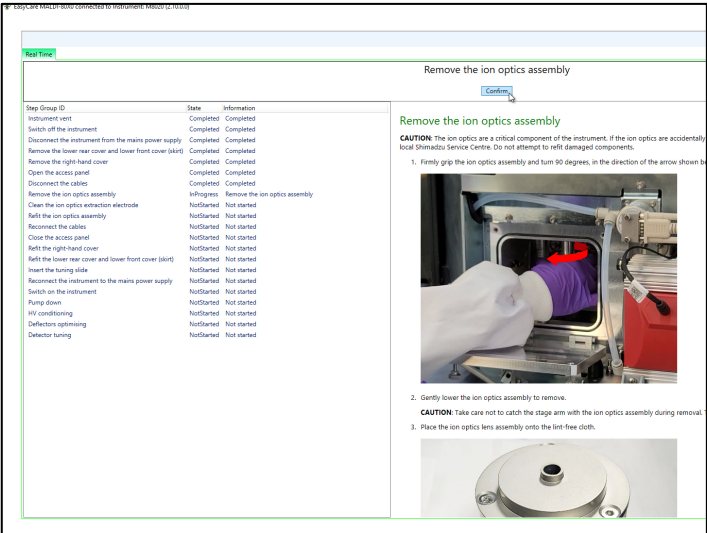


Fig. 5 The MALDI EasyCare software wizard guides the user through the cleaning and autotuning process. Each step in the workflow contains detailed instructions, accompanied with images, providing even novice users with the confidence to perform these maintenance tasks.



P/N	Description
224-40800-58	MALDI-8020 EasyCare Linear benchtop MALDI-TOF MS
224-40900-58	MALDI-8030 EasyCare Linear benchtop MALDI-TOF MS
TO-724R00	TOFMix MALDI Standards kit



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