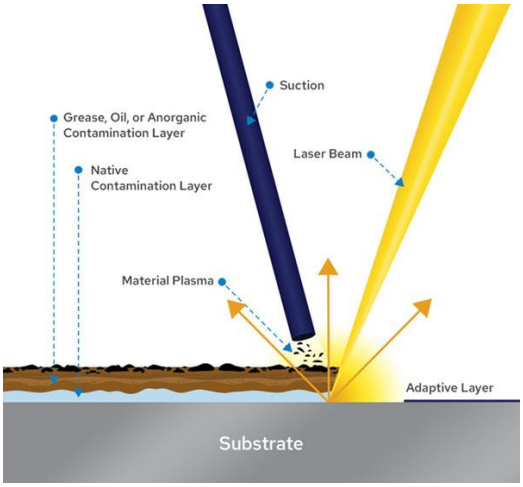
Bachelorarbeit/Semesterarbeit/Masterarbeit

Laser cleaning of magnetic systems with IR

Hintergrund

Magnet- bzw. Spulensysteme in der Zelle reagieren empfindlich auf kleinste Verunreinigungen im Inneren. Um den hohen Anforderungen gerecht zu werden, bedarf es ausgeklügelter Prozesse. Bei der Laserreinigung werden Laserlichtimpulse im Nanosekundenbereich auf die Oberfläche / den verschmutzen Bereich emittiert bzw. ausgestrahlt. Die Partikel bzw. die Ablagerungen absorbieren das emittierte Laserlicht. Dabei ändert sich der Aggregatszustand der Partikel (in gasförmig) oder es kommt zu einer Druckänderung durch die Wechselwirkung zwischen Laserlicht und Materie, wobei die Partikel sich von der Oberfläche lösen. In diesem Zusammenhang sind die richtigen Laser- und Prozessparameter essenziell und müssen für diese Anwendung an der kommerziellen F.u.E – Laseranlage eingestellt werden.

Quelle: https://adapt-laser.com/how-laser-cleaning-works/



Schematische Darstellung des Laserreinigungsprozesses.
Quelle: https://adapt-laser.com/how-laser-cleaning-works/

Aufgabe

- Literaturrecherche: - mögliche Laser- und Prozessparameter für die IR-Nanosekundenlaseranlage
- Design of Experiments (DoE)
  Versuchsplanung für geeignete Laser-/Prozessparameter
- Bahnplanung (Laserpfad)
- Evaluation der effizientesten Parameter und Scan-Strategie
- Dokumentation

Voraussetzungen

- Kenntnisse im Bereich Laserablation/Lasertechnik vorteilhaft
- Motivation und Zuverlässigkeit, sowie Eigeninitiative und selbstständiges Arbeiten

Kontakt

Dr. Marcel Gerstgrasser Tel. +41 44 944 20 31 marcel.gerstgrasser@mt.com

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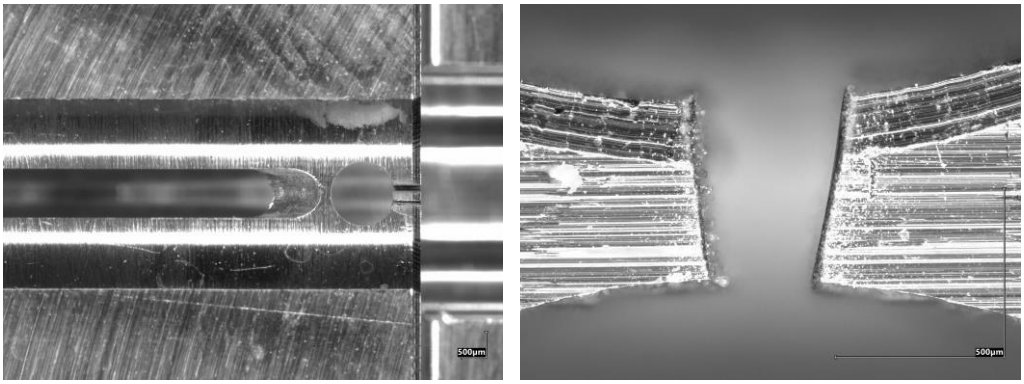
Bachelorarbeit/Semesterarbeit/Masterarbeit

Laser deburring of machined parts

Hintergrund

Beim Laserentgraten wird das gezielte Entfernen eines fertigungsbedingten Grates realisiert. Durch mechanische Bearbeitung wie zum Beispiel Bohren oder Fräsen, entstehen an scharfen Kanten Grate, die oft unerwünscht sind oder sogar hinsichtlich der Funktionalität des Bauteiles nicht akzeptiert werden können. Durch die Laserbearbeitung kann das Bauteil gezielt entgratet werden. In unserem Fall erfolgt das Entgraten durch Materialentzug mittels abtragenden Prozesses (Laserablation). Der Grat wird dabei anvisiert und durch gezielten Materialabtrag entfernt. In diesem Zusammenhang sind die richtigen Laser- und Prozessparameter essenziell und müssen speziell für diese Anwendung an der kommerziellen F.u.E – Laseranlage eingestellt und untersucht werden.

Quelle: https://www.prozessfabrik-berger.de/laserverfahren/laserentgraten



Schematische Darstellung des Laserreinigungsprozesses.
Quelle: ETH Zürich IWF/Mettler Toledo

Aufgabe

- Literaturrecherche: - mögliche Laser- und Prozessparameter für die IR-Nanosekundenlaseranlage
- Design of Experiments (DoE)
  Versuchsplanung für geeignete Laser-/Prozessparameter
- Bahnplanung (Laserpfad)
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Kontakt

Dr. Marcel Gerstgrasser Tel. +41 44 944 20 31 marcel.gerstgrasser@mt.com

Veröffentlicht: 04.12.2025

Bachelor / Master Thesis

Advanced Lever Position Control

Background

Roughly speaking, the basic working principle of a magnetic force restoration (MFR) loadcell is based on a lever on a rocker. On one side of the rocker an unknown load is placed, on the other side a voice coil is used to apply a counter force. The applied load is then related to the current which is needed to generate the necessary magnetic force on the coil, to restore the neutral position of the beam. The digital controller is a critical building block of such a system. That's why, we are constantly looking for promising approaches to enhance its performance in terms of robustness and speed. Especially in today's environment of highly automated applications and decreasing process tolerances, the requirements on our sensors become more challenging. This work offers an interesting opportunity to focus on the dynamics of a high precision electromechanical device.

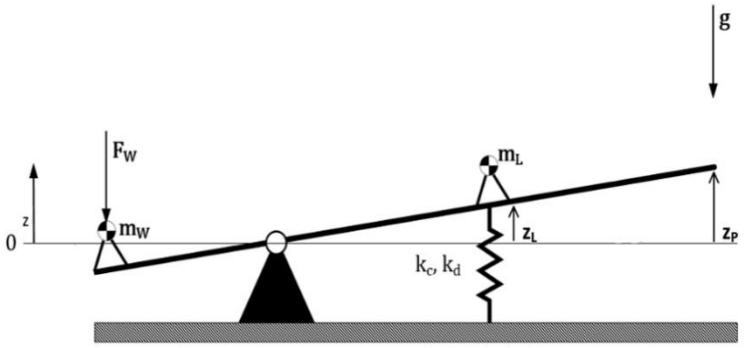

Fig1: Simple model of an MFR loadcell

Tasks

- Literature Research:
  Identify and evaluate control methods which are beneficiary for the posed problem.
- Modelling
- Developing a concept for a promising approach.
- Proof of concept: Implement a minimal valuable product (Model or on the hardware)
- Documentation

Requirements

- Deep understanding of model-based control is a must.
- Strong knowledge about mechanical and electrical dynamics is a must.
- Knowledge about digital signals and systems is a must.
- Knowledge MATLAB/Simulink is recommended.
- Knowledge in embedded C is a plus.

Contact

Pascal Enderli pascal.enderli@mt.com

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Internship

Infrastructure ramp-up for the next generation embedded platform

Background

Within METTLER TOLEDO the Loadcells and Platforms Switzerland unit provides software platforms, which build the foundation of many of METTLER TOLDEO products. The current embedded software platform has been successfully in use for almost 20 years and has been deployed in millions of nodes. However, to keep up with the rapid development of new MCUs and feature demand, a new platform is launched which should server METTLER TOLEDO units for the next 20 years.




Tasks

- Familiarize yourself with the METTLER TOLEDO development environment.
- Design and shape a tool landscape that will support METTLER TOLEDO developers all around the globe to efficiently work with the new embedded platform.
- Setup and configuration of tools on server systems and reference developer clients.
- Integrate tools provided by METTLER TOLEDO IT into the development tool landscape.
- Onboard and support of METTLER TOLEDO developers to the new toolchains.

Prerequisites

- Linux (ideally Red Hat) server management experience.
- Software Development and toolchain experience.
- Interest in (embedded) software development, tooling and processes.

Contact

Chetan Viraktamath Chetan.Viraktamath@mt.com (Reference: LCPF-CH SW-ES Team)

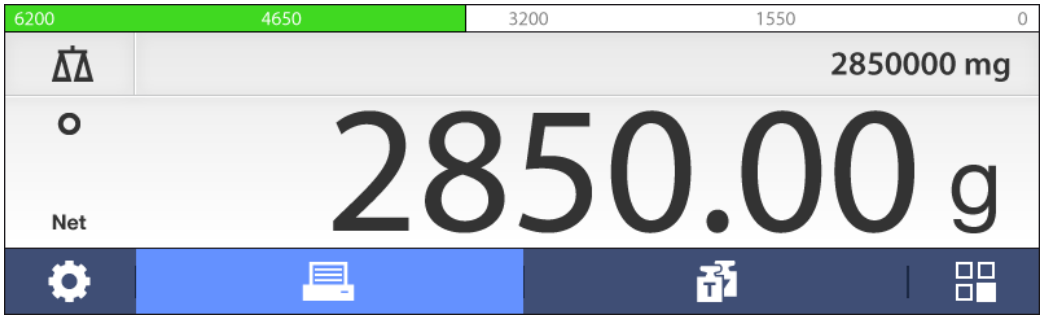
Published: 04.12.2025

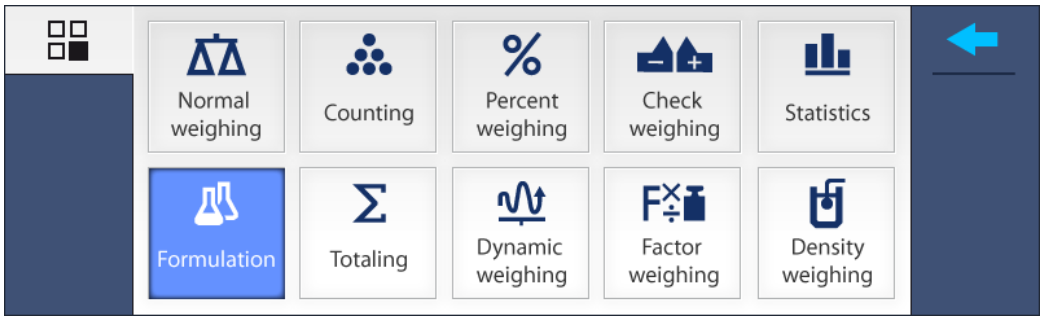
Bachelor/Semester Thesis, Internship

LVGL based prototype terminal

Background

LVGL is a popular open-source embedded graphics library to create UIs for different MCU, MPU and display types. METTLER TOLEDO wants to assess the potential of LGVL for creating UI applications for both their embedded software platforms (bare-metal and RTOS). A demonstrator of a clickable GUI shall be implemented, that shows a weight value on an existing product or evaluation kit and allows the user to trigger actions or change display parameters. With support of the SW-ES team an abstraction layer should be designed, to integrate LGVL into the existing OS and driver layers of the METTLER TOLEDO bare-metal and RTOS systems, and to allow data exchange between UI application and business logic. LVGL should be evaluated regarding aspects like feature richness, usability, CPU performance and memory consumption and compared to existing commercial graphic toolkits.





Tasks

- Design and create UI application for a balance or terminal mockup with LVGL in Win32 or Zephyr native_sim simulation.
- Design abstraction layer and integrate LVGL in in the METTLER TOLEDO bare metal and RTOS environment, to run an app on an embedded target.
- Evaluation of LVGL and comparison against other graphical toolkits.
- Documentation

Requirements

- Knowledge in embedded C programming
- Knowledge in software engineering and design
- Flair for UX design

Contact

Chetan Viraktamath Chetan.Viraktamath@mt.com (Reference: LCPF-CH SW-ES Team)

Published: 04.12.2025

Bachelor / Master Thesis

Advanced Disturbance Modelling

Background

In order to deliver exceptionally robust force sensor performance, it is necessary to take the disturbances which act on the system into account. At METTLER TOLEDO, we use models of numerous physical effects to apply countermeasures for unwanted measurement influences. Common disturbances include heat transfer, changing air condition and mechanical coupling of external/internal forces. To keep up with the automation trend and the growing need for robust sensors, we are constantly looking for reliable models which are able to improve the insensitivity of our internal signals. This work is suited for students with a deep understanding in at least one of the relevant fields. It offers the opportunity to gain a deep understanding of the complex interaction between disturbances and a dynamic electromechanical system.

Tasks

- Literature Research:
  Learn about the underlaying physical interactions.
- Modelling
- Developing a concept for compensating for the disturbance.
- Find solutions to sense disturbances.
- Proof of concept: Implement a minimal valuable product (Model or hardware)
- Documentation

Requirements

- Strong knowledge about mechanical dynamics or thermodynamics is a must.
- Knowledge about digital signals and systems is a must.
- Knowledge of MATLAB/Simulink or another modelling software is recommended.
- Knowledge in embedded C is a plus.

Contact

Pascal Enderli pascal.enderli@mt.com

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