

THE

LASER USER

ISSUE 111
WINTER 2024

AILU

Ultrafast laser future trends

Optimising femtosecond pulses

Synchronised axis 3D engraving

Cored wire additive cladding

Coating removal from hard tools



**HIGH PERFORMANCE
ULTRAFAST LASERS:
FUTURE TRENDS AND
CURRENT HIGHLIGHTS**

THE LASER USER

Editor: Dave MacLellan
Sub-Editor: Catherine Rose

ISSN 1755-5140

© 2024 – Association of Industrial Laser Users

The Laser User is the house magazine of the Association of Industrial Laser Users. Its primary aim is to disseminate technical information and to present the views of its members. The views and opinions expressed in this magazine belong to the authors and do not necessarily reflect those of AILU.

The Editor reserves the right to edit any submissions for space and other considerations.

Authors retain the right to extract, in part or in whole, their material for future use. The Laser User is published quarterly in February, May, August and November by AILU for its members and is available in print or online.

Editorial Board for this issue:

Ric Allott	STFC
Richard Carter	Heriot-Watt University
Charles Dean	Fimark Ltd
Jonathan Magee	ACSYS Lasertechnik UK
Nadeem Rizvi	Laser Micromachining Ltd



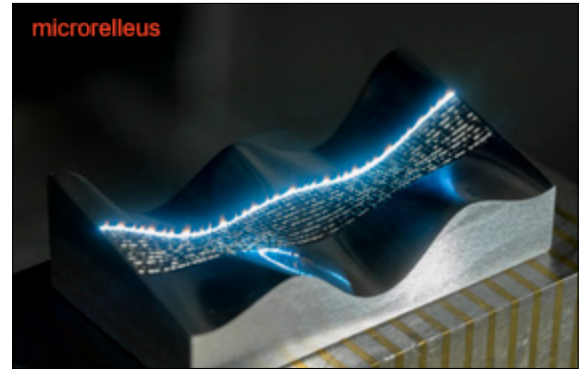
ADVERTISING ENQUIRIES

+44 (0) 1235 539595
 cath@ailu.org.uk

Advertising rates at:
www.ailu.org.uk/advertising/

Association of Industrial Laser Users
 Oxford House
 100 Ock Street
 Abingdon
 Oxfordshire
 OX14 5DH

+44 (0) 1235 539595
 info@ailu.org.uk
www.ailu.org.uk



Cover image: Femtosecond laser engraving of free-form microstructures on a 3D shape tempered steel tool insert.

Courtesy Microrelleus, S.L.

AILU STEERING COMMITTEE 2022-23

President:	Ric Allott (STFC)
Vice Presidents:	Paola De Bono (TWI) Richard Carter (Heriot-Watt University)
Exec. Director:	Dave MacLellan (Anode Marketing)

Elected until 2026

Nesma Aboulkhair	(University of Nottingham & TII (UEA))
Chris Peters	(UKAEA)
Pratik Shukla	(MTC)
Stan Wilford	(IPG Photonics)

Elected until 2025

Rachel McBain	(Laser Trader)
Jamie Costello	(Coherent)
Chris Waters	(Micrometric)

Elected until 2024

Cliff Jolliffe	(PI)
Danijela Rostohar	(HiLASE)
Tian Long See	(MTC)
Sinan Bilgin	(SS Laser Solutions)

Co-opted until 2024

Tom Chaffer	(TRUMPF)
Clive Grafton-Reed	(Rolls-Royce)
Tony Jones	(Cyan Tec Systems)
Mike Poulter	(TRUMPF)

Past presidents and founder members are also able to attend committee meetings. Anyone wishing to join the AILU Steering Committee please contact the Executive Director.

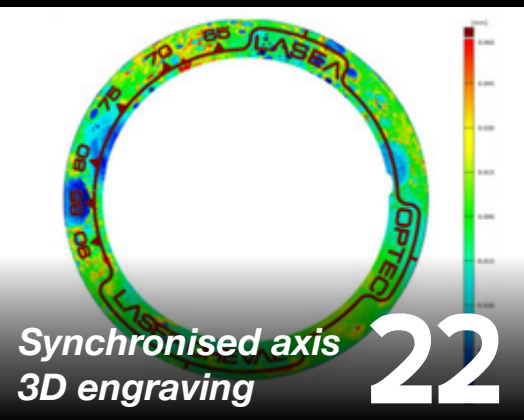
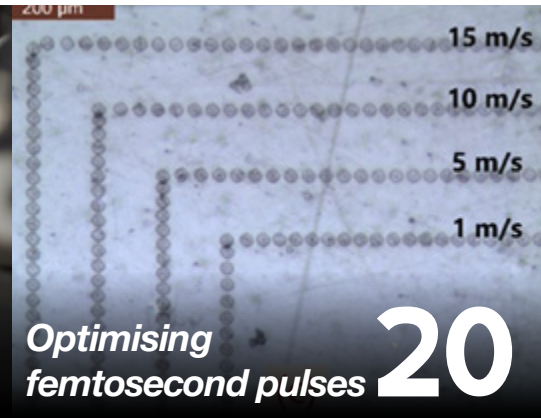
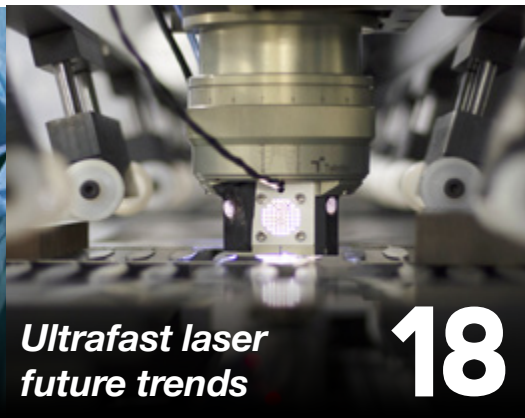
WELCOME TO NEW AILU MEMBERS

Asco Engineering
 Jeff Fogg

Flow Science, USA
 Allyce Jackman

University of Hull
 Antonia Bernard

HIGHLIGHTS...



Interview: Luxinar

14

Ultrafast laser future trends

18

Optimising femtosecond pulses

20

Synchronised axis 3D engraving

22

Cored wire additive cladding

24

Coating removal from hard tools

26

ASSOCIATION NEWS

First Word	4
President's Message	4

OBITUARIES

Barry Proctor	5
Brooke Ward	5

BUSINESS NEWS

	6
--	---

CASE STUDIES

	8
--	---

FEATURE

SONI-LASER Project Q&A	11
------------------------	----

EARLY CAREER RESEARCHERS

	12
--	----

EDITORIAL

Interview: Yannick Galais, Luxinar	14
Job Shop Corner	16
A Funny Thing...	34

PRODUCT NEWS

	29, 31
--	--------

EVENTS

Event Reviews	13, 32
Forthcoming ALLU Events	35
Events diary	36

MAIN FEATURES

Ultrafast lasers: the next frontier <i>Eric Mottay</i>	18
Optimising femtosecond laser pulses for superior quality <i>Chandra Nathala & Jim Bovatsek</i>	20
Optical and mechanical axes synchronisation for 3D engraving <i>Abel Gil Villalba</i>	22
Cored wires: a viable alternative for engineering applications <i>Jihane Guenoun et al.</i>	24
Laser de-coating for low-carbon manufacturing <i>Jinglei Ouyang et al.</i>	26
Observations	28

CONTENT BY SUBJECT

Business News	6
Job Shop News	16
Product News	29, 31
SONI-LASER: Welding with ultrasound excitation	11
Ultrafast laser future trends	18
Optimising femtosecond pulses	20
Synchronised axis 3D engraving	22
Cored wire additive cladding	24
Coating removal from hard tools	26
Events	35, 36

ASSOCIATION NEWS

FIRST WORD



As I write this, I am sitting in San Francisco in the middle of Photonics West. On first impression, the exhibition here is like the photonics industry worldwide: there are thousands of companies from all over the world doing lots of amazing things! The first thing you need is either a very good map or a personal guide. It strikes me that AILU is both a map and guide – to connect people with the right people at the right

time in the laser material processing landscape.

Networking and making connections face-to-face are vital parts of the process of getting to know and understand your industry (or your research area). Whether you are in your early career and need an introduction – or well established in your career but new to the laser field – there is something here for you!

I am very pleased with the knowledge that is broken down into bite sized chunks in The Laser User (and our extensive archive available via the website). This is augmented by the workshops, business meetings and ILAS that we run – if you haven't yet attended one look out for the forthcoming events this year. Join our webinar on handheld laser welding in March or visit us at the AILU stand at MACH in April (NEC Birmingham). Then we have a workshops on Micro Processing, Batteries and High Power & Hybrid Laser Welding to look forward to in May, at TRUMPF in Luton. See more details of these events and more on pages 35 and 36.

Dave MacLellan
dave@ailu.org.uk

PRESIDENT'S MESSAGE



Welcome all to the latest edition of The Laser User. I am writing to you fresh from San Francisco as I have been attending Photonics West – the (really) big lasers and optics conference and exhibition operated by SPIE.

I was delighted to see a number of AILU members out on the west coast enjoying an incredibly

busy and vibrant few days, alongside a whole host of other UK based companies. With over 1600 exhibitors and 20,000 attendees, this really is the “to be seen at” show.

During the week Dave MacLellan and I took the opportunity to talk with senior directors at both SPIE and Optica (formerly the Optical Society of America) – chewing the cud over potential future opportunities for collaboration with AILU. It certainly feels like there are plenty of things we can do jointly that will result in bigger and better benefits for our members in future. From the buzz around the show it was also clear to me that photonics is in a very strong position with new, exciting products and innovations across a whole range of sectors on display.

The one downside of the whole week - it is mightily expensive in San Fran – particularly in the conference centre itself. I ended up buying the most expensive banana on the planet for my lunch on the first day – save it to say I selected my lunchtime fruit from the breakfast bar at the hotel on subsequent days. Despite this, I thoroughly recommend a trip to Photonics West if you can – the opportunity to meet with folks from Asia, US and Europe all in one place is fantastic.

I hope you will all enjoy reading this edition of our magazine and encourage you to partake fully in AILU's activities and events – the more you put in the more you get out!

Ric Allott
ric.allott@stfc.ac.uk