

LUXINAR

INGENUITY AMPLIFIED

High power femtosecond
laser sources
at 1030nm, 515nm and 343nm
for cutting-edge solutions

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Ultrashort Pulse Laser Product Manager

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28 June 2023 - EPIC Meeting on Ultrafast Laser Processing





25
YEARS
1998-2023

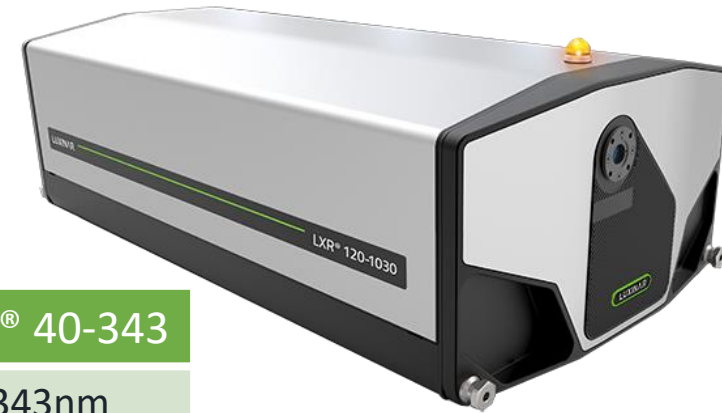
We are Luxinar

 20000+ Lasers installed around the world	4  LXR series femtosecond laser sources	12  Product ranges of sealed CO ₂ laser sources		
200+ Employees worldwide	 7500 Square meters of manufacturing space	24  Years of experience in CO ₂ laser technology		
 IP66 Rating Against dust & water (most lasers)	 ISO 9001:2015 Quality management accreditation	100+  Countries where our lasers are installed	10  Working days to return your processed samples	1200 Characters per second are laser marked by MULTISCAN

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LXR[®] ultrashort pulse lasers



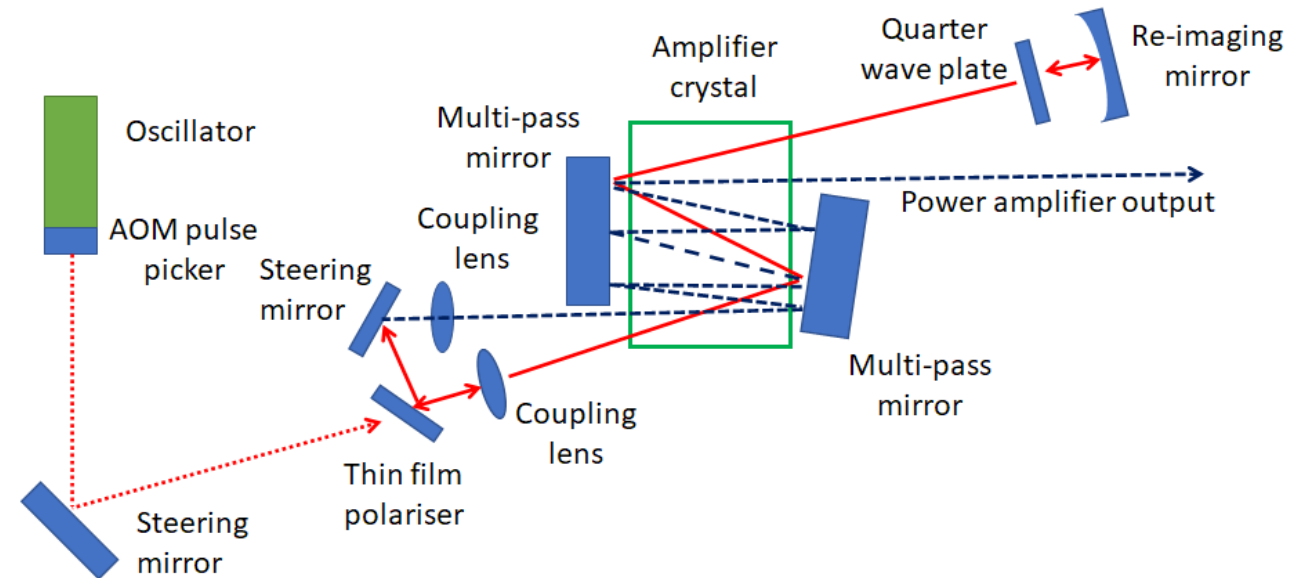
Parameter	LXR [®] 120-1030	LXR [®] 50-1030	LXR [®] 80-515	LXR [®] 40-343
Wavelength	1030nm	1030nm	515nm	343nm
Rated average power	120W	50W	80W	40W
Pulse duration	800 ± 100fs			900 ± 100fs
Rated pulse energy	120μJ	100μJ	80μJ	40μJ
Max. fast burst energy	600μJ	250μJ	400μJ	200μJ
Frequency	Single shot to 40MHz			
Power and pulse energy stability	< ± 1%rms			
Polarisation	Linear perpendicular to base			
Typical beam quality	M ² < 1.2			M ² < 1.3
Output beam diameter	3mm ± 0.5mm			

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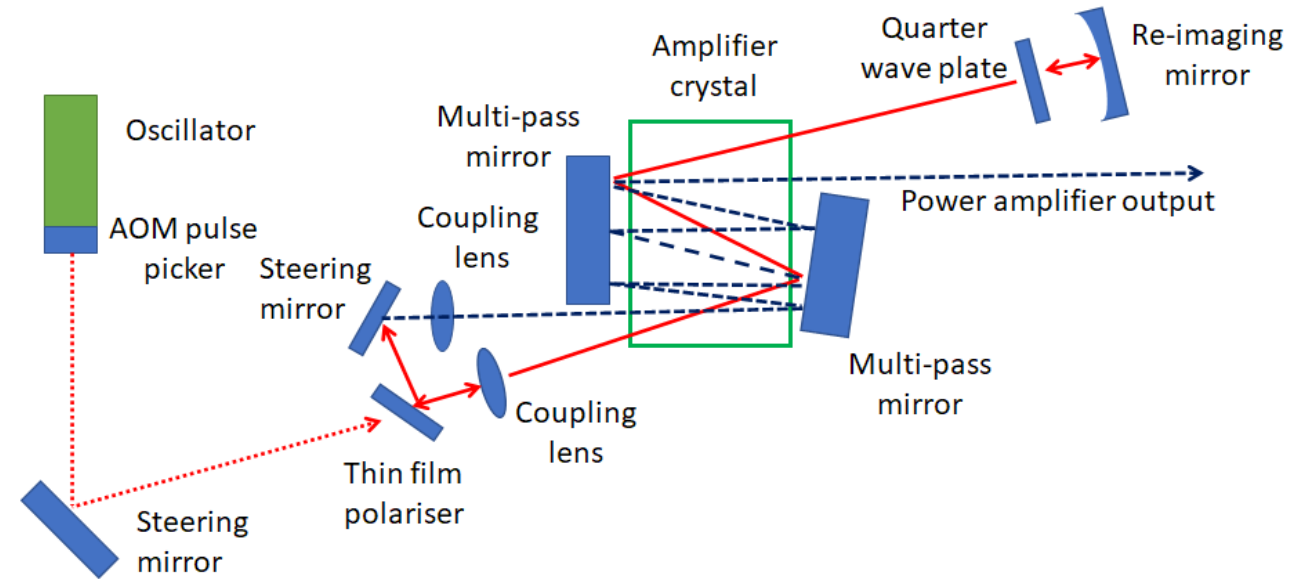
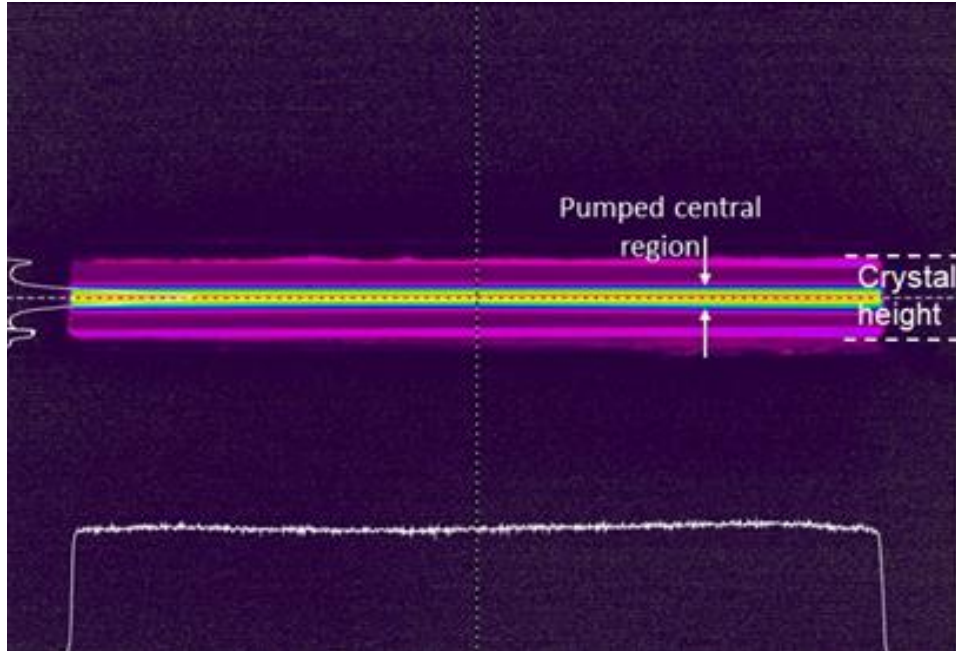
LXR[®] ultrashort pulse lasers: patented technology

- Pre-amplifier and power amplifier in one crystal
- Demonstrated input seed powers of 15mW – 3W resulting in similar amplified output powers



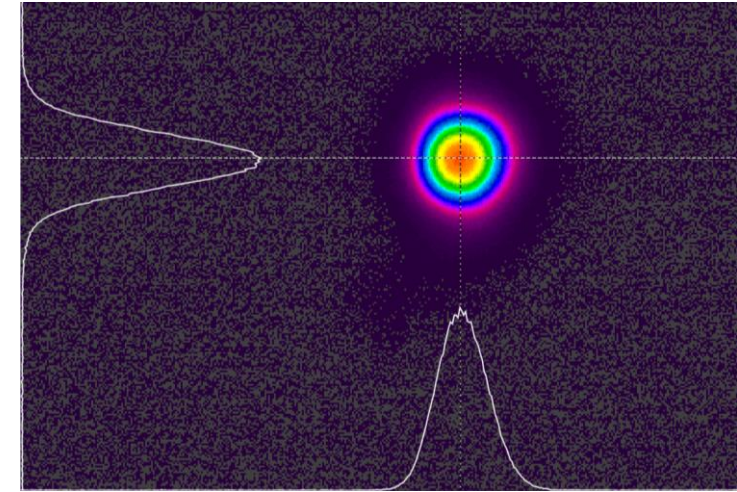
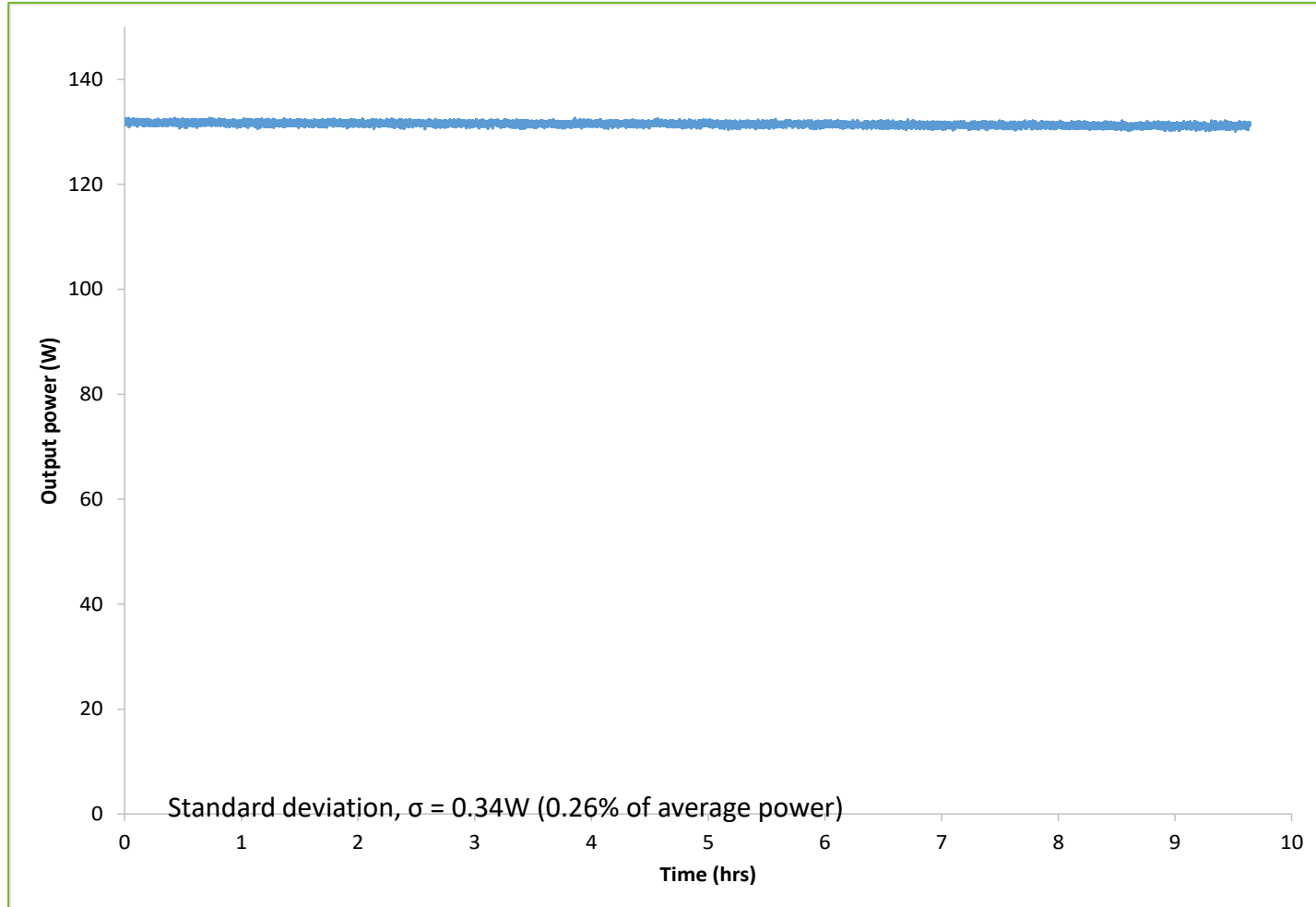
LXR[®] ultrashort pulse lasers: patented technology

- Pre-amplifier and power amplifier in one crystal¹
- Demonstrated input seed powers of 15mW – 3W resulting in similar amplified output powers

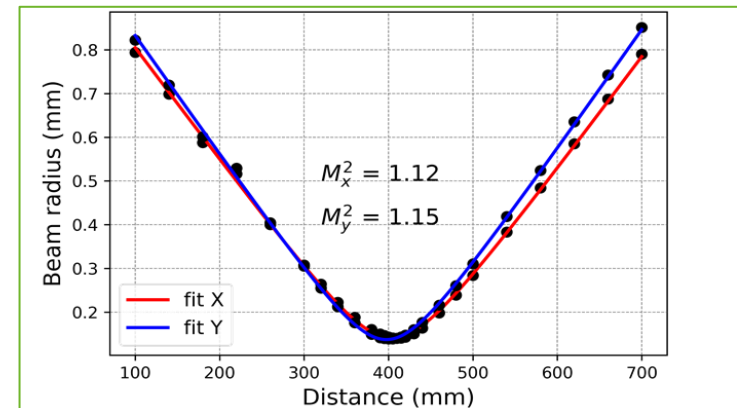


High intensity and uniform gain region for effective amplification²

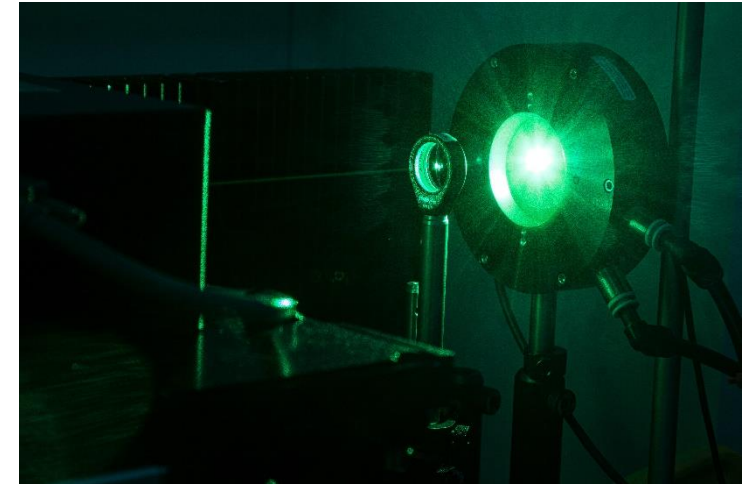
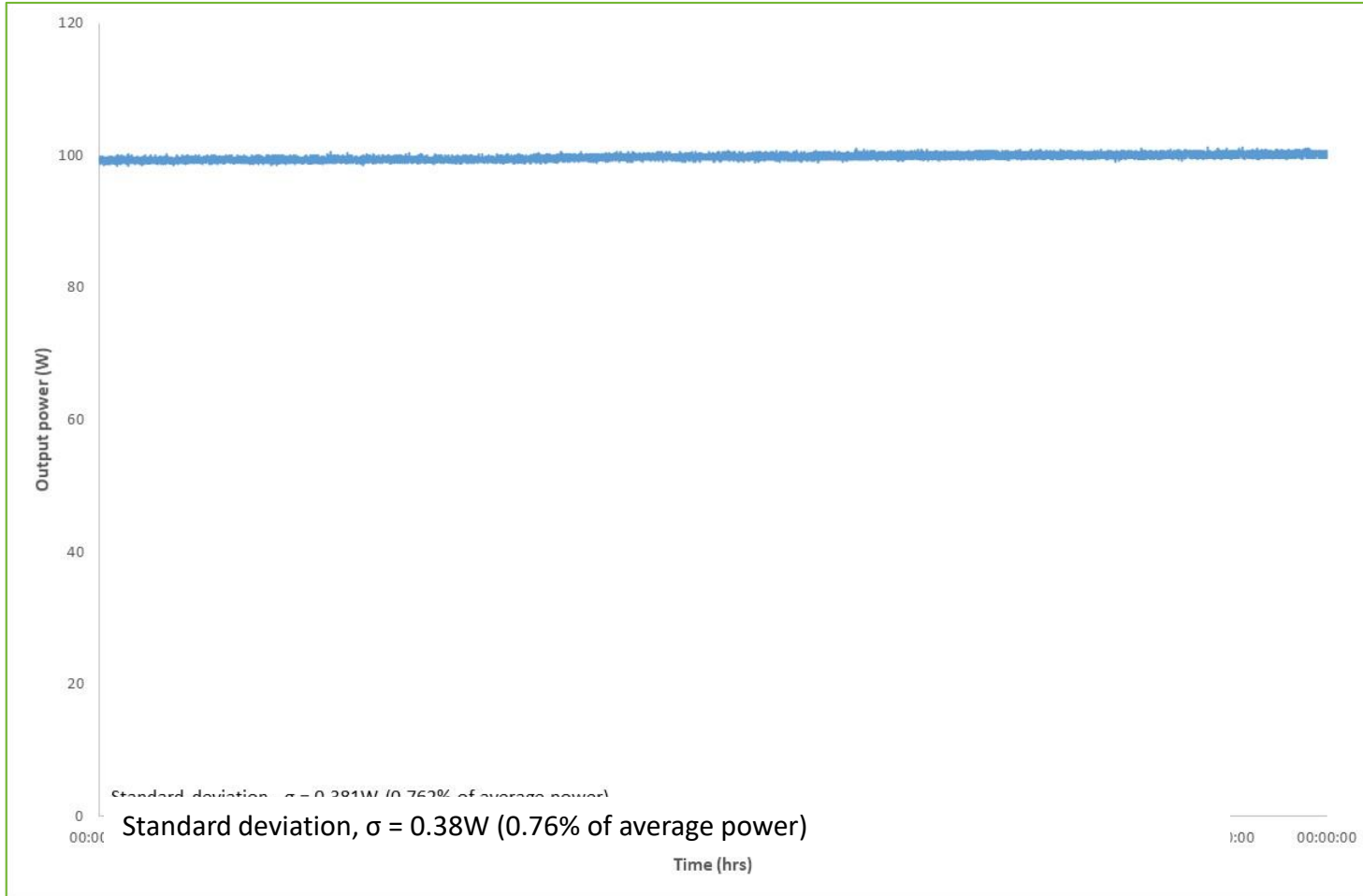
LXR[®] 120-1030



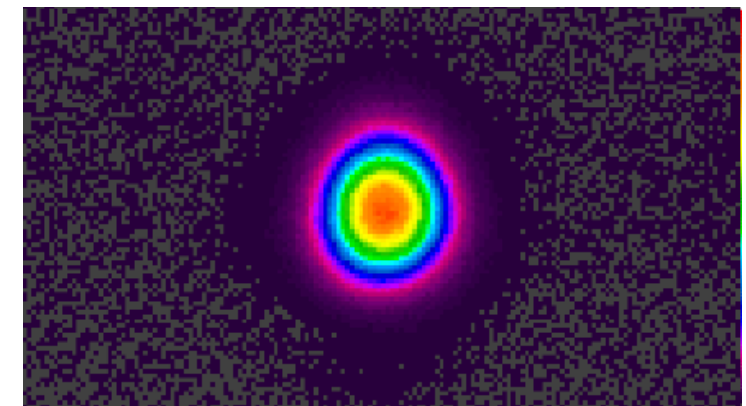
Typical beam at focus and caustic plot



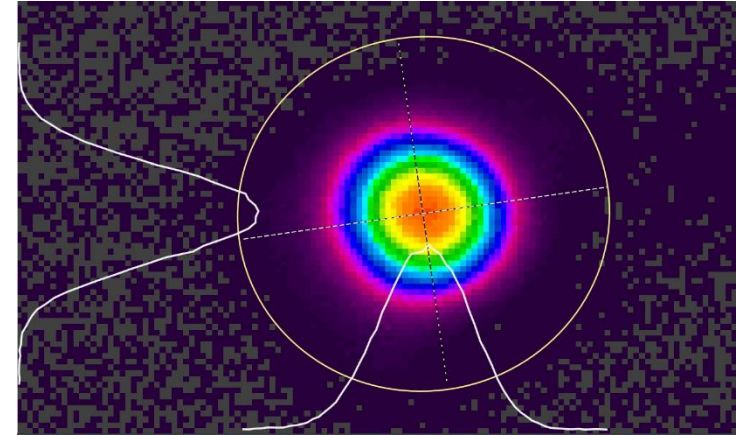
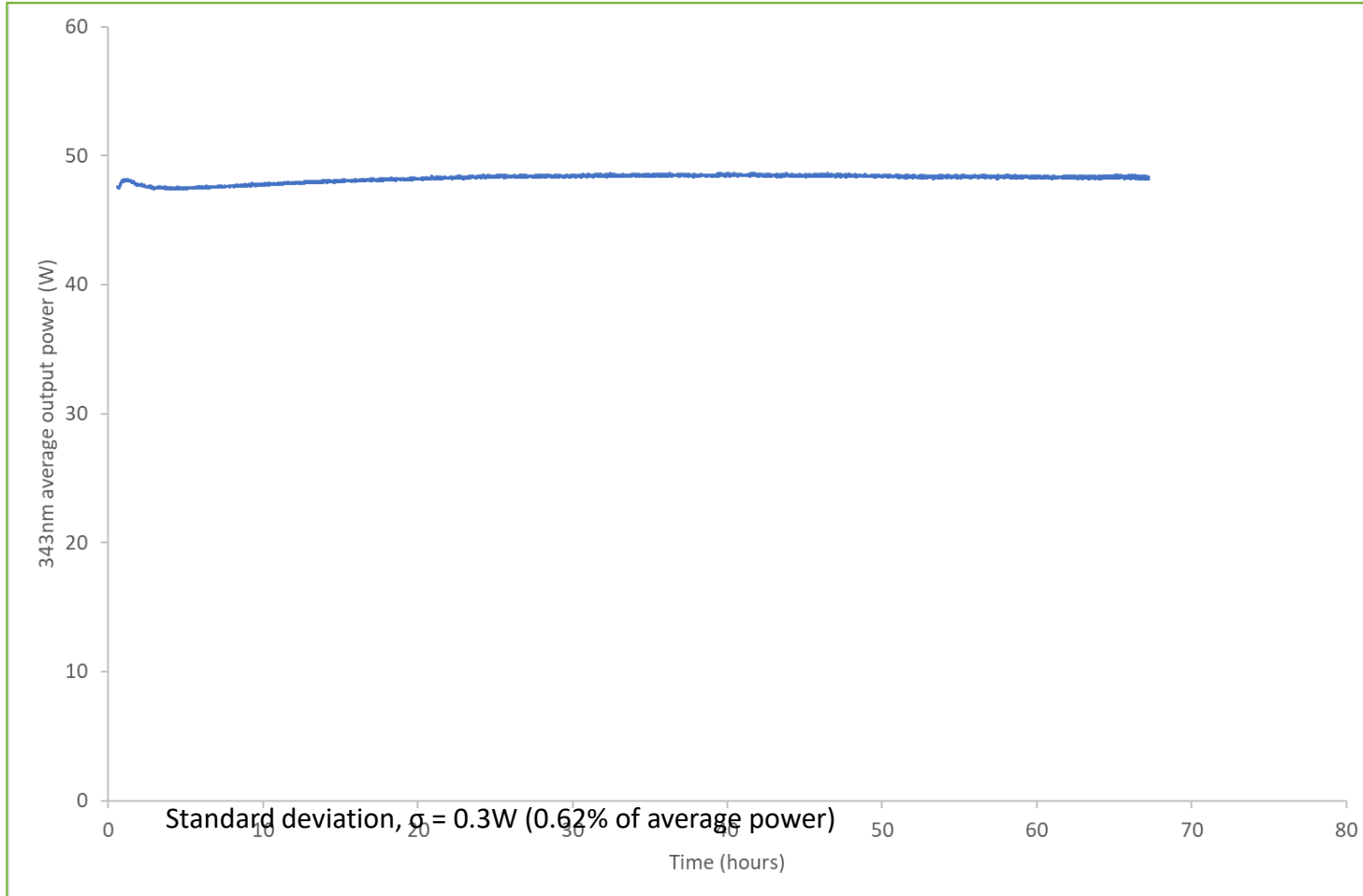
LXR[®] 80-515



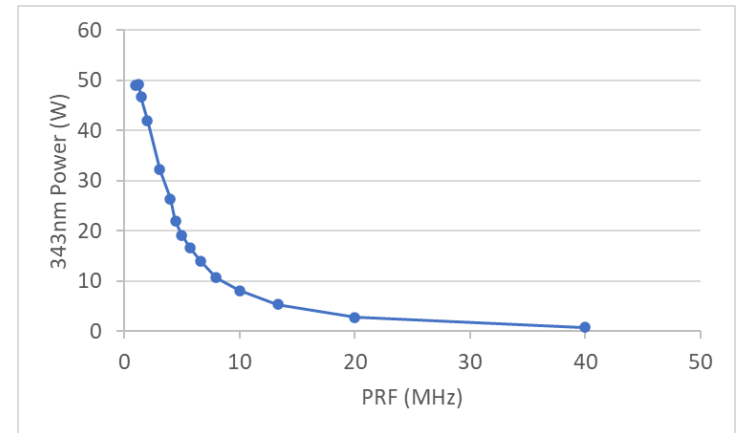
Typical beam at focus at 10MHz PRF



LXR[®] 40-343



Typical beam at focus at 1MHz PRF



WHY

... we need this complexity ?

... we must pay for it?

Wait until the mud settles and the water is clear

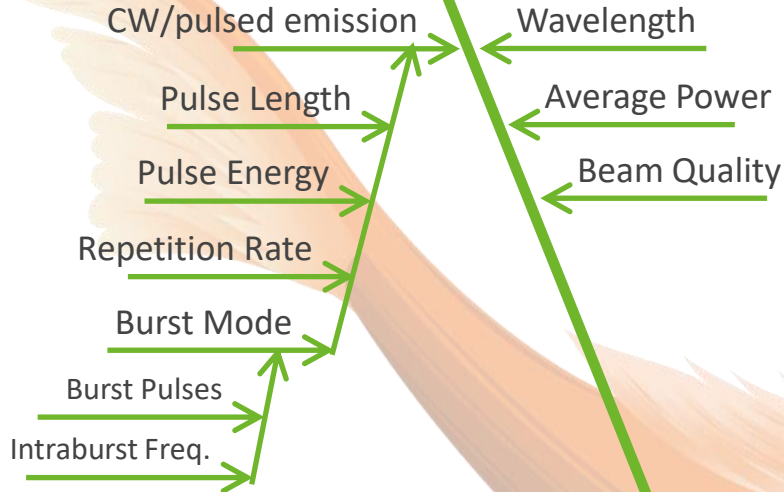
Lao Tzu



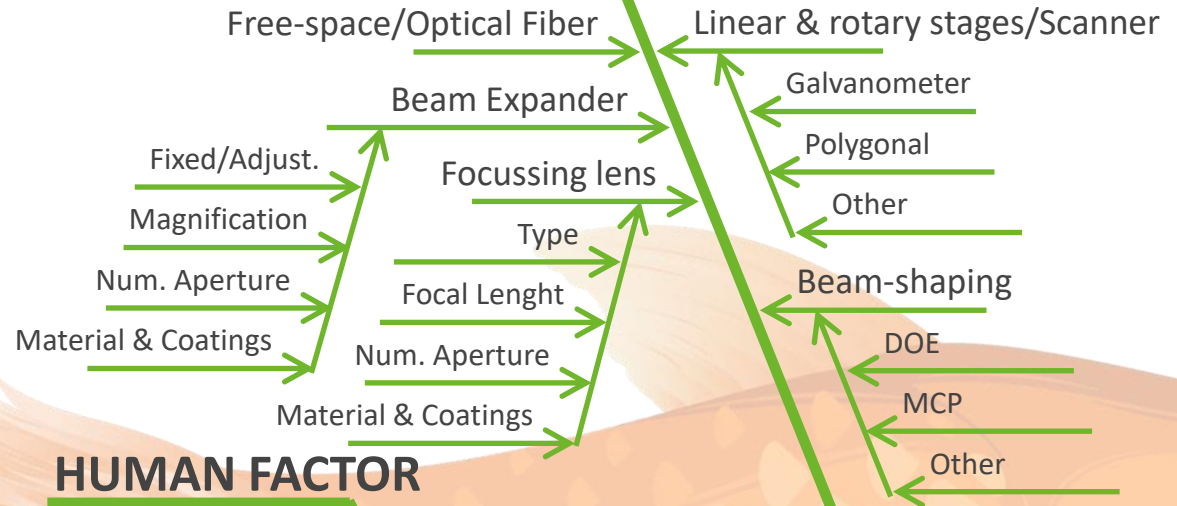
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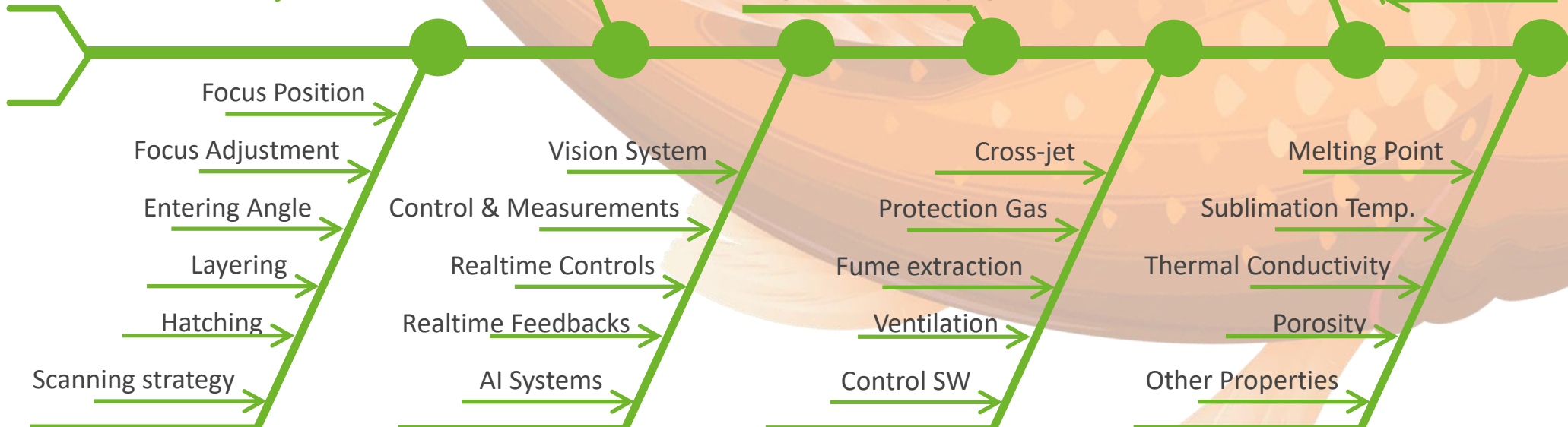
LASER



BEAM DELIVERY



HUMAN FACTOR



PROCESS

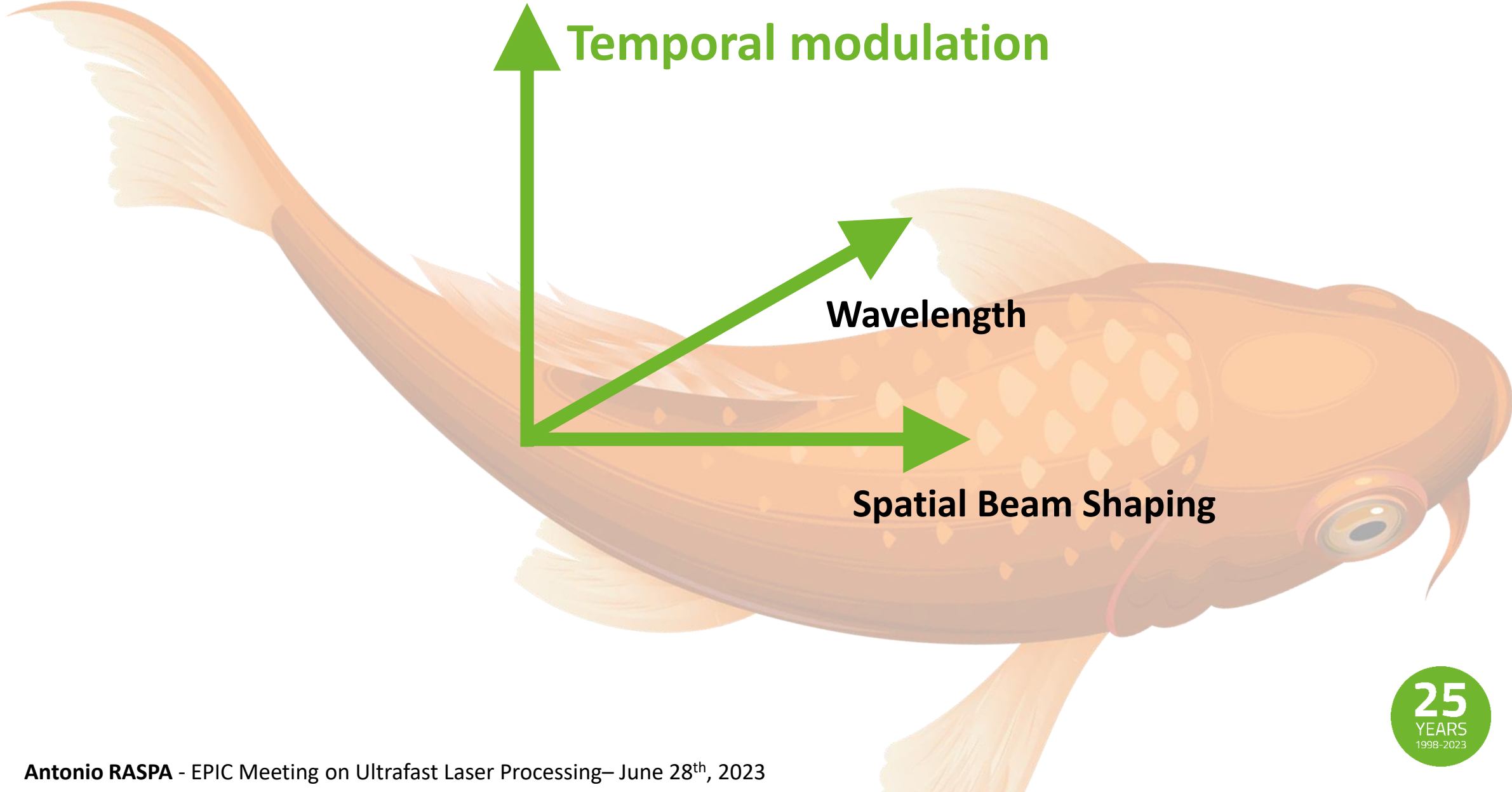
PROC. STRATEGY

PROC. CONTROL

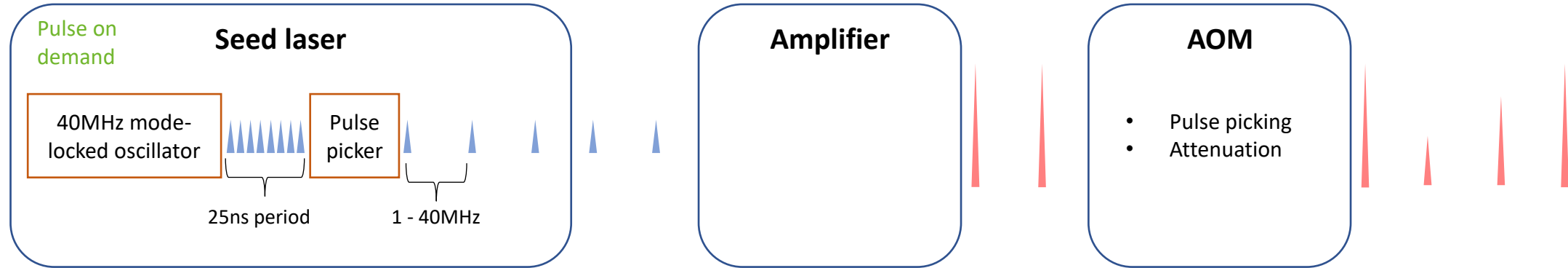
MACHINE

MATERIAL

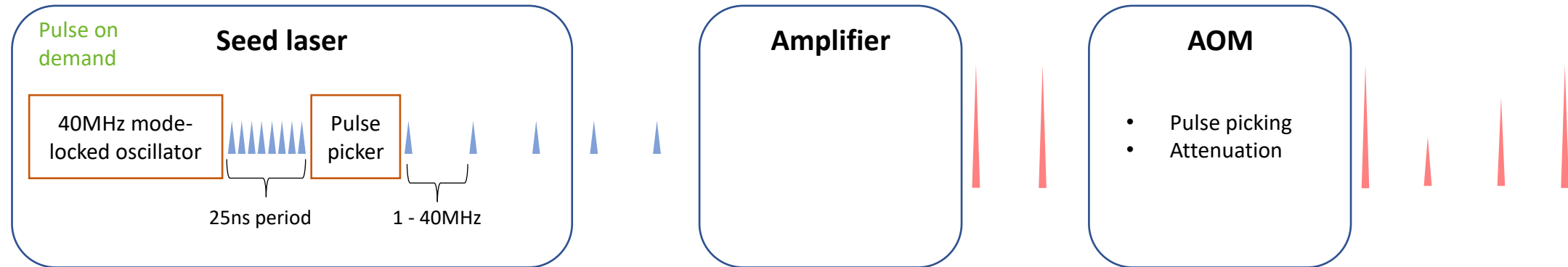




Pulse on demand, burst mode and fast-burst mode as standard

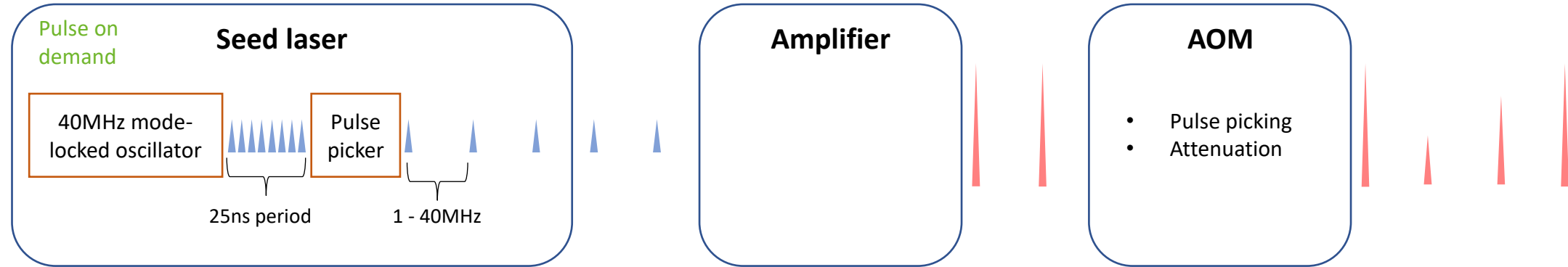


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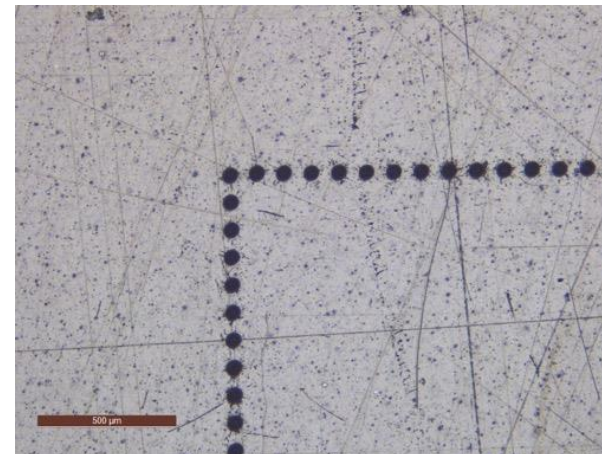
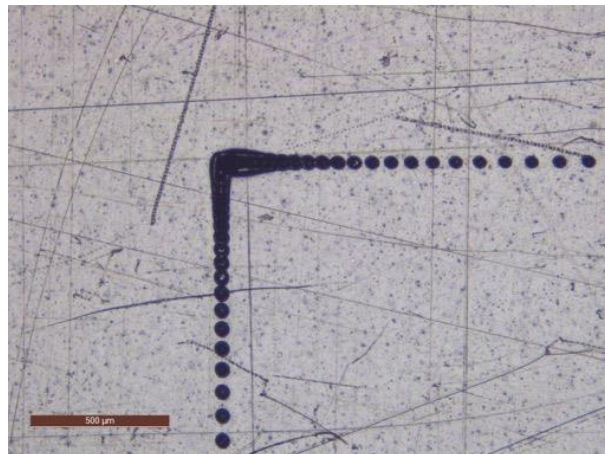
- Sync output available which allows the user/scanner to synchronise *exactly* with the laser output
- Pulse energy can be maintained to $\pm 1\%$ whether 10 kHz is requested or 10 MHz is requested

Pulse on demand, burst mode and fast-burst mode as standard



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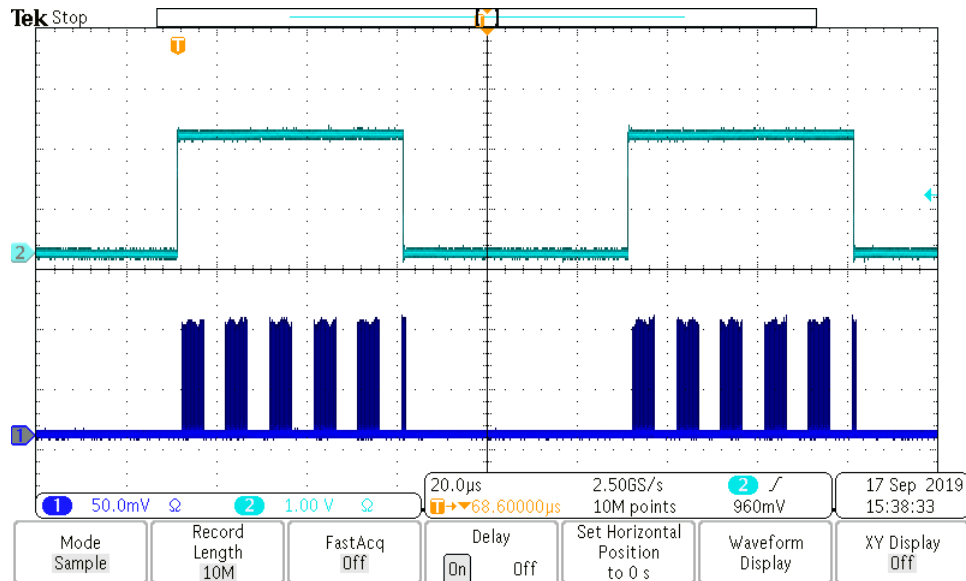
No pulse on demand with 100 μ m spacing



Pulse on demand with 100 μ m spacing

Pulse on demand, **burst mode** and fast-burst mode as standard

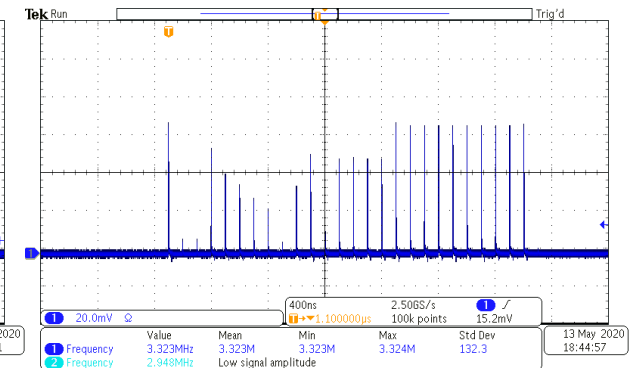
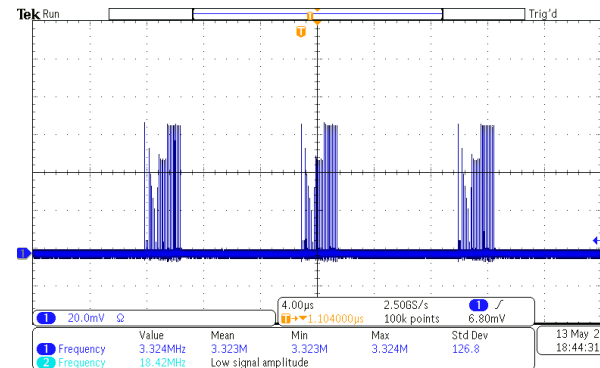
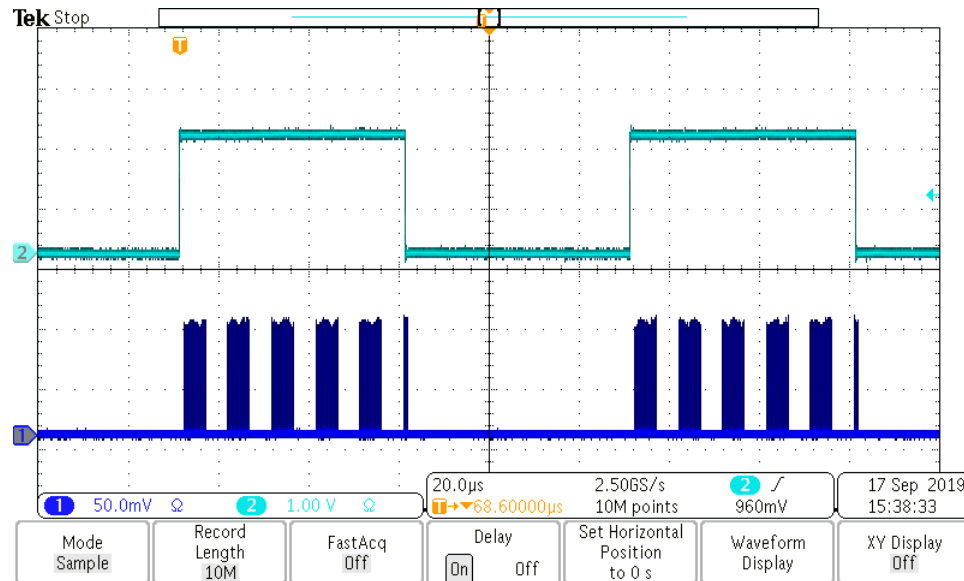
- Laser can be programmed to operate bursts as well as gated
- Individual pulse energy can be set within these bursts up to 10 MHz



- Intraburst frequency 10MHz
- 50 pulses per burst
- Burst frequency 100kHz
- Gating frequency 10kHz

Pulse on demand, **burst mode** and fast-burst mode as standard

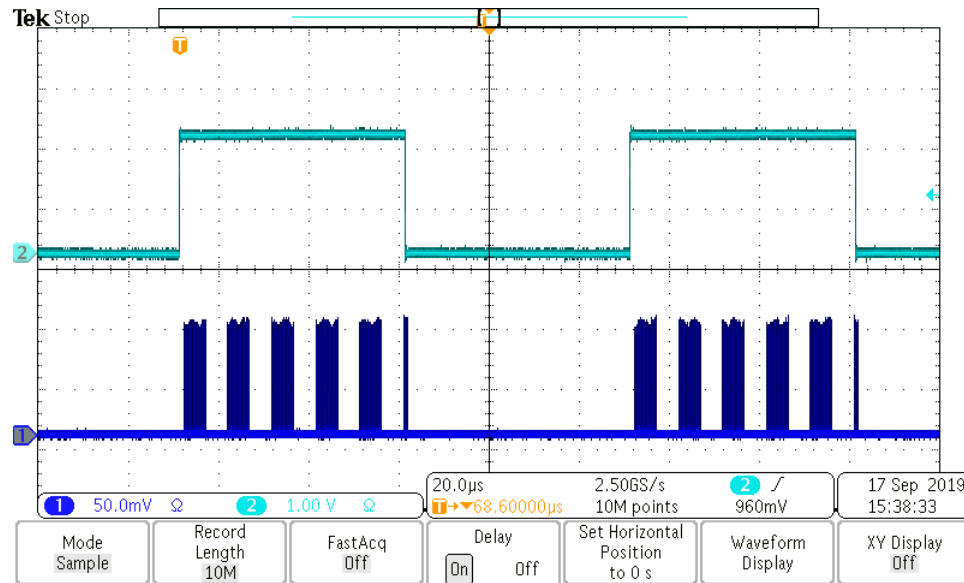
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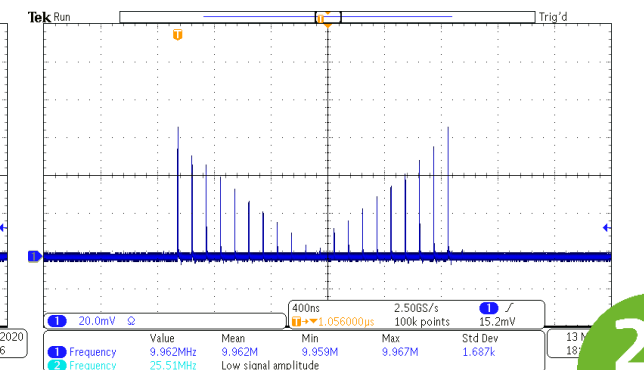
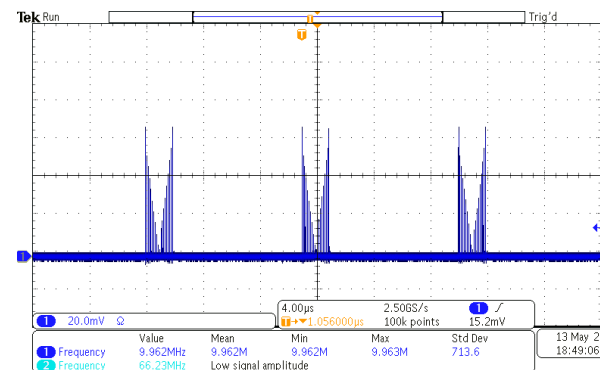
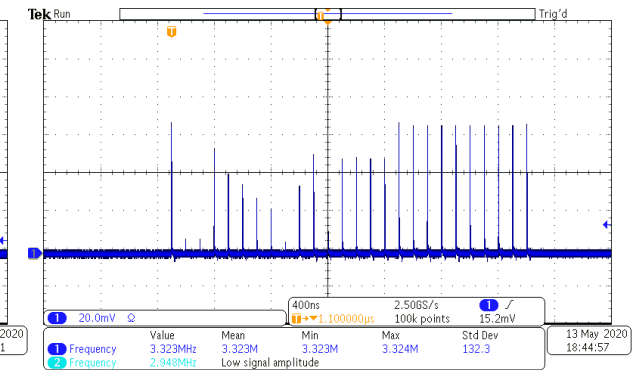
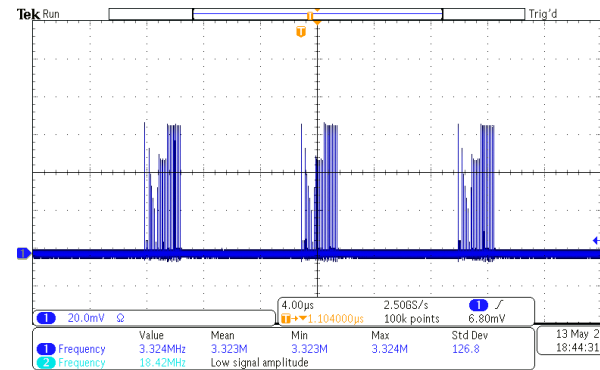
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Pulse on demand, **burst mode** and fast-burst mode as standard

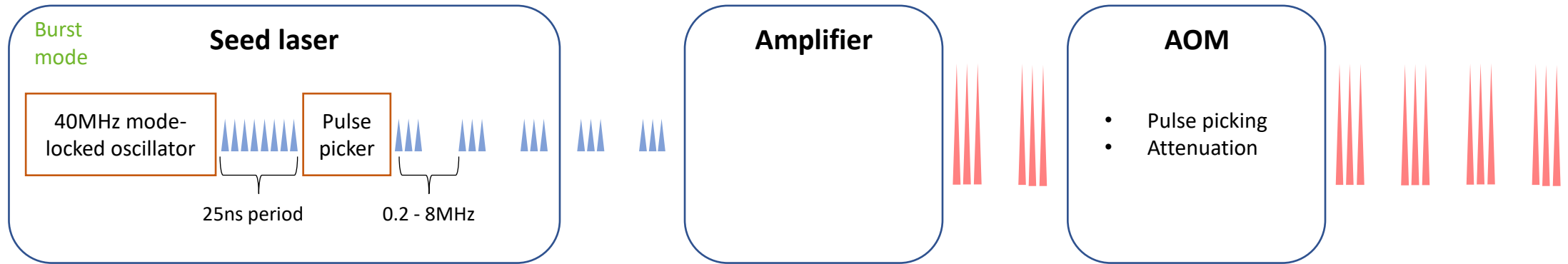
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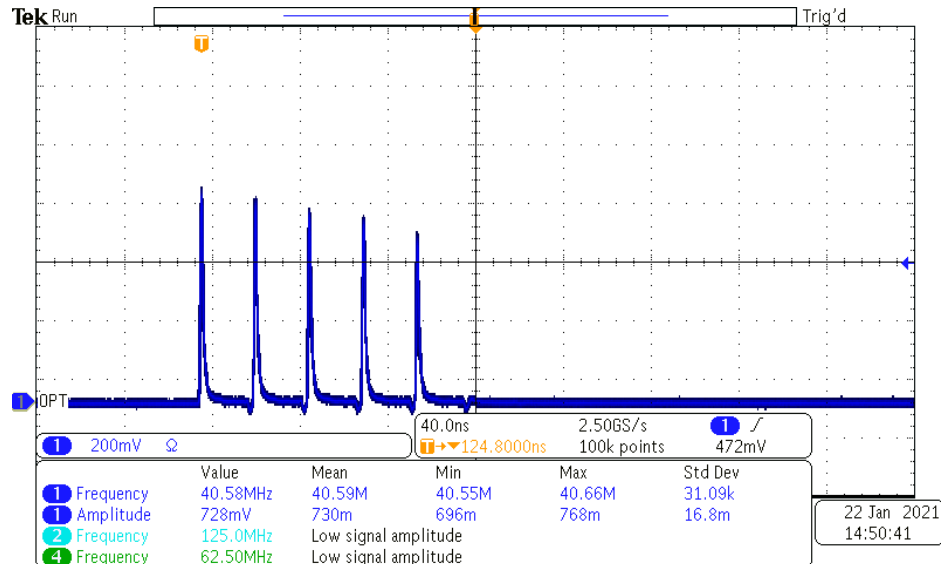
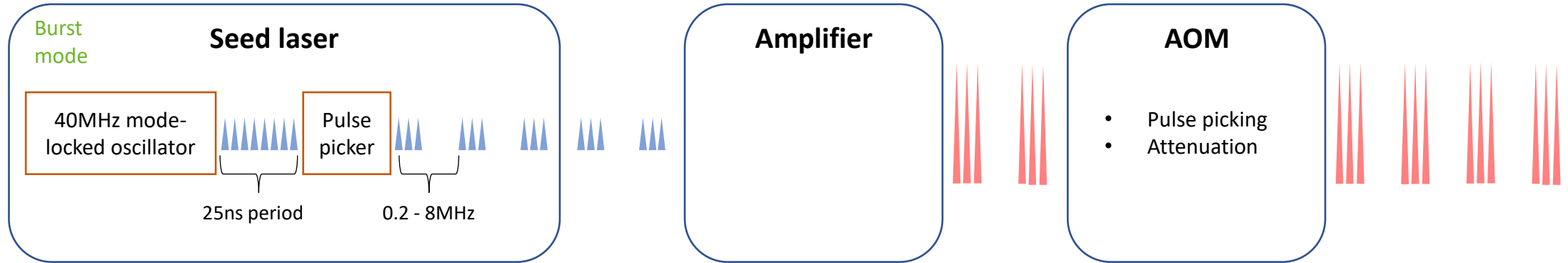
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Pulse on demand, burst mode and **fast-burst mode** as standard



Pulse on demand, burst mode and **fast-burst mode** as standard

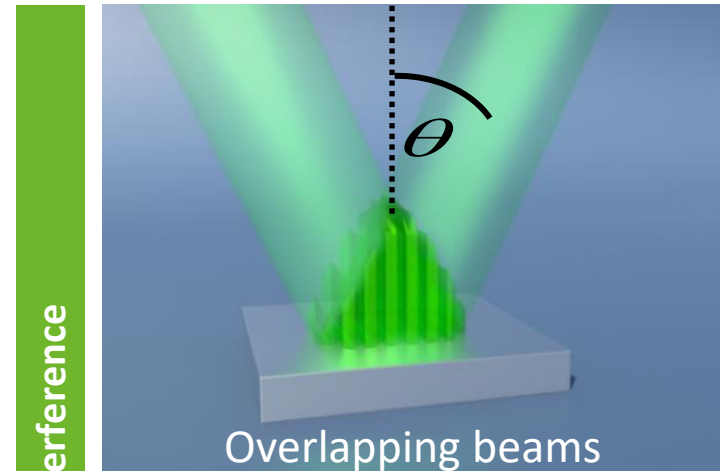
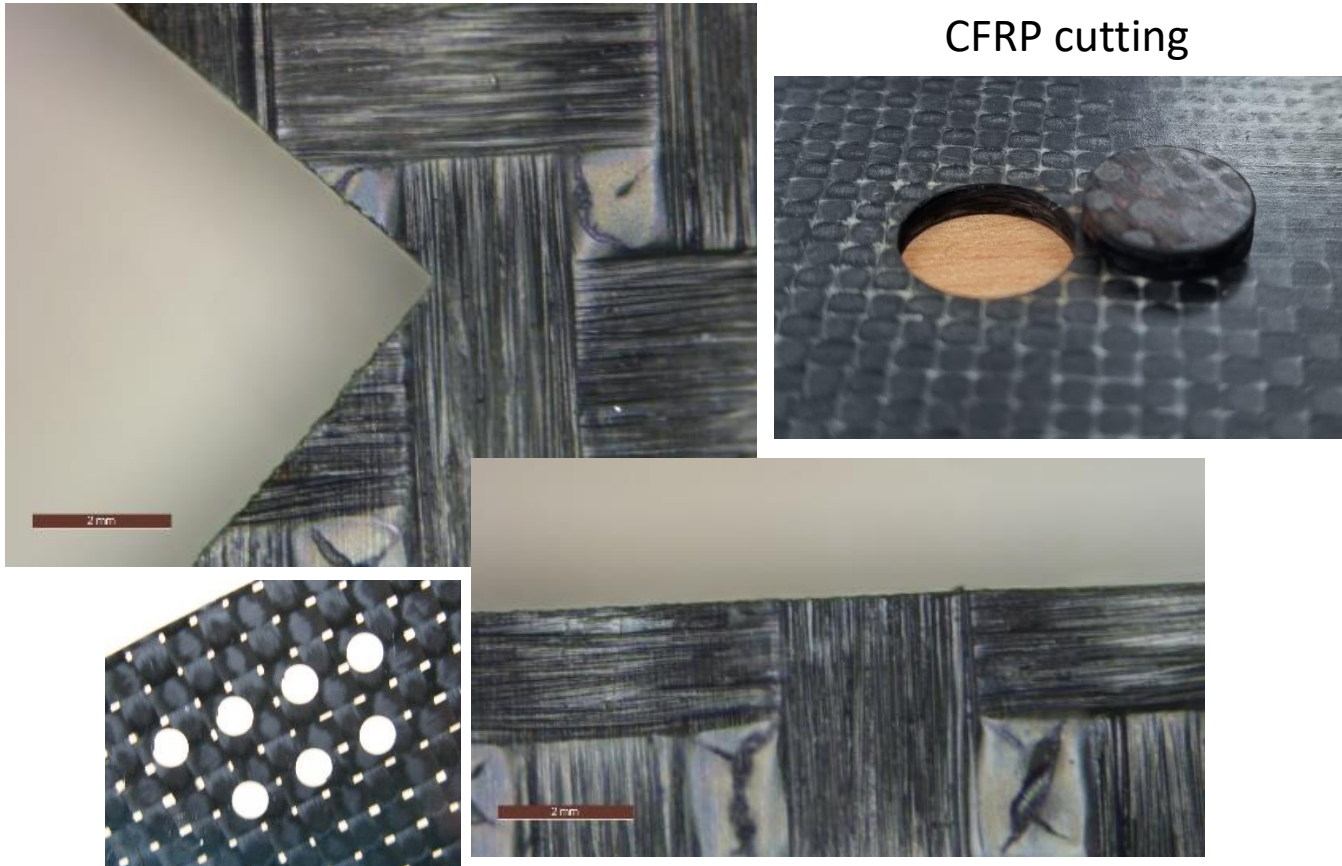


5 pulse burst at 200kHz with 600µJ burst energy

- Key functionality for applications such as glass separation and drilling
- Can increase the efficiency of material removal whilst maintaining high quality machining

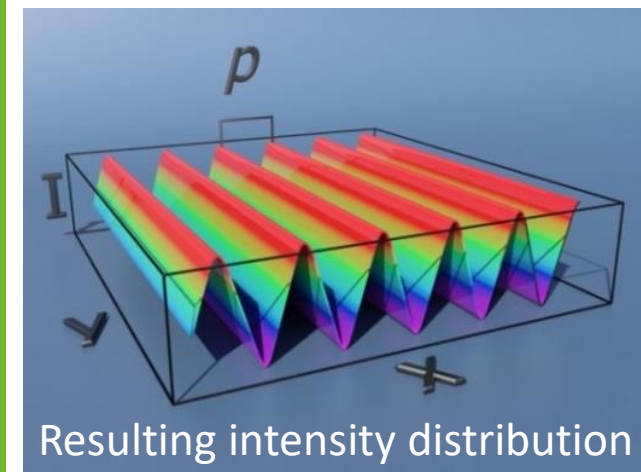
Applications

The large operational parameter space enables a wide range of applications. From glass separation to surface functionalisation, micro-welding to micro-via drilling.



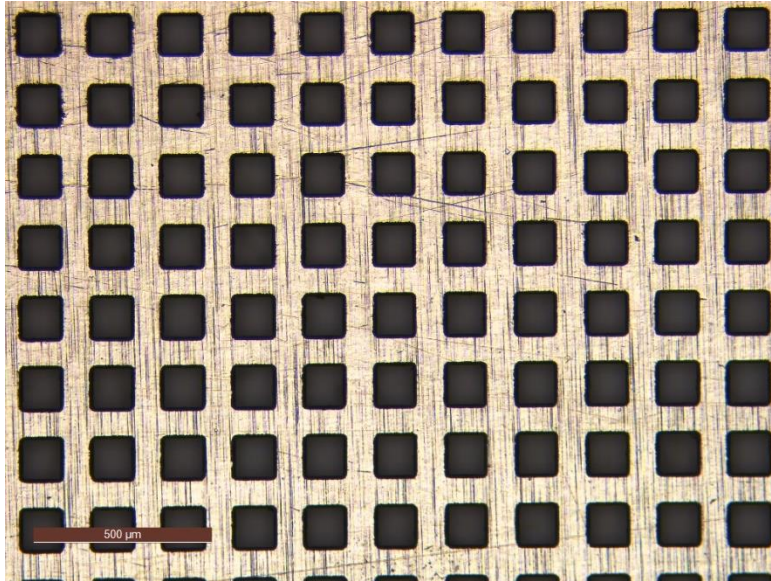
Direct laser interference patterning (DLIP)

2-Beam Interference

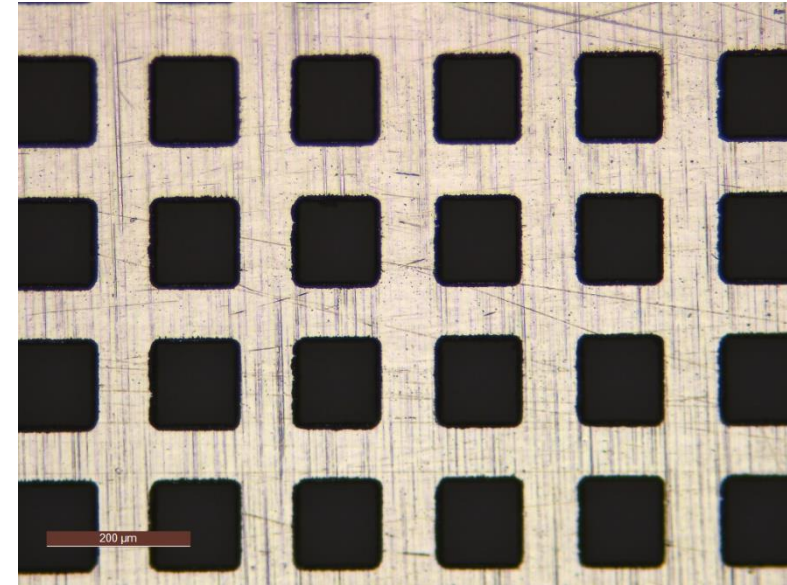


Invar foil cutting

5× magnification

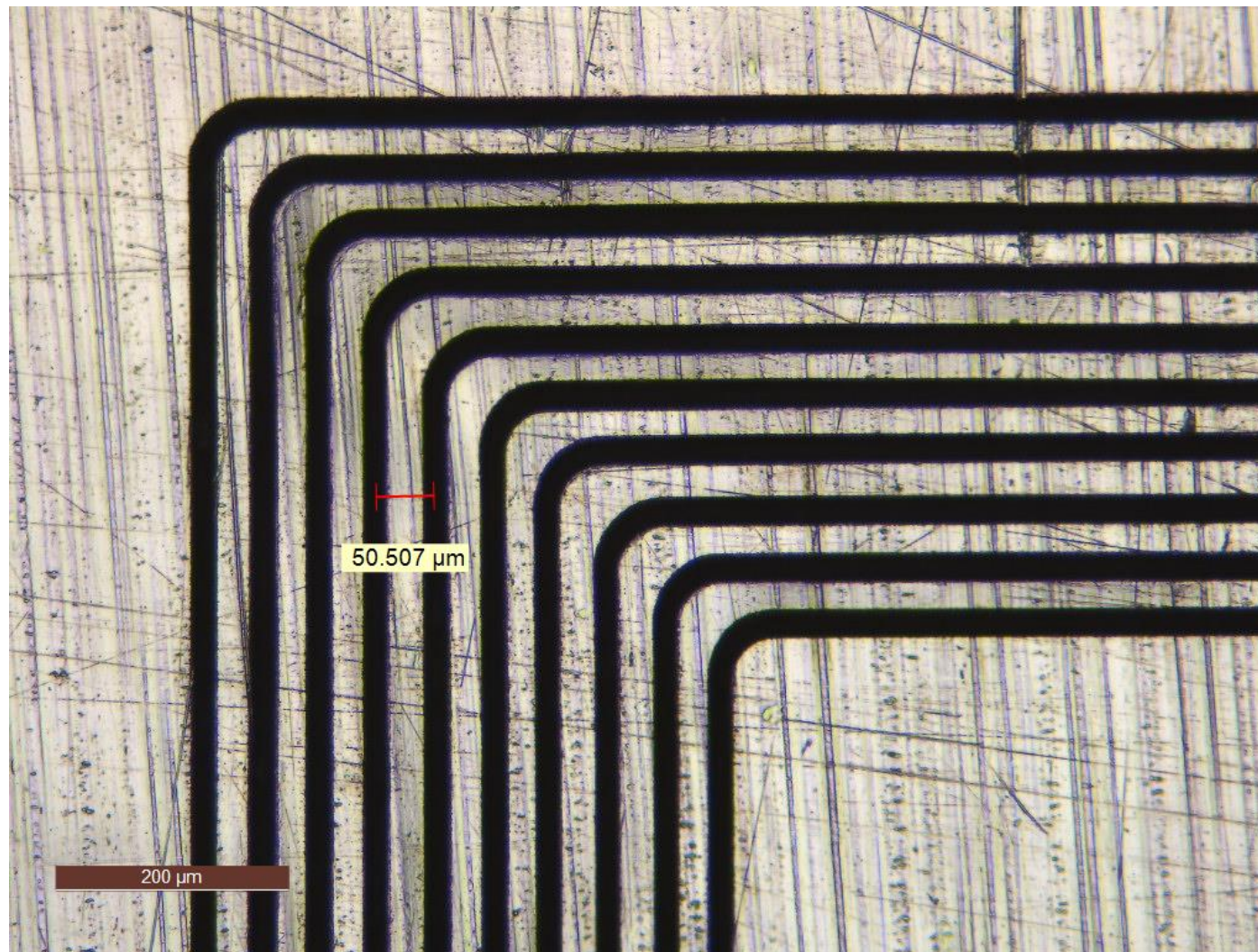


10× magnification



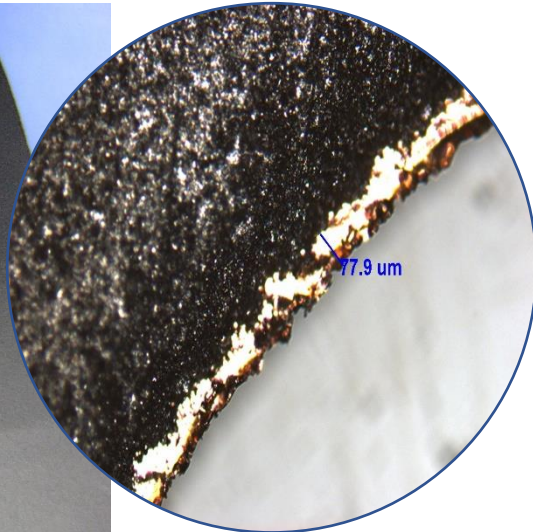
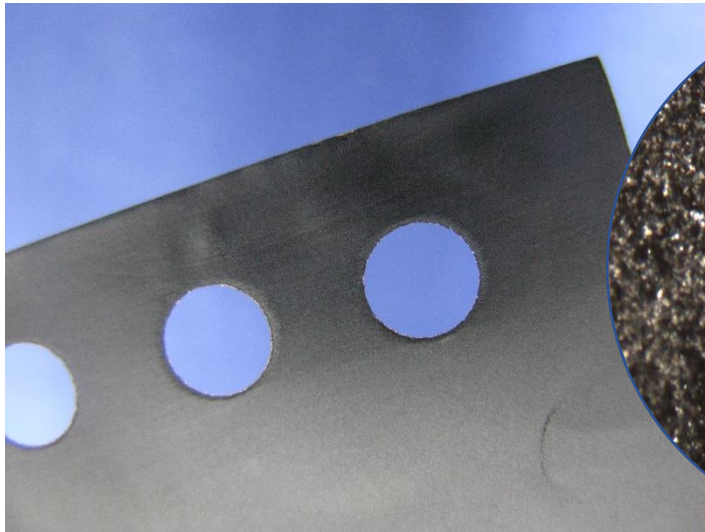
- 20μm thick Invar foil
- 100μm square holes, 200μm pitch
- 20MHz intra-burst pulse repetition frequency
- 16.kHz burst frequency, 10 pulses per burst
- 6μm separation between burst
- 30 passes

Foil ablation for RFID



Battery electrodes slitting and notching

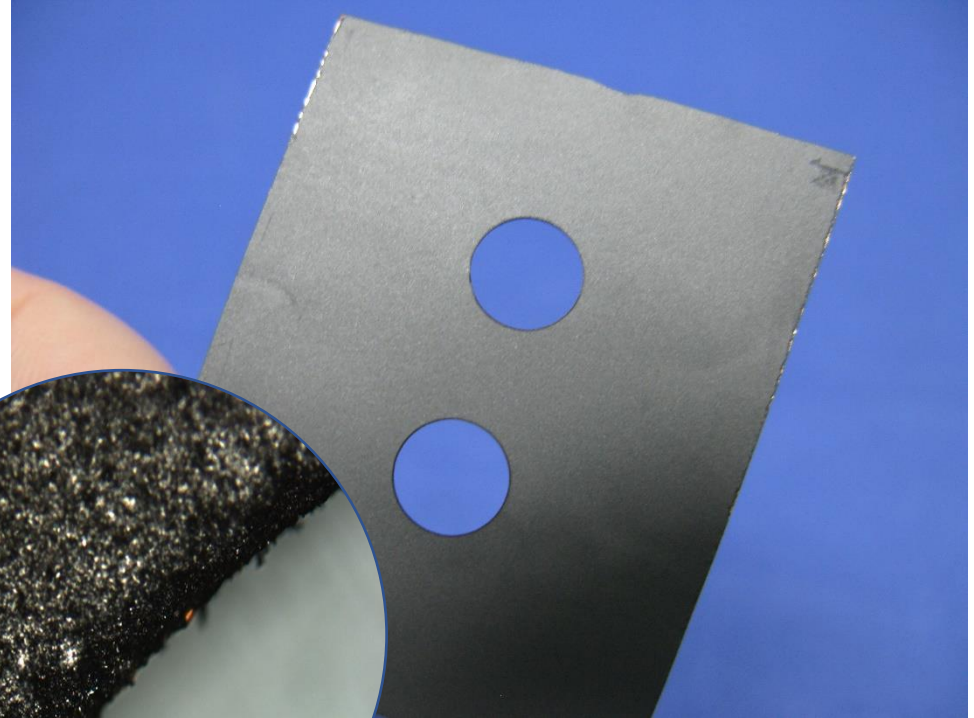
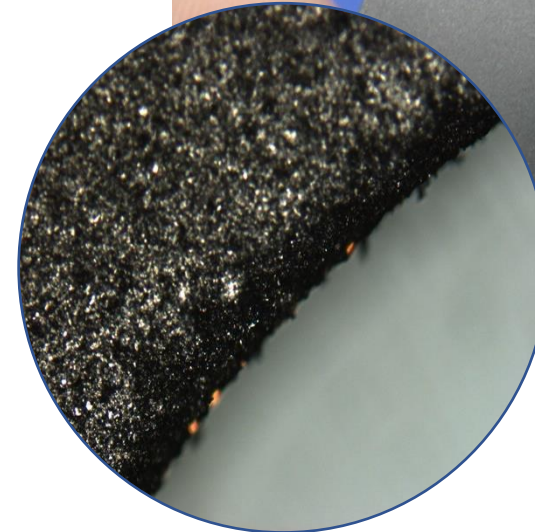
- Wavelength 515nm
- Average power level 80W
- Fast-burst mode
- Galvo scanner for high-speed processing
- Feasible also with CO₂ but with copper exposed alongside the cut
- USP GREEN laser produces higher overall cut quality



CO₂

vs

USP Green



Applications for LXR® series

- High-speed separation of optically transparent materials
- Joining of optically transparent materials to similar/dissimilar materials
- Micromachining with virtually no thermal transfer
- Surface functionalisation in a range of materials for a range of applications
- Metal foil scribing/ablating
- Sub-surface glass marking
- Cutting of metal and plastics for medical devices
- Cutting carbon fibre composites
- Engraving printing drums for flexo packaging

Industries for LXR® series

- Mobile internet enabled devices
- Medical device manufacturing
- Microelectronics
- Micromachining
- Flat panel display cutting
- Automotive
- Printing
- Security



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Thank you for
your attention

ANY QUESTION?

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