FRENCH MEGAJOULE LASER (LMJ)

176 beams
1.4 MJ (UV)

8 beams bundle

1056 nm (IR)
351 nm (UV)

10 mm target
THE LMJ SYSTEM
SEQUENCES ADAPTABILITY
(FRENCH MEGAJOULE LASER)
1. Laser MegaJoule Shot Overview
2. Control system
3. Grafcets
4. Adjustments
5. GUI
THE LMJ SYSTEM SEQUENCES ADAPTABILITY:
SHOT OVERVIEW | CONTROL SYSTEM | ADJUSTMENTS | GRAFCETS | GUI
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1
2
3
4
Shot:

Laser emission

1 2 3 4
The LMJ System Sequences Adaptability:

Shot Overview

- Facility Preparation
  - PreAmplifier: high energy fitting
  - Inserters movements
  - Alignment Laser thermalization

- Preparation

- Timing shot 1s

- Post Shot
Facility Preparation  Alignment  Preparation  Post Shot

- Beams Alignment
- Target Alignment
- Plasma Diagnostics Alignment
THE LMJ SYSTEM SEQUENCES ADAPTABILITY:
SHOT OVERVIEW | CONTROL SYSTEM | ADJUSTMENTS | GRAFCETS | GUI

- Facility Preparation
- Alignment
- Validation Shot
- Timing shot 1s

• Non amplified shot
• Equipment Configuration
• Camera Arming
• Timing validation
• Data storage
THE LMJ SYSTEM SEQUENCES ADAPTABILITY:

SHOT OVERVIEW

- Amplified shot
- Equipment Configuration
- Camera Arming
- Timing shot
- Data storage

Facility Preparation → Alignment → Validation Shot → Power Shot Timing shot 1s → Preparation → Post Shot

« Insertion / En-tête et pied de page »

Pour personnaliser le pied de page et la date :

Personnaliser la zone de pied de page
Cliquer sur appliquer partout
Equipment Securing
Power conditionning
Lamp Test
Data storage
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Resource

- Name
- Attributes: Reserved, Context, Operational State, Operational Mode
- Methods: Reserve(), Release()

Functions:
- Membership of a perimeter
  Perimeter: Resource group

Control Points:
- 14 °C
- 10 kV

Alarms

Resource Manager
Supervisory Control System

- Chain01
- Chain22
- Upper Quadruplet
- Lower Quadruplet
- Injection
- Amplifiers
- Transport
- Focalization

PAM1
PAM2

Amplifiers
Transport
Focalization

Beam1, Beam2, Beam3, Beam4

Source

Sensors
Motors

Resource
System view
Utilisation relationship
THE LMJ SYSTEM SEQUENCES ADAPTABILITY:
SHOOT OVERVIEW | CONTROL SYSTEM | ADJUSTMENTS | GRAFCETS | GUI

Supervisory Control System

- Chain01
- Chain22
- Upper Quadruplet
- Lower Quadruplet
- Injection
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PAM1
- PAM2
- Amplifiers
- Transport
- Focalization

Source
- Beam1
- Beam2
- Beam3
- Beam4
- Sensors
- Motors

Configuration Manager

Resource

System view

Utilisation relationship
THE LMJ SYSTEM SEQUENCES ADAPTABILITY :

SHOT OVERVIEW | CONTROL SYSTEM | ADJUSTMENTS | GRAFCETS | GUI

N3 Facility planning And operations

N2 System control

High level supervisory

N1 Subsystem Supervisory

Subsystem Control Command

Sequence Manager

SYSTEM SEQUENCES

Power Conditioning

PEPC

Timing

Target Diagnostics

Target Chamber Equipments

Cryogenic Equipments

Personal Safety

Laser Diagnostics

MO & PAM

Vacuum Control

Alignment

Laser Amplification

Primary Vacumm

Utilities

Equipment

Vacuum Control
Common Framework Tools

- Configuration Manager
- Resource Manager
- Sequence Manager
THE LMJ SYSTEM SEQUENCES ADAPTABILITY:

SHOT OVERVIEW | CONTROL SYSTEM | ADJUSTMENTS | GRAFCETS | GUI

N3 Facility planning and operations
N2 System control
High level supervisory

N1 Subsystem Supervisory
Subsystem Control Command

N0 Equipment Control
Equipment

Tools

Power Conditioning
Target Diagnostics
Target Chamber Equipments
Cryogenic Equipments
Laser Diagnostics
MO & PAM
Alignment
Vacuum Control
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Utilities
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SHOT OVERVIEW | CONTROL SYSTEM | GRAFCETS | ADJUSTMENTS | GUI

Shot sequence main grafcet

Laser configuration grafcet

Power Conditioning Supervisory Function:
Configure
THE LMJ SYSTEM SEQUENCES ADAPTABILITY:

SHOT OVERVIEW | CONTROL SYSTEM | GRAFCETS | ADJUSTMENTS | GUI

Alarms

Power Conditioning Supervisory Function:
Configure
1. Laser MegaJoule Shot Overview
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The LMJ System Sequences Adaptability:

**Shot Overview | Control System | Grafcets | Adjustments | GUI**

### Shot Sequence Model File
- Sequence program name
- Supervisories concerned by sequence
- Main resource class
- Excluded resource class
- Resource class priority
- Supervisory
  - Main step
  - Settings name: Function Class

### Adjustment File
- Sequence program name
- Supervisory
- Main resource
- Excluded resource
- Resource priority
- Supervisory
  - Main step
  - Settings value: Function
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Panorama
Grafct successful executions : 100th achieved power shots

Adjustment File : Easiness to drive new bundles.

GUI synthesis philosophy applies in 8 beams or 176 beams bundles.

System sequences are ready for the coming LMJ beams integration.