Connecting Rod Solutions

great laser makes great products

Solutions We Provide

Laser Scribing

Laser Marking

Laser Grooving

Laser Hardening

Laser Drilling

Laser Cleaning
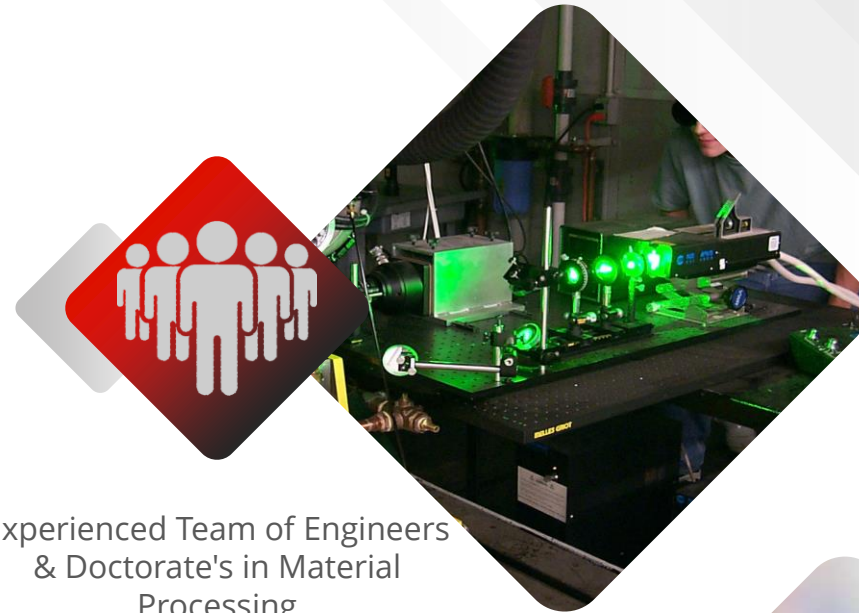
Laser Welding

Laser Cladding

Laser Sintering

Laser Cutting

SCANTECH LASER

Why US?

+225,000 Hours Laser Processing
+500 Applications Developed

Experienced Team of Engineers & Doctorate's in Material Processing

Cost Effective Solution with Experience in Industrial Automation

Application Lab is well Equipped for Material Processing & Sampling

SCANTECH
LASER

Our Clients

Kalyani Forge

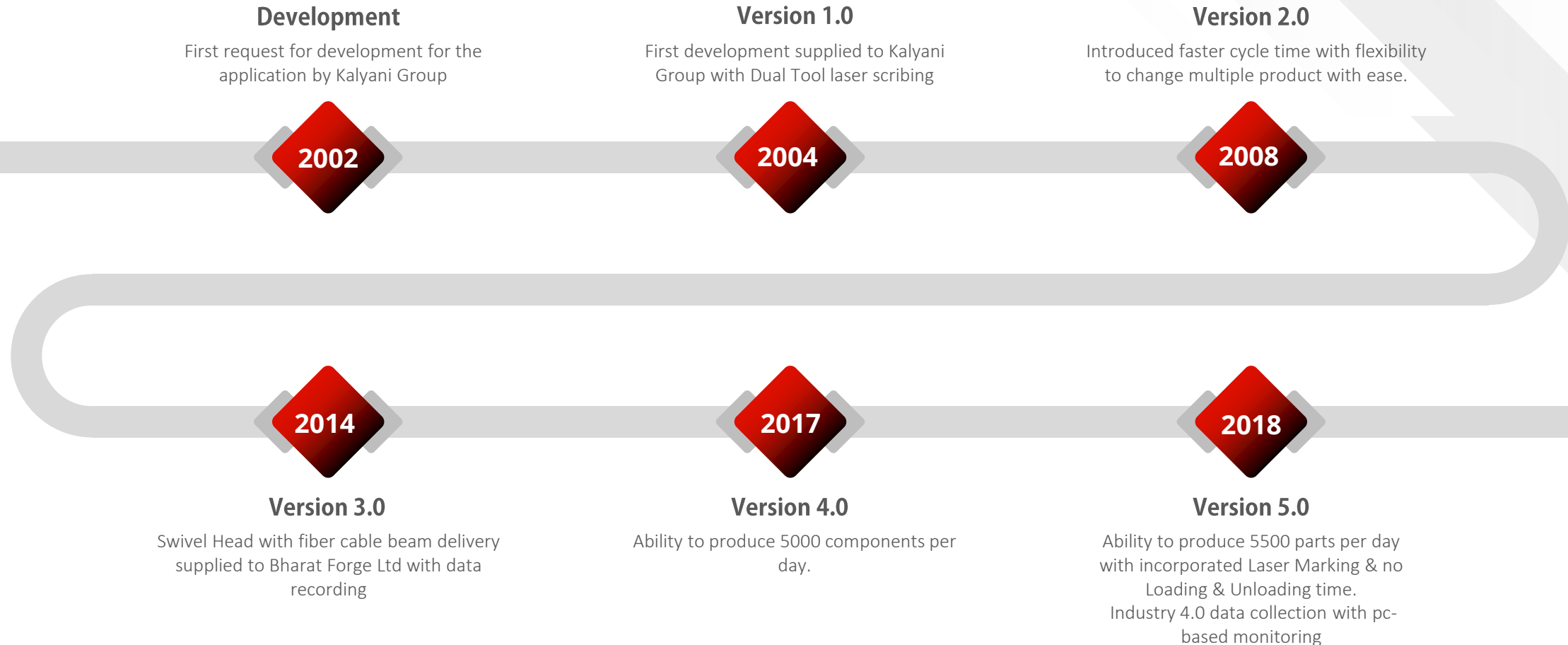Mahindra (Tractor)

Bharat Forge

Bajaj Motors

Sansera Engineering

Devgiri Forgings

Magal Tech

M M Forgings

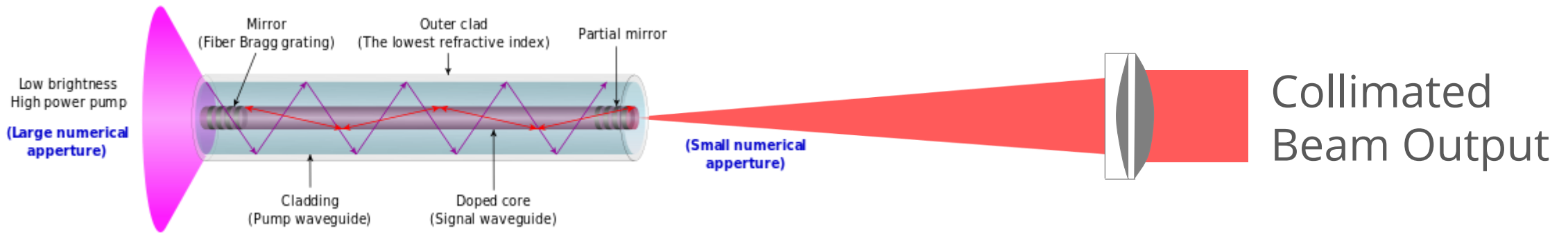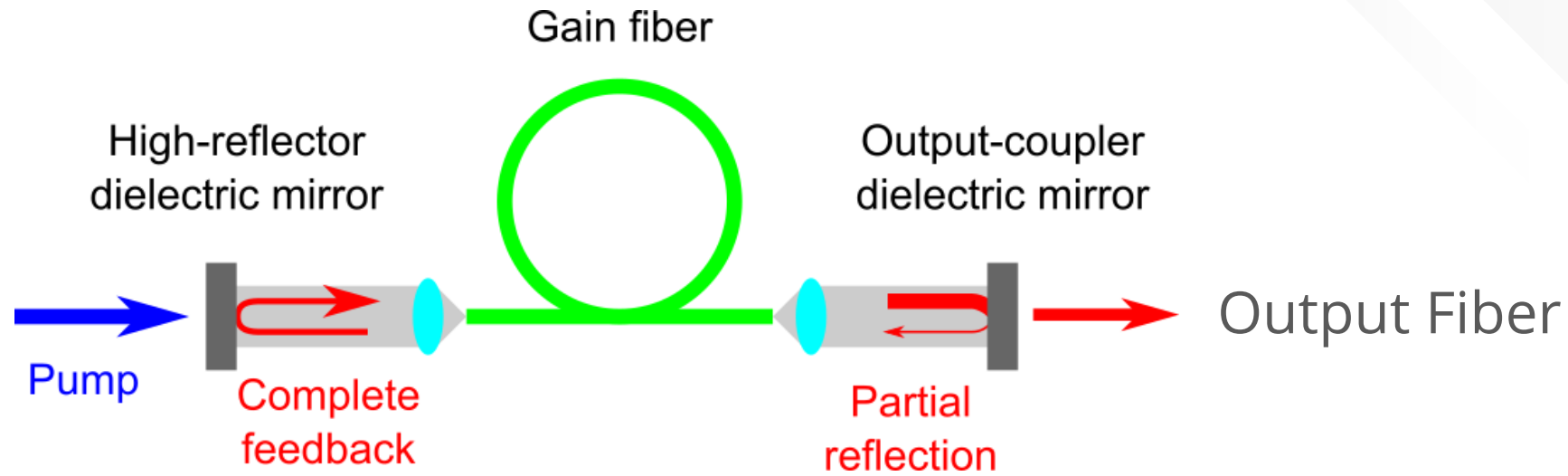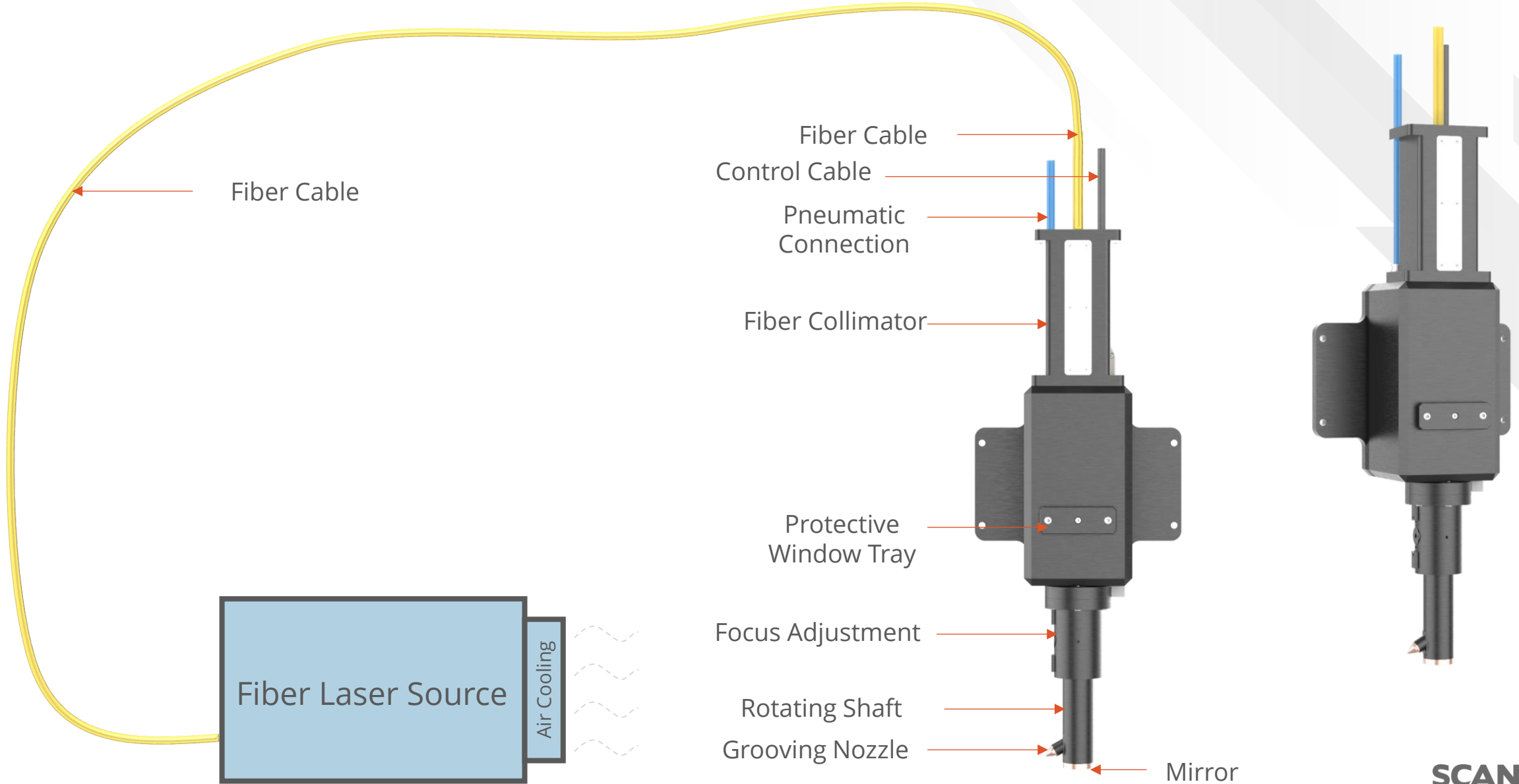Radha Krishna Forgings

SCANTECH LASER

Product Road Map

Development

First request for development for the application by Kalyani Group

2002

Version 1.0

First development supplied to Kalyani Group with Dual Tool laser scribing

2004

Version 2.0

Introduced faster cycle time with flexibility to change multiple product with ease.

2008

2014

Version 3.0

Swivel Head with fiber cable beam delivery supplied to Bharat Forge Ltd with data recording

2017

Version 4.0

Ability to produce 5000 components per day.

2018

Version 5.0

Ability to produce 5500 parts per day with incorporated Laser Marking & no Loading & Unloading time.
Industry 4.0 data collection with pc-based monitoring

SCANTECH LASER

Laser Source – Fiber Laser Principle

Gain fiber

High-reflector
dielectric mirror

Output-coupler
dielectric mirror

Pump

Complete
feedback

Partial
reflection

Output Fiber

Mirror
(Fiber Bragg grating)

Outer clad
(The lowest refractive index)

Partial mirror

Low brightness
High power pump

**(Large numerical
apperture)**

**(Small numerical
apperture)**

Cladding
(Pump waveguide)

Doped core
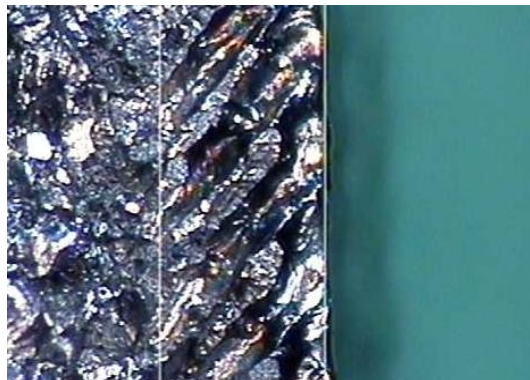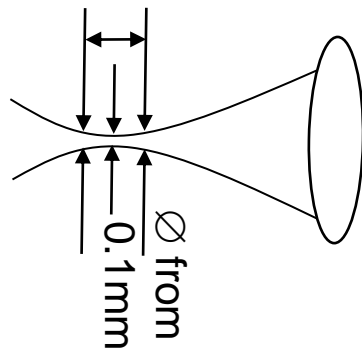(Signal waveguide)

Collimated
Beam Output

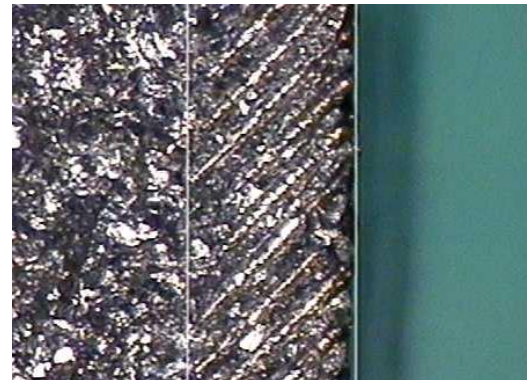Uncollimated Beam Output

Laser Source – Fiber Laser Setup

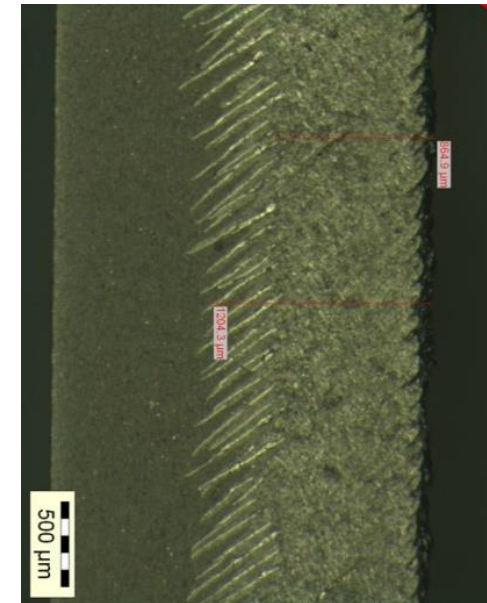# Material Processing – Fiber vs Lamp Pump

Other Lasers
Depth of Focus

∅ from 0.1mm

Fiber Laser
Depth of Focus

∅ from 0.025 mm
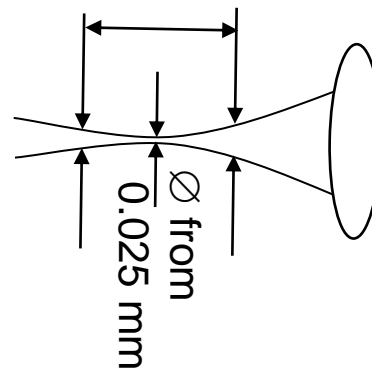
Less Force
Less Deformation
Less Chipping
Less HAZ
Smaller Kerf

SCANTECH LASER

Material Processing – Fiber vs Lamp Pump

notch

material

$HAZ \sim (\lambda\, t)^{1/2}$
λ= heat conduct..
t = pulse duration
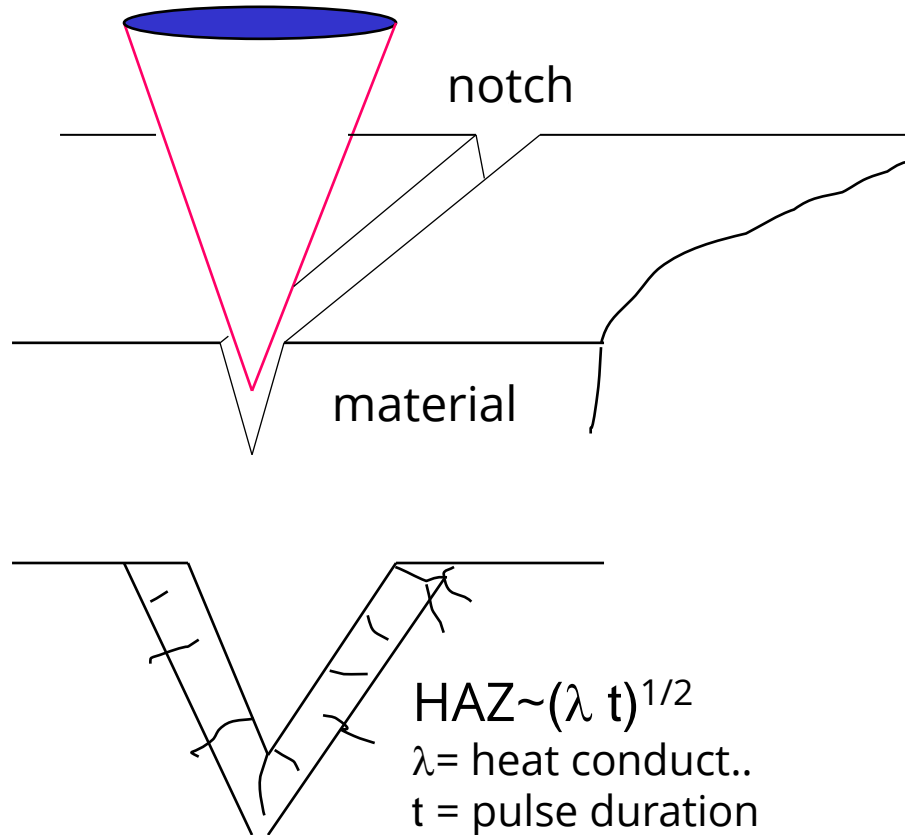
Lamp Pump (Perforated Notch):
Depth: pulse power/pulse energy/duration
Speed: average power/pulse rate

Fiber Laser (Continuous Notch):
Depth: pulse power/pulse energy/pulse rate
Speed: average power/pulse rate

Lamp Pump   QFS

HAZ
Less Microcracks/Pulse Energy/Power/Speed

Process Summary
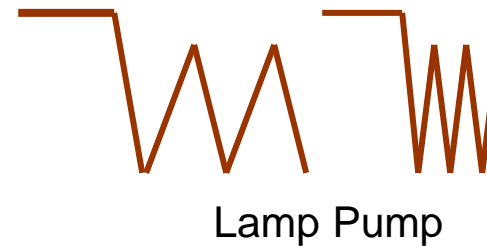
- Different types of optics & mode selection as per applications

- Level of energy distribution nearly perfect, thus even scribing results

- Closed-loop control by assist of position feedback for even depth and high quality results

- Short wavelength enabling superior absorption, thus highest process efficiency of all laser types

Laser Scribing of Connecting Rod

SCANTECH LASER

Proposed Model
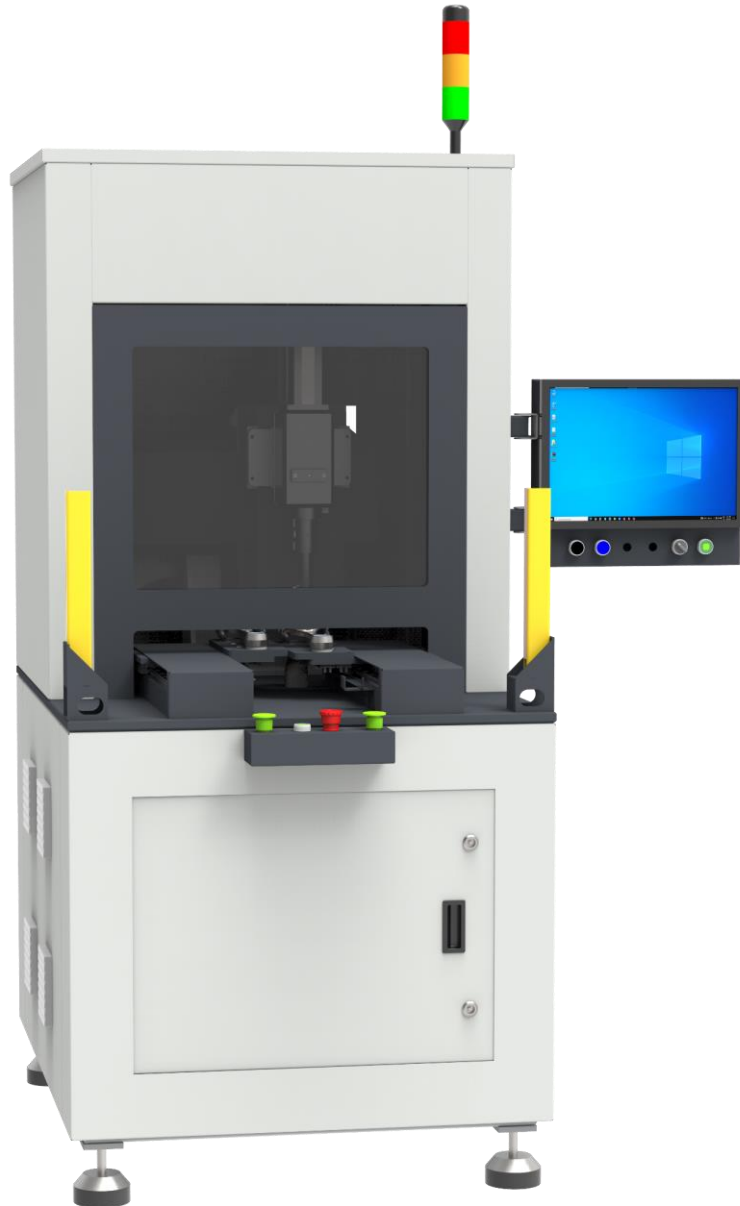
ProScribe 3000
Scribing with Fiber Laser

Version 5.0

SCAN**TECH**
LASER

Schematic - Machine

Tower Lamp

Flexible
Operating Panel

Sacrificial Viewing
Window

Safety Light
Curtain

Fixture with Job

X1 & X2 Axis

Two Hand
Operation Switch

Laser Cabinet

Electrical Cabinet

SCANTECH
LASER

Process Flow

To place the Conrod on the fixture

Operator will press two hand operation switch to start the job processing

Sensor will be active once Conrod is loaded and mounted correctly

Loaded fixture will move inside, simultaneously part loading is done on another fixture

Scribing head will take the position towards the parts to scribe the part as per the input fed in the operating panel

As an option, while it is scribing it will mark part number simultaneously

(Only on ProScribe 3000 & 4000)

On completion of Scribing the fixture will come out, while other fixture is preloaded during job process will move in.

1 2 3 4 5 6 7
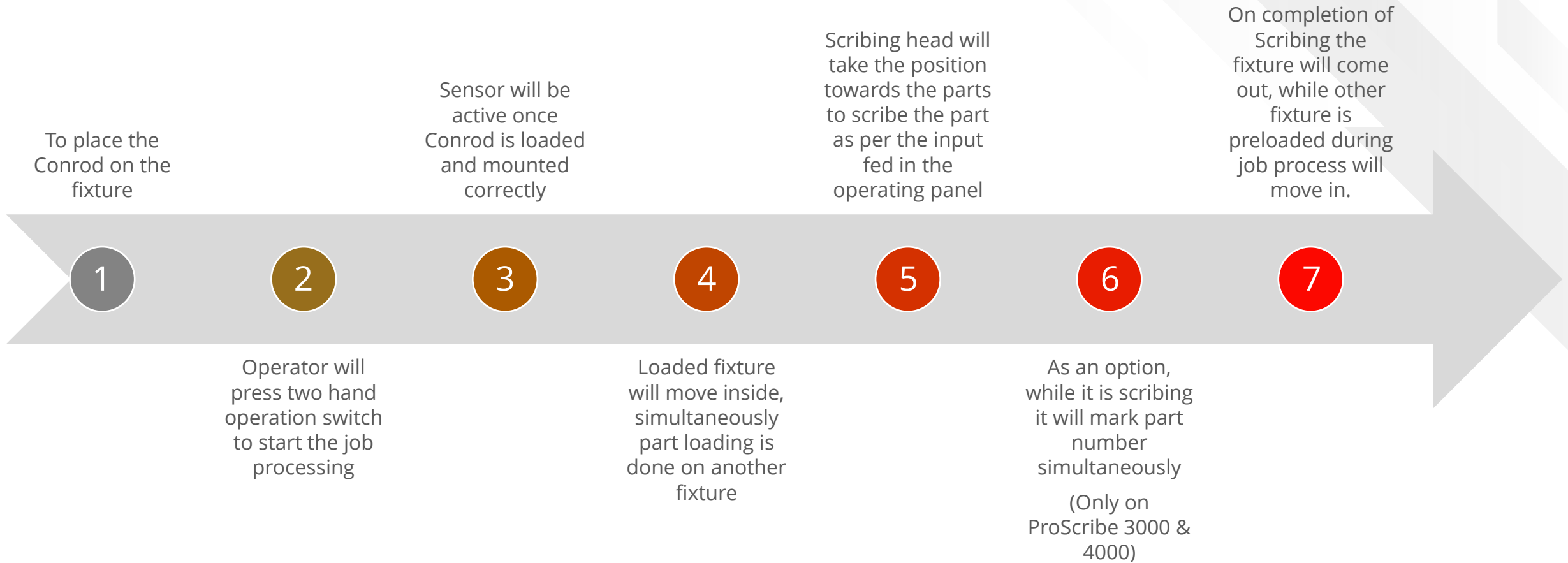
SCANTECH LASER

Production Data

Loading Time & Unloading Time: **0 Sec**

Traverse Time: **3 Sec**

Laser Scribing Time: **6 Sec**

Positioning Time: **7 Sec**

Total Job Out Time: **15 Sec.**

SCANTECH
LASER

Machine Features

Product Recipe	3 Level Security	Error Log Report	Synchronized Database	Alarm Log Data
Shift Data Report	Poka-Yoke	Safety Light Curtain	Servo With Built-In Encoders	Job Sensors

SCANTECH LASER

Poka-Yoke: Contact Type

1. Fixture on the machine is equipped with proximity sensor which will not allow the process to continue further unless the part is properly inserted.

2. If All axis are not at Home position, further process will not start. Sequence of steps will be as given below :

   a. First step – Reset all Alarms

   b. Second step – Home » All axis reference

   c. Third step – Press the Cycle start button

3. Tip Touch Sensor to stop head from crashing with the job in case of any system malfunction.

SCANTECH LASER

Poka-Yoke: Motion Stop Type

1. If Emergency button is pressed to stops the process Immediately when an error is detected. To start the operation again correct number of sequence of steps should be taken are as follows:

    a. First step – Laser Control » Laser ON » External Activation

    b. Second step – Home » Axis reference

    c. Third step – All Alarm » Reset

2. Alarm buzzer will sound if

    a. Nozzle collide with the component.

    b. Any external metal part comes around the job location.

Poka-Yoke: Warning Type

1. Laser will not fire if:

    a. Job is not loaded at Scribing Fixture.

    b. Proximity sensor does not sense the Job.

    c. Laser is not in ON mode.

    d. All axis are not at Home position.

2. Status Warning Alarm:

    a. Panel doors are open.

    b. Electrical Panel Temperature is high.

    c. Safety Light Curtain Active
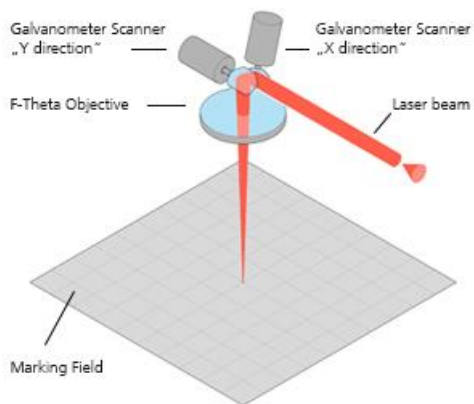
3. Wrong fixture alarm

Laser Marking – Why Laser Marking?

- No Ink or heat source required
- Clean environment
- No consumables
- Low processing cost
- High reliability
- Permanent mark
- Easy to sync with existing production line
- Better visibility
- High flexibility over materials
- High speed
- Fast turnaround time
- Non-contact process
- High accuracy & repeatability
- High Resolution

SCANTECH
LASER

Laser Marking - Setup

- The machine has 3 main parts
    - Laser
    - Controller
    - Surface

- The beam emitted from it allows the controller to trace patterns onto the surface

- The controller (usually a computer) controls the direction, intensity, speed of movement and spread of the laser beam aimed at the surface

Galvanometer Scanner „Y direction"
Galvanometer Scanner „X direction"
F-Theta Objective
Laser beam
Marking Field

Laser Marking - Setup

Beam Collimator

Beam Steering Unit

Focusing Lens

Output Laser

Q-Switched Fiber Laser

Laser Source
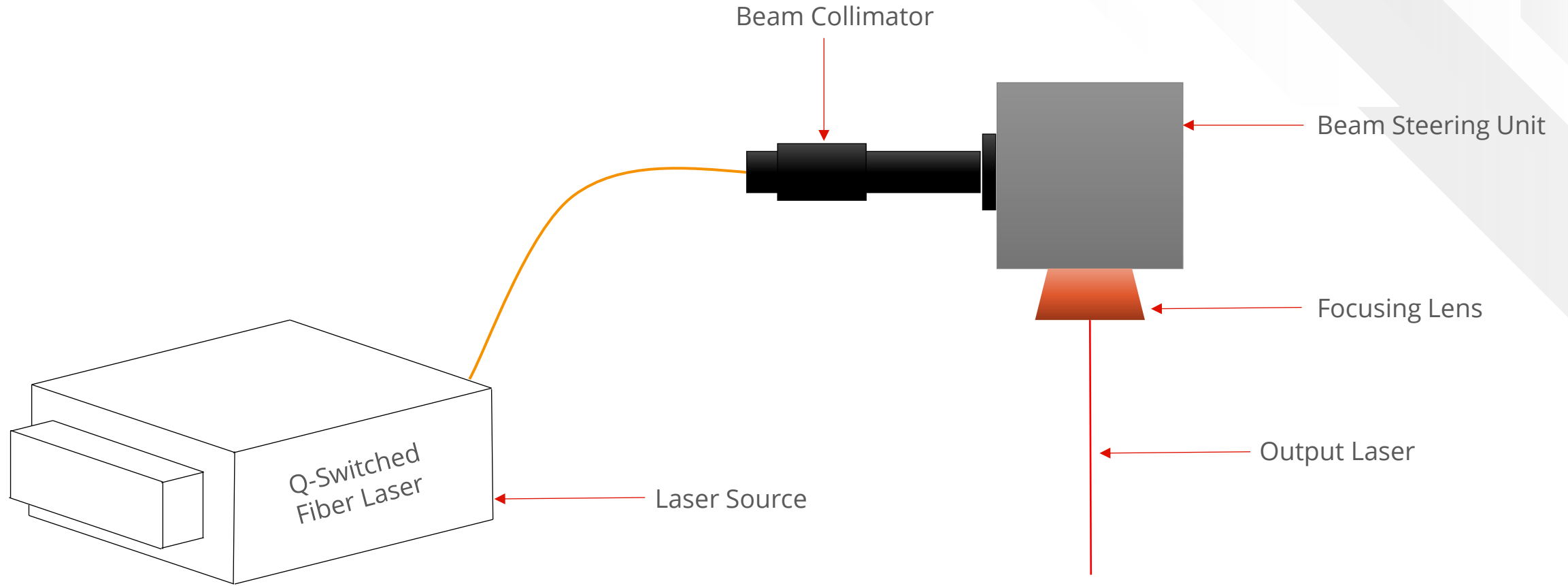
Proposed Schematic

ProPress
Connecting Rod Fracturing Solution

Version 2.0

SCANTECH LASER
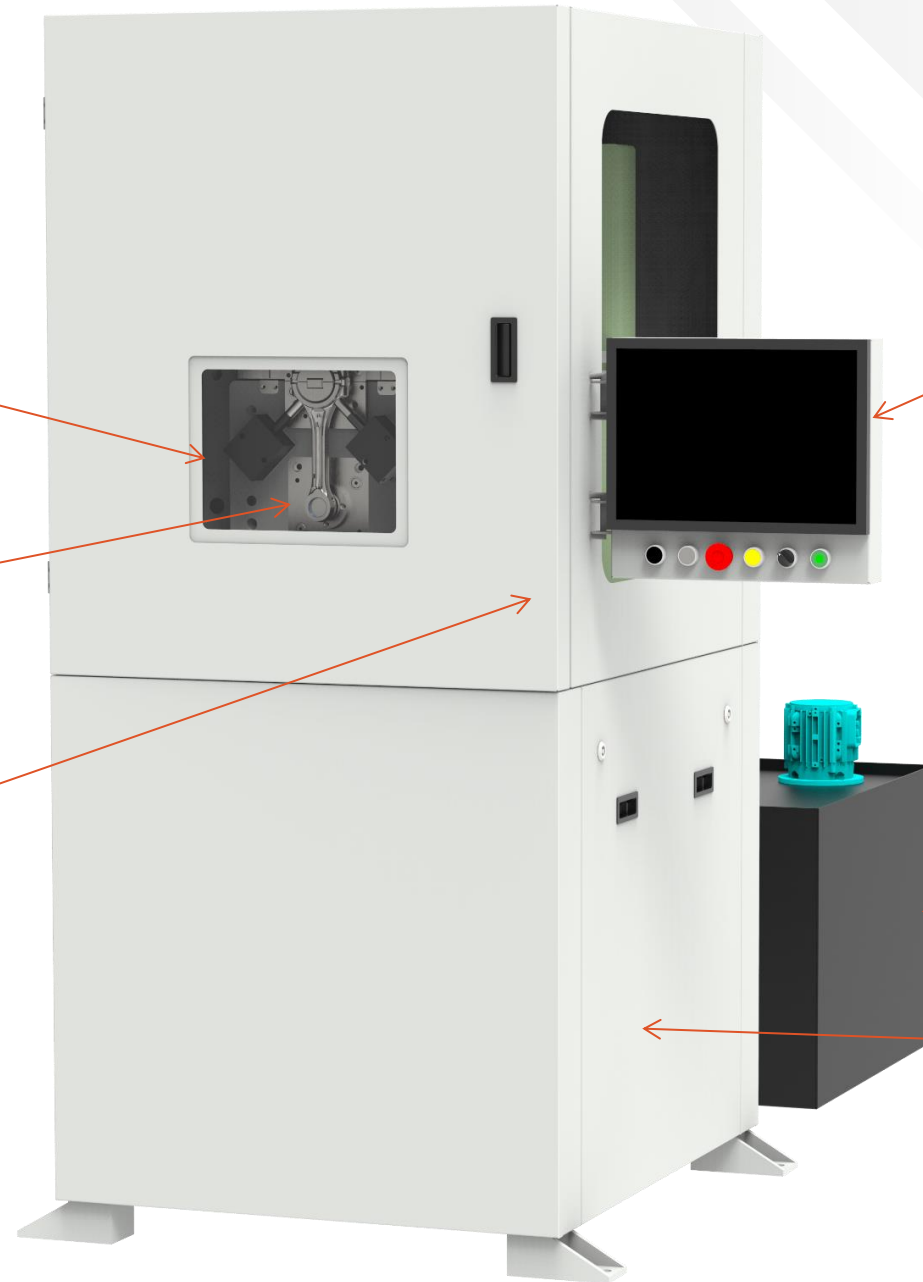
Schematic - Machine

Sacrificial Viewing Window

Fixture with Job

Fixture Maintenance Door

Flexible Operating Panel

Hydraulic Power Pack

Electrical Cabinet

SCANTECH
LASER

Schematic - Machine

Guide Rod

Hydraulic Cylinder

Fracture Relief Assembly

Big End Clamping Cylinder

Lubrication Manifold

Split Wedge

Position Scale

Vertical Job Position

Clamping Cylinder

SCANTECH LASER

Process Flow

1 — To place the Conrod on the fixture

2 — Operator will press two hand operation switch to start the job processing

3 — Jobs will be clamped using 3 hydraulic cylinders to ensure rigidness of the job.

4 — Hydraulics will verify the required pressure and start building impact pressure.

5 — Slider wedge will reach to the initial position and impacts within 500 ms

6 — As an option, while it is scribing it will mark part number simultaneously

7 — On completion of fracturing air jet will blow away any particulate and job will be unclamped.

SCANTECH LASER