

THE PLEK PRO
MAKING THE WORLD'S
BEST GUITARS EVEN BETTER

plek®

ADVANCED INSTRUMENT PROCESSING

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PLEK: THE ART OF THE FINGERBOARD

HIGH-END GUITAR TECHNOLOGY MADE IN GERMANY

PLEK is many things to many different people. We like to think of it as a question - **What makes for the best possible playability in a guitar?** - which we have turned into a machine.

It is also way of looking at the fingerboard, the frets, the strings, of your instruments.

It is the application of decades of research and experience, and dialogue with master guitar builders. It is a philosophy, an idea of quality and playability, as well as a technology.

The **Plek Pro** is an integrated tool that can give you

a precise overview of the fingerboard and fret profiles of your instruments, magnified to a resolution of 0.001mm (0.00004").

It is a tool that can take on almost any fingerboard- and fret-related task, and produce consistent and reliable high-quality results.

We are specialists for a particular aspect of the instrument - the world that exists between nut and saddle, the playing area that connects the musician to the instrument.

We are convinced that our approach, our machines, are the perfect partners in your work.

**Plek is many things to many
different people**

/ CONCEPT

The **Plek Pro** has been designed as a state-of-the-art tool for use in guitar production. A tool that not only undertakes precise fret dressing but also helps with quality control, R&D and OEM scenarios.

All work performed on an instrument is done under simulated string tension to reproduce exact playing conditions. This means that the **Plek Pro** can identify precisely what needs to be done to achieve a perfect fingerboard and perfect fretwork, whether on an individual instrument or a production series.

State-of-the art tool for use in guitar production

Instructions to the machine can be saved in the form of templates, leading to rapid cycle times and highest quality results, instrument after instrument.

Plek Pro helps to speed up the production process and raise the quality of instruments to an extremely high, consistent and measurable level.



THE PLEK PROCESS

The Plek Pro is first and foremost a tool that gives you a way of looking at a guitar fingerboard and frets in microscopic detail, as well as a way of working with that information. So to fully understand the advantages that a Plek Pro can bring to your production, we would like to briefly run you through the fundamental building blocks of the Plek process.

PREPARATION / EXTERNAL STRING TENSION SIMULATOR (STS)

In a production scenario, the first step in the Plek process is preparation. Custom-built processing fixtures are fastened to the instrument, which is then placed under simulated string tension in the external String Tension Simulator (STS) to ascertain the neck/trussrod adjustment required for further processing in the **Plek Pro**.



SIMULATED STRING TENSION

One of the beauties and challenges of instrument making has always been that the main component - wood - is an unpredictable and living material, influenced by humidity and other environmental factors.

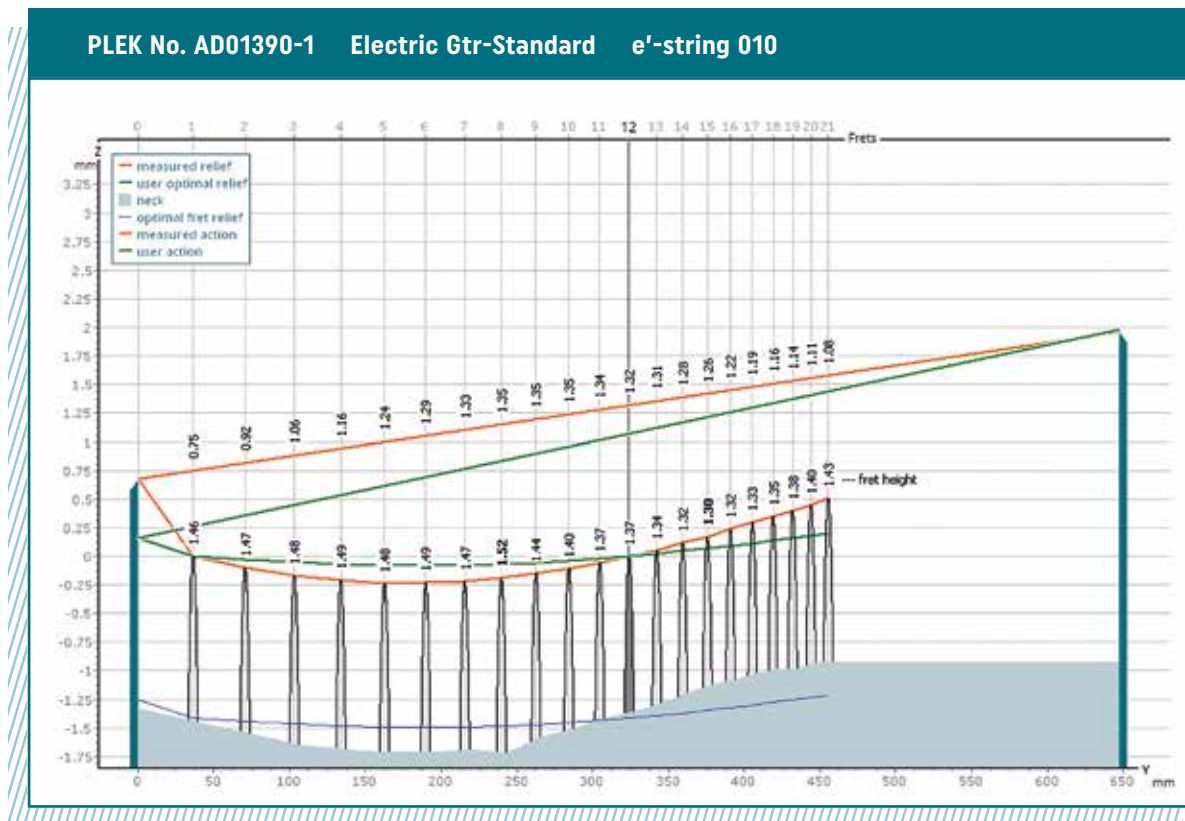
Working under simulated string tension helps reduce unpredictability and achieve greater consistency in an instrument series.

LOADING: THE PLEK PRO AND ON-BOARD STS

The instrument is then loaded into the **Plek Pro** machine. Each **Plek Pro** is equipped with an on-board STS system that makes it possible to perform all subsequent processes under simulated string tension. This, together with the previously attached custom-built instrument series fixtures, ensure maximum accuracy at every stage.

THE SCAN

The scan is the first basic step in the Plek process. The **Plek Pro** analyzes the fingerboard and frets and produces a mass of detailed information about the instrument nut, target string action, fingerboard and frets. The machine then produces various greatly magnified representations of that scan that will tell you all you need to know about the work that needs to be done on the instrument.



THE VIRTUAL FRET DRESS

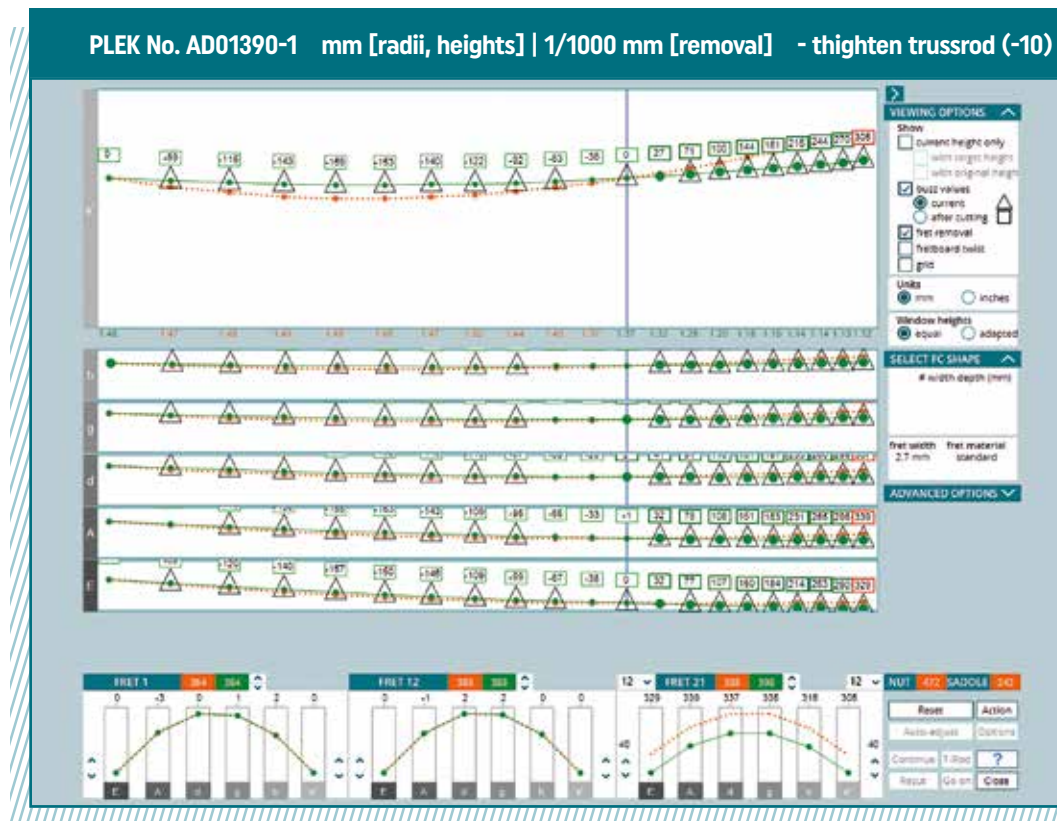
The Virtual Fret Dress is one of the key elements of the Plek software. Once you have identified what needs to be done, the **Plek Pro** can simulate the results of any fretdress that you intend to undertake. This means that you can know beforehand what the best possible results for that instrument will be. Once you have decided on a course of action, the machine will then perform the instructions you have given it.

THE VIRTUAL FRET DRESS

At the core of the Plek Pro software is a feature which lets you simulate fret dress actions based on the results of an instrument scan. This gives you enormous flexibility in optimizing the playability of an instrument series and helps reduce both R&D and cycle times to a minimum.

The **Plek Pro** software is an extremely user-oriented program that makes it possible to perform any preferred dress for any action, and to implement any compound radius and/or upper end fall-off. Neck and fret relief can be implemented on a string-by-string basis, radius can be set at the 1st and 12th frets and at the last fret on the fingerboard. The great advantage of this approach is that many different fret “solutions” can be studied in a virtual mode before any work is done on the actual guitar.

The VFD process can of course be automated in a production scenario to enhance cycle times.



PLEK DATA

Individualized data files provide a complete processing history for each instrument. Additional data services make it possible to monitor the quality of instrument output from any machine, anywhere.

PROCESSING

When using the STS and the automated Virtual Fret Dress, the actual cutting procedures will start immediately after the initial scan. The frets are cut exactly as designed, the nut slots and nut surface can be cut if selected, and a saddle, mounted in the saddle vise, can be trimmed, all in one process. Again, this will result in an extremely precise fret plane, nut slots and a saddle height that yields the exact target action when the instrument is strung.

Every guitar that passes through the Plek Pro has its own individual data file

DATA STORAGE

Every guitar that passes through the **Plek Pro** has its own individual data file that records the history of all the work done on the individual instrument by the Plek machine. Such an individualized record is useful not only in terms of production quality control, but also potentially later, when optimizing instrument setup or even servicing the instrument once purchased.

Additional data services are also available to optimize quality control in the production environment. These include the Plek Machine Protocol Database, which can be used to monitor machine performance and cycle times, as well as the Remote File Viewer, which can give access to individual guitar scan information. Taken together, these tools are invaluable aids not only for final assembly but also for quality control, whether in a single or multi-machine facility, or multi-facility or OEM scenarios.

/ ADVANTAGES

The **Plek Pro** provides you with a wide range of advantages in a production scenario.

These can be briefly summarized as follows:

MAXIMUM AUTOMATION

From automated fret dressing and crowning, to automated nutslot and surface cutting, plus a host of additional functions such as fingerboard planing and saddle cutting, the **Plek Pro** can deliver significantly enhanced processing times per guitar in a production environment.

ONE-CLICK OPERATION

Our software templates and automated virtual fret dress adjustment makes it possible to standardize the processing required for individual guitar models. Actions and tolerances can be pre-programmed to minimize operator intervention and effectively achieve one-click operation.

MULTIFUNCTIONAL SCAN OPTIONS

The various options available during scanning can provide a wide range of data on which to act, including data on fingerboard quality, trussrod adjustment and neck relief, and fret seating and placement. The virtual fret dress

enables precise simulation of all intended fretdress and boardplaning actions prior to implementation.

QUALITY CONTROL

The **Plek Pro** provides quality control functionality at key stages within the process. In addition, built-in safety parameters help to ensure consistent quality and optimal results. Processing of each guitar is recorded in an individual guitar file, creating a complete record of all actions taken. Additional information can be provided by the Plek Machine Protocol Database, which gives an at-a-glance overview of your production quality, machine performance, volumes and cycle times. Remote File Viewing capability can also provide instant access to scan visuals of individual instruments from any machine location. This is particularly useful not only in final assembly but also in a multi-machine or multi-facility production scenario, as well as for quality control of OEM production facilities.

/ FEATURES

Every Plek Pro installation is custom configured to your own production specifications, whether single machine, multi-machine, OEM, multi-facility production, special requirements, etc.

The following section is designed to give you an overview of the possibilities and potentials that Plek Pro machines can offer.



STANDARD MODULES The **Plek Pro** in its most basic form is configured with a scanning module and two cutting modules, as well as with internal and external STS modules.

SCANNING MODULE

The scanning module basically consists of a sensor finger combined with a high-resolution magnetic linear encoder.

This sensor is able to measure all relevant parameters of a guitar's playability: action, fretboard relief, fretboard contour, fret height, fret spacing as well as nut and saddle details. All this at a resolution of 0.001 mm (0.00004").

For further processing **Plek Pro's** software analyzes and displays all measurements numerically and as diagrams.

CUSTOM FRET CUTTER HEAD

For fret dressing the **Plek Pro** makes use of a specially manufactured carbide cutting wheel contoured for cutting the desired fret height as well as rounding the fret crown simultaneously. **Plek Pro** fretcutters

are accurate down to 0.01 mm (0.0004"). Each fret cutter comes with 2 or 3 customized shapes matched to your fretwire specs.

HIGH FREQUENCY SPINDLE / NUT CUTTING

Plek Pro's second cutting module is a High Frequency Motor Spindle (HFS) rotating at 5.000 – 50.000 r.p.m., which is used for cutting nut surface and nut slots, as well as a range of other optional functions.



MADE-TO-MEASURE COMPONENTS

Every Plek Pro machine includes carefully customized components designed to meet your own specific production requirements. Custom STS fixtures ensure perfect stability for each instrument series in the Plek machine. Custom fretcutter heads are made according to your own fretwire specs. Neck relief gauges are customized according to the scale of your instrument series.

A selection of several precision rotary bits (ball-, shaft-, cone-type) can be automatically loaded from a toolholder panel.

INTERNAL STRING TENSION SIMULATOR (STS)

The internal STS is controlled by the software. All the relevant process parameters for the selected guitar/bass model are loaded via a pre-assigned template, including the required STS air pressure.

EXTERNAL STS

The external STS is a stand-alone device which can be used to

undertake standardized trussrod adjustment prior to insertion in the **Plek Pro**. This results in significant production time speed-up by minimizing load/unload times and avoiding interruptions in the main machine. One single external STS can serve multiple **Plek Pro** machines. The **Plek Pro** is optimized to work together with the external STS in a production environment.

NECK RELIEF GAUGE

The external STS comes together with a neck relief gauge which can be used to check neck/trussrod

adjustment when the instrument is placed under simulated string tension. Each neck relief gauge is customized according to the scale of the instrument series. Taken together, these two components help to greatly reduce cycle times.

CUSTOM STS FIXTURES

To ensure the 100% accuracy of the Plek process, all guitar STS fixtures are custom-made for your instruments. One set of fixtures is included as standard in our production packages. Additional fixtures may be purchased as required.

/ OPTIONAL FEATURES

When configuring a Plek Pro to your individual requirements you would typically take advantage of our range of optional features designed to enhance specific aspects of your production. The result is a machine that is perfectly suited to your production environment. For example, the HFS can also be used to plane the

fingerboard, cut the fret slots, mark the pin holes on an acoustic bridge, cut the pocket for a nut or an acoustic saddle, or trim an acoustic bridge saddle to the exact height. Optional functions may require additional hardware, e.g. additional cutter bits, as well as software add-ons, which can be purchased or booked as a daily or monthly subscription.

SOFTWARE ADD-ONS

TEMPLATES Our software templates make it possible to define the recurring properties of instrument models and also set parameters of the Plek processes to be performed for a given model.

AUTOMATED VIRTUAL FRET DRESS ADJUSTMENT (AVFA) An automated version of the Virtual Fret Dress which can automatically suggest a setting according to operator-defined tolerances. The system then

either waits for manual confirmation or can be configured to continue automatically. A major time saver for production.

BOARD PLANING Fingerboard planing can be undertaken based on scan results and required parameters (compound radius, falloff etc).

FRET SLOT CUTTING Fret slot cutting can be specified in terms of width and depth to follow the fretboard radius.

The machine can be instructed to perform a "natural binding" by not cutting through the entire board.

NUT POCKET CUTTING A "pocket" for the nut can be cut into the fingerboard.

SADDLE CUTTING The saddle is placed in a vise and cut according to the defined string action and radius. Options include cutting of the top and/or bottom of the saddle.

SADDLE SLOT CUTTING This add-on makes it possible to cut a slot into acoustic bridges. The cut is based on the Plek scan to ensure correct string spacing and precise scale length compensation.

BRIDGE PINHOLE MARKING This add-on for acoustic guitars is based on the Plek instrument scan, resulting in perfectly placed pin hole markings.

PAIRS Nut slot cutting for instruments with "paired" strings, e.g. 12-string guitars or mandolins.

MULTISCALE PROCESSING The Plek machine can be used to scan multiscale instruments and to cut multiscale frets, as well as multiscale nuts, fret slots, saddle slots and nut pockets. Multiscale frets must be crowned by hand.

FINGERBOARD MARKING An addon to engrave generic position markers

such as dots and blocks.

HARDWARE ADD-ONS

ADDITIONAL CUSTOM STS FIXTURES STS fixtures can be made to order for individual guitar series.

ADDITIONAL FRET CUTTER HEADS (FCH) Each Plek Pro comes with two FCH as standard. Additional FCH can be purchased as backup.

ADDITIONAL NECK RELIEF GAUGES (NRG) Additional NRG can be purchased for instrument models with different scales.

DATA ADD-ONS

CLOUD CONFIGURATION BACKUP Your machine configuration files can be automatically stored online as an insurance against data loss. Cloud Configuration Backup means that machines can be rapidly restored to their pre-loss settings.

CLOUD PRODUCTION DATA BACKUP

Production guitar files can be automatically backed up to our cloud storage facility. Together with the Plek Remote File Viewer, this means that data is available not only for backup purposes, but also for quality control from remote locations.

MACHINE PROTOCOL DATABASE The Machine Protocol Database can be used to gather invaluable information about production quality, machine and operator performance, and cycle times. The database can be accessed from any computer with an internet connection.

REMOTE FILE VIEWER The Plek Remote File Viewer makes it possible to monitor individual guitar quality, with complete access to scan records, from any location. Ideal for high-level production monitoring and quality control.

CONFIGURATION

PLEK MODULES/ADD-ONS	CUSTOM PRODUCTION/REPAIR	QUALITY CONTROL, DISTRIBUTION, R&D	SMALL MANUFACTURER	LARGE MANUFACTURER	LARGE MANUFACTURER MULTIPLE MACHINES
MODEL	STATION *	STATION *	STATION *	PRO	PRO
Core Functions: Scan / Fret & Nut Cutting	X	X	X	X	X
Standard Fret Cutter	X	X			
Custom Fret Cutter Shape Combinations			X	X	X
Custom HFS Cutter Set			X	X	X
Internal STS				X	X
External STS				X	X
Neck Relief Gauge				X	X
STS Fixtures				X	X
O P T I O N A L					
SOFTWARE					
Templates		(X)	(X)	X	X
AVFA			(X)	X	X
Board Planing	X	X	X	(X)	(X)
Fret Slot Cutting	X	X	X	(X)	(X)
Nut Pocket Cutting	X	X	X	(X)	(X)
Saddle Cutting	X	X	X	(X)	(X)
Saddle Slot Cutting	X	X	X	(X)	(X)
Bridge Pinhole Marking	X	X	X	(X)	(X)
Multiscale	X	X	X	(X)	(X)
Fingerboard Marking	X	X	X	(X)	(X)
HARDWARE					
On-Instrument STS		(X)	X		
Additional Neck Relief Gauge				X	X
Additional STS Fixtures				X	X
DATA					
Cloud Configuration Data Backup	X	X	X	X	X
Cloud Production Guitar File Backup	(X)	(X)	X	X	X
Production Protocol Database			X	X	X
Remote Guitar File Viewer			X	X	X

Please refer to our Service Plan brochure for full details on each service plan.

/ SERVICES

Service is a key part of the Plek system and ranges from support, to software updates, fret cutter blade sharpening, machine tuning and maintenance, to operator training and consulting.

SETUP & TRAINING

Machine setup and on-site operator training by experienced Plek experts. Further/advanced training is also available on request.

SUPPORT & MONITORING

Our global support and monitoring network is available to help you with any questions relating to Plek machines and the Plek process.

SOFTWARE UPDATES

Plek Pro software is constantly being updated and developed further, normally at the rate of one major release per year.

FRET CUTTER RESHARPENING

We offer fret cutter resharpener services for all machines.

MACHINE MAINTENANCE SERVICE

Regular maintenance and servicing ensures that your machines are kept in a state of optimum productive readiness.

SPARE AND REPLACEMENT PARTS

We offer a full range of spare and replacement parts.

CONSULTING SERVICES

Further consulting services are available to deal with all your Plek-related requirements.

SERVICE PLAN OPTIONS

A choice of four different service plans is available, starting from on-demand services (ODS) with no fixed monthly fee at list prices, a basic plan (BSC) with minimum fixed costs, a standard plan (STD) for medium sized businesses, up to a premium package (PRM) with a generous level of free services included. While subscribing to a service plan with a fixed monthly fee is recommended for most businesses, the services on demand option will be the default plan, if no other decision has been made.

ON-DEMAND SERVICES (ODS) As the name suggests, services are provided on demand when needed, with no fixed monthly costs. Billing is based on the current list prices. Support time is billed in 15-minute blocks, plus a ticket fee for each newly registered service case. If a software version that is no longer supported is installed on the customer's machine, it may be necessary to update the machine before support can be provided.

BASIC (BSC) SERVICE PLAN The Basic Service Plan is designed for smaller businesses with no frequent need of services and support, in order to minimize the cost. A small monthly base fee ensures the availability of discounted prices on software, support and most of the available services. Stocked wear parts are discounted by 2%.

STANDARD (STD) SERVICE PLAN This service plan is designed for small and medium-sized companies with a high production volume and an increased need for service and support.

Software updates are free of charge, there is a monthly quota of free telephone and online support, a free subscription to the "Builders Toolkit" software add-on package and significantly reduced prices for FC resharpening and other services. Stocked wear parts are discounted by 5%.

PREMIUM (PRM) SERVICE PLAN The Premium Service Plan is ideal for larger companies that use multiple Plek machines and require optimal performance with full cost control. This plan includes not only free software updates and an unlimited contingent of telephone and online support, but also free maintenance and the optional setup of a customer-specific online database that records machine performance. A reduced per-machine base fee is also available for customers with more than one machine, as well as preferential service pricing and a 10% discount on stocked parts. Monitoring and analysis of machine performance and achieved instrument quality is facilitated with the help of online reports.

/ CONTACT

The best way to decide on the optimum **Plek Pro** configuration for your production requirements is to contact us. Our team has many years of experience working with guitar makers of all sizes and can provide expert advice on how to incorporate the Plek system into your production workflow.

Of course, don't hesitate to contact us about any aspect of the Plek system. We pride ourselves on our customer service and our close contact with our customers. We know that the decision to purchase and install a complex, customized, state-of-the-art system can only be the result of a dialogue between you, the guitar maker, and us here at Plek.

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/ APPENDIX: TECHNICAL DATA

PROCESSING CYCLE SPECS

EXTERNAL STS		
PROCESS GROUP	PROCESS	AVERAGE PROCESSING TIMES (MIN:SEC)
INSTRUMENT PREPARATION	Mount fixtures	0:30
	Load instrument and tension simulation	0:30
	Adjust truss-rod and unload instrument	0:50
PREPARATION, TRUSS-ROD ADJUSTMENT		~2:00

A complete evaluation of the instrument and fret dressing can be done in less than 13 minutes.

PLEK PRO		
PROCESS GROUP	PROCESS	AVERAGE PROCESSING TIMES (MIN:SEC)
LOADING	Load guitar	
	Load template	
	Tension simulation	0:30
BASELINE SCAN	Pre-scan (fret number check)	
	Neck width measurement	
	Scan	1:40
FRET DRESS	Automated Virtual Fretdress	0:30
	Fret cutting	3:00-10:00 depending on pre-production conditions
HISTORY SCAN	Rescan for QC	1:00
LOAD, SCAN, FRET CUT, QC		6:00-12:00

SYSTEM ACCURACY		
ACCURACY	MILIMETERS	INCHES
SENSOR FINGER Magnetic transmission linear encoder resolution: 0.001 mm (0.00004")	+/- 0.005	+/- 0.0002
FRET CUTTER	+/- 0.01	+/- 0.0004
HFS (NUT/SADDLE CUTTING)	+/- 0.05	+/- 0.002

FURTHER PROCESSING TIMES			
PROCESS GROUP	PROCESS	AVERAGE PROC. TIMES (MIN:SEC)	TOTAL AVG (MINS)
FRET DRESS	Fret dress	3:00-10:00	6:00-12:00
FRET DRESS AND NUTSLOT	Nutslot	+0:40	~7-13
FRET DRESS, NUT-SLOT, NUTSURFACE	Nut surface	+2:10	~9-15
FRET DRESS, NUTSLOT, NUT-SURFACE, SADDLE	Saddle	+1:30	~11-16

INSTALLATION SPECS

POWER SUPPLY AC 110-220 V, FUSE 15 A

If you wish to protect the **Plek Pro** machine in the event of a power failure we recommend to use a UPS (uninterruptable power supply) with a power of approx. 1000 W.

PHONE LINE AND INTERNET ACCESS (DSL)

Is required for online support / maintenance via remote computer.

The ethernet connection (internet access) of the Plek Station machine is not set up for wireless access points. For operational safety reasons and for a smooth online remote Plek support wireless is not an option.

COMPRESSED AIR 0.6 – 0.8 MPa / 85 – 116 PSI

(no minimum tank capacity)

OPERATOR REQUIREMENT AND TRAINING

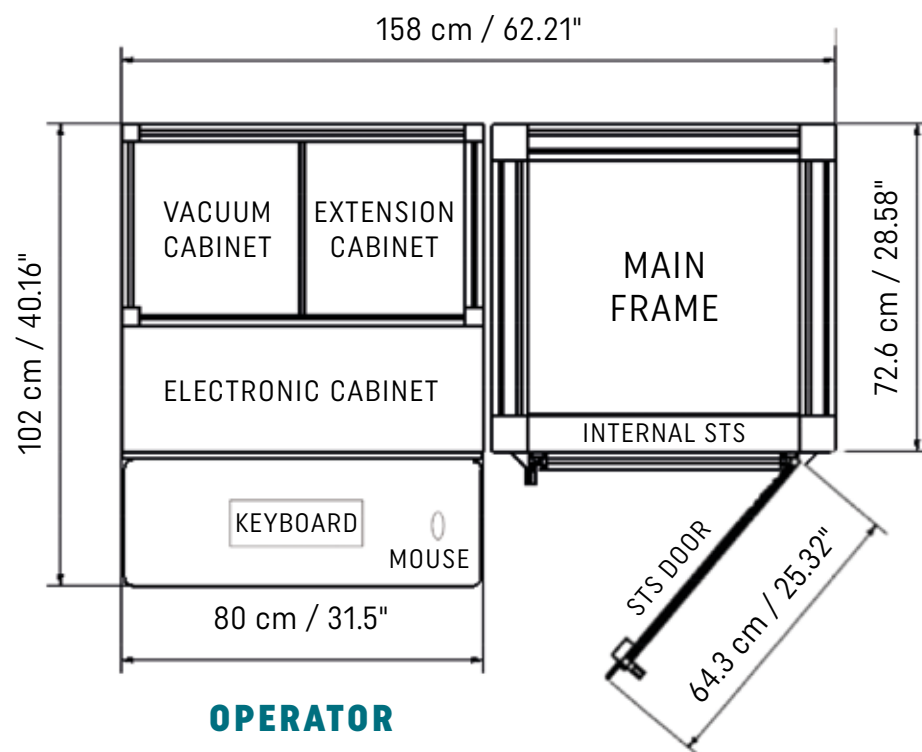
Any person with basic computer skills and a knowledge of guitars can operate the machine. An operator can be trained in 2-3 days.

LIFTING DEVICE FOR MACHINE SETUP

e.g. fork lift, crane, etc. for moving the shipping crates (2 crates approx. 500kg / 1100lbs each).

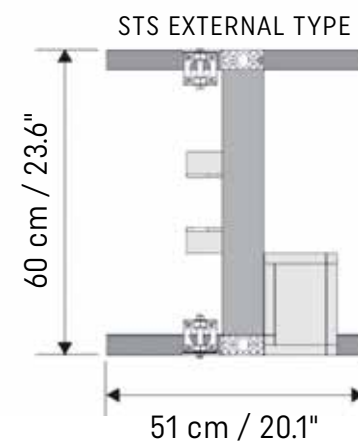
SPACE FOR MACHINE

(width/depth incl. operator space/height):
158 x 180 x 230 cm / 62.21" x 70.87" x 90.6"



EXTRA SPACE FOR EXTERNAL STS

(width/depth/height):
60 x 51 x 180 cm / 23.6" x 20.1" x 70.9"





ADVANCED INSTRUMENT PROCESSING

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