Piano Restringing

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Piano Stringing Made Easy

A. Focus & Goals
   1. Get basics down first, then proceed to faster, more advanced techniques.
   2. Neatness & uniformity
   3. Establish an efficient, fool-proof routine
   4. Make speed & quality go hand-in-hand while still being careful.
   5. Learn & understand variables associated with different piano designs & scales.
   6. Proper creative tool usage.

B. Tear down – Review
   1. Piano stringing can be made fun & easy, but the most important foundation is in proper tear-down, understanding what makes each piano tick. I have strung many pianos that other tuner/technicians and rebuilders have torn down while neglecting to note very important items which can cause mistakes and be very time-consuming to rectify. Seek help from someone if you are in doubt about anything before tearing a piano down.

C. Suggested Tools
   1. Tuning hammers with long & extra long tips or extensions.
   2. Coil lifter/spacer – deep coil lifter
   3. Approx. 1.5 lb. sledge hammer
   4. 2 string hooks
   5. Slide hammer coil setter/tightener
   6. Wire cutters/dikes
   7. Needle nose pliers & needle nose vise grips
   8. Small hammer
   9. Tuning pin & plate bushing punches
   10. Brass drift for seating strings
   11. Machinist screw jacks & pin block supports
   12. Good scissors, razor blade & felt knife

D. Preparation for Stringing – Checklist
   1. Proper plate position
   2. Plate bolts & screws seated & tight
   3. Nose bolts properly adjusted & tight

4. Piano belly & bridges assemblies integrity
5. Duplex bars, roller bars polished & located
6. Scale marked, ties & unusual hitch pins tagged, or anything else unusual
7. Proper under-string rests, felt & cloth (don't forget necessary shims under felts). Sometimes the wood & felt strips can be modified and substituted with quarter-round brass. Otherwise, steam off the old felt from the wood strips and re-use them.
8. Plate bushings (reaming optional)
9. If using old pin block: clean. Reaming can glaze the holes.
10. Plate wedge(s) marked, installed & taped in place
11. Establish tuning pin length & diameter
12. Protect case & plate
13. Support pin-block on grands and, yes, on some uprights
14. Capo bars cleaned, shaped, & polished
15. Proper tool lay-out
16. Taping your thumb & finger
17. Calculate proper tuning pin to hitch pin ratio

E. Stringing Procedure
    1. Lace wire
        i. Lace wire through capo bar on agraffe
        ii. Wind 2.5 coils on tuning pin
        iii. Drive in pin-block slightly higher than a level string plane height with becket positioned at exactly 3:00
        iv. Thread string through proper bridge pins and bring string to left-hand side of hitch pin, pulling tightly, removing as much slack as possible.
        v. Quickly whip around the hitch pin, slightly more than 180 degrees.
        vi. Continue to pull tight & thread through bridge
        vii. Cut approximately 1 hole and four fingers behind selected tuning pin hole and make your preliminary cut.
        viii. Lace through capo or agraffe and cut four fingers from front to rear of hole.
            1. Note: while stringing pianos with pressure bars removed, or bass section with no agraffes or capo bars, preliminary cuts are not necessary.
            2. You may need to slightly adjust amount of wire you cut governed by the following variables: hand size, tuning pin size, amount of tension that string scale requires, and the amount of slack that your wire has. Get a good feel for these changes before you pick up too much speed.

2. Cutting wire
    i. With tied and wound strings you need to cut a little more wire to take up slack in tied strings.
    ii. Wound strings usually need more tension to bring to pitch. On wound strings, run tuning pin one or two turns before driving in tuning pin. This will insure that windings will be tight and produce good tone. If you turn the wrong way, the strings will sound flat and dead.
    iii. One more note about tied strings. Typically I use 4 or 5 windings, but sometimes I have to use more or less because of neighboring hitch pins.
3. Fasten to pins
    i. After wire is cut, wind another 1.5 coils on your number 2 tuning pin and position becket at 3:00-6:00.
    ii. Tighten #1 tuning pin 6:00-8:00 and #2 to 6:00 to 9:00. While doing this, pull string to base of coil with light pressure.
    iii. Now tighten beckets and do a rough string-spacing.
4. Tighten pins
    i. Next, pull #1 tuning pin to approximately 11:00 using firm pressure, holding up string with lifter, string hook, or, yes, even a screwdriver.
    ii. Now pull #2 tuning pin to approximately 11:00 or 12:00, or just until tight enough for coil to stay up.
    iii. Tighten beckets, set coils & space strings.
    iv. Adjust tuning pin level to allow for level string plane or up to 5 degrees deflecting downward.
    v. Bring #1 tuning pin to pitch and then #2. Sometimes you need to juggle tuning pins slightly to get your beckets even at approximately 12:00.
    vi. Do final string leveling after completing each section. Don't forget to space "dead side" of strings.
5. Seat strings
    i. Use a brass drift and seat all strings at hitch pins.
    ii. Tap very gently on bridges at front and rear bridge pins.
6. Just be careful. Don't go to sleep. Look back often to make sure you haven't missed hitch or bridge pins. Pay attention to your side bearing at the bridges. Have fun and do a factory-quality job.

Own A Guide to Restringing by John W. Travis.
Call Casima piano in CA for string scales.
Restringing a regular piano might take 4-6 hours.

Epoxy Uses

- Marine grade epoxy dip in hole three times & let it sit for three days.
    - West System Epoxy TO6 epoxy with slow hardener. Use for soundboard and bridge repairs.
    - 3:1 ratio.
    - Even with the slow-setting catalyst, still the pot life is only 15 minutes.
    - Color the epoxy within the first 15 minutes.
    - Thin it down 3:1 or 5:1 with sanding sealer.
        - Spray this on soundboard shims; this light coat of epoxy, followed by sanding sealer and then lacquer, makes the soundboard more solid as well as water resistant.
        - After the board has been sanded and stained, put on about 4-5 oz (epoxy reduced with lacquer thinner, 3:1 to 5:1) thinned down like water and spray it on. It will dry within 5 min.
        - This solution will keep the board from sucking up water
- Misc.
    - Tightbond is a surface glue.
    - Impact motion can sheer glue.
    - If the pins are rusty, replace the pin block.

An oversized pin in the treble turns quicker and makes tuning more difficult.
Mason Hamlin screw stringers have such a small turning ratio that they are very accurate to tune with tiny movements. Tunings on these are very stable.

On uprights, remove the entire key bed.
Unless a piano has a documented problem, don't re-scale it. Don't use a customer's piano for a guinea pig unless you know what you are doing or it has an obvious problem.
Ed does rescale Steinway B's.

Document before dismantling

When tearing a piano down, document everything. Make a map, from bottom to top. Understand the reasoning why it was done the way it was.

- Where strings are connected to hitch pins.
    - Some pianos will loop a string around two hitch pins to widen the scale on the plate.
    - Note which strings are tied.
    - One JC Fischer tied the center string of each unison. The back hitch pins are wider than the front hitch pins. Put all the tied strings in first, then go back and do the loop strings.
    - Count the number of hitch pins and the number of notes.
- Mark the scale
    - Measure the string diameters
    - Count and mark each change
- Analyze the bridges, the pin block, etc.

When restringing, turn off all distractions so you don't lose track of where you are. Restringing gathers momentum.

Disassemble

- Remove
    - Key bed
    - Bottom board
    - Pressure bar
- Strings & pins
    -

Bridge Repairs

Grands need to be beautiful

Uprights are usually not seen inside. Clean up the piano.

When doing bridge repairs, Ed can restring a piano faster than he can fold strings back and put them back on again.

- Epoxy the cracks
    - Use dry ars pigment
    - Pull the pins out
    - Re-level the top of the bridge so the front is slightly higher than the back scale.
    - Bevel with a scraping chisel. Get the termination point around the middle.
    - Paint the graphite on.
    - Inject colored epoxy so it can be sanded.
    - Don't use Devcon epoxy from the hardware stores.
        - Go to Daniel Smith Art Supply in Seattle
        - Mix the epoxy to the specifications. Stir it before introducing lacquer thinner or color pigment.
    - Clean the excess with cheesecloth. Do not leave any epoxy on the bridge.
        - Wipe as much as possible with paper towel

        - Wipe with cheese cloth
        - Use string to remove around the pins
- Cyanoacrylic
    - Clean the bridges
    - First fill the hole and leave it proud with colored epoxy
        - When dry, sand it.
    - Put a little dot of cyanoacrylic and it will soak around the pins and into cracks.
    - Won't need to clean it up. It soaks in.
    - Some accelerators eat paint and even lacquer.
- Replace or recap
    - New pins

Re-felt

- Under-string felt or cloth
    - For gluing onto curved surfaces, paint the glue on both the cloth and the metal. Check periodically to make sure the felt is adhering.
    - For flat surface, lay the felt upside down on a piece of paper and brush on the glue.
    - Make sure not to get glue on the other side of the felt.
- Glues
    - Tacky Glue
        - Dries clear and sets quickly
        - Put in microwave for 10 seconds to speed up the flow
    - PVCE glue works well, but can squeeze out (as does Tightbond)
    - Steinway firm under-string felts should be a little thicker, because it is important that the strings touch the felt.
    - Let glue dry overnight

Duplex Bars

- Remove the duplex bar to remove the notches
- 5 min epoxy, a little dot, on each one
- After the strings are on, you can reposition

DeCapo Bar

- Polish the decapo bar with emery cloth
- Don't try to get the grooves out
- If you sand too much you will get into soft metal

Plate Bushings

- Whenever you restring a piano, replace the plate bushings
- Remove the bushings after the tuning pins are out
- Measure the original plate bushings
- Use a pin driving tool to set the bushings in

Tied Strings

- Make the loop by hand with duck-billed pliers.
- Wrap your thumb with tape. Holding the loop with the pliers, push the tail around the wire at least 3 or 4 windings.
- Hitch the coil on the piano and wrap the other end of the wire 2.5 windings around the tuning pin. Pound in the pin.
- Set the coil by tapping the wire winding towards the hitch pin with a brass rod
- Align the winding tail so it is straight, for looks.

Hitch pins under a plate strut

- Map the string pattern around the pins
- Snap off any extraneous hitch pins
- Sometimes there is no clearance for a string to pass through. Here are a few ways to get the string around the hitch pin:
    - Hack saw the top of the pin
    - Wrap the wire around the pin.
    - Put the tuning pin and guess where it would loop around the pin
    - Make a bend in the wire first.

German double-tie

- For a jig, drive a few different sizes of hitch pins or nails into a work bench. They should stick up about ¾"
- To create the coil, wrap the wire around the pin, then with the thumb, wrap the tail around the wire.
- To make a German (or French) double-tie, wrap the wire around the bench pin twice before wrapping the coils.
- Cut off the coil tail.

Bass Strings

- Make sure your hands are really clean, and use some powder
    - Perspiration is acidic, and copper is very sensitive
- There are a couple ways to put on bass strings
    - Have someone hand you the string from the other side
        - Make sure your helper does not make mistakes
        - It is easy to miss a hitch pin, to get the wires out of order, or to cross the strings.
        - Don't get distracted talking
        - Establish a rhythm
    - Do it all yourself
        - Avoid distractions
            - Don't answer the phone
            - You can develop a maintained rhythm and system
        - Pull the key bed out
            - This will upset the level of the keys a bit
            - Leave the key bed in if just doing a set of bass strings
- Start with the lowest string

- Sometimes there is little or no room to pound in the lowest pin because of the case.
  - Remove the side of the piano
  - Ratchet the pin in
  - Tap the pin in with the hammer sideways or the punch angled
  - Pad/protect the case
- Put the string on the pin
  - Cut the wire to length
    - Bass strings require a little more length than treble strings because the tension is greater
    - The bigger the tuning pins, the more wire is needed
  - Wind the wire
    - Start with the crank handle up
    - The first half-turn of the handle is the most crucial. Pull the wire tight while winding to set the bend in the becket
    - Turn the crank a total of 2.5 turns, ending with the handle down.
  - Before pounding in the pin, twist the wire
    - Twist one time for monochords
    - Bi-chords get two twists
- Tighten up the string
  - This keeps the coil from loosening
  - Tuning the bass strings slightly sharp helps stretch out the string
  - Rough tune the strings right away
  - By the next day these strings will have dropped flat

Mason & Hamlin Screw Stringer

- Remove the hook
- Measure the length of wire with two fingers
- Make a ¼ right-angle bend in the end of the wire and insert it through the hole.
- Wrap the wire two times around the hook
- Pinch the becket
- Allow 12-14 hours to restring this piano

Braiding the Strings

- Ed uses a tiny screw driver. A crochet hook would also work
- Duplicate the factory style
- The top of the piano will sing a little better and have more sustain without braid in the tenor section. The only reason to braid there is if there are overtones.
- Back-braid above the strings, and then pull the felt over the first felt.

Pressure Bar

- The underside of the pressure bar should be perfectly smooth. Sand out the grooves. Feel the grooves with your fingernail.
- The strings need to be rather loose when re-installing the pressure bar

- Use an electric screwdriver with a ratchet to set the screws equally
- Tighten each screw by hand consecutively a half turn each at a time
- Make several passes by hand
- Knocking tuning pins down can also help make it easier to screw down the pressure bar
- If the bar is too low, there will be too much noticeable down-bearing. Avoid severe angles.

Level the tuning pins

- Establish the string plane and the pin height on the back row first
- Tap the rest of the pins down until the strings are level with the plate
- Check
    - By eye
    - With your fingers
    - With a straight edge
- The front pins closest to the strings are always the highest.