

PIANO SCALE EVALUATION

A DISCUSSION OF RESTRINGING PREPARATION

AGENDA

- Scale copy
- Benefits of Evaluation – Specification
- Evaluation Elements
- Specifications to the String Manufacturers
- Data Capture

SCALE COPY

- Paper patterns
- Duplication
- Few known parameters
 - Tension
 - Inharmonicity
 - Expansion
 - Volume/Impedance

Benefits of Scale Evaluation

- Control winding material changes
- Better match to Historic Characteristics
- Smooth out parameter curves
- Correction of termination nuances or replacement of termination points.
- Stress leveling to aid stability

Winding Material Changes

- Most common winding material today is soft copper.
- Difference in densities results in different volume, tension, inharmonicity

Steel->Copper

Silnic->Copper

Aluminum->Copper

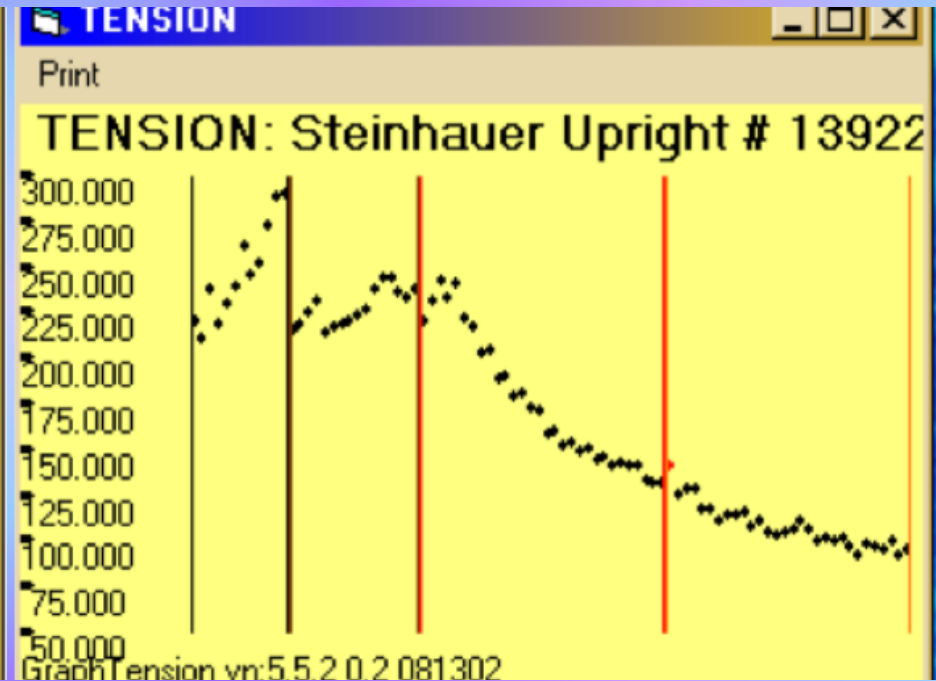
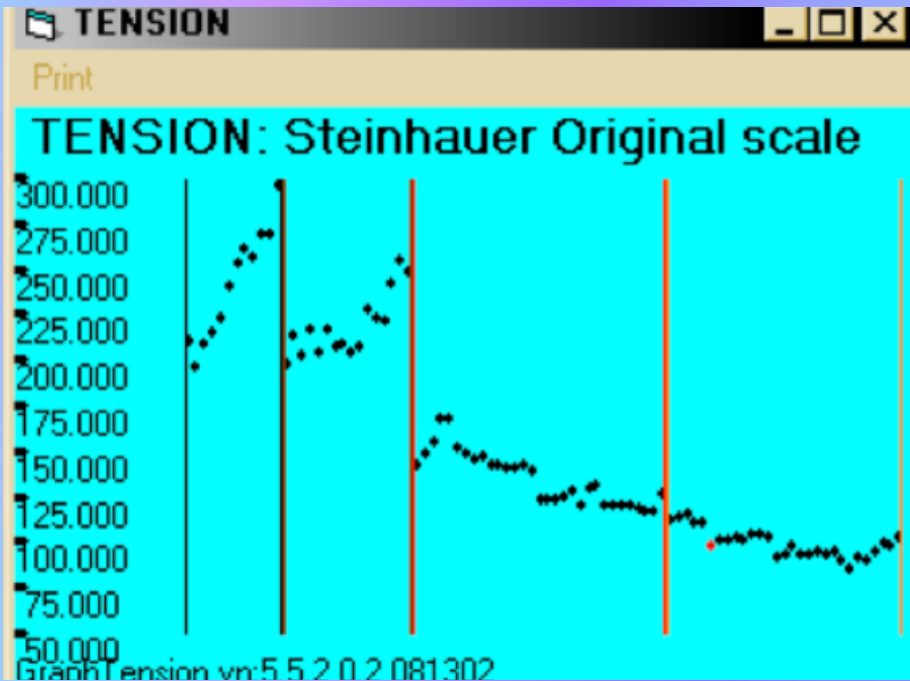
Better Match to Historical Characteristics

- Change of core or wrap to control
 - Tension
 - Volume/impedance
 - Expansion
 - Pitch change

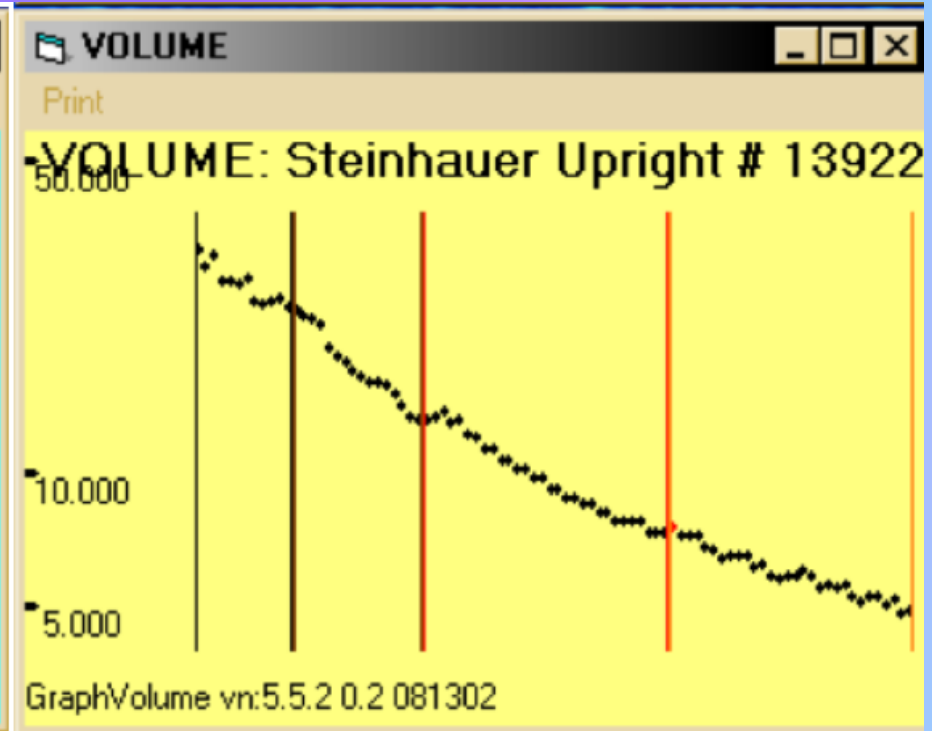
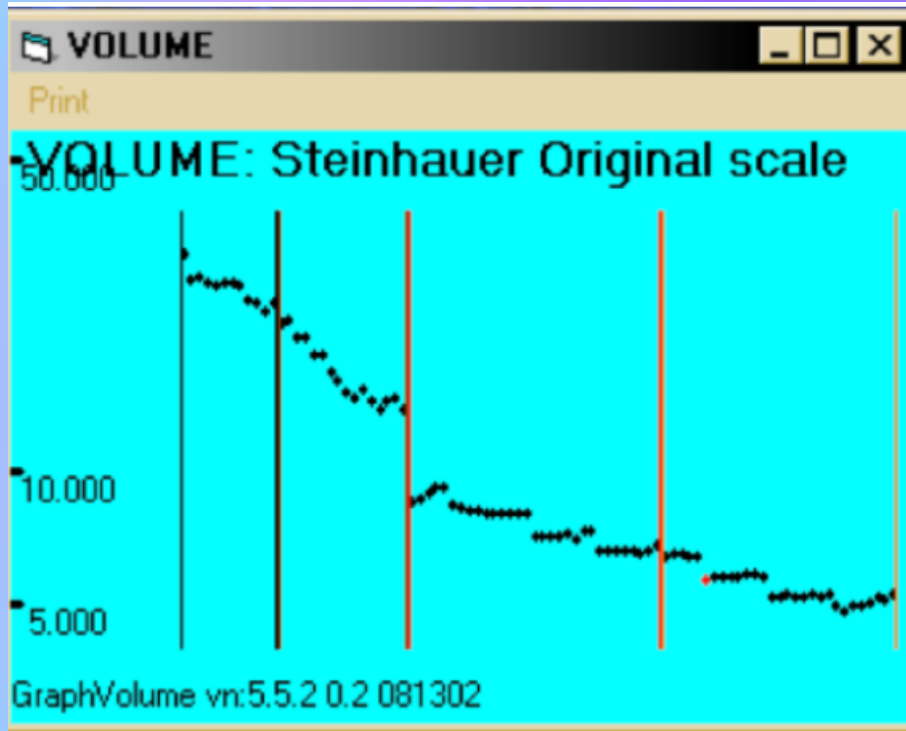
Improve Parametric Consistency

- Inharmonicity Curves
- Tension Patterns
- Volume Curves
- Across the breaks

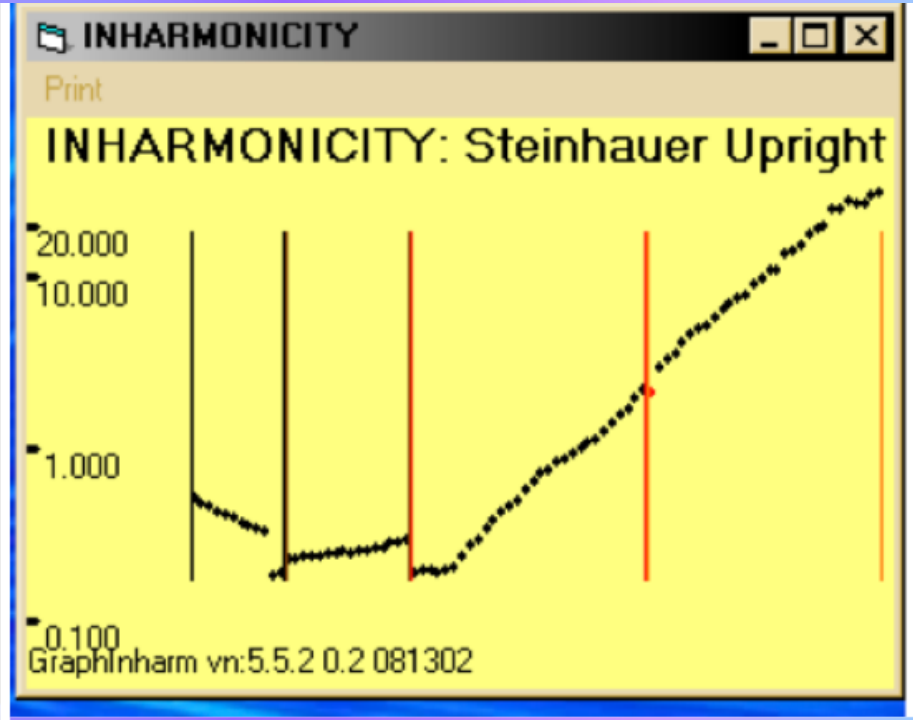
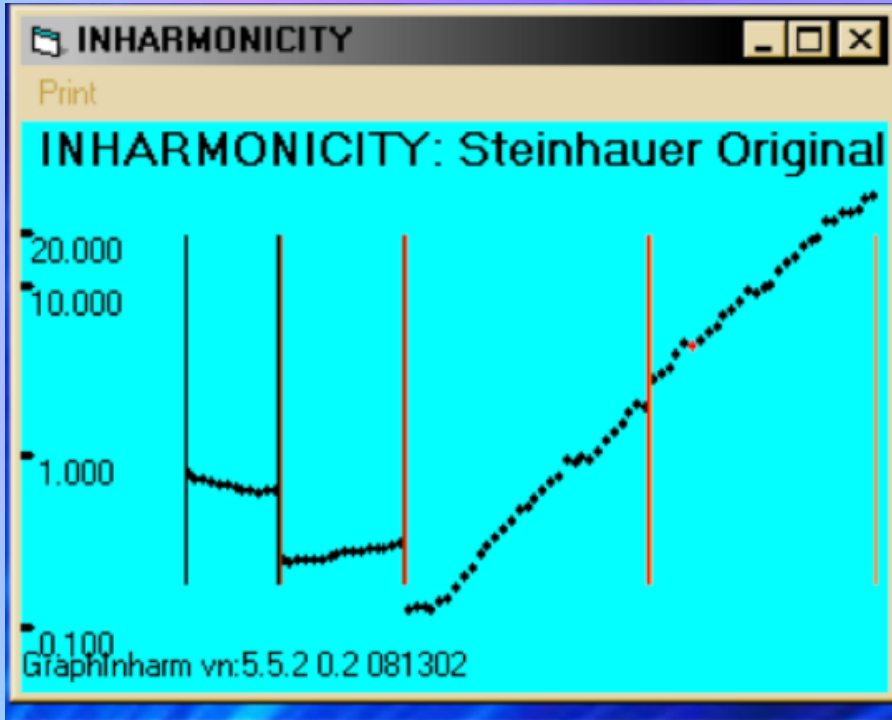
Tension



Volume



Inharmonicity



EVALUATION ELEMENTS

- Speaking Length
- Core / Wrap
- Material
- Length of Wrap
- Wrap Step
- Exposed core length



Change in Material

Material	Tension	Volume	Inharmonicity
Steel	200.243	29.102	0.198
Copper	224.151	32.576	0.184
Aluminum	80.701	11.728	0.391
Silver-Nickel	226.542	32.924	0.183

Change of Material has greatest effect on all three major parameters

Speaking Length

Speaking Length	Tension	Volume	Inharmonicity
53.25	233.931	33.279	0.17
53.125	232.834	33.201	0.172
53	231.74	33.123	0.173

Tension and Volume are directly proportional to length, Inharmonicity is inversely proportional.

Core

Core	Tension	Volume	Inharmonicity
51	232.943	33.217	0.19
49	232.834	33.201	0.172
47	232.731	33.186	0.155

All three parameters are directly proportional.
Greatest effect on Inharmonicity

Wrap

Wrap	Tension	Volume	Inharmonicity
235	243.011	34.652	0.167
230	232.834	33.201	0.172
225	222.877	31.781	0.176

Tension and Volume are directly proportional to length, Inharmonicity is inversely proportional. Greatest effect on Inharmonicity

Step

Step	Tension	Volume	Inharmonicity
0.75	222.877	31.781	0.8
0.5	222.877	31.781	0.524
0.25	222.877	31.781	0.318

Inharmonicity is greatly affected by step length. Directly Proportional

Exposed Core

Exposed Core	Tension	Volume	Inharmonicity
1	222.877	31.781	0.358
0.75	222.877	31.781	0.253
0.5	222.877	31.781	0.18

Inharmonicity is greatly affected by exposed core length. Directly Proportional.

String Specifications

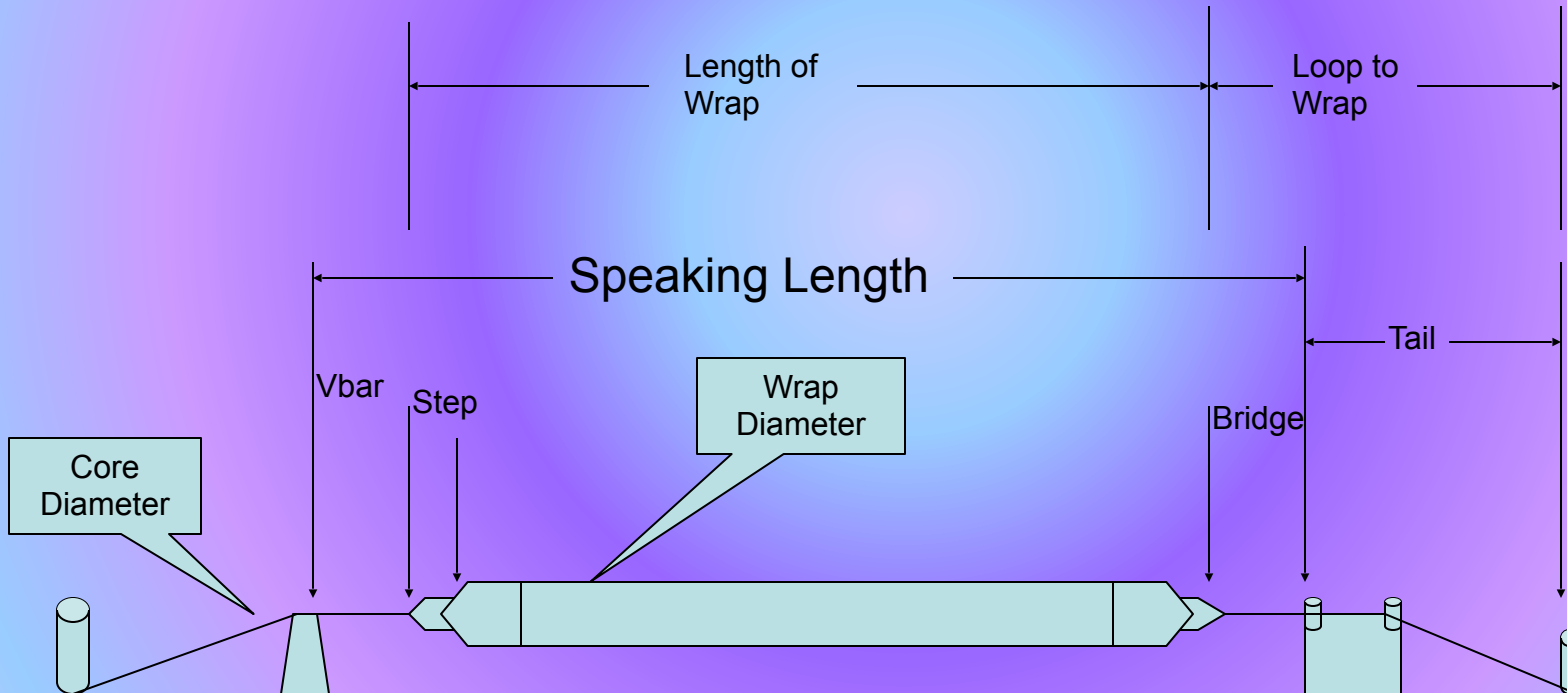
- Core
- Wrap Diameter
- Wrap step
- Loop to start of wrap
- Length of wrap
- Tolerances

Data Capture

- Speaking Length
- Core & Wrap
- Bridge to start of wrap
- V-Bar to start of wrap
- Bridge to loop



Reference Illustration



THANK YOU

- Please write with any questions or comments to opportuneist.pianoservice@frontier.com
- Visit the web site at
- www.oppo-tune-ist.com