

## SAGGING LINE MITIGATOR (SLiM) SUMMARY & BENEFITS

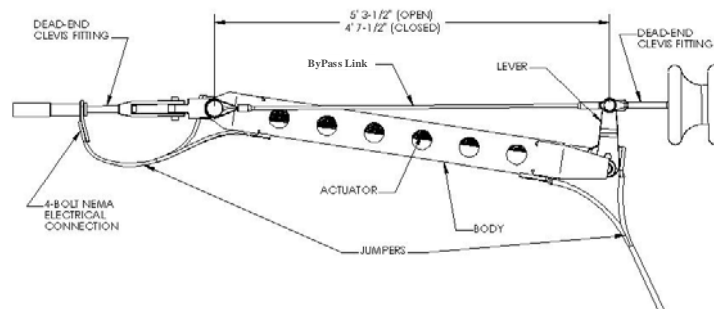
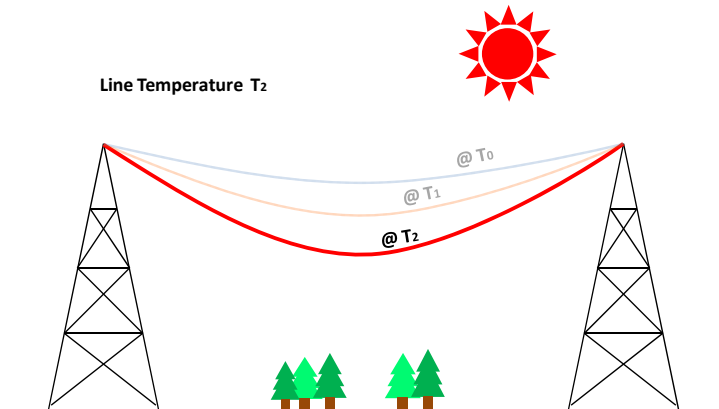
### WHY SLiM?

#### *Problem Statement:*

- Safety/reliability issues due to excess sag (e.g. outages, major blackouts of East, California...; fires; ...) – a regulatory concern
- Lower asset utilization and *loss of revenue* when needed most
- Limited ability to integrate *mandated* renewable energy resources
- Vegetation removal: *not “Green”!*

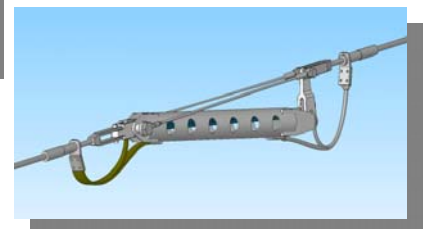
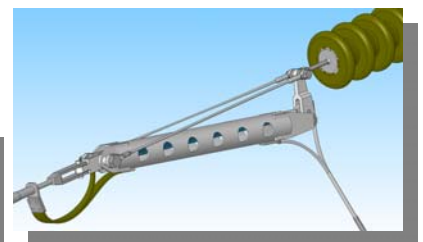
#### *Current Approaches:*

- Derate lines
- Increase tower height
- Re-conductor
- Construct new lines
- ... or SLiM



### WHAT IS SLiM?

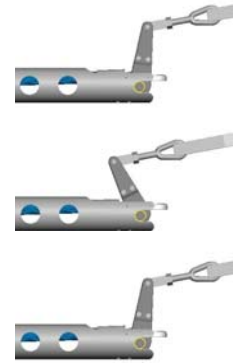
A low-cost, passive, robust, rugged, low/no maintenance, fail-safe, and yet simple transmission line hardware device that counteracts the effect of thermal expansion of the line with the use of smart materials to eliminate line excess sag during peak conditions (ambient and high current) – when needed most. SLiM has been through extensive R&D, testing, proof-of-concept, demonstration, and actual installation (“utility acceptance”) phases.



For more information, please see <http://www.PTranSolutions.com>.

**HOW SLiM WORKS**

- A portion of line current passes through SMA actuator
- Actuator shortens when heated by current and ambient conditions (same conditions as for the line)
- Lever arm magnifies actuator change and transfers it to the line
- Line tension extends actuator when cool so no over-loading ever occurs



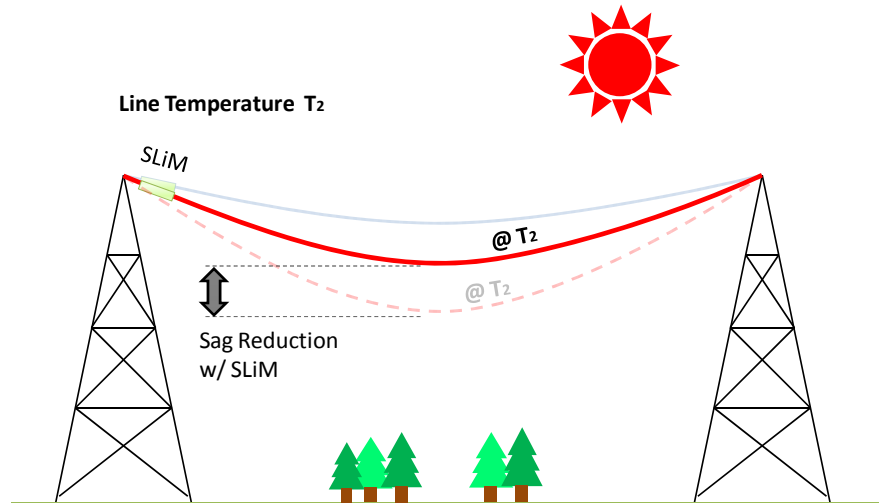
**SLiM BENEFITS**

- Solves an age-old utility challenge of transmission line sag by a simple and fail-safe product that is more economical and faster/easier to install than traditional alternatives
- Provides significantly higher asset utilization by increasing transmission line throughput (Line re-rating → increase in electricity sales → increase profitability) with 100%ROI/payback in < 1-year
- Increase ability to integrate renewable resources
- Green and green (less need for vegetation removal and longer interval for vegetation management).

Conductor	Span Length (ft)	SLiM ROM (in)	Sag Rdc'tn (%)	Ampacity Increase (%)
Drake	750	8"	46%	228%
Drake	1000	8"	37%	82%
Drake	1250	8"	29%	47%
Rook	1000	6"	50%	157%

Case studies considering:

- Initial tension of 4500lbs for Drake and 3500lbs for Rook at 40F
- Max. conductor temp of 100C
- High ambient temp/solar and low (2ft/sec) wind
- ROM=Range of Motion
- Ampacity limited due to excess sag that SLiM device can remove



**INFORMATION & CONTACT**

For additional information about our product, please contact Reza Jannatpour, VP of Business Development, at 650-224-1298 ([r.jannat@PTranSolutions.com](mailto:r.jannat@PTranSolutions.com)) or Manuchehr Shirmohamadi, CTO, at 510-410-4046 ([m.shir@PTranSolutions.com](mailto:m.shir@PTranSolutions.com))