

STANLEY.
Engineered Fastening



SPECTRALOCK[®]

HIGH PERFORMANCE THREAD LOCKING
WITH ANTI VIBRATION LOOSENING
SOLUTIONS




Spectralock®

HIGH PERFORMANCE THREAD LOCKING WITH ANTI-VIBRATION LOOSENING SOLUTIONS

Loosening is one of the significant failure in fasteners. Vibration, Preload, Material strength are the significant contributions factors that causes the loosening. Also, loosening occurred most often on moving parts. This invention is to introduce a new patented design with better features to prevent loosening of the fastener during application with superior anti-vibration performances.



| Key Competitive / Value Add Features of Spectralock® | Current Approach / Customer Problem &/or Needs |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none">• High vibration loosening performances• High Seating Torque• High Off-torque• Better pull out strength• Critical Stress Intensity is now shifted to the minor diameter (shank). <p>Unique Features</p> <ul style="list-style-type: none">✓ Resists vibration loosening✓ High pre-load torque and High off-load torque✓ Easy run-in✓ Distribute tightened load evenly at root diameter✓ Minimized fatigue failure | <ul style="list-style-type: none">• LOCTITE, PATCHING or WASHERS and Other locking devices including Spiralock.• WARRANTY ISSUES WITH CUSTOMER'S CURRENT PRODUCTS• LOOSENING ISSUES ON TESTING OF NEW PRODUCTS• SIMPLE FIX  |

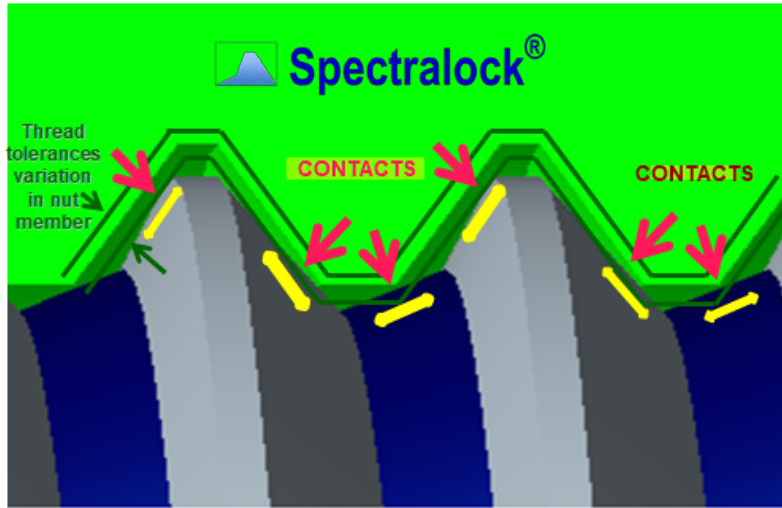


Unique Feature:

1. Poly-directional thread tolerances compensation for locking performances

Thread Tolerances Restraining Design:

➔ To create the anchoring points for eliminating the degree of movements (x, y & z directions) during vibration movements.



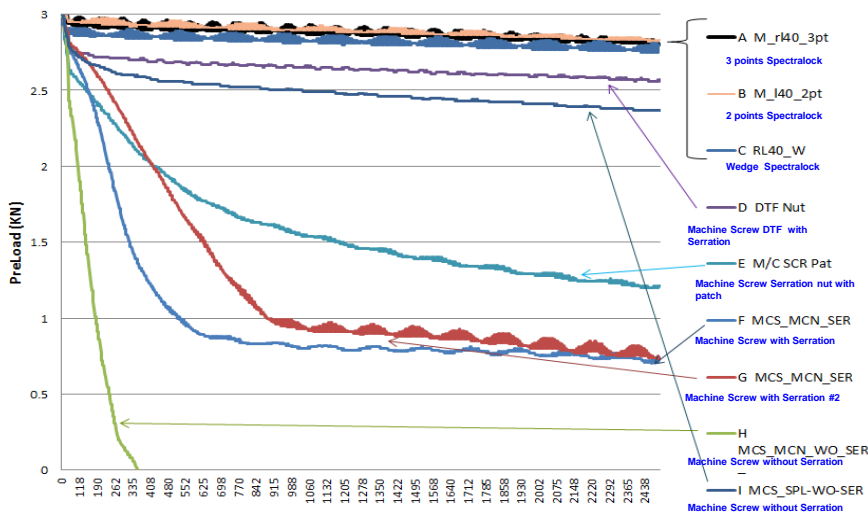
DESIGN FEATURES:

- ✓ Asymmetric thread:
 - ✓ 22°,
 - ✓ 35°, and
 - ✓ 27°.
- ✓ Major thread crest locked with female thread.
- ✓ Minor thread root locked with female thread.
- ✓ Compatible for both metric and inches internal threads tolerances
- ✓ Prevents vibration-induced movements through the 3 critical contacts points
- ✓ Unique features from this new designs:
 - Higher vibration loosening performances
 - Better pull out strength
 - Critical Stress Intensity factor is now at the minor diameter (shank)

2. Vibration loosening performances

| SAMPLE TYPE / NO | | PRELOAD KN | # CYCLES @ 10Hz | REMAINING PRELOAD KN | REMAINING PRELOAD % |
|------------------|-------------------------|------------|-----------------|----------------------|---------------------|
| C | 2 RL40_40deg_9oct13_S6 | 3.0 | 2500 | 2.84 | 94.67 |
| B | 10M_tp5_l40_sl_a_s3 | 3.0 | 2500 | 2.83 | 94.33 |
| A | 8M_tp5_rl40_25_15_s5 | 3.0 | 2500 | 2.8 | 93.33 |
| D | 11 DTF Nut_S3 | 3.0 | 2500 | 2.57 | 85.67 |
| E | 12 M/C SCR Pat_S3 | 3.0 | 2500 | 1.21 | 40.33 |
| F | 4 MCS_MCN_SER_TOP_S10 | 3.0 | 2500 | 0.74 | 24.67 |
| G | 6 MCS_MCN_SER_COP_S8 | 3.0 | 2500 | 0.73 | 24.33 |
| H | 5 MCS_MCN_WO_SER_MIS_S7 | 3.0 | 2500 | 0.01 | 0.33 |

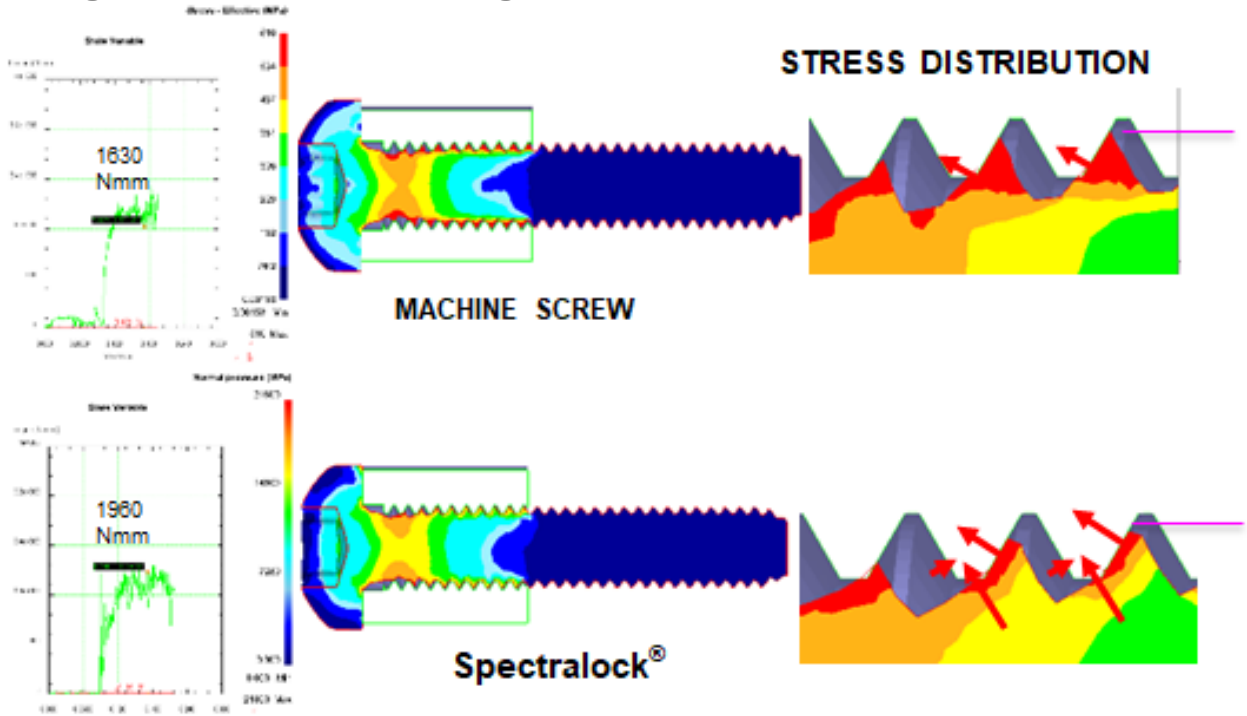
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A= 3 points Spectralock
B = 2 points Spectralock
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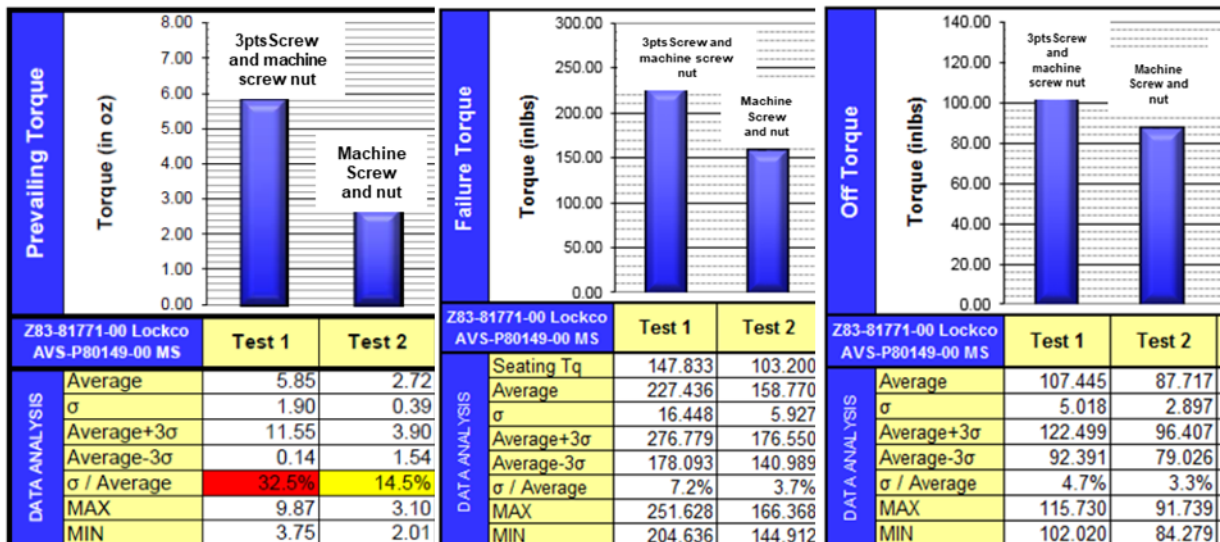
Spectralock® design was proven to have superior vibration loosening functions and performances.

3. Higher Thread Strength



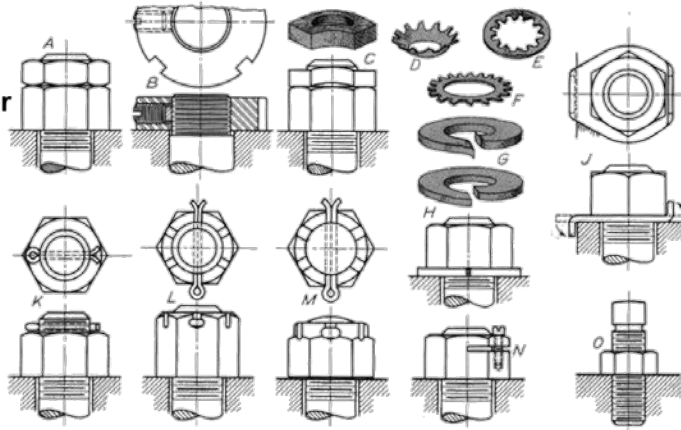
- ✓ Stress intensity is located at the root thread profile, higher surface contact area hence improved in fastener strength
- ✓ At same loading condition in this simulation.
 - ✓ The machined screw has failed (all red color, thread will stripped out)
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4. Higher Prevailing, Failure and Off Torque



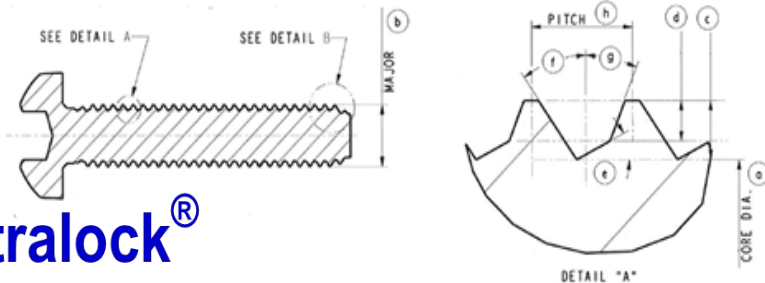
5. Spectralock® eliminates the Common Threaded Joint “Band-Aids”

- Adhesive
- Patch bolt
- Split washer, star washer
- Disk lock - wedge type
- Serrations
- Jam nuts
- Lockwire
- Castle nut w/cotter pin
- Tab lock (keyway)
- Prevailing torque
 - All metal
 - Nylon ring
 - Interference fit



Spectralock® modifies basic joint behavior instead of relying on thread friction

6. Spectralock Fasteners: Technical data



Spectralock®

| | LC 0.8 X 0.20 | LC 1.0 X 0.25 | LC 1.2 X 0.25 | LC 1.4 X 0.30 | LC 1.6 X 0.35 | LC 2.0 X 0.40 |
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Detail Description of Spectralock®

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- High vibration loosening performances
- High Seating Torque
- High Off-torque
- Better pull out strength
- Critical Stress Intensity is now shifted to the minor diameter (shank).

Unique Selling Features

- ✓ Resists vibration loosening
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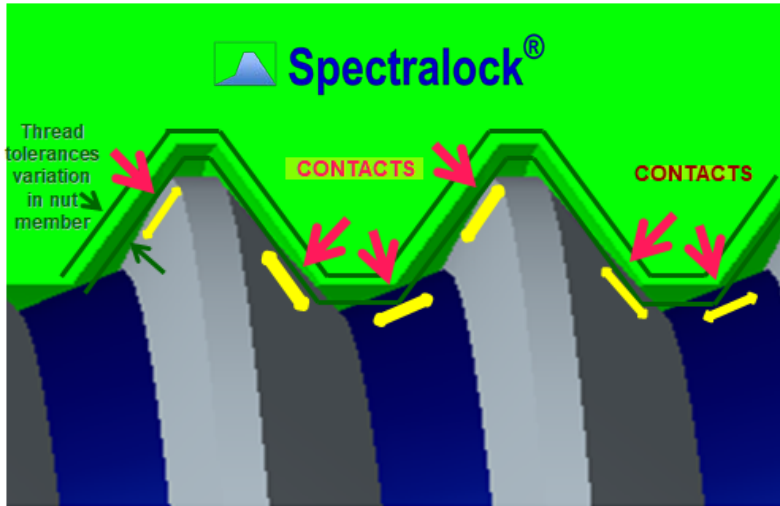
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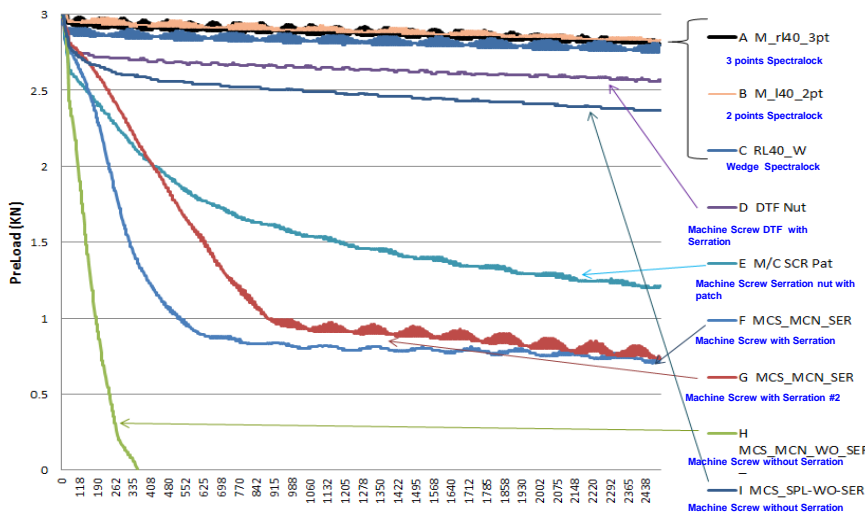
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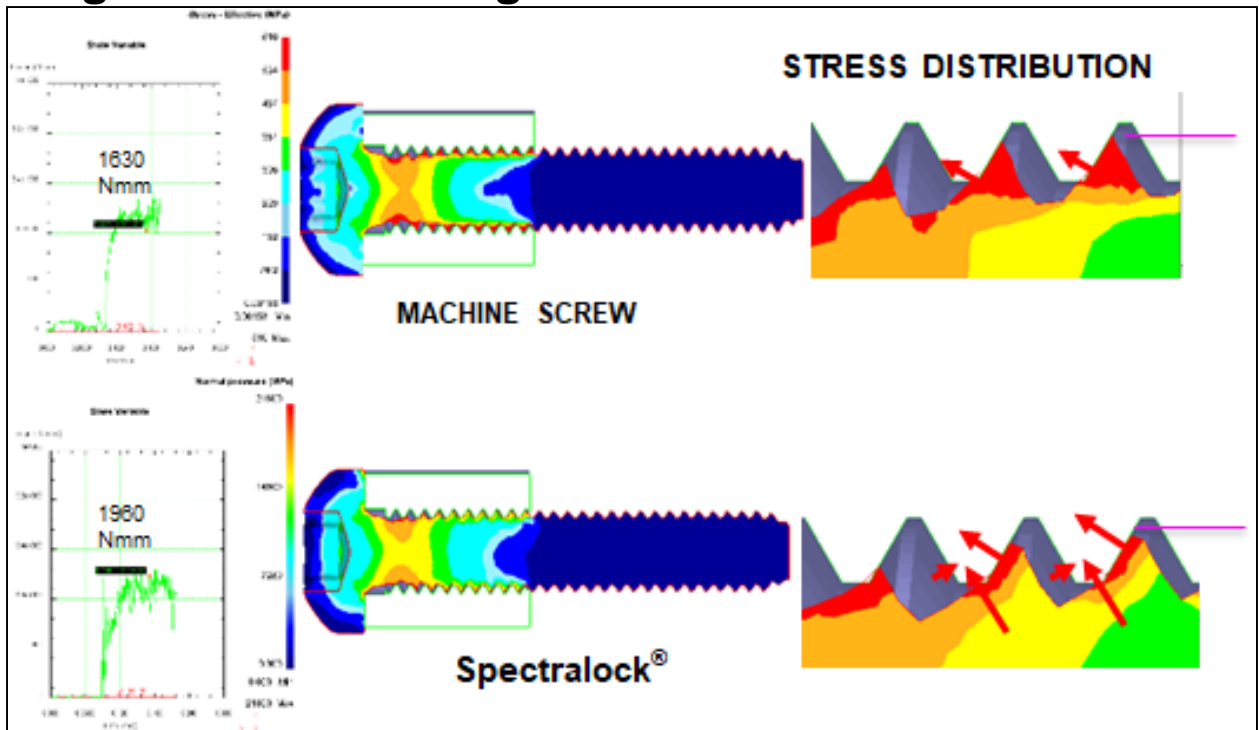
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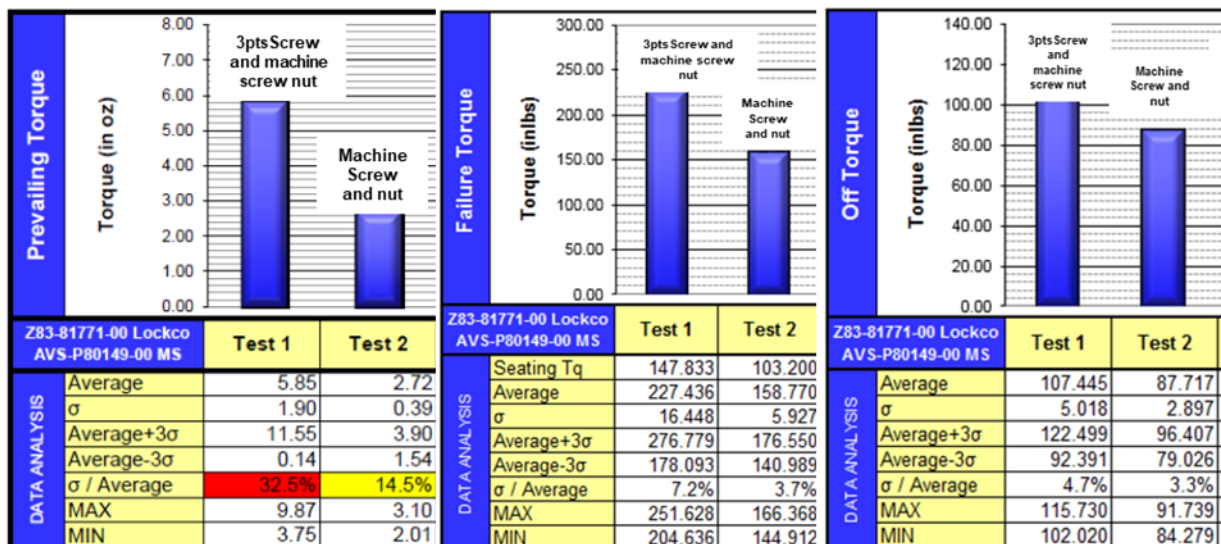
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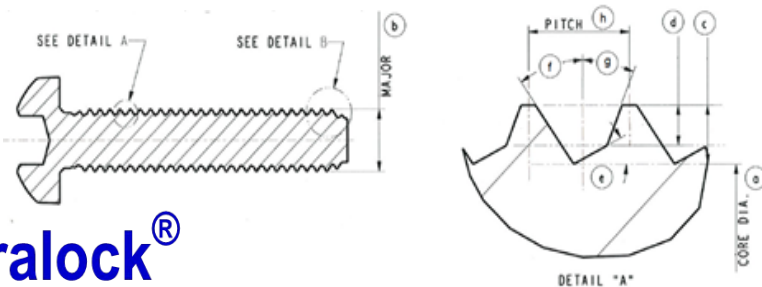


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Spectralock Fasteners: Technical data



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Thread-Locking with Anti-Vibration Engineered Fastening Solutions



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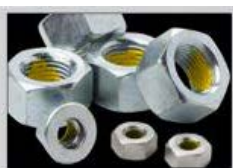


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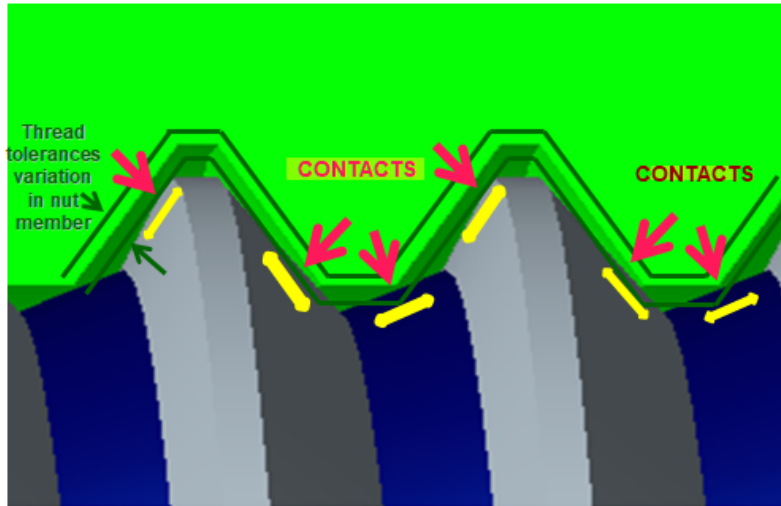


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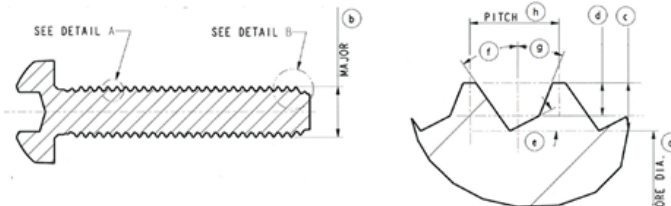
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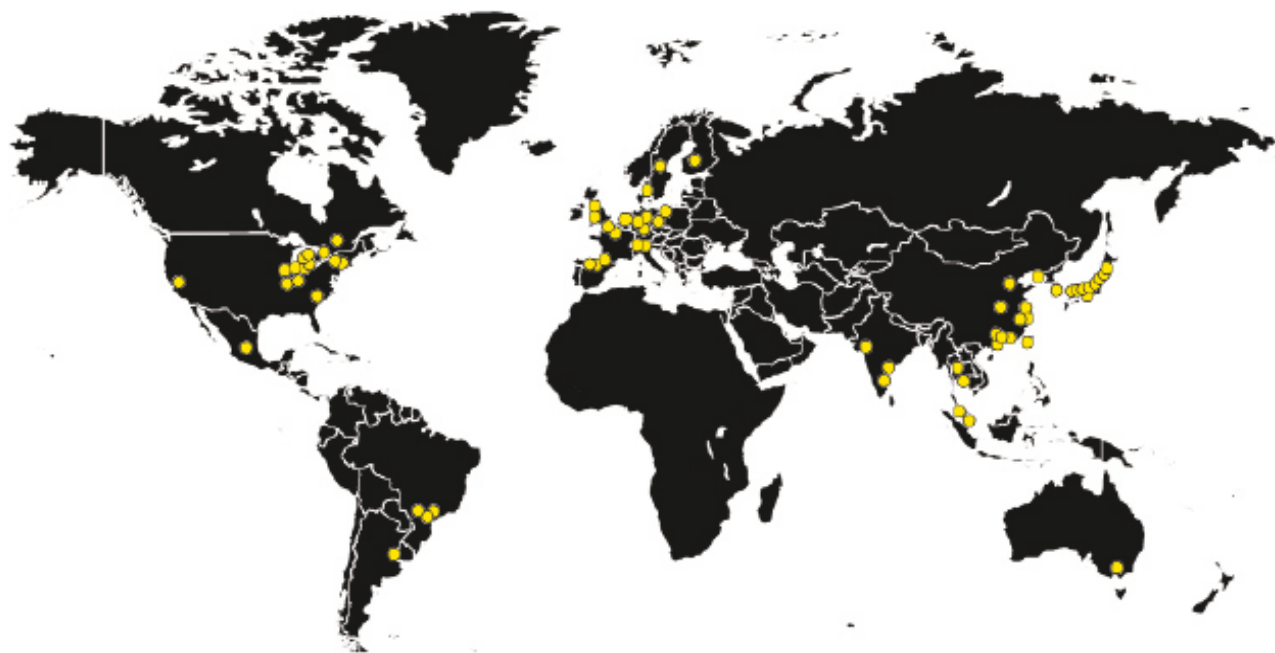
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