Strain Seer - 2D Strain Analysis Tool

📊 What is 2D Strain Analysis?

2D strain analysis measures material deformation using 5 fiducial markers and 2 scale markers to calculate:

- εxx: Stretching/compression in x-direction
- εyy: Stretching/compression in y-direction
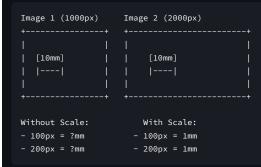- εxy: Shearing deformation

🔄 How It Works

1. Mark 5 fiducial points (red) and 2 scale points (green)
2. Enter scale length to convert pixels to real-world units
3. Input deformation distance for each image
4. View strain analysis and regression results

📍 Point Labeling Convention

```
0 ------- 1
|  \   /  |
|    4    |
|  /   \  |
3 ------- 2
```

- Points 0-3: Corner points (clockwise from top-left)
- Point 4: Center point
- Scale points: Calibration markers (green)

📏 Why We Need Scale Points

```
Image 1 (1000px)     Image 2 (2000px)
+---------------+    +----------------------+
|               |    |                      |
|   [10mm]      |    |      [10mm]          |
|   |----|      |    |      |----|          |
|               |    |                      |
+---------------+    +----------------------+

Without Scale:        With Scale:
- 100px = ?mm         - 100px = 1mm
- 200px = ?mm         - 200px = 1mm
```

Scale points ensure:

- Consistent measurements across images
- Accurate pixel-to-real-world conversion
- Reproducible results

🚀 Step-by-Step Guide

1. **Upload Images**

   - Supported: PNG, JPG, JPEG, GIF, BMP
   - ⚠️ **Important**: Upload files in order
   - Order determines sequence in analysis and plots

2. **Annotate Points**

   - 5 red fiducial points
   - 2 green scale points
   - Enter deformation distance

3. **Run Analysis**
   - Set scale length
   - View results
   - Export data

💡 Tips for Best Results

- Clear fiducial markers
- Known scale distance
- Well-lit, focused images
- Correct point order (0-4)
- Upload images in sequence

Choose image files

☁️	Drag and drop files here Limit 200MB per file • PNG, JPG, JPEG, GIF, BMP	Browse files

📄	deformation-30mm-force.png 1.5MB	✕
📄	deformation-25mm-force.png 1.6MB	✕
📄	deformation-20mm-force.png 1.3MB	✕

Showing page 1 of 3   ‹ ›

📊 Files Status

Order	File	Status	Fiducial Points	Scale Points	Deformation Distance (mm)
1	deformation-00mm-force.png	Complete	5	2	0.000000
2	deformation-05mm-force.png	Complete	5	2	5.000000
3	deformation-10mm-force.png	Complete	5	2	10.000000
4	deformation-15mm-force.png	Complete	5	2	15.000000
5	deformation-20mm-force.png	Complete	5	2	20.000000
6	deformation-25mm-force.png	Complete	5	2	25.000000
7	deformation-30mm-force.png	Complete	5	2	30.000000

🎯 Image Annotation

Select image to annotate

deformation-30mm-force.png	⌄

Mode

Transform

Class

Fiducial

Complete

Point Coordinates

Type	Order	X	Y
Fiducial	1	299.5	495.5
Fiducial	2	535.4	522.7
Fiducial	3	508.2	733.1
Fiducial	4	201.1	729.7
Fiducial	5	381.0	656.7
Scale	6	703.4	52.6
Scale	7	688.1	687.3

Deformation Distance

Enter deformation distance (mm)   ⑦

| 30.00 | − | + |

🔬 Strain Analysis

> ✅ **Ready for Analysis**
>
> Next steps:
>
> 1. Set scale length
> 2. View results
> 3. Export data
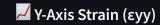
📐 Scale Calibration
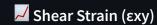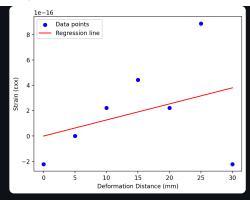
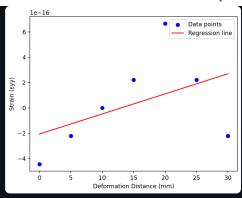Enter physical length of scale markers (mm)

Scale Length (mm)
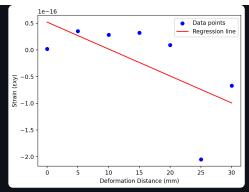
| 50.00 | − | + |

📈 X-Axis Strain (εxx)   📈 Y-Axis Strain (εyy)   📈 Shear Strain (εxy)

Regression Equation:

$\varepsilon xx = 1.27e\text{-}17 \text{ mm}^{-1}x + 2.47e\text{-}32$

R^2 Value: 0.121212 **P-value:** 0.444113

	Distance (mm)	εxx
0	0.00	-2.22e-16
1	5.00	0.00e+00
2	10.00	2.22e-16
3	15.00	4.44e-16
4	20.00	2.22e-16
5	25.00	8.88e-16
6	30.00	-2.22e-16

Regression Equation:

$\varepsilon yy = 1.59e\text{-}17 \text{ mm}^{-1}x + -2.06e\text{-}16$

R^2 Value: 0.211864 **P-value:** 0.298667

	Distance (mm)	εyy
0	0.00	-4.44e-16
1	5.00	-2.22e-16
2	10.00	0.00e+00
3	15.00	2.22e-16
4	20.00	6.66e-16
5	25.00	2.22e-16
6	30.00	-2.22e-16

Regression Equation:

$\varepsilon xy = -5.05e\text{-}18 \text{ mm}^{-1}x + 5.20e\text{-}17$

R^2 Value: 0.389734 **P-value:** 0.133993

	Distance (mm)	εxy
0	0.00	2.02e-18
1	5.00	3.50e-17
2	10.00	2.83e-17
3	15.00	3.20e-17
4	20.00	8.94e-18
5	25.00	-2.05e-16
6	30.00	-6.70e-17

📥 Data Export

📄 Raw Data

Available formats:

- JSON: File data + scale length
- CSV: Strain components

Download Raw Data (JSON)

Download Raw Data (CSV)

📊 Analysis Results

Available formats:

- JSON: Regression parameters
- CSV: Regression data

Download Analysis Results (JSON)

Download Analysis Results (CSV)

⚠️ **New Analysis**

To start fresh:

1. Refresh page
2. Upload images
3. Mark points
4. Set scale length