



**RAMJACK**<sup>®</sup>

# 2011 CASE STUDY

Volume: 2011 | Issue: Solana Power Plant

## SOLANA POWER PLANT

Abengoa Solar  
Gila Bend, Arizona

**SOLUTIONS THROUGH  
CUSTOM ENGINEERING**  
Meeting the Challenges of Changing  
Soil Conditions of the Arid Southwest



**71,000**

Piles Installed at a Rate of  
Up to 680 Per Day

## Straight Line Construction

[www.straightlinepier.com](http://www.straightlinepier.com) | 719-575-9942  
Pueblo West, CO

# SOLANA POWER PLANT | ABENGOA SOLAR

## Gila Bend, Arizona

**CASE STUDY 2011**

### SITUATION

Ram Jack has been involved in the Renewable Energy world by providing helical foundations for solar and wind applications over the past several years. In 2010, a Spanish company, Abengoa, reached out to Ram Jack to procure a foundation solution for the Solana Solar Plant they would be implementing in southern Arizona.

The foundations had to be custom engineered to meet the challenges of changing soil conditions in the arid southwest desert. The field where the installation would take place had been developed as an irrigated alfalfa field for many years and as the field was now empty the moisture content of the soil began to decrease.

Because of this ongoing change in soil density, several months of independent tests were performed to properly identify the most accurate solution. Based on the overall project schedule, maintaining a fast-paced installation process would be required to hit the target completion date for what would be the largest solar collector field in the world.



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### SOLUTION



Straight Line Construction, a Ram Jack dealer that also specializes in micropiles, was the perfect candidate to perform the solar field installations. With soil density testing complete, a series of engineering meetings led to an approved T-shaped pile cap and sleeve design.

The custom design was embedded into an open-hole micropile to meet the strict load tolerances along with the aggressive installation rate of up to 680 piles per day in 40+ blow count soil conditions.

Ram Jack's engineering and support staff played an integral role in product design and proof pile load testing to ensure a smooth project completion.

Nearly 71,000 piles were installed during an 11-month period in 2011. The overall installation was completed two months ahead of schedule.

### CONCLUSION

The Solana Solar Plant is now nearing completion on 2,300 acres near Gila Bend, Arizona, which will provide energy to power over 70,000 homes. Ram Jack is extremely proud and appreciative for the opportunity provided by Abengoa, a dominant innovator and contributor to green energy development and its affiliate companies (Teyma and Abencs, now Abensia).

Abengoa, Teyma, and Abencs were all extraordinarily professional, and provided a remarkable work environment for our installation crews. Due to the success of this project, Ram Jack has developed an ongoing relationship with Abengoa that has allowed us to take on additional projects and hopefully many more in the future.

The T-shaped caps were produced at the Ram Jack Headquarters and Manufacturing Center in Ada, Oklahoma. Installation was performed by Straight Line Construction, a Ram Jack Dealer with three locations, including Albuquerque, NM, Pueblo West and Denver, CO.





- Engineered Foundation Solutions
- Products Manufactured in the USA
- 50+ Locations Nationwide



Recognized as Code Compliant to Meet International Building Codes



# HELICAL PILE DESIGN SOFTWARE: FOUNDATION SOLUTIONS™

**Create Profiles**

- Simulate soil profiles, including peat
- Anchors with varying diameter and helix configurations
- Vertical/battered/tie-back pile design
- Custom pile design

**Mobile-friendly**

- Web-based software
- Use anywhere, anytime
- Tablet and PC-friendly

**Share & Report**

- PDF Output for submittals
- Share projects with other registered users

Project :: /Ram Jack Distribution / Proposed Building Addition::

**Soil Profile**

Profile	Start Depth (ft)	Layer	N	c	α
0	0	Clay	4	900	0.9
2	2	Peat	3	25	0
5	5	Clay	11	1285.5	0.84
8	8	Clay	4	0	0
12	12	Clay	10	1143	0.9
15	15	Sand	15	0	0
22	22	Sand	22	0	0

**Anchors**

Lead Shaft (OD) Inches: 2-7/8 | Lead Shaft Length (Ft): 10 | Extension Shaft OD (Inches) (F): 2-7/8

Wall Thickness: 0.217 | Yield Strength: 65 | Tensile Strength: 80

Geometric Data / Back Slope

Anchor declination Degree: 90 | Pile Head Position: 0

X-AXIS: 0 0 0 0 0 | Y-AXIS: 0 0 0 0 0

**Estimated Pile Capacity:**

**Compression Results**

Allowable Frictional Resistance: 9.08 kip

Allowable End Bearing Capacity: 25.92 kip

Allowable Pile Capacity: 35.0 kip

Appr. Pile Embedment Depth: 42 ft

Required Min. Installation Torque: 7800 ft-lbs

[www.ramjack.com/DesignSoftware](http://www.ramjack.com/DesignSoftware)  
888-332-9909

