Cyclic Steam Stimulation (CSS) in Rajasthan:
Nakasawa's Pursuit of Enhanced Oil Well Flow Rate

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Abstract
Enhancing oil recovery from heavy-oil reservoirs is a challenge due to the inherent high viscosity of the oil. Among the various methods developed, Cyclic Steam Stimulation (CSS) stands out. Nakasawa's experience in the fields of Rajasthan, India, highlights the optimization and effectiveness of this technique, influenced significantly by the advanced steam generator utilized.

1. Introduction
Rajasthan's oil fields present a challenge due to their high-viscosity oil. In addressing this, Nakasawa deployed the CSS technique, employing state-of-the-art steam generator technology, to achieve improved flow rates and advanced oil recovery.

2. Materials and Methods

Central to Nakasawa's CSS is their Super Matroid Tech steam generator. This generator is characterized by:

- **High Steam Quality:** Ensuring maximal reservoir penetration and optimized oil heating.
- **Adaptive Control System:** Adjusts in real-time to variations in reservoir conditions for consistent steam output.
- **Efficient Fuel Consumption:** Reducing operational costs and guaranteeing prolonged operation.

Oil samples from Rajasthan were evaluated using this steam generator. Essential performance metrics, such as maximum radius of formation heating, steam condensation time, and saturation time, were duly noted.

3. Specific Results
The efficacy of Nakasawa's steam generator was evident. Post-CSS, the oil flow-rate growth factor was staggeringly high, with a ratio of about 42 to 1. This meant that for every unit of oil extracted before the stimulation, 42 units were extracted post-CSS. This level of efficiency, particularly with Rajasthan's highly viscous oils, underscores the remarkable capabilities of the steam generator and the CSS technique.

4. Nakasawa's Rajasthan Experience
Nakasawa's trials in Rajasthan became a testament to their advanced technology:
- **Enhanced Oil Recovery:** Even with Rajasthan's high-viscosity oil, significant improvements in recovery rates were achieved.
- **Sustained Flow Rates:** Post-CSS, flow rates didn't just spike; they maintained high levels for prolonged durations, showcasing the method's sustainability.
- **Operational Efficiency:** The adaptive functionality of the steam generator meant efficient fuel utilization, leading to cost reductions throughout the operation.

5. Discussion
Nakasawa's achievements in Rajasthan emphasize the combination of the CSS technique and the machinery enabling it. From its real-time adjusting control system to efficient fuel usage, the steam generator played a crucial role in maximizing oil flow rates in the region's challenging conditions.

6. Conclusion

With the CSS deployment in Rajasthan's fields, Nakasawa has demonstrated that marrying the right technology with an insightful understanding of reservoir characteristics can bring about revolutionary improvements in oil recovery from high-viscosity zones.