

# Mohamad Amin Saad

**Water Desalination Consultant**

**Membrane Technology Expert**

**39 years** of Experience in RO/UF Pretreatment & System Design, Operation, Performance Monitoring, Fouling, Troubleshooting and Real-Time **SMART** technology & Plant Solutions



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 Mohamad Amin Saad

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 [MASAR Technologies, Inc.](https://www.facebook.com/MASARTechnologies)

## Summary ▼

A recognized international expert and independent consultant and technology innovator with over 39 years of technical expertise and field experience in membrane technologies and applications for water desalination, treatment and purification industry with hands-on involvement in over 50 large and strategic RO & UF (Reverse Osmosis and Ultrafiltration) plants worldwide, especially in the Arabian Gulf Region and USA.

*Technical expertise and field experience areas include:*

- **Water Desalination:** Innovative developer in the areas of applying and managing seawater, brackish water desalination and industrial wastewater water purification using membrane technology processes of reverse osmosis (RO), nanofiltration (NF) & ultrafiltration (UF), including extensive analysis and full accountability for non-revenue water (NRW) losses impacting the financial health of the producing entity.
- **Membrane Technologies:** Membrane system design, engineering management, factory and site testing, plant startups and commissioning, plant operation and performance monitoring, evaluation, optimization and trouble-shooting.
- **Expert Consultancy Services:** Water desalination and brine management feasibility studies, industry and market analyses, evaluation and planning options.
- **Expert Software Innovation,** development, optimization and licensing the **SMART SilentAlarm™** technology & software systems) for real-time system Monitoring and analytics as part of water utility and plants digital transformation in order to optimize operational efficiency, performance and cost-effectiveness of their water plants. The **SilentAlarm™** is the world's only early detection and real-time technology for monitoring and measurement of membrane fouling and scaling.
- **Environmental Assessments & Regulatory Compliance:** Providing technical consultancy in designing and supporting regulatory and environmental permitting of a new seawater desalination project in California,

and participating as a team member in the effort to draft the first-ever Seawater Desalination Code, under the auspices of the Saudi Arabian Electricity & Co-Generation Regulatory Authority.

- **Technical & Cost Feasibility Studies:** RO/UF membrane desalination plant design, operation, cost effectiveness and risk assessment evaluations and recommendations, including commercial potential projections and assessment.
- **New Technology & Product Evaluations:** Patent review and research, test protocol and pilot plant design, setup, trial monitoring and evaluation of existing and new, innovative water desalination technologies, processes and products.
- **Project Engineering:** Experienced in fast-track technical and business development project management, RO/UF process and engineering design review applying international standards and best industry practice, performing and verifying engineering calculations & mass balances, reviewing P&IDs, equipment and material selection, quality control, and monitoring plant construction progress and commissioning activities, attending Factory Acceptance Tests (FATs), and supervising Site Acceptance Tests (SATs).

Worked on several high-profile projects for prominent international and multi-national companies and clients including Independent Water & Power Project (IWPP) developers, regional governmental and private water and electricity utility authorities & organizations and global technology research conglomerates.

- **Technical Evaluations & Testing:** Business & market development and commercialization of new and innovative products, systems, processes and technologies involving RO & UF membrane and innovative, unconventional desalination and pretreatment technologies worldwide.
- **Business Development:** Establishing and conducting business in the Middle East/Arabian Gulf markets with a wide and extensive network of key government and private sector decision makers contacts.
- **Training:** Conducting advanced, specialized and practical technology training, as well as designing and supervising comprehensive and long-term training programs for water desalination plant's engineers, supervisors & operators, as well as industry professionals of various backgrounds, needs and levels of experience.

#### Focus

- ❖ Membrane & pretreatment system technology application, process design, membrane desalination plant startup, commissioning, testing, operation and performance monitoring, evaluation, optimization, trouble-shooting, and developing and utilizing innovative and customized plant performance technology and software solutions for seawater, brackish desalination & industrial wastewater treatment and purification technologies using membrane technology processes (RO, NF, UF, MF).
- ❖ Applied and pilot research, product development & optimization, feasibility assessment, evaluation and techno-commercial development of new, innovative, patentable and promising membrane and non-

membrane technologies, products and process applications, especially for sea water desalination and water reuse utilizing renewable energy resources, to continually minimize energy and chemicals consumption, drive to more environmental friendliness and minimize the total cost of water production for various applications and industries. This includes performing comprehensive technical and market commercial diligence, feasibility and cost studies especially for new startups, innovative and promising technologies, processes and products and investable enterprises, especially for seawater desalination and energy production and optimization.

- ❖ Helping progressive and innovative water desalination technology companies, IWPPs, desalination plant control & instrumentation and water technology companies by sub-licensing our proprietary **SilentAlarm™ SMART** technology exclusively or semi-exclusively, for monitoring, evaluating, troubleshooting and optimizing the operational efficiency and true performance characteristics, as well membrane fouling and scaling detection, measurement and management for membrane-based water desalination, filtration and purification plants.

## Experience & Career Accomplishments



**MASAR Technologies, Inc.**

1993-Present

*Founder, President & Principal Consultant & Trainer*

- Technical consulting and business development in the area of membrane technology applications for drinking/potable and industrial water desalination & purification. Expertise includes project and proposal development, process design, performance evaluation, start-up, optimization & trouble-shooting of membrane system operations.
- Conducted RO/UF on-site and analytical evaluations, troubleshooting and upgrades of dozens of sea water and brackish water desalination plants, especially in the Arabian Gulf, Red Sea and the Gulf of Oman Regions. Current, long-term consulting contract with a major international water desalination and power generation provider for monitoring, optimization and troubleshooting one of the largest and most strategic SWRO plants in the world.
  - ✓ Technical consultancy and advisership on behalf of an international group of insurers to evaluate, validate and settle several substantial operational and performance claims by the private developer and operator of one of the largest SWRO desalination plants in the world.
  - ✓ Troubleshooting, optimization and upgrade of the world's first, most innovative and largest mobile desalination barges of 50,000 m<sup>3</sup>/day in total capacity resulting in restoring plant performance and availability from under 20% to over 90% and transforming the independent project company into profitability from the verge of bankruptcy in less than 2 years. Project team was awarded the 2011 Saudi Water & Power Forum's Prize for Innovation.
  - ✓ Engineering, technical oversight and commissioning leadership of a new

45,000 m<sup>3</sup>/day seawater RO desalination plant construction project, including project development, construction and performance acceptance testing and commercial operation in record 16 months.

- ✓ Optimization and troubleshooting of 160,000 m<sup>3</sup>/day, Al-Buraidah Brackish RO Desalination Plant for the Ministry of Water & Electricity, Saudi Arabia.
- ✓ Optimization and troubleshooting of Al Jubail 91,000 m<sup>3</sup>/day SWRO Desalination for the Saline Water Conversion Corporation (SWCC) in Saudi Arabia.
- Two-year technical subject-matter desalination consultancy for an international management consulting firm acting on behalf of Saudi NEOM on a greenfield development project involving state-of-the-art desalination, brine disposal, zero liquid discharge (ZLD) and other treatment options, and energy recovery technologies.
- Technical consultancy for an international management consulting firm acting on behalf of Saudi Saline Water Conversion Corp. (SWCC) on a privatization scheme of its national desalination infrastructure and assets, including review, analysis and reporting on Technical Condition Assessment, stream meetings and Technical Advisory Request for Privatization Proposals.
- Technical consultancy for an international management consulting firm acting on behalf of Bahrain's Electricity and Water Authority on its utility transformation program. This included analysis of the utility's plant availabilities, recovery rates, forced outages, reference energy efficiency and other factors contributing to non-revenue water losses, all impacting paid tariff structure and deductions.
- Subject-matter consultancy on desalination for a US team of academic researchers and industry collaborators working on an innovative project to restore alkalinity to the oceans while extracting excess CO<sub>2</sub> from the atmosphere to mitigate the impact of climate change and producing commercial products.
- Technical consultancy in designing and supporting regulatory and environmental permitting of a new water desalination project in California, working with Federal, state and county agencies to ensure full compliance with established and applicable environmental regulations, guidelines and procedures, as well as introduction of green technologies.
- 10-Year consultation for a US client to patent, test and develop commercial applications and markets for an innovative seawater desalination technology, process and device with extremely competitive energy efficiency and pretreatment requirements than current thermal and membrane desalination processes.
- Subject-matter consultancy for a US team working on a Google Moon Shot project to produce alternative fuel from ocean waters.
- Establishment of the first certified water desalination and power generation polytechnical institute for high-school graduates in Saudi Arabia and GCC countries. The Saudi Higher Institute for Water & Power Technologies in Rabigh is now enrolling more than 800 trainees a year.
- Designing and conducting advanced Membrane Desalination Technologies in Practice, Fouling & Plant Operation & Maintenance training workshops

and courses for plant operators, engineers and supervisors. Trained over 700 professionals in conjunction with IDA Congresses on Desalination and Water Re-use since 2002, with the European Desalination Society's (EDS) EuroMed & Desalination and the Environment Conferences, with the annual Saudi Water & Power Forum and the Middle East Desalination Research Center (MEDRC). Specialized training courses were also designed and conducted for various public and private water and power authorities and organizations, project developers worldwide.

- Currently tasked by the IDA to establish and lead a new committee and charter a plan to establish engineering and technical standards and codes specific to the desalination industry for optimum performance, minimum environmental impact and lowest cost of desalination plant operations.



### **ACWA Power International**

2008–2013

Riyadh-Jeddah, Saudi Arabia & Barka, Oman

*Sr. Manager, Desalination Technologies & Training, ACWA Power International*

- Project-Technical and Engineering Director, Operations and Commissioning Manager and Training Consultant for a major Independent Water and Power Projects (IWPP) in the Middle East for 5 years, including:
  - ✓ As Operations Manager (February 2010 - August 2012) reporting to the Board of BOWAREGE, an ACWA Power project company in Saudi Arabia, owner of the world's largest and most innovative mobile seawater desalination plants, led within 30 months the turnaround of the project into successful and stabilized operation, availability, performance and commercial viability, effectively resulting in doubling the company's operational revenues and bringing it into profitability from the verge of bankruptcy, which earned it industry's and world's credibility and recognition as the recipient of the 2011 Saudi Water & Power Forum's Award for Innovation. These accomplishments were the results of careful, extensive analysis of all aspects of the plants' operation, identifying sources of and holding the operator company fully contractually, financially and technically accountable for all calculated and realized production losses (i.e., *non-revenue water*) impacting the financial health and direct revenues of the owner company on a day-to-day basis. The Chairman of the Board of the owner company officially stated during a board meeting that, "*what was done was a clear example of how a company would come out of a dire situation, and should be taught at the Harvard Business School*".
  - ✓ As Technical/Engineering Director and Commissioning Manager for a new, fast-track and very challenging SWRO Project (IWP), led the effort of overseeing and coordinating the engineering and design & documentation review and approval process on behalf of the owner for a 45,000 m<sup>3</sup>/day RO desalination plant owned by a project company.

*Responsibilities included:*

- Enforcement and guidance of international and industrial safety standards.
- Supervision of reviews of all aspects of plant design, application of best engineering and industry standards and overall technical consulting and oversight.
- Close management, monitoring of and coordination with EPC contractor.
- Interface with client and client's Engineer in order to deliver the project safely, on schedule and on budget.
- Establishment and management of project's document control system from the initial Limited Notice To Proceed (LNTP) to post-COD approval and delivery of the EPC's As-Built Drawings and completion of the Construction Punch List.
- Led and coordinated all plant's commissioning activities related to compliance with engineering design, SATs, Acceptance Tests and certifications, as well as monitoring activities by client's Engineer on site.
- Provided leading pre-bid project technical consulting and advisory services over one year that played a key role in establishing credibility with the prospective client and eventually winning the project on a non-bid, direct negotiation basis.
- As Training Consultant & Project Director (November 2008- January 2010), led the effort to setup the first in-house fresh engineers training program, as well as setting up the *Higher Institute for Water & Power Technologies* in Saudi Arabia, the world's only diploma-certified water desalination and power generation polytechnic institute to train Saudi high school graduates as plant operators and maintenance technicians. The institute has now been operational since 2010 with over 800 trainees currently.



**BIOSPHERE2® PROJECT-DECISION INVESTMENTS**  
1993-1996

**SPACE BIOSPHERE VENTURES (SBV)**

- Developed experience in designing and supporting regulatory compliance and environmental permitting of new and special water desalination projects in California, with the strictest regulatory laws in the country and possibly the world, working with Federal, state and county agencies to ensure full compliance with established and applicable environmental regulations, guidelines and procedures, as well as introduction of green technologies and environmentally-friendly technical solutions.
- Led the effort for monitoring, upgrading, optimizing and trouble-shooting Biosphere2® Environmental Project's water and wastewater discharge and treatment schemes. This involved designing, implementing and monitoring



the Biosphere2® Environmental Waste Management Compliance Plan, including conducting extensive and successful discussions with relevant regulatory agencies to secure necessary permitting, drafting and supervising the implementation of a technical, cost-effective and legal contract for safe and permitted discharge of one million gallons of contaminated wastewater effluents.

- Managing the dangerously rising CO<sub>2</sub> levels in an air-tight environment via designing and operating an upgraded, safe and technically-efficient abatement system.
- Development, optimization and marketing of innovative environmental applied research, technologies and products, such as indoor air purification system (Airtron®) and management of commercial testing and healthcare laboratory information systems (LIMS).



### **AQUA-CHEM, INC.**

Milwaukee, Wisconsin - U.S.

1991-1993

*Development Manager, Membranes*

- Key leadership in introduction, development and marketing of RO membrane process technology as a new strategic business direction for the company to integrate with other established technologies in order to maximize the company's technical and commercial competitive position in the industry.
- Pursued opportunities for large-scale commercial applications of membrane processes in the U.S., South America, Europe and the Middle East, especially in industrial wastewater treatment and Zero-Liquid Discharge (ZLD) applications.



### **E.I. DUPONT CO. - PERMASEP® PRODUCT**

1983-1990

Saudi Arabia, UAE - Middle East, Europe & USA

*Senior Technical Marketing Specialist*

- Providing technical and marketing leadership in applying hollow fine-fiber and spiral membrane technology in water desalination and industrial treatment systems.
- Provided detailed process design reviews, designing and conducting pilot research studies and field trials of new products and existing product optimization, plant startup assistance and performance monitoring and evaluation of strategic RO systems employing polyamide HFF membranes in the Middle East, which constituted about 70% of DuPont's RO membrane business worldwide. Major customers included government agencies, oil companies and the process industry.
- Spearheaded the technology marketing effort to establish new markets

in highly competitive and challenging environments utilizing strategic business partnerships with international licensees, consultants and end users.

- Played a vital role in establishing and supporting marketing strategies to maintain DuPont's leading market presence, establish new markets and increase market share through a diverse network of international licensees, especially in the Middle East, Indian Sub-continent, Mediterranean and Europe.

#### **Educational Background** ▼

- B.S./M.Sc. Chemical Eng.– Georgia Institute of Technology, Atlanta, Georgia, USA.
- B.S. Chemistry – American University in Cairo, Egypt.

#### **Personal Skills** ▼

- Exceptional problem-solver, multi-tasker, organizational & negotiator.
- Multi-cultural diversity, client focus, prioritization and attention to detail.
- Highly innovative, Self-motivated, success-driven and results-oriented.
- Self-starter and hands-on project manager, with ability to work well under pressure, tight deadlines and changing environments.
- Technical and business proposal writing, presentations & coordination.
- Well-versed in computer software & tools (MSOffice, PowerPoint, Excel, Access, Adobe Acrobat, Visual Basic, HTML/Java web & graphic design).
- US citizen - near-native speaker of American English and native Arabic speaker in several regional dialects with vast bilingual technical, literary and communications skills.

#### **Personal Interests** ▼

- Photography, poetry & calligraphy artwork.
- International travel, political history & current world affairs.
- Humanitarian advocacy especially relating to providing clean and healthy water to unprivileged communities worldwide.

#### **Professional Associations & Collaborations** ▼

1. International Desalination Association (IDA), USA.
2. Water Desalination & Reuse Center, King Abdullah University of Science & Technology (KAUST), Kingdom of Saudi Arabia.
3. Middle East Desalination Research Center (MEDRC), Sultanate of Oman.
4. Water and Energy Sustainability Center (WEST) – University of Arizona, USA.
5. Center for Middle Eastern Studies Panel on Science and Diplomacy, University of Arizona, USA.



6. Water Resources Center – University of Arizona, USA.
7. Arab Science & Technology Foundation (ASTF), United Arab Emirates.
8. European Desalination Society (EDS), Italy.

#### Professional Publications ▼

1. Saad, M.A., "The SMART Solution to Membrane Fouling Detection, Monitoring & Management", presented at and published in the proceedings of the *IDA World Congress on Desalination & Water Reuse*, San Diego, California, USA, Aug.-Sept. 2015, IDA, Massachusetts, USA.
2. Saad, M.A., "Overview & Trends of Membrane Desalination Technology & Privatization in MENA Region", presented at and published in the proceedings of the *IDA Conference on Desalination & Sustainability*, Casablanca, Morocco, March 2012, IDA, Massachusetts, USA.
3. Saad, M.A., Nada, N., Bajunaid, A., Smaili, A. K., Blazevski, M., Senior, D., Hagmayer, G., "Performance History of UF Membrane Pre-Treatment of Floating Barges' Red Sea RO Desalination", presented at and published in the proceedings of the *IDA World Congress on Desalination & Water Reuse*, Perth, Australia, September 2011, IDA, Massachusetts, USA.
4. Saad, M.A., Bajunaid, A., "Barge-Mounted Desalination Solution: From Emergency Domestic Supply to Disaster Relief", presented at and published in the proceedings of the *IDA Conference on Desalination Industry Action for Good*, Portofino, Italy, May 2011, IDA, Massachusetts, USA.
5. Saad, M.A., "Evaluating Pretreatment SDI Versus Real-time Membrane Fouling Monitor as SWRO Fouling Indicators", submitted for presentation at and publication in the proceedings of the *IDA World Congress on Desalination & Water Reuse*, Dubai, United Arab Emirates, October 2009, IDA, Massachusetts, USA.
6. Saad, M.A., "Real-Time Monitoring of Membrane Fouling", *Waste & Energy Thailand*, March-April 2008, TechnoBiz Communications Ltd., Bangkok, Thailand.
7. Saad, M.A., "Quenching a Thirst for Desalinated Water Technology, *An Overview of The IDA World Congress on Desalination & Water Reuse, Mas Palomas, Canary Islands, Spain*", *Water & Wastewater International Journal*, Vol. 22, Issue 6, December-January 2007, PennWell, Oklahoma, USA.
8. Saad, M.A., "Word of the Expert: Water Privatization in the Arab World – *Issues & Solutions*", *Arab Water World Journal*, Part 1: January 2007, Vol. XXXI No. 1, 96; Part 2: February 2007, Vol. XXXI No. 2, 96, Chatila Publishing House, Lebanon.
9. Saad, M.A., "Event Review: Jeddah Water & Power Forum 2006 – *Opportunities & Solutions*", *Arab Water World Journal*, February 2007, Vol. XXXI No. 2, 80, Chatila Publishing House, Beirut, Lebanon.
10. Saad, M.A., "Pushing The Limits: Optimizing Membrane Plants Via Correlating Fouling with Critical Flux", presented at and published in the proceedings of the *International Desalination Association's Congress on Desalination & Water Reuse*, Singapore, September 2005, IDA, Massachusetts, USA.
11. Saad, M.A., "Membrane Desalination for the Arab World – *Overview & Outlook*", presented at the *First Forum on Water Desalination and Purification Technology Outlook for the Arab World* held by the Arab Science & Technology Foundation, Marrakech, Morocco, May 29-30, 2004. *Arab Water World Journal*, January-February 2005, Vol. XXIX No. 1, 29, Chatila Publishing House, Beirut, Lebanon.
12. Saad, M.A., "Early Discovery of RO Membrane Fouling and Real-Time Monitoring of Plant Performance for Optimizing Cost of Water", presented at and published in

- the proceedings of *EuroMed 2004 Conference on Desalination in Southern Mediterranean Countries*, Marrakech, Morocco, May 30-June 2, 2004. *Desalination* 165 (183-191), February 2004, Elsevier Science Publishers, Amsterdam, The Hague.
13. Saad, M.A., "Manufacturer's Case Study: Smart Software Optimizes Membrane Plants" –*International Desalination & Water Reuse Quarterly*, August/Sept. 2003, Vol. 13/2, pp. 45-49, Faversham House Group Ltd., UK.
  14. Saad, M.A., "Fresh Water for All: Status, Impact & Future Of Desalination In The Middle East & Mediterranean Countries", *Arab Water World Journal*, July-August 2003, Vol. XXVII No. 4, 65, Chatila Publishing House, Beirut, Lebanon.
  15. Saad, M.A., "Desalination for a Better Future: The Technologies & The Innovations", *Arab Water World Journal*, May/June 2002, Vol. XXVI No. 3, 33-35, Chatila Publishing House, Beirut, Lebanon.
  16. Saad, M.A., Joseph Richardson, "Real-time Membrane Fouling Monitoring – A Case History", *proceedings of the World of Water Conference*, Las Vegas, Nevada, USA, December 10-12, 2001. Also excerpted in *Industrial Water World Journal*, Case Studies, January 2002, PennWell, Oklahoma, USA.
  17. Saad, M.A., "Waters from Another World", *International Desalination Association News*, Volume 8, Issue 11-12, Nov./Dec. 1999, IDA, Massachusetts, USA.
  18. Saad, M.A., "Optimize Water Cost by Early Prediction of Membrane System Fouling Trends", proceedings of the *International Desalination Association's 1999 World Congress on Desalination and Water-Reuse*, August 30-September 2, 1999, San Diego, California, USA, IDA, Massachusetts, USA.
  19. Saad, M.A., "New Innovations in the Global Desalination Market", *Water Conditioning and Purification Magazine*, 1997, 60-64, Publicom, Inc., Tucson, Arizona, USA.
  20. Saad, M.A., "Biofouling Prevention in RO Polymeric Membrane Systems", proceedings of *NWSIA's 1992 Biennial Conference on Desalting and Recycling*, August 1992, Newport Beach, California. Also published in *Desalination*, 88 (1992) 85-105, Elsevier Science Publishers, Amsterdam, The Netherlands. Reprinted for *Water Quality Association* credit in *Water Conditioning & Purification Magazine*, 36 (1995) 58-68, Publicom, Inc., Tucson, Arizona, USA.
  21. Saad, M.A., "Pretreatment Requirements for Industrial Wastewater RO/Evaporator Systems in Zero Liquid Discharge Applications", proceedings of *Watertech '91 Conference*, San Jose, California, November 1991. Also published in *Industrial Water Treatment*, 24 (1992) 18-28, and abstract published in *UltraPure Water*, Nov. 1991, Tall Oakes Publishing, Colorado, USA.
  22. Saad, M.A., M. Al-Arrayedh, B. Erickson, H. Yoshioka, "Reverse Osmosis Desalination Plant, Ras Abu Jarjur, State of Bahrain - Two Years Operational Experience for the 46,000 m<sup>3</sup>/day RO Plant", proceedings of the *International Desalination Association's World Congress on Desalination and Water Reuse*, Cannes, France, 1987, IDA, Massachusetts, USA. Also published in *Desalination*, 65 (1987) 197-230, Elsevier Science Publishers, Amsterdam, The Netherlands.
  23. Saad, M.A., "Permasep<sup>®</sup> RO Plant Operating and Performance Experience in the Middle East", proceedings of the *Fourth Arab Water Technology Conference*, Dubai, UAE, October 1986.