

# NEW ACCELERATOR BEAM CENTERLINE (ABC) PRODUCTION LINE AT VAREX IMAGING CORPORATION

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**RADMEDEX LLC designs electron beam accelerators and components to customer specifications and runs production at low cost.  
It is as simple as ABC™.**



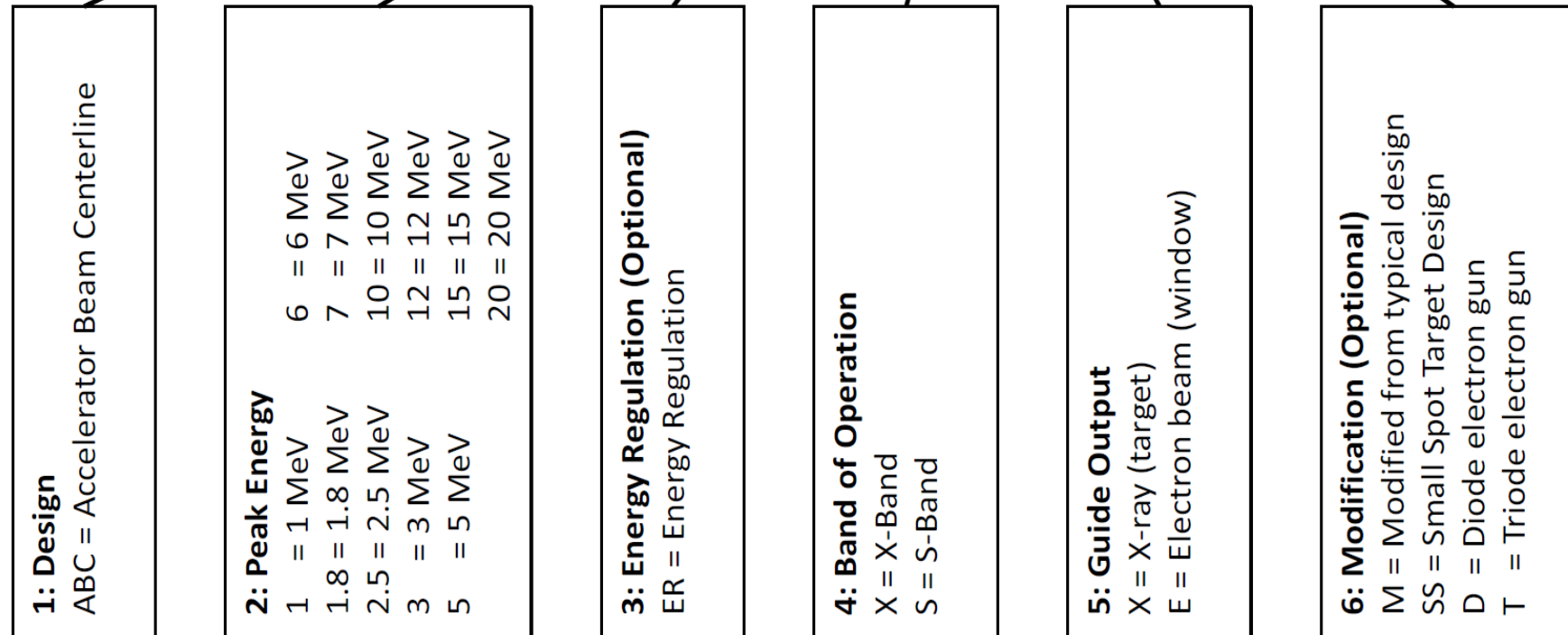
**THOUGHT ONE LLC** 

## Abstract

- In January 2017, former component division of Varian Medical in Salt Lake City becomes independent public company, Varex Imaging Corp.
- Separation from Varian required establishing Accelerator Beam Centerline Production (ABC) on premises of HQ in Salt Lake City.
- In May 2016, 8 months prior to Varian spinning off Varex, it acquired assets of two small companies that I had founded in 2008 and 2011 and was running at the time (see picture) .
- After 5 years since the acquisition, we are reporting on the key results.

# ABC Nomenclature

## ABC-12ER-X-E-M



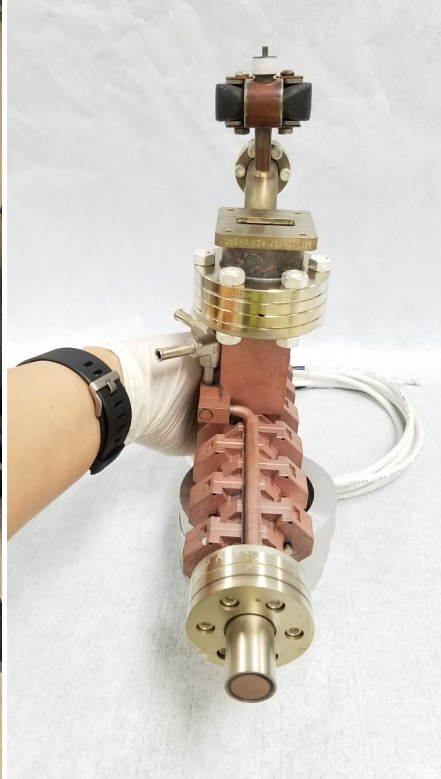
# Establishing New Product Line at Varex

Part Number	Model	Operating Energy Range, MeV	Max Dose Rate @ 1 m from tungsten target	Electron Beam Current, peak, mA	Description
140439	ABC-3-S-X-D	1.7-3.9	500	0-310	For 3 MeV linac, diode or triode e-gun options fully tested
145686	ABC-3-S-X-T	1.7-3.9	400	0-310	
137034	ABC-5-S-X-T	3.5-6.4	700	0-260	For 4 or 5 MeV linac, triode e-gun
145266	ABC-5-S-E-T	3.5-6.4	N/A	0-260	
139853	ABC-7ER-S-X	3.2-8.0	1300	0-280	For 6 or 7 MeV linac
145268	ABC-7ER-S-E	3.2-8.0	N/A	0-280	
145262	ABC-9-S-X	7.0-11.5	2500	N/A	For 9 MeV linac, e-beam tested, dose rate estimated, TBD
145261	ABC-9-S-E	7.0-11.5	N/A	0-75	
145269	ABC-10-S-E	10	N/A	230	For high power e-beam (15-20 KW) 10 MeV linac
146601	ABC-15-S-X	15	TBD	N/A	Replacements for Varian K-series, 15-20 MeV, design data only
146602	ABC-20-S-X	20	TBD	0-30	
142873	ABC-1-X-X	0.9-1.3	10	0-150	Measured data with lower power magnetron at 300 kW peak
136813	ABC-1.8-X-X	1.8	14	0-100	
146603	ABC-2.5-X-E	1.5-2.9	100	0-100	Design data for higher power magnetron
145270	ABC-6-X-X	5-6.5	TBD	0-150	Design data for higher power magnetron
145271	ABC-6-X-E	5-6.5	N/A	0-150	
136775	ABC-12ER-X-E	4-12	N/A	10	Intraoperative application, mature product

- “It is as simple as ABC” - Varex now owns this Trademark!
- All who are present are well aware - it isn’t so simple, really, but with a great team and a strong, competent leadership it is much easier. 😊
- During the first couple years, Varex continued production of the ABCs on premises of Bodycote in Fremont, CA.
- Varex has completed integration of ABC design and production at its Salt Lake Facility in 2018-2021, and we continuing to expand the capabilities.
- Presently, we have established a pilot design and production line at Varex; successfully produced, tuned and fully tested a number of new linacs; and continuing to design exceptional, “state-of-the-art” ABC models.



# Developed Key X-Band ABC Models



## LEFT to RIGHT

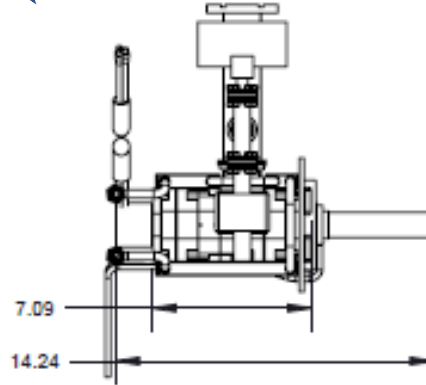
- ABC-12ER-X-E for electron beam radiation therapy, a mature product for intraoperative and some other applications;
- ABC-1.8-X-X for security and NDT, a fully qualified unit (also tested at 2.5 MeV with higher power magnetron);
- ABC-2.5-X-X-DI two section 2.5 MeV linac with a symmetrical input through an integrated 3 dB coupler, a fully tested prototype, delivered up to 50 R/min@ 1 m, pulse rate 100 pps-800 pps.

# Developed Key S-Band ABC Models

## ABC-3ER-S-X



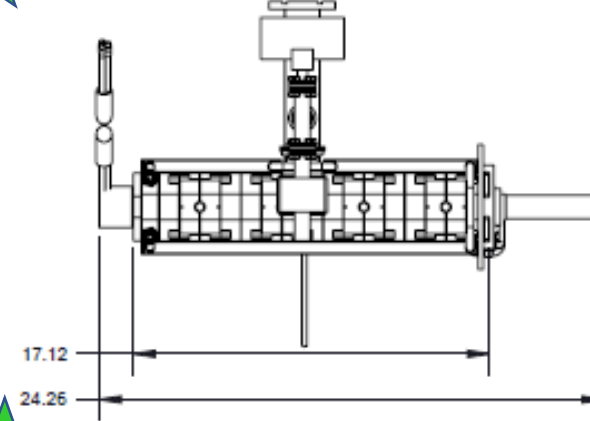
- 3 MeV, 300 R/min@1m
- 1-3 MeV
- 0-300 R/min@1m



## ABC-7ER-S-X



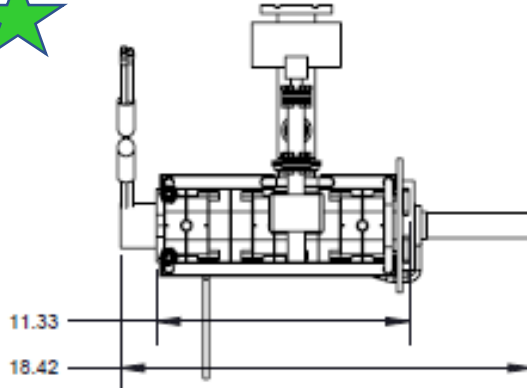
- 7 MeV, 500 R/min@1m
- 3-8 MeV
- 0-1000 R/min@1m



## ABC-5ER-S-X



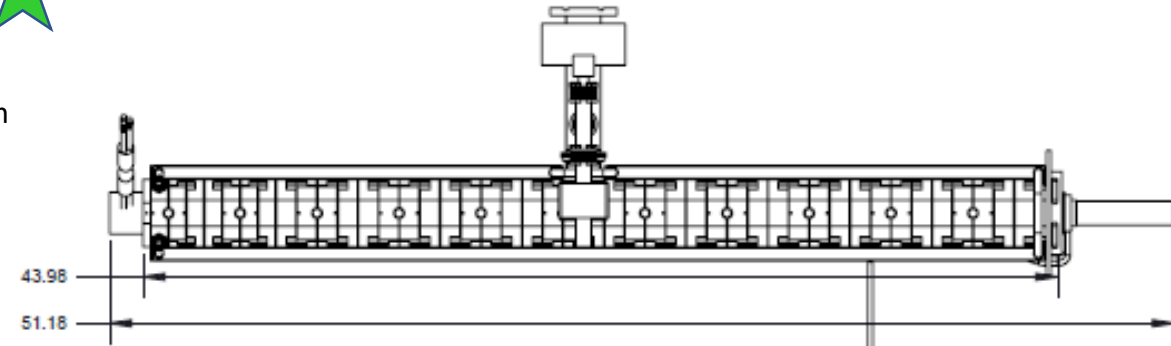
- 5 MeV, 700 R/min@1m
- 3-6 MeV
- 0-800 R/min@1m



## ABC-9ER-S-X



- 9 MeV, 3000 R/min@1m
- 6-12 MeV
- 0-3200 R/min@1m



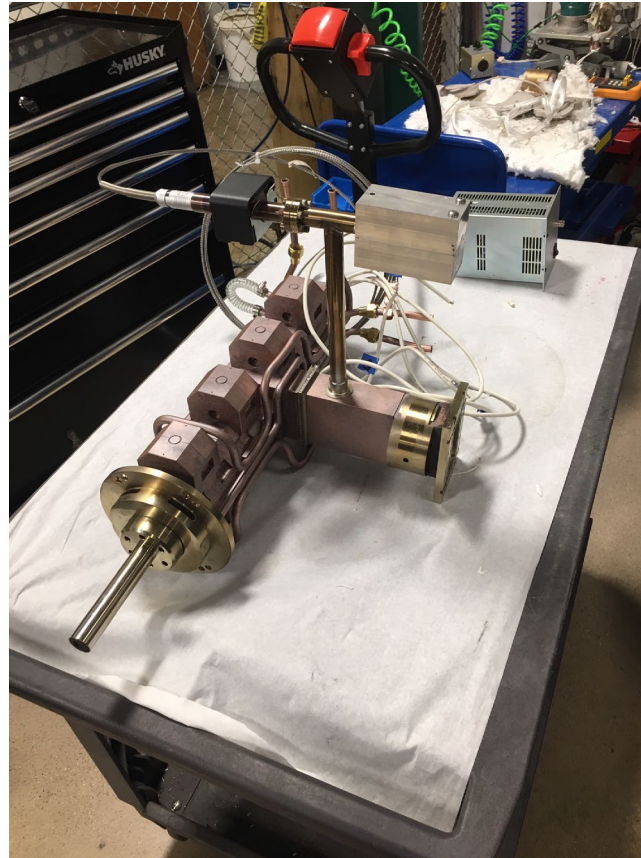
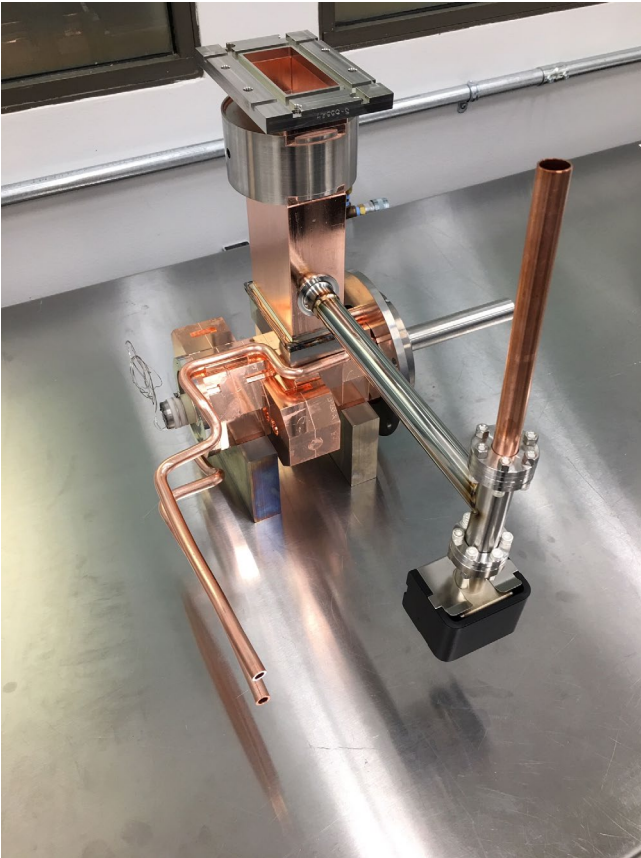
- successfully tested at full power, ready for production

All units have broad energy, current, and dose rate regulation, upgraded and with some new features. Triode e-gun allows for complete beam shut down. Multiple energy mode in broad energy range.



## LEFT to RIGHT

- ABC-3-S-X for NDT and security screening;
- ABC-7ER-S-X, a 3-8 MeV energy regulated linac for security and NDT, smaller beam spot options are in works;
- ABC-10-S-E for a high power e-beam linac designed for sterilization (successfully tested without focusing system, now focusing coils being added).



**THANK YOU FOR YOUR ATTENTION!**

**WITH GREAT APPRECIATION AND IN HONOR OF EVERLASTING MEMORY OF MY LATE  
MENTORS, COLLEAGUES, AND FRIENDS:**

**DR. IGOR SHCHEDRIN, MR. RUSSELL SCHONBERG, DR. THEODOR ROUMBANIS, MR. HANK  
DERUYTER, AND MANY OTHERS**

