Russian segment of ISS in the future

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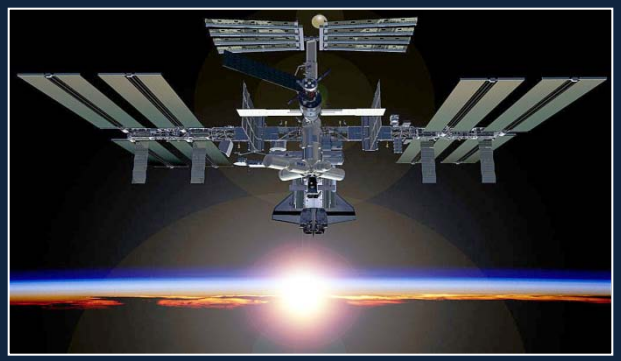
ЭНЕРГИЯ

the past …

… the present …



… the future

ISS current status

1. 6 Crew Members fly on board beginning May, 2009.
2. Crew delivery to ISS provide by Russian “Soyuz” and American “Shuttle”. Maintenance of ISS provide by Russian “Progress”, American “Shuttle”, European ATV and Japanese HTV. Number of Russian spaceships increased to 4 “Soyuz” and 6 “Progress” per year.
3. Assembly of American, European and Japanese segments are completed in 2010.
4. Russian segment Assembly will be finished in 2015.
5. Began segment–by–segment maintenance mode (each Crew maintain own segment).
6. President of United States decided to stop “Shuttle” flights from 2010. After that Crew delivery to ISS will be provide by Russian “Soyuz” until American commercial manned spaceship is ready for flight.
7. IP’s Space Agencies decided to prolong of ISS flight until 2020.

Russian segment problems

1. RS ISS assembly is not completed.

2. Life time of Russian segment is until 2013.

3. Output of Russian Power system is not enough (partly we used 6 кwт from American Power system resources).

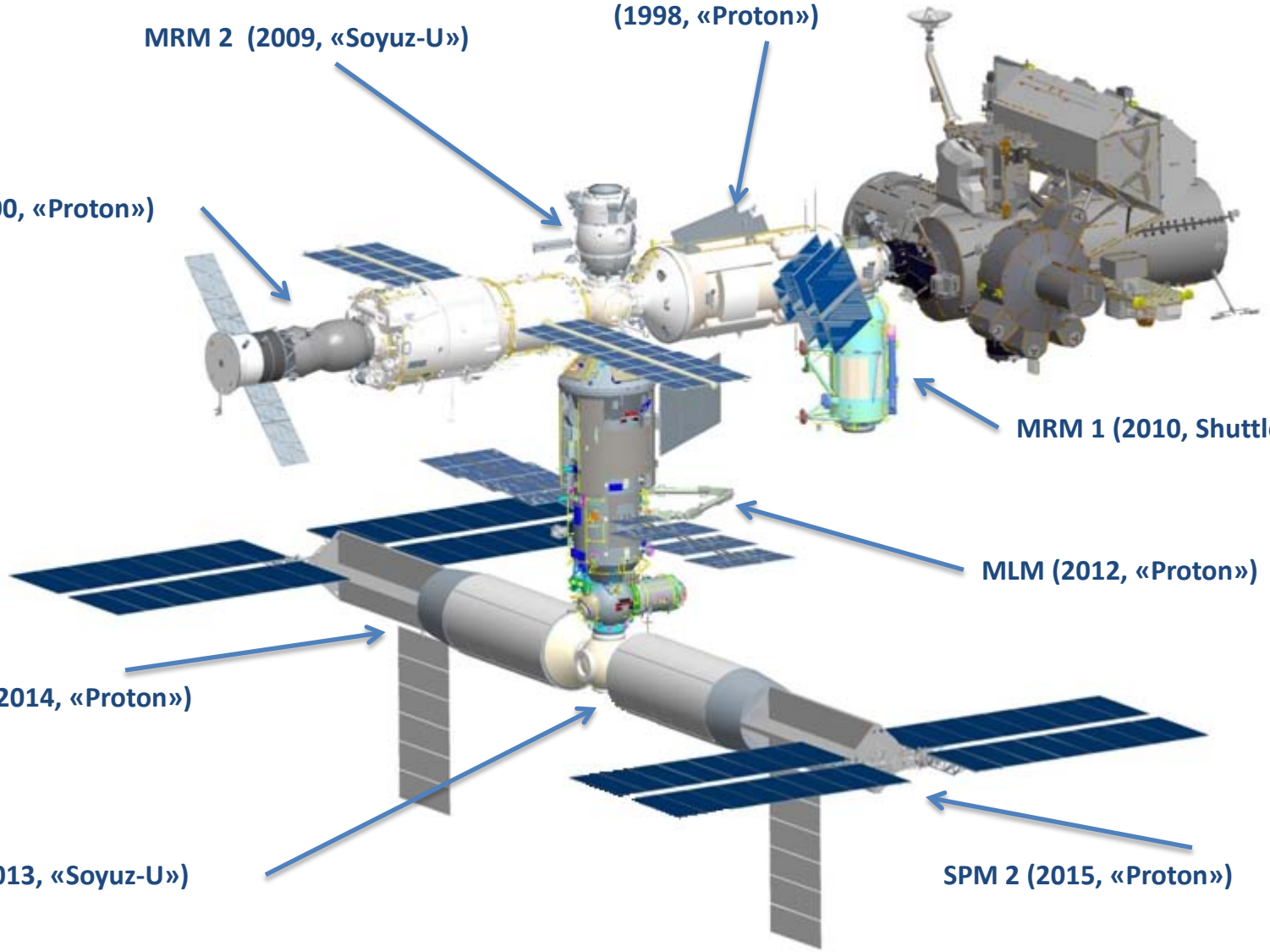
4. RS ISS has no own communication system like TDRS (partly we used American TDRS resources).

5. The ISS orbit attitude is established at 350 km to accommodate ”Shuttle” docking capability requires not less 6 “Progresses” to deliver fuel for ISS orbit attitude keeping.

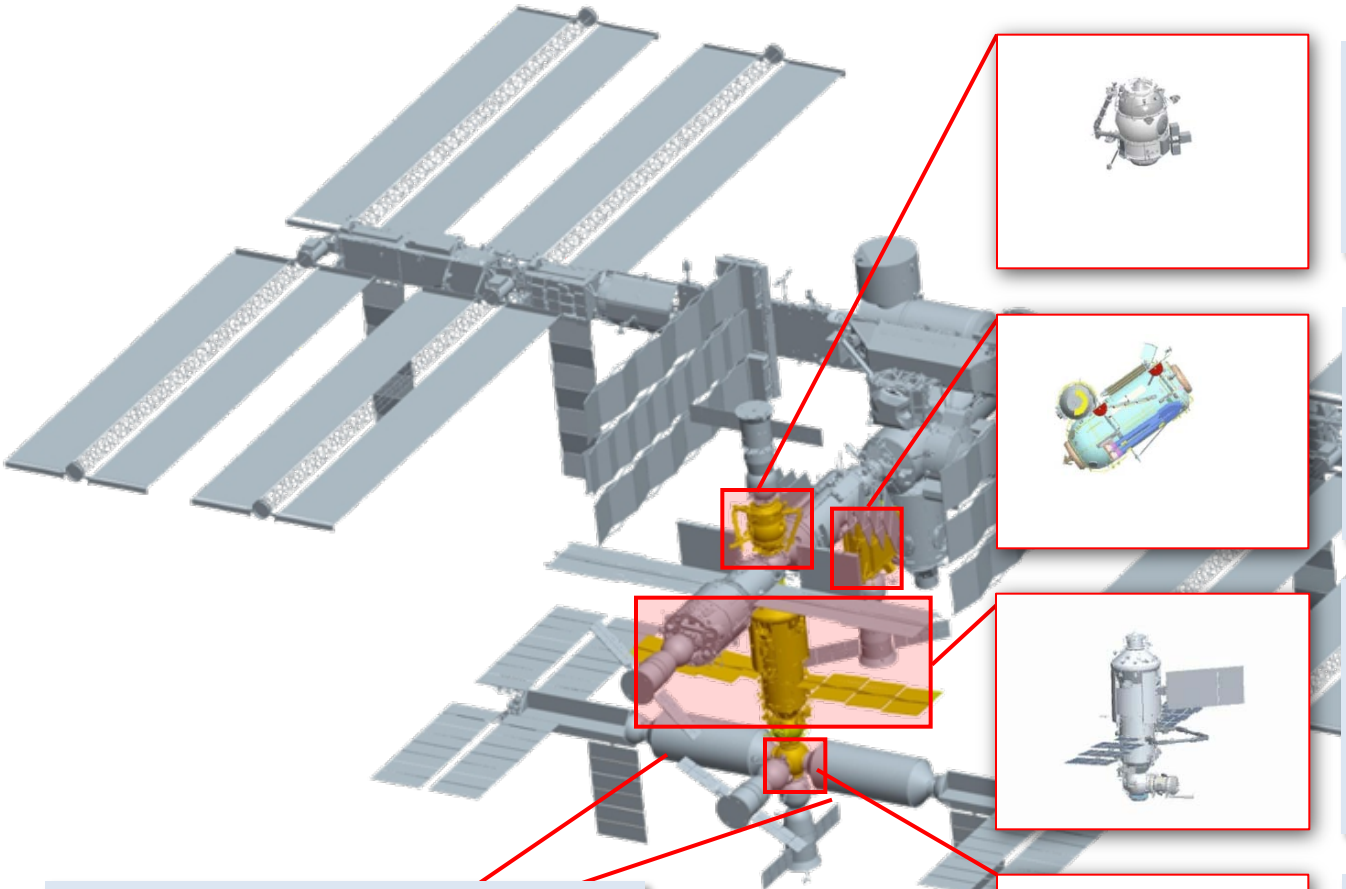
RS ISS main items in the future

1. RS ISS Assembly complete.
2. RS ISS Life time prolong to 2020.
3. RS ISS Power capability increase.
4. Own satellite communication capability achieve.
5. Old “Soyuz” replace by new manned spaceship PKNP.
6. Old “Soyuz-FG” Launcher replace by new Launcher “Rus-M”.

RS ISS ASSEMBLY SEQUENCE



RS ISS NEXT MODULES



MRM2

Mass, кg	4000
Pressure volume, м^3	12,5
Workplaces	2

MRM1

Mass, кg	7900
Pressure volume, м^3	18
Workplaces	2

MLM

Mass, кg	20700
Pressure volume, м^3	70
Workplaces	12

UM

Mass, кg	4000
Pressure volume, м^3	14

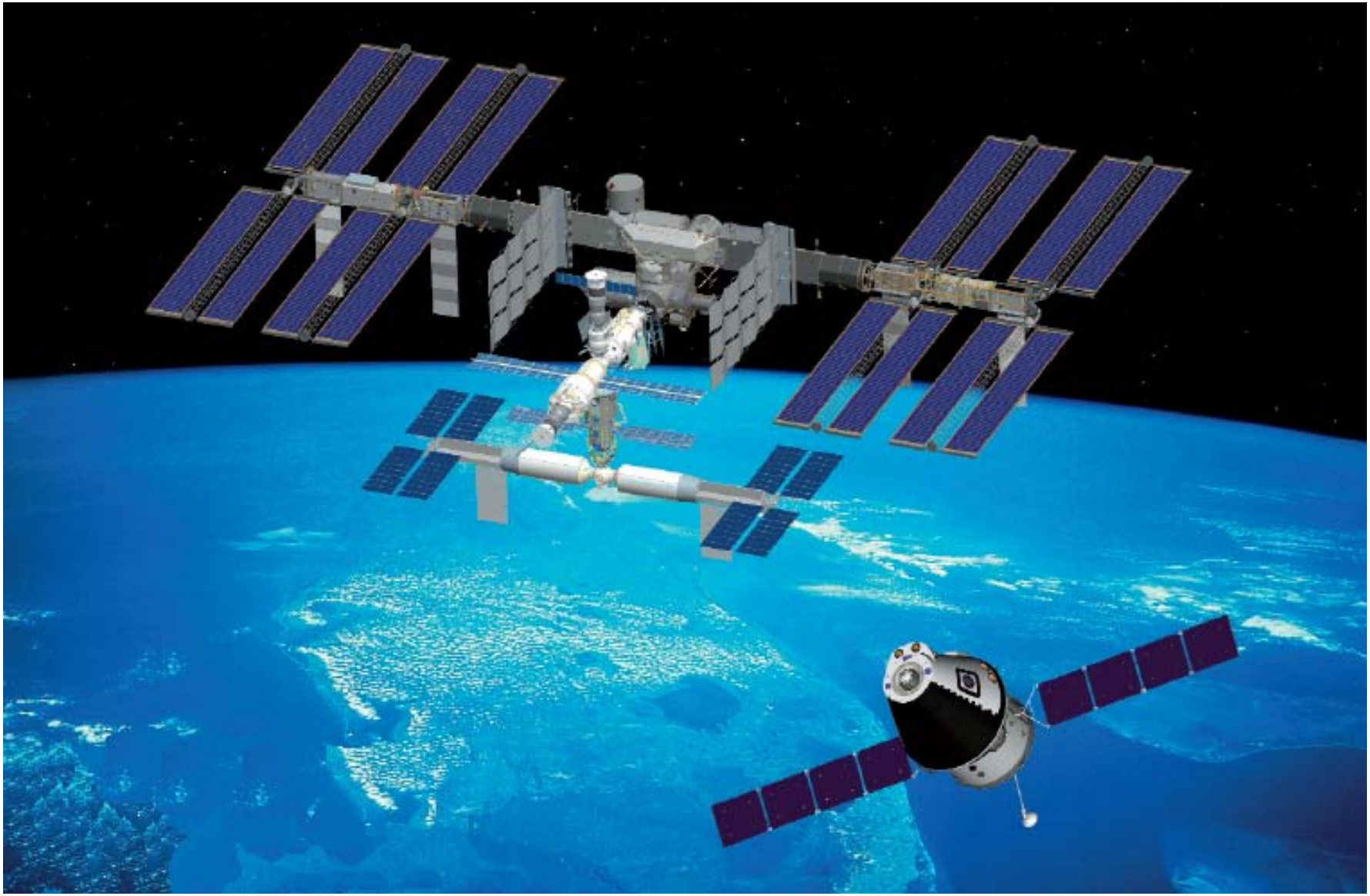
SPM1, SPM2

Mass, кg	2 x 20000
Pressure volume, м3	2 x 150
Workplaces	2 x 12

ISS PROGRAM
FROM 2009 TO 2015 YEARS

	2009	2010	2011	2012	2013	2014	2015
ISS CREW	3	6					
American segment next modules	Node 3						
Spacecrafts "Shuttle", "Orion"	15A 2J/A 17A ULF3 20A	19A ULF4 ULF5				FT PH Ares -1 for CEV Orion	Unmanned flight CEV Orion
Spacecrafts ATV, HTV	HTV-1	ATV-2 HTV-2	HTV-3 ATV-3	HTV-4 ATV-4	HTV-5 ATV-5	HTV-6 ATV-6	HTV-7
Commercial transport vehicle COTS	FT COTS Dragon Demo C2	Dragon Demo C3		Contracts CRS			
Russian segment next Modules (RS)	MRM -2	MRM -1		MLM	UM	SPM -1	SPM -2
Spacecrafts "Soyuz"	224 225 226 227	228 229 701 230	231 702 703 704 (232)	705 706 707 708			
Spacecrafts "Progress"	366 402 367 403 404	405 407 409 411 406 408 410	412 414 501 417 413 415 416	418 502 421 419 420 422			

RS ISS Life time prolongation to 2020



THE LIST OF ACTIONS FOR RS ISS LIFE UNTILL 2020 YEAR EXTENSION

- **Actions for ISS irreplaceable equipment life extension**
- **Actions for ISS replaceable equipment life extension and consumable materials providing**

CURRENT STATE OF WORKS FOR RS ISS LIFE EXTENSION

- **Afrer extensive study the decision to extend life of docking compartment «PIRS» was made**
- **The work for FGB life extension are carried out now, it's planned to be finished in 2012 year**
- **The input data for SM life extension analysis are prepared, its planned to be executed from 2010 to 2012 years**

SUMMARY

- **Work for ISS life until 2020 year extension is initiated**
- **We don't see any insurmountable problems now for successful completion of listed work to 2013 year**

RS ISS Power capability increasing

MLM and two SPM Scientific Power Modules will provide enough power to Russian segment:

MLM -5,5 kWt
(after that we will stop using American segment Power resourses).

SPM1 - 48 kWt

SPM2 - 48 kWt

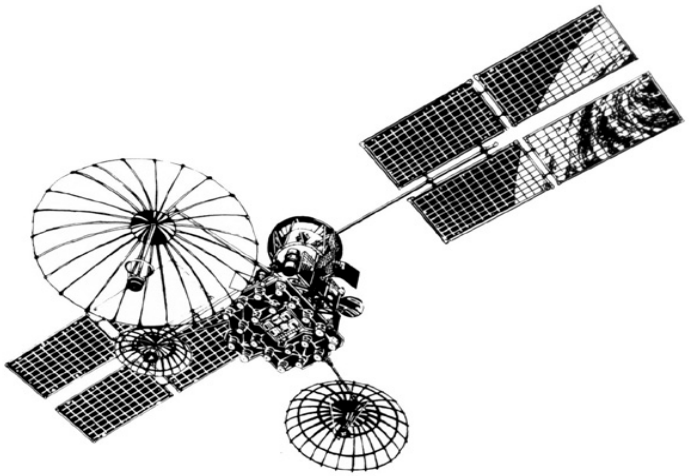
New Russian Satellite Communication System

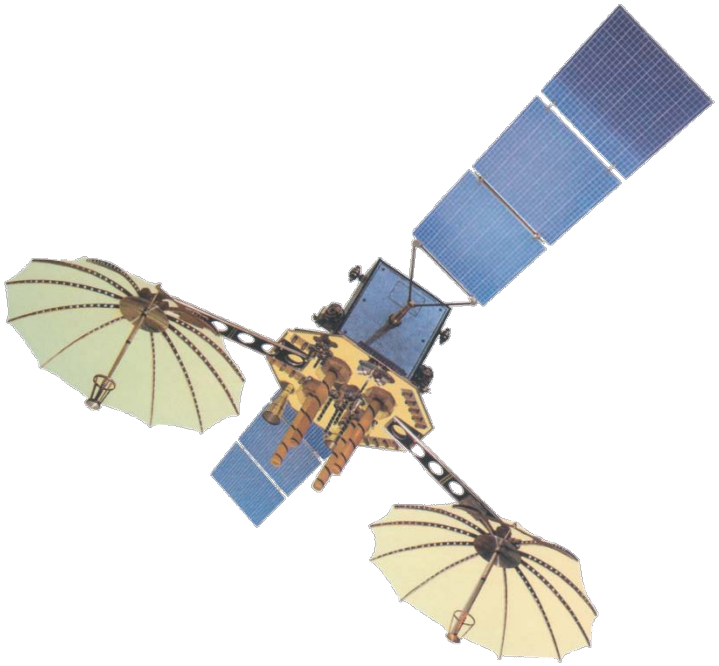
In 2012 we will launch new Russian communication Satellite “Louch-5A”. After that we will stop using American communication recourses.

This satellite will have S and Ku band for TV, telemetry and command communication capability.

In future we hope tohave two communication satellites “Louch-5A”, “Louch-5B”.

Longitude of first “Louch-5A “ is 16º West, second “Louch-5B “ is 95º East



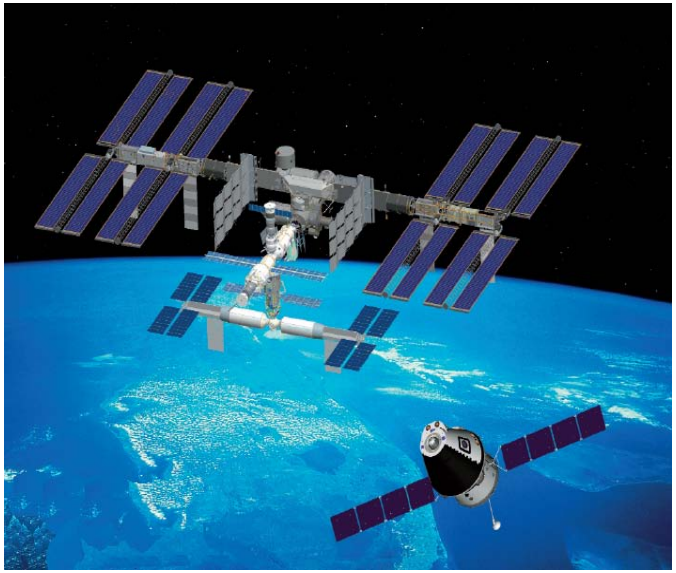


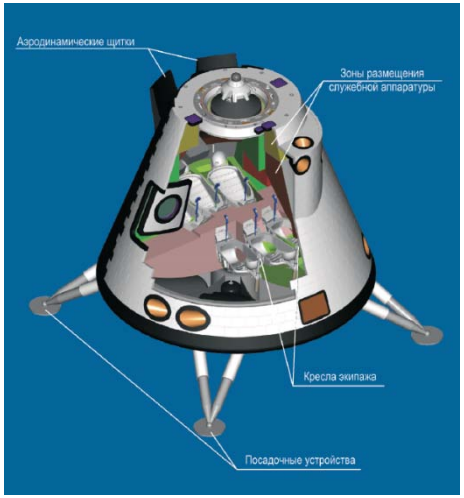
New Russian Manned spaceship PKNP

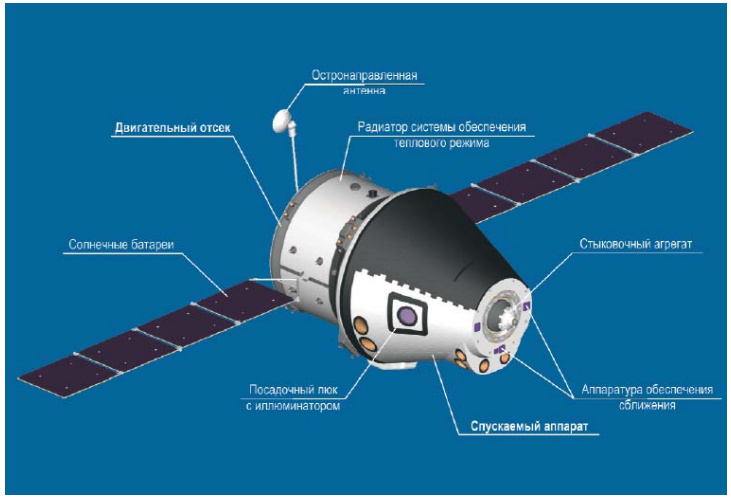
New Russian Manned spaceship will product by Korolev Rocket Space Corporation "Energia".

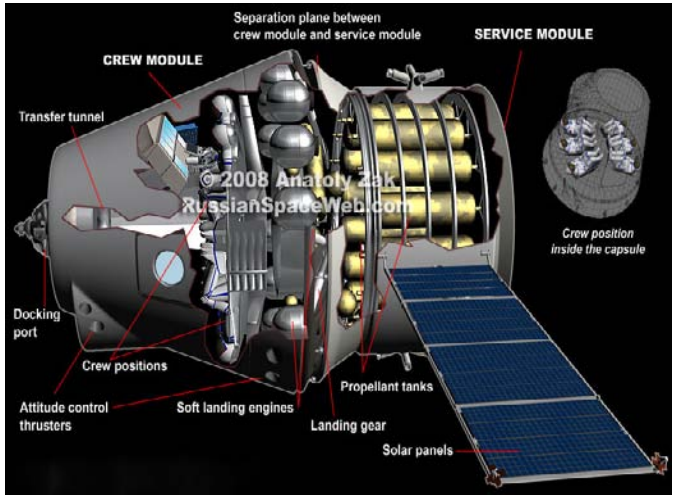
Facts:	**Mass**	**- 12 tones**
	Launcher	**- "Rus-M"**
	Autonomous flight duration	**- 5–30 days**
	General Flight duration	**- 365 days**
	Crew size	**- 6**
	Cargo capacity	**- 500 kg**

First test unmanned flight planned in 2015 from Vostochny Launch site.
First manned flight planned in 2018.



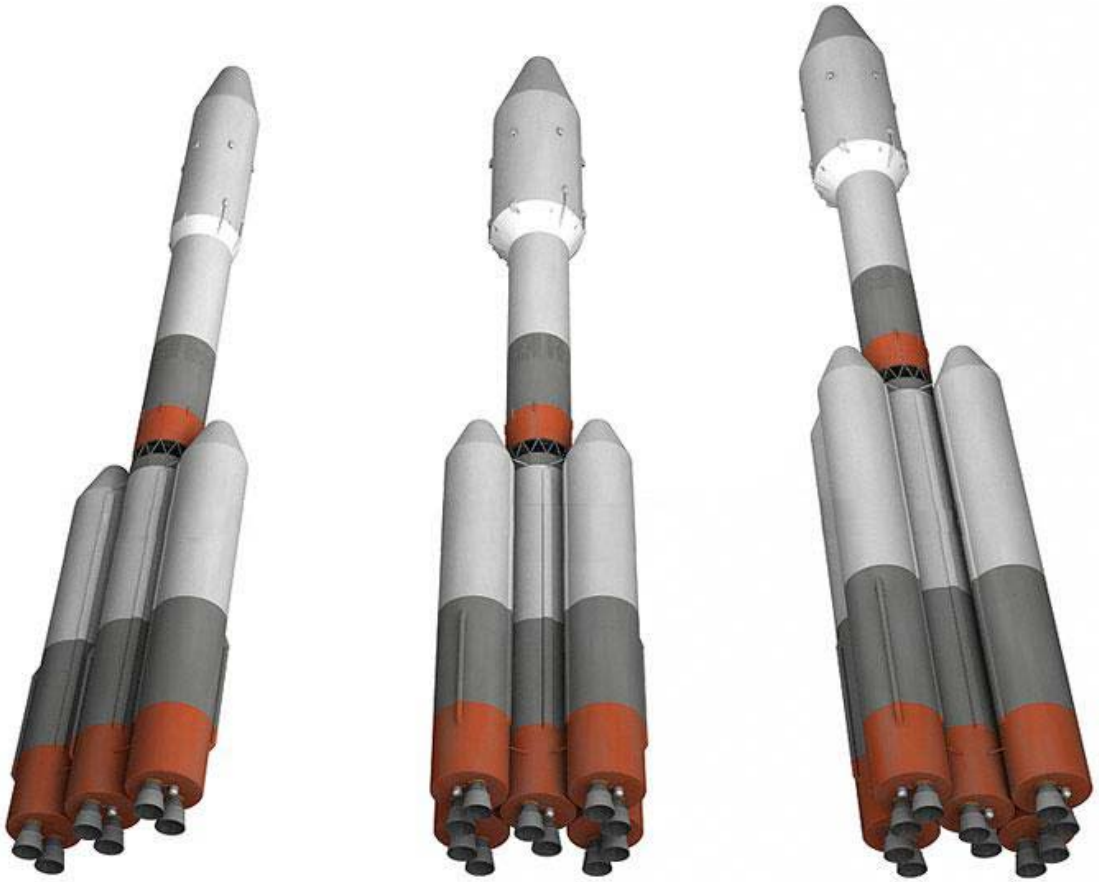






New Russian Launcher “Rus-M”

New Russian Launcher “Rus-M” will product by Samara Space Center. “Rus-M” capability and general view you can see below.



Variant 1 – 16 tons to low orbit **Variant 2 – 35 tons to low orbit** **Variant 2 – 35 tons to low orbit**

Conclusion

1. RS ISS assembly going well as planned. Assembly will be completed in 2015.

2. We do not have any technical insurmountable problems for RS ISS Life time increase until 2020.

3. For RS ISS flight capability increase will be delivered three research modules with own solar arrays, small Air lock, European Arm ERA, Russian Satellite communication system “Louch-5”.

4. “Soyuz” (Crew capacity 3 members) will be replaced to new manned spaceship PKNP (Crew capacity 6 members).

5. After “Shuttle” flight stop ISS attitude will be increased up to 415 km.