Costs saving through investment in
Superior Filtration

RMF SYSTEMS WHITEPAPER

SYSTEM CONTAMINATION

In the hydraulic market it is an accepted fact that poor fluid condition causes 80% of all Hydraulic failures (fig 1). This is the result of the presence of solid particles such as metal, sand, rubber and water in oil. Mainstream filters are incapable of removing the smallest particles, smaller than 2 micron (better known as silt); most of the silt remains in the system and affects the chemical composition of the oil.
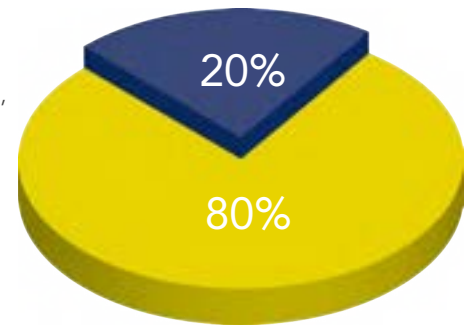
The presence of free water contributes to the deterioration of the oil. The combination of water and small copper particles will also create a catalytic effect which can shorten oil life considerably. All these problems lead to reduced oil usage life and increase component wear, maintenance cost and machine down time. Removing silt and preventing the formation of free water can combat these problems and reduce the operating cost.

Fig. 1 Hydraulic failures

Hydraulic fluid is one of most important components in a Hydraulic system!

The hydraulic fluid is the medium used to:
► Transmit fluid power
► Dissipate heat
► Lubricate
► Create seal clearances between moving parts
► Transport contaminant

We compare two systems which have a pump with a flow of 250 l/min running 24 hours a day 7 days a week. The Iso cleanliness level of the first system is ISO 23/21/18 and the cleanliness level of the second systems is ISO 16/14/11.

In table 1 we look at the 100 ml sample that is taken in both systems. We compare the number of particles between the systems.

NUMBER OF PARTICLES PER 100 ML OF SAMPLE FLUID		
	ISO 23/21/18	ISO 16/14/11
Particle larger than 4 μm	4.000.000 - 8.000.000	32.000 - 64.000
Particle larger than 6 μm	1.000.000 - 2.000.000	8.000 - 16.000
Particle larger than 14 μm	130.000 - 250.000	1.000 - 2.000

Table 1

4375 kg of dirt passes through the pump of the first system each year. The expected pump life time wil be approximately 2 years.
In the second sytem 25 kg of dirt pass through the pump each year.
The expected pump life will be more than 14 years (see table 2).

To calculate the life extension factor of the systems we use the table 2.

A ▼	B	LIFE EXTENSION FACTOR								
	▶	2	3	4	5	6	7	8	9	10
	28/26/23	25/23/21	24/22/19	23/21/18	22/20/17	22/20/17	21/19/16	21/19/16	20/18/15	20/18/15
	27/25/22	25/23/19	23/21/19	22/20/17	21/19/16	21/19/15	20/18/15	20/18/14	19/17/14	19/17/14
	26/24/21	23/21/18	22/20/17	21/19/16	21/19/15	20/18/14	19/17/14	19/17/13	18/16/13	18/16/13
	25/23/20	22/20/17	21/19/16	20/18/15	19/17/14	19/17/13	18/16/13	18/16/12	17/15/12	17/15/11
CURRENT	24/22/19	21/19/16	20/18/15	19/17/14	18/16/13	18/16/12	17/15/12	16/14/11	16/14/11	16/14/10
MACHINE	23/21/18	20/18/15	19/17/14	18/16/13	17/15/12	17/15/11	16/14/11	16/14/10	15/13/10	15/13/10
CLEANLINESS	22/20/17	19/17/14	18/16/13	17/15/12	16/14/11	15/13/11	15/13/10	15/13/9	14/12/9	14/12/8
ISO 4406	21/19/16	18/16/13	17/15/12	16/14/11	15/13/10	16/13/9	14/12/9	14/12/8	13/11/8	13/11/8
	20/18/15	17/15/12	16/14/11	15/13/10	14/12/9	14/12/8	13/11/8	-	-	
	19/17/14	16/14/11	15/13/10	14/12/9	14/12/8	13/11/8	-	-	-	
	18/16/13	15/13/10	14/12/9	13/11/8	-	-	-	-	-	
	17/15/12	14/12/9	13/11/8	-	-	-	-	-	-	
	16/14/11	13/11/8	-	-	-	-	-	-	-	
	15/13/10	13/11/8[1]	-	-	-	-	-	-	-	
	14/12/9	13/11/8[2]	-	-	-	-	-	-	-	
	(1) Life Extension=1,8				(2) Life Extension Factor=1,45					

Table 2

The values above show that the life time of the oil in the hydraulic system extends 7 times. In the folowing pie diagram you can see that by investing in superior filtration you can reduce maintenance, quality and manufactoring budget.
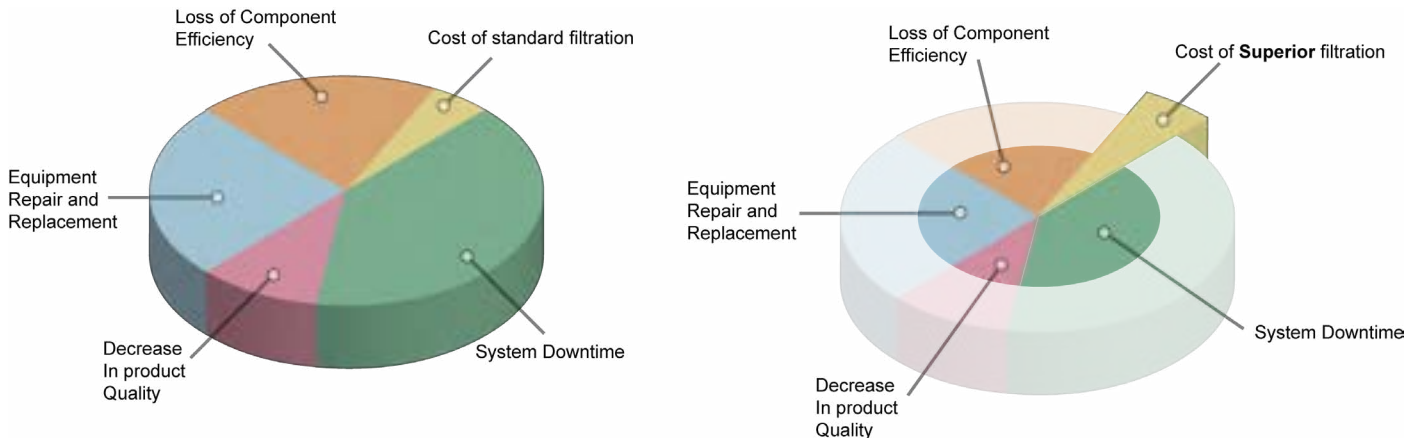
Example

No. of machines:	*20*	
Operating time	*5.000 hrs/year*	
Machine costs:	*40 euro/hour*	
Labor costs:	*35 euro/hour*	
Total downtime:	*10.000 hours*	
Downtime caused by hydraulic failure:	*35%*	

If we calculate total downtime costs **without** superior filtration:

Downtime caused by hydraulic failures	35% of 10.000 h	3.500 h
80% of all hydraulic failures caused by poor fluid conditions	80% of 3.500 h	2.800 h
Machine downtime costs	2.800 h * 40 €	112.000 €
Labor costs for repairs	2.800 h * 35 €	98.000 €
Total downtime costs	**112.000 € + 98.000 €**	**210.000 €**

By using RMF Systems Superior filtration we can prevent 80% of all poor fluid conditions related failures.

Superior filtration reduced downtime:	80% of 2.800 h	2.240 h
Total poor fluid condition related downtime:	2.800 h - 2.240 h	560 h
Machine downtime:	560 h * 40 €	22.400 €
Labor costs for repairs	560 h * 35 €	19.600 €
Total downtime costs with superior filtration:	**22.400 € + 19.600 €**	**42.000 €**

This shows that you can save approximatly 168.000 € each year by using superior filtration.

Recent case studies confirm the above. Investing in superior filtration will reduce the maintenance costs drastically. We would be pleased to help you out with all contamination related failures by applying this model in your application.